CURRICULUM-2023 (C-23)

DIPLOMA IN INTERNET OF THINGS
(DIOT)

1. PREAMBLE

Technical Education is a key driver of economic development and plays a crucial role in providing individuals with the skills and knowledge necessary to thrive in the workplace. As technological advancements continue to reshape industries and create new opportunities, it is critical that technical education curricula remain relevant and up-to-date.

The curriculum has been designed with this in mind, with a focus on practical skills, critical thinking, and problem-solving. We believe that these skills are essential for success in both academic and professional spheres. The revamping of the technical education curriculum is made with collaborative effort from educators, industry experts, policymakers, and students.

At the heart of the curriculum, is the belief that the technical education should be student-cantered, empowering learners to take ownership of their learning and pursue their passions. We aim to create a learning environment that is safe, supportive, and nurturing, where every student has the opportunity to reach their fullest potential. We acknowledge that learning is a lifelong journey, and our curriculum is designed to provide a solid foundation for continued growth and development. We hope that our students will not only leave with a diploma but with employability and passion for learning.

The State Board of Technical Education and Training, (SBTET) AP, has been offering Diploma programmes to meet the above said aspirations of the stake holders: industries, students, academia, parents and the society at large. As such, it has been the practice of SBTET, A.P., to keep the curriculum abreast of the advances in technology through systematic and scientific analysis of current curriculum and bring out an updated revised version at regular intervals. Accordingly, the SBTET, AP under the aegis of the Department of Technical Education, Andhra Pradesh in its57th Board Meeting held on 05-02-2019 (vide item no: 18) resolved to update the Polytechnic Curriculum C-20with the guidance of National Institute of Technical Teachers Training & Research (NITTTR), Extension Centre, Vijayawada (ECV), to be implemented with effect from the academic year 2023-2024.

Analysis of Curriculum C-20 was started in the month of January - 2023. Feedback was collected from all stake holders: Students, Lecturers, Senior Lecturers, Head of Sections and Principals for all programmes for this purpose. The Curriculum should be flexible, adaptable, and responsive to the changing needs of the industry and society.

Accordingly, aworkshop was convened on 15th February 2023, from 10:00 A.M. onwards, by Smt. C. Naga Rani, I.A.S, Director of Technical Education & Chairperson, SBTET to discuss the revamping of C-20 curriculum to meet the needs of industries and for improvement of placements.

The meeting was attended by Sri. SaurabGaur,I.A.S, Principal Secretary, Skill Development & Training, Smt. Lavanya Veni, I.A.S, Director, Employment & Training. Thirteen Representatives from Industries and 14 Academicians from Higher level institutions and Officials of ITI, Skill Development, CTE &SBTET attended the workshop.

Smt. C Naga Rani, I.A.S., Commissioner of Technical Education while addressing in the workshop, highlighted the importance of industrial training and hands-on experience and emphasized that students should undergo such training to provide support to industries. The Gaps in the

Curriculum are to be filled to make the students passionate to work in the industry in order to support economy of the country.

The committees of each branch, consisting of industry experts, representatives from higher-level institutions, and faculty from polytechnics, have been instructed to explore the feasibility of in corporating the following elements into the curriculum to enhance employability:

- IoT for all branches
- Theoretical & Practical subjects 50: 50 Ratio
- Industry 4.0 concepts
- 5G Technology
- Critical Thinking (Quantitative Aptitude, Data Interpretation, Quantitative reasoning etc) to face the written tests conducted by the industries during placements.
- Internships after 1st Year, 3rd Sem (2 to 3 weeks)

A series of workshops with subject experts followed in the subsequent weeks for thorough perusal and critique of draft curricula; and the suggestions thus received from Industrialists and academia have been recorded, validated by another set of experienced subject teachers from the Department of Technical education for incorporation into the Curriculum C-23.

These measures have been taken to ensure that the curriculum aligns with industry requirements, enhances students' practical skills, and improves their employability prospects.

Finally, the draft curriculum was sent to academicians of higher-level institutions, industrial experts and NITTTR (ECV) for wetting..

The design of new Curricula for the different diploma programmes has thus been finalised with the active participation of the members of the faculty teaching in the Polytechnics of Andhra Pradesh, and duly reviewed by Expert Committee constituted of academicians and representatives from industries.

Thus, the primary objective of the curriculum change is to enhance the employability of diploma holders by correlating the growing needs of the industries with relevant academic input.

The curriculum has been designed with a strong adherence to the outcome-based approach as prescribed by the National Board of Accreditation (NBA). This approach focuses on defining clear learning outcomes and aligning the curriculum to meet these outcomes. By incorporating the out come-based approach, the curriculum aims to meet the requirements for NBA accreditation.

The revised Curriculum i.e., Curriculum–2023 (C-23) is approved by BoG of SBTET for its implementation with effect from Academic Year 2023-24.

2. HIGHLIGHTS OF CURRICULUM C-23:

1. Duration of course for regular Diploma is 3 years.

2. The Curriculum is prepared in Semester Pattern. However, First Year is maintained as Year-wise pattern.

3. 6 Months Industrial training has been introduced for 3 years Diploma Courses in VI semester.

4. Updated subjects/topics relevant to the industry are introduced in all courses at appropriate places.

5. The policy decisions taken at the State and Central level with regard to environmental science are implemented by including relevant topics in Chemistry. This is also in accordance with the Supreme Court guidelines issued in Sri Mehta's case.

6. Keeping in view the increased need of communication skills which is playing a major role in the success of Diploma Level students in the industries, emphasis is given for learning and acquiring listening, speaking, reading and writing skills in English. Further as emphasized in the meetings, Communication Skills lab and Life Skills lab are continuing for all the branches.

7. Upon reviewing the existing C-20 curriculum, it is found that the theory content is found to have more weightage than the Practical content. In C-23 curriculum, more emphasis is given to the practical content in Laboratories and Workshops, thus strengthening the practical skills. The ratio of Theory & Practicals is 50:50.

8. With increased emphasis for the student to acquire Practical skills, the course content in all the subjects is thoroughly reviewed and structured as outcome based than the conventional procedure based.

9. Curriculum of Laboratory and Workshops have been thoroughly revised based on the suggestions received from the industry and faculty, for better utilization of the equipment available in the Polytechnics. The experiments /exercises that are chosen for the practical sessions are identified to confirm to the field requirements of industry.

10. The theory and practical subjects are restructured to find room for new theory and practical subjects to meet the present the industrial needs.

11. To make the students effective and efficient in all aspects, three periods per week are allotted in every year/semester for STUDENT CENTRIC ACTIVITY in which student will be trained for placements or make use of library or participate in sports & games/clean & green etc.

3. ACKNOWLEDGEMENTS

We also extend our sincere thanks to Sri K.Vijaya Bhaskar, Secretary, SBTET, Andhra Pradesh, Sri. V.Padma Rao Joint Director of Technical Education, officials of Directorate of Technical Education and the State Board of Technical Education, Andhra Pradesh and all teaching fraternity from the Polytechnics who are directly or indirectly involved in preparation of the curricula.

4. RULES AND REGULATIONS OF C-23 CURRICULUM

4.1 Duration and pattern of the courses

All the Diploma programs offered at various institutions are approved by the All-India Council for Technical Education (AICTE) and have a duration of either 3 years or 3½ years of academic instruction. The structure of these Diploma courses follows a combination of year-wise and semester patterns.

In the first year of the Diploma program, the courses are organized in a year-wise pattern, i.e. the curriculum is designed to be completed within one academic year. The remaining two or two and a half years of the program are then conducted in a semester pattern, where each academic year is divided into semesters.

In respect of few courses like Diploma in Bio-Medical course, the training will be in the seventh semester.

Run-through system is adopted for all the Diploma Courses, subject to eligibility conditions.

4.2 Procedure for Admission into the Diploma Courses:

Selection of candidates is governed by the Rules and Regulations laid down in this regard from time to time.

a. Candidates who wish to seek admission in any of the Diploma courses will have to appear for the Common Entrance Test for admissions into Polytechnics (POLYCET) conducted by the State Board of Technical Education and Training, Andhra Pradesh, Vijayawada. Only the candidates satisfying the following requirements will be eligible to appear for the Common Entrance Test for admissions into Polytechnics (POLYCET).

b. The candidates seeking admission should have appeared for S.S.C examination, conducted by the Board of Secondary Education, Andhra Pradesh or equivalent examination thereto, at the time of applying for the Common Entrance Test for admissions into Polytechnics (POLYCET). In case of candidates whose results of their Qualifying Examinations is pending, their selection shall be subject to production of proof of their passing the qualifying examination in one attempt or compartmentally at the time of admission.

c. Admissions are made based on the merit obtained in the Common Entrance Test (POLYCET) and the reservation rules stipulated by the Government of Andhra Pradesh from time to time.

d. For admission into the following Diploma Courses for which entry qualification is 10+2, candidates need not appear for POLYCET. A separate notification will be issued for admission into these courses.

      i. i). D.HMCT ii).D. Pharmacy

4.3   Medium of Instruction

The medium of instruction and examination shall be English.

4.4   Permanent Identification Number (PIN)

A cumulative / academic record is to be maintained of the Marks secured in sessional work and end examination of each year/ semester for determining the eligibility for promotion etc., A Permanent Identification Number (PIN) will be allotted to each admitted candidate to maintain academic records.

4.5   Number of Working Days Per Semester / Year:

a) The Academic year for all the Courses shall be in accordance with the Academic Calendar.
b) The Working days in a week shall be from Monday to Saturday
c) There shall be 7 periods of 50 minutes duration each on all working days.
d) The minimum number of working days for each semester / year shall be 90 / 180 days excluding examination days. If this prescribed minimum is not achieved due to any reason, special arrangements shall be made to conduct classes to complete the syllabus.

4.6   Eligibility (Attendance to Appear for the End Examination)

a) A candidate shall be permitted to appear for the end examination in all subjects, if he or she has attended a minimum of 75% of working days during the year/Semester.
b) Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester or 1st year may be granted on medical grounds.
c) A stipulated fee shall be payable towards condonation for shortage of attendance.
d) Candidates having less than 65% attendance shall be detained.

e) Students whose shortage of attendance is not condoned in any semester / 1st year and not paid the condonation fee in time are not eligible to take their end examination of that class and their admissions shall stand cancelled. They may seek re-admission for that semester / 1st year when offered in the next subsequent academic semester/year.

For INDUSTRIAL TRAINING:

i) During Industrial Training the candidate shall put in a minimum of 90% attendance.

ii) If the student fails to secure 90% attendance during industrial training,the student shall reappear for 6 months industrial training at his own expenses.

4.7   Readmission
Readmission shall be granted to eligible candidates by the respective Principal/ Regional Joint Director.

a) (i) Within 15 days after commencement of class work in any semester (Except Industrial Training).

(ii) For Industrial Training: before commencement of the Industrial training.

b) Within 30 days after commencement of class work in any year (including D. Pharmacy course or first year course in Engineering and Non-Engineering Diploma streams). Otherwise, such cases shall not be considered for readmission for that semester / year and are advised to seek readmission in the next subsequent eligible academic year.

c) The percentage of attendance of the readmitted candidates shall be calculated from the first day of beginning of the regular class work for that year / Semester, as officially announced by CTE/SBTET but not from the day on which he/she has actually reported to the class work.

4.8 Scheme of Evaluation

a) First Year

Theory Courses: Each Course carries Maximum marks of 80 with an end examination of 3 hours duration, along with internal assessment for Maximum of 20 marks. (Sessional marks). However, there are no minimum marks prescribed for sessionals.

Laboratory Courses: There shall be 40/20 Marks for internal assessment i.e. sessional marks for each practical Course with an end examination of 3 hours duration carrying 60/30 marks. However, there are no minimum marks prescribed for sessional.

b) III, IV, V, VI and VII Semesters:

Theory Courses: End semester evaluation shall be of 3 hours duration and for a maximum of 80 marks

Laboratory Courses: Each Course carry 60/30 marks of 3hours duration 40/20 sessional marks.

4.9 Internal Assessment Scheme

a) Theory Courses: Internal assessment shall be conducted for awarding Sessional marks on the dates specified. **Three-unit tests shall be conducted for I year students and two Unit Tests for semesters. The details are presented below.**

Internal Assessment shall be of 90 minutes duration and for a maximum of 40 marks for each test.

S. No.	Type of Assessment	Weightage Assigned
(i)	Testing of knowledge through mid-examination for year/sem as (Mid-1+Mid-2+Mid3)/3 or (Mid-1 + Mid-2)/2	40
(ii)	Assignments	5
(iii)	*Dynamic Learning activities : Project Work/ Seminar/Tech-fest/Group Discussion, Quizzes etc./Extra-curricular activities/NSS/NCC/ IPSGM/Cleaning & Greening of Campus etc.*	*5*
	T O T A L	**50**

At least one assignment should be completed for each unit which carries 10 marks. The total assignment marks should be reduced to 5.

At least one dynamic learning activity is to be conducted which carries 10 marks. The total marks should be reduced to 5.

The total 50 marks assigned to internal assignment is to be scaled down to 20 marks.

b) Practical Courses:

(i) **Drawing Courses:**

The award of Sessional marks for internal Assessment shall be as given in the following table:

Distribution of Marks for the Internal Assessment Marks			
First Year (Total:40 Marks)		Semesters (Total:40 Marks)	
Max:20 Marks	Max:20 Marks	Max:20 Marks	Max:20 Marks
From the Average of THREE Unit Tests.	From the Average of Assessment of Regular Class work Exercises.	From the Average of TWO Unit Tests.	From the Average of Assessment of Regular Class work Exercises.

- For first year engineering drawing each unit test will be conducted for a duration of 2 hours with maximum marks of 40.
- (Part - A: 4 questions x 5 marks = 20 Marks; Part –B: 2 questions x 10 marks = 20 marks).
- For the semester drawing examinations, Two Unit tests shall be conducted as per the Board End Examination Question Paper Pattern.
- All Drawing exercises are to be filed in serial order and secured for further scrutiny by a competent authority

(ii) Laboratory Courses:

(a) Student's performance in Laboratories / Workshop shall be assessed during the year/ semester of study for 40 marks in each practical Course.

(b) Evaluation for Laboratory Courses, other than Drawing courses:

i. Instruction (teaching) in laboratory courses (except for the course on Drawing) here after shall be task/competency based as delineated in the Laboratory sheets, prepared by SBTET, AP & NITTTR- ECV and posted in SBTET website.

ii. Internal assessment for Laboratory shall be done on the basis of task/s performed by the student as delineated in the laboratory sheets, prepared by SBTET, AP & NITTTR-ECV and posted in AP, SBTET website.

iii. Question paper for End semester Evaluation shall also be task/s based and shall be prepared and distributed by SBTET as done in case of theory courses or prepared as per SBTET rules in vogue.

c) Internal assessment in Labs / workshops / Survey field work etc., during the course of study shall be done and sessional marks shall be awarded by the concerned Teacher.

d) For practical examinations, except in drawing, there shall be two examiners. External examiner shall be appointed by the Principal in consultation with respective Head of Section preferably choosing a qualified person from in the order of preference.

i) Nearby Industry

ii) Govt / Semi Govt organization like R & B, PWD, PR, Railways, BSNL, APSRTC, APSEB etc.

iii) Govt / University Engg College.

iv) HoDs/Senior Lecturer/Lecturer from Govt. Polytechnic

Internal examiner shall be the person concerned with internal assessment as in (c) above. The end examination shall be held along with all theory papers in respect of drawing.

e) Question Paper for Practicals : Question paper should cover the experiments / exercise prescribed to test various skills like handling, manipulating, testing, trouble shooting, repair, assembling and dismantling etc., from more than one experiment / exercise

f) Records pertaining to internal assessment marks of both theory and practical Courses are to be maintained for official inspection.

g) In case of Diploma programs having Industrial Training, Internal Assessment and Summative Evaluation, shall be done as illustrated in the following table:

Assessment no	Upon completion of	By	Based on	Max Marks
1	12 weeks	1.The faculty concerned (Guide) and 2. Training in charge (Mentor) of the industry	Learning outcomes as given in the scheme of assessment , for Industrial Training	120
2	22 weeks			120
3.Final summative Evaluation	24 week	1.The faculty member concerned, 2.HoD concerned and 3.An external examiner	1.Demonstration of any one of the skills listed in learning outcomes	30
			2.Training Report	20
			3.Viva Voce	10
			TOTAL	**300**

h) Each staff member including Head of Section shall be assigned a batch of students 10 to 15 for making assessment during industrial training.

GUIDELINES FOR INDUSTRIAL TRAINING OF DIPLOMA IN INTERNET OF THINGS PROGRAMME:

1. Duration of the training: 6 months (24 weeks).
2. Eligibility: As per SBTET norms
3. Training Area: Students can be trained in the relevant industries or companies etc., related to Internet of Things/ Computer Science Engineering fields.
4. The Industrial Training shall carry 300 marks and pass marks is 50% in assessment at industry (first and second assessment put together) and also 50% in final summative assessment at institution level.
5. Formative assessment at industry level shall be carried out by the representative of the industry, where the student is undergoing training and the faculty from the concerned section in the institution.
6. If the student fails to secure 50% marks in industrial assessments put together, the student

should reappear for 6 months industrial training at his/her own expenses.

7. If the student fails to secure 50% marks in final summative assessment at institution level, the student should reappear for final summative assessment in the subsequent board examination.

8. Final Summative assessment at institution level is done by a committee including **1. Head of the section (of concerned discipline ONLY), 2. External examiner from an industry and 3. Faculty member who assessed the student during industrial training as member.**

9. During Industrial Training the candidate shall put a minimum of 90% attendance.

10. If the student fails to secure 90% attendance during industrial training, the student should reappear for 6 months industrial training at his/her own expenses.

4.10   Minimum Pass Marks

a) Theory Examination:

For passing a theory Course, a candidate has to secure a minimum of 35% in end examination and a combined minimum of 35% of both Sessional and end examination marks put together.

b) Practical Examination:

For passing a practical Course, a candidate has to secure a minimum of 50% in end examination and a combined minimum of 50% of both sessional and practical end examination marks put together. In case of D.C.C.P., the pass mark for typewriting and short hand is 45% in the end examination. There are no sessional marks for typewriting and Shorthand Courses of D.C.C.P course.

C) Industrial Training:

I. Monitoring: Similar to project work each teacher may be assigned a batch of 10-15 students irrespective of the placement of the students to facilitate effective monitoring of students learning during industrial training.

II. Assessment: The Industrial training shall carry 300 marks and pass marks is 50% in assessments at   industry (first and second assessment) and final summative assessment at institution level put together i.e. 150 marks out of 300 marks. And also student has to secure 50% marks in final summative assessment at institution level.

4.11.   Provision for Improvement

Improvement is allowed only after he / she has completed all the Courses from First Year to Final semester of the Diploma.

a) Improvement is allowed in any 4 (Four) Courses of the Diploma.

b) The student can avail of this improvement chance **ONLY ONCE**, that too within the succeeding two examinations after the completion of Diploma. However, the duration including Improvement examination shall not exceed **FIVE** years from the year of first admission.

c) No improvement is allowed in Practical / Lab Courses or Project work or Industrial Training assessment. However, improvement in drawing Course(s) is allowed.

d) If improvement is not achieved, the marks obtained in previous Examinations hold good.

e) Improvement is not allowed in respect of the candidates who are punished under Mal-practice in any Examination.

f) Examination fee for improvement shall be paid as per the notification issued by State Board of Technical Education and Training from time to time.

g) All the candidates who wish to appear for improvement of performance shall deposit the original Marks Memos of all the years / Semesters and also original Diploma Certificate to the

Board. If there is improvement in performance of the current examination, the revised Memorandum of marks and Original Diploma Certificate will be issued, else the submitted originals will be returned.

4.12. Rules of Promotion From 1ST YEAR TO 3rd, 4th, 5th, 6th and 7th Semesters:

A) For Diploma Courses of 3 Years duration

i). A candidate shall be permitted to appear for first year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds up to 10%) and pay the examination fee.

ii) A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the first year and pays the examination fee. A candidate who could not pay the first year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training, AP from time to time before commencement of 3rd semester.

A candidate is eligible to appear for the 3rd semester examination if he/she puts the required percentage of attendance in the 3rd semester and pays the examination fee.

iii) A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pay the examination fee. A candidate, who could not pay the 3rd semester exam fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training AP from time to time before commencement of 4th semester.

iv) A candidate is eligible to appear for the 4th semester examination if he/she puts the required percentage of attendance in the 4th semester and pays the examination fee.

iv) A candidate shall be promoted to 5th semester provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5th semester.

A candidate is eligible to appear for the 5th semester examination if he/she puts the required percentage of attendance in the 5th semester and pays the examination fee.

v) A candidate shall be sent to Industrial training / vi semester provided he/she puts in the required percentage of attendance in the 5th semester and pay the examination fee/ promotion fee as prescribed by SBTET.

A candidate is eligible to appear for Industrial Training assessment (Seminar/Viva-voce) puts the required percentage of attendance, i.e., 90% in 6th semester Industrial Training.

For IVC & ITI Lateral Entry students:

i.) A candidate shall be permitted to appear for Third Semester examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds up to 10%) and pay the examination fee for Third semester.

ii) A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pay the examination fee. A candidate, who could not pay the 3rd semester exam fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training AP from time to time before commencement of 4th semester.

A candidate is eligible to appear for the 4th semester examination if he/she puts the required percentage of attendance in the 4th semester and pays the examination fee.

ii) A candidate shall be promoted to 5th semester provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5th semester.

A candidate is eligible to appear for the 5th semester examination if he/she puts the required percentage of attendance in the 5th semester and pays the examination fee.

iii) A candidate shall be sent to Industrial training / vi semester provided he/she puts in the required percentage of attendance in the 5th semester and pay the examination fee/ promotion fee as prescribed by SBTET.

A candidate is eligible to appear for Industrial Training assessment (Seminar/Viva-voce) only if he /she has the required percentage of attendance, i.e., 90% in 6th semester Industrial Training and paid the examination fee.

B) For Diploma Courses of 3 ½ Years duration (MET/ CH/ CHPP/ CHPC/ CHOT/ TT):
i.   A candidate shall be permitted to appear for 1st year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds up to 10%) i.e. attendance after condonation on Medical grounds should not be less than 65% and pay the examination fee.

ii.   A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the 1st year and pays the examination fee. A candidate who could not pay the 1st year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 3rd semester.

iii.   A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pay the examination fee. A candidate, who could not pay the 3rd semester exam fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 4th semester.

A candidate is eligible to appear for the 4th semester exam if he/she puts the required percentage of attendance in the 4th semester

For IVC & ITI Lateral Entry students:

i. A candidate shall be promoted to 5th semester industrial training provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5th semester.

ii. Promotion from 5th to 6th semester is automatic (i.e., from 1st spell of Industrial Training to 2nd spell) provided he/she puts the required percentage of attendance, which in this case ie.,90 % of attendance and attends for the VIVA-VOCE examination at the end of training.

iii. A candidate shall be promoted to 7th semester provided he / she puts the required percentage of attendance in the 6th semester and pays the examination fee. A candidate, who could not pay the 6th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 7th semester.

iv. A candidate shall be promoted to 7th semester of the course provided he/she has successfully completed both the spells of Industrial Training.

> i. A candidate is eligible to appear for 7th semester examination if he/she Puts in the required percentage of attendance in the 7th semester

For IVC & ITI Lateral Entry students:

> a) Puts in the required percentage of attendance in the 7th semester .

C) For Diploma Courses of 3 ½ Years duration (BM):

The same rules which are applicable for conventional courses also apply for this course. The industrial training in respect of this course is restricted to one semester (6 months) after the 6th semester (3 years) of the course.

i. A candidate shall be permitted to appear for first year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds upto 10%) i.e. attendance after condonation on Medical grounds should not be less than 65% and pay the examination fee.

ii. A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the first year and pays the examination fee. A candidate who could not pay the first year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 3rd semester.

iii. A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pay the examination fee. A candidate who could not pay the 3rd semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 4th semester.
A candidate is eligible to appear for the 4th semester examination if he/she

> a) Puts in the required percentage of attendance in the 4th semester

> **For IVC & ITI Lateral Entry Students:**

> A candidate is eligible to appear for the 4th semester examination if he/she puts the required percentage of attendance in the 4th semester

iv. A candidate shall be promoted to 5ᵗʰ semester provided he / she puts the required percentage of attendance in the 4ᵗʰ semester and pays the examination fee. A candidate, who could not pay the 4ᵗʰ semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5ᵗʰ semester.

A candidate is eligible to appear for the 5ᵗʰ semester exam if he/she

a) Puts in the required percentage of attendance in the 5ᵗʰ semester.

For IVC & ITI Lateral Entry students:

a) Puts in the required percentage of attendance in the 5ᵗʰ semester.

v. A candidate shall be promoted to 6ᵗʰ semester provided he/she puts in the required percentage of attendance in the 5ᵗʰ semester and pays the examination fee.
A candidate who could not pay the 5ᵗʰ semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 6ᵗʰ semester.

A candidate is eligible to appear for 6ᵗʰ semester examination

a) Puts in the required percentage of attendance in 6ᵗʰ semester

For IVC & ITI Lateral Entry students:

a) Puts in the required percentage of attendance in 6ᵗʰ semester.

vi. A candidate shall be promoted to 7th semester provided he/she puts in the required percentage of attendance in 6th semester and pay the examination fee. A candidate, who could not pay the 6th semester examination fee, has to pay the promotion fee prescribed by SBTET from time to time before commencement of the 7th semester (Industrial Training).

A candidate is eligible to appear for 7th semester Industrial Training assessment (Seminar/Viva-voce) if he/she

a) Puts in the required percentage of attendance, ie., 90% in 7th semester Industrial Training

For IVC & ITI Lateral Entry students:

a) Puts in the required percentage of attendance, ie., 90% in 7ᵗʰ semester Industrial Training.

4.13. Students Performance Evaluation

Successful candidates shall be awarded the Diploma under the following divisions of pass.

a) First Class with Distinction shall be awarded to the candidates who secure an overall aggregate of 75% marks and above.
b) First Class shall be awarded to candidates who secure overall aggregate of 60% marks and above and below 75% marks.
c) Second Class shall be awarded to candidates who secure a pass with an overall aggregate of below 60%.

i. The Weightage of marks for various year/Semesters which are taken for computing overall aggregate shall be 25% of I year marks + 100% of 3rd and subsequent Semesters.

ii. In respect IVC & ITI Lateral Entry candidates who are admitted directly into diploma course at the 3rd semester (i.e., second year) level the aggregate of (100%) marks secured at the 3rd and subsequent semesters of study shall be taken into consideration for determining the overall percentage of marks secured by the candidates for award of class/division.

d) Second Class shall be awarded to all students, who fail to complete the Diploma in the regular 3 years/ 3 ½ years and four subsequent examinations from the year of first admission.

4.14. EXAMINATION FEE SCHEDULE:

The examination fee should be as per the notification issued by State Board of Technical Education and Training, AP from time to time.

4.15. Structure of Examination Question Paper:

I. Formative assessment (Internal examination)

a) For theory Courses:

Three-unit tests for first year and two-unit tests for semesters shall be conducted with a duration of 90 minutes for each test for maximum marks of 40. It consists of part A and Part B.

Part A contains five questions and carries 16 marks. Among these five questions first question consists of four objective items like one word or phrase answer/filling-in the blanks/true or false etc with one mark for each question. The other four questions are short answer questions and carry three marks each.

Part B carries 24 marks and consists of three questions with internal choice i.e.., Either/Or type, and each question carries 8 marks.

The sum of marks of 3 tests for I year and 2 tests for semesters including assignments and Dynamic learning activities (50 marks) shall be reduced to 20 marks in each Course for arriving at final sessional marks.

b) For drawing Courses:

For I year:

Three-unit tests with duration of 90 minutes and for maximum marks of 40 marks shall be conducted for first year. It consists of part A and Part B.

Part A consists four questions for maximum marks of 16 and each question carries four marks (4×4 marks=16 marks).

Part B carries maximum marks of 24 and consists of five questions while the student shall answer any three questions out of these five questions. Each question in this part carries a maximum mark of 8, (3×8 marks=24 marks).

The sum of marks obtained in 3-unit test marks shall be reduced to 20 marks for arriving at final sessional marks. Remaining 20 marks are awarded by the Course teacher based on the student's performance during regular class exercise.

For semester: Two-unit tests with duration of 90 minutes and for maximum marks of 40 marks shall be conducted. The sum of marks obtained in 2-unit test marks shall be reduced to 20 marks for arriving at final sessional marks. Remaining 20 marks are awarded by the Course teacher based on the student's performance during regular class exercise.

c) For Laboratory /workshop: 50% of total marks for the Course shall be awarded based on continuous assessment of the student in laboratory/workshop classes and the remaining 50% shall be based on the sum of the marks obtained by the students in two tests.

II. Summative assessment (End examination)

The question paper for theory examination is patterned in such a manner that the Weightage of periods/marks allotted for each of the topics for a particular Course be considered. End Examination paper is of 3 hours duration.

a) **Each theory paper consists of Section 'A' and 'B'**

   Section 'A' with Max marks of 30, contains 10 short answer questions. All questions are to be answered and each carry 3 marks, i.e., 10 x 3 = 30.

   Section 'B' with Max marks of 50contains 8 essay type questions. Only 5 questions are to be answered and eachcarry10 marks, i.e., Max. Marks: 5 x 10 = 50.

   Thus, the total marks for theory examination shall be: 80.

b) **For Engineering Drawing Course (107) consist of section 'A' and section 'B'**.

   Section 'A' with max marks of 20, contains four (4) questions. All questions in section 'A' are to be answered to the scale and each carries 5 marks, i.e.. 4 x 5=20.

   Section 'B' with max marks of 40, contains six (6) questions. The student shall answer any four (4) questions out of the above six questions and each question carries 10 Marks, i.e., 4 x 10 = 40.

c) **Practical Examinations**
   For Workshop practice and Laboratory Examinations, Each student has to pick up a question paper distributed by Lottery System.

Max. Marks for an experiment / exercise	:	50
Max. Marks for VIVA-VOCE	:	10
Total Max. Marks	:	60

   In case of practical examinations with 50 marks, the marks shall be distributed as

Max. Marks for an experiment / exercise	:	25
Max. Marks for VIVA-VOCE	:	05
Total Max. Marks	:	30

In case of any change in the pattern of question paper, the same shall be informed sufficiently in advance to the candidates.

d) **Note: Evaluation for Laboratory Courses, other than Drawing courses**:

I. Instruction (teaching) in laboratory courses (except for the course on Drawing) hereafter shall be task/competency based as delineated in the Laboratory sheets, prepared by SBTET, AP and posted in its website.

II. Internal assessment for Laboratory shall be done on basis of task/s performed by the student as delineated in the laboratory sheets, prepared by SBTET, AP and posted in its website.

III. Question paper for End semester Evaluation shall be prepared as per SBTET rules in vogue.

4.16. ISSUE OF MEMORONDUM OF MARKS

All candidates who appear for the end examination will be issued memorandum of marks without any payment of fee. However candidates who lose the original memorandum of marks have to pay the prescribed fee to the Secretary, State Board of Technical Education and Training, A.P. for each duplicate memo from time to time.

4.17. MAXIMUM PERIOD FOR COMPLETION OF DIPLOMA Programmes:

Maximum period for completion of the diploma courses is twice the duration of the course from the date of First admission (includes the period of detention and discontinuation of studies by student etc) failing which they will have to forfeit the claim for qualifying for the award of Diploma (They will not be permitted to appear for examinations after that date). This rule applies for all Diploma courses of 3 years and 3 ½ years of engineering and non-engineering courses.

4.18. ELIGIBILITY FOR AWARD OF DIPLOMA

A candidate is eligible for award of Diploma Certificate if he / she fulfils the following academic regulations.

i. He / She has pursued a course of study for not less than 3 / 3 ½ academic years & not more than 6 / 7 academic years.

ii. He / she has completed all the Courses.
Students who fail to fulfil all the academic requirements for the award of the Diploma within 6 / 7 academic years from the year of admission shall forfeit their seat in the course & their seat shall stand cancelled.

For IVC & ITI Lateral Entry students:

i. He / She has pursued a course of study for not less than 2 / 2 ½ academic years & not more than 4 / 5 academic years.

ii. He / she has completed all the Courses.

Students who fail to fulfil all the academic requirements for the award of the Diploma within 4 / 5 academic years from the year of admission shall forfeit their seat in the course & their seat shall stand cancelled.

4.19. **ISSUE OF PHOTO COPY OF VALUED ANSWER SCRIPT, RECOUNTING& REVERIFICATION:**

A) FOR ISSUE OF PHOTO COPIES OF VALUED ANSWER SCRIPTS

I.   A candidate desirous of applying for Photo copy of valued answer script/s should apply within prescribed date from the date of the declaration of the result.
II. Photo copies of valued answer scripts will be issued to all theory Courses and Drawing Course(s).
III. The Photo copy of valued answer script will be dispatched to the concerned candidate's address as mentioned in the application form by post.
IV. No application can be entertained from third parties.

B) FOR RE-COUNTING(RC) and RE-VERIFICATION(RV) OF THE VALUED ANSWER SCRIPT

i.   A candidate desirous of applying for Re-verification of valued answer script should apply within prescribed date from the date of the declaration of the result.
ii. Re-verification of valued answer script shall be done for all theory Courses' and Drawing Course(s).
iii. The Re-verification committee constituted by the Secretary, SBTETAP with Course experts shall re-verify the answer scripts.

I.   **RE-COUNTING**

The Officer of SBTET will verify the marks posted and recount them in the already valued answer script. The variations if any will be recorded separately, without making any changes on the already valued answer script. The marks awarded in the original answer script are maintained (hidden).

II. **RE-VERIFICATION**

(i)   The Committee has to verify the intactness and genuineness of the answer script(s) placed for Re-verification.
(ii) Initially single member shall carry out the re-verification.
(iii) On re-verification by single member, if the variation is less than 12% of maximum marks, and if there is no change in the STATUS in the result of the candidate, such cases will not be referred to the next level i.e.., for 2-Tier evaluation.
(iv) On re-verification by a single member, if the variation is more than 12% of maximum marks, it will be referred to 2-Tier evaluation.
(v)   If the 2-Tier evaluation confirms variation in marks as more than 12% of maximum marks, the variation is considered as follows:
a) If the candidate has already passed and obtains more than 12% of the maximum marks on Re-verification, then the variation is considered.

b) If the candidate is failed and obtains more than 12% of the maximum marks on Re-verification and secured pass marks on re-verification, then the status of the candidate changes to PASS.

c) If a candidate is failed and obtains more than 12% of the maximum marks on Re-verification and if the marks secured on re-verification are still less than the minimum pass marks, the status of the candidate remain FAIL only.

(vii) After Re-verification of valued answer script the same or change if any therein on Re-verification, will be communicated to the candidate.

(viii) On Re-verification of Valued Answer Script if the candidate's marks are revised, the fee paid by the candidate will be refunded or else the candidate has to forfeit the fee amount.

Note: No request for Photo copies/ Recounting /Re-verification of valuedanswer script would be entertained from a candidate who is reported to have resorted to Malpractice in that examination.

4.20. Mal Practice Cases:

If any candidate resorts to Mal Practice during examinations, he / she shall be booked and the Punishment shall be awarded as per SBTETAP rules and regulations in vogue.

4.21. Discrepancies/ Pleas:

Any Discrepancy /Pleas regarding results etc., shall be represented to the SBTETAP within one month from the date of issue of results. Thereafter, no such cases shall be entertained in any manner.

4.22. Issue of Duplicate Diploma

If a candidate loses his/her original Diploma Certificate and desires a duplicate to be issued he/she should produce written evidence to this effect. He / she may obtain a duplicate from the Secretary, State Board of Technical Education and Training, A.P., on payment of prescribed fee and on production of an affidavit signed before a First Class Magistrate (Judicial) and non-trace able certificate from the Department of Police. In case of damage of original Diploma Certificate, he / she may obtain a duplicate certificate by surrendering the original damaged certificate on payment of prescribed fee to the State Board of Technical Education and Training, A.P.

In case the candidate cannot collect the original Diploma within 1 year from the date of issue of the certificate, the candidate has to pay the penalty prescribed by the SBTET AP from time to time.

4.23. Issue of Migration Certificate and Transcripts:

The Board on payment of prescribed fee will issue these certificates for the candidates who intend to prosecute Higher Studies in India or Abroad.

4.24. Specific Changes Incorporated In Present Curriculum C-23

DIPLOMA in INTERNET OF THINGS BRANCH:

i) This Diploma Programme titled " Diploma in Internet of Things" is newly introduced from C-23 scheme onwards

ii)   This programme offers courses on Internet of Things along with basic courses on Computer Engineering.

iii)   A theory course on Basics of Electronics and Computer Engineering (IOT-105) is introduced to introduce the essential basics of both electronics and computer engineering

iv)   A practical course on Basics of Electronics Engineering (IOT-112) is introduced to impart practical skills in Electronic components and devices

v)   This program introduces both theory and practical courses on computer languages such as : Programming in C, OOP through JAVA, and Python programming to equip the student with the basic language skills.

vi)   The essential and fundamental computer courses such as: Digital Electronics, Operating Systems, DBMS, Web design etc., are also included in this programme to impart the basic computer knowledge to the students.

vii)   Specialised courses on IoT such as: Data Communication and Networking (IOT-304), IOT Architecture and Its Protocols (IOT-306), Sensors and Actuators in IOT (IOT-405), Industrial IOT and Its Security (IOT-504) along with their Practical Courses are introduced.

viii)   Since IOT design requires the 'Embedded System based hardware platform', courses such as : Microcontrollers & Interfacing (IOT-403), Hardware Platforms for IOT (IOT-503) along with their practical courses were introduced.

ix)   An emerging course on Bigdata & Cloud Computing(IOT-502) was introduced to impart the state of the art of computer engineering.

4.25. General

i.   The Board may change or amend the academic rules and regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students, for whom it is intended, with effect from the dates notified by the competent authority.

ii. All legal matters pertaining to the State Board of Technical Education and Training, AP are within the jurisdiction of Mangalagiri.

iii. In case of any ambiguity in the interpretation of the above rules, the decision of the Secretary, SBTET, A.P is final.

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DIPLOMA IN INTERNET OF THINGS
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
FIRST YEAR

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Year	Scheme Of Examinations			
		Theory	Practicals		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY SUBJECTS								
IOT-101	English	3	-	90	3	20	80	100
IOT-102	Engineering Mathematics-I	5	-	150	3	20	3	100
IOT-103	Engineering Physics	3		90	3	20	80	100
IOT-104	Engineering Chemistry and Environmental studies	3	-	90	3	20	80	100
IOT-105	Basics of Electronics & Computer Engineering	5	-	150	3	20	80	100
IOT-106	Programming in C	5	-	150	3	20	80	100
PRACTICAL SUBJECTS								
IOT-107	Engineering Drawing	-	3	90	3	40	60	100
IOT-108	Programming in C Lab	-	3	90	3	40	60	100
IOT-109	Physics Lab	-	3	90	1.5	20	30	50
IOT-110	Chemistry Lab	-			1.5	20	30	50
IOT-111	Computer Fundamentals Lab	-	3	90	3	40	60	100
IOT-112	Basics of Electronics Engineering Lab		3	90	3	40	60	100
	Activities	-	**3**	**90**	**3**			
	Total	**24**	**18**	**1260**	**-**			**1100**

101,102,103,104 ,109,110 & 111common to all branches
107 common with DECE, DAIML, DAMG, DAMT, DCAI, DCBD, DWD, DCCN, DCME

DIPLOMA IN INTERNET OF THINGS
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
III SEMESTER

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Semester	Scheme Of Examinations			
		Theory	Practicals		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY SUBJECTS								
IOT-301	Mathematics–II	4		60	3	20	80	100
IOT-302	Digital Electronics	5		75	3	20	80	100
IOT-303	Operating systems	5	-	75	3	20	80	100
IOT-304	Data Communication & Computer Networks	4		60	3	20	80	100
IOT-305	DBMS	5	-	75	3	20	80	100
IOT-306	IoT Architecture & its Protocols	4		60	3	20	80	100
PRACTICAL SUBJECTS								
IOT-307	Digital Electronics Lab	-	3	45	3	40	60	100
IOT-308	Data Communication & Computer Networks Lab	-	3	90	3	40	60	100
IOT-309	DBMS Lab	-	3	45	3	40	60	100
IOT-310	Basic IoT Lab	-	3	45	3	40	60	100
	ACTIVITIES	-	3	45				
	Total	27	15	630		260	640	1000

301 commnon with all branches
302 common with DCME
303 common with DCME,DAIML,DCCN
305 common with DCME,DAIML,DCAI,DCCN,DWD
307 common with DCME,DCAI, DCBD,DWD   308 common with DAIML,DCAI,DCCN,DW & 309 common with DCCN

DIPLOMA IN INTERNET OF THINGS
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
IV SEMESTER

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Semester	Scheme Of Examinations			
		Theory	Practicals		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY SUBJECTS								
IOT-401	Software Engg.	5	-	75	3	20	80	100
IOT-402	Web Technologies	5	-	75	3	20	80	100
IOT-403	Microcontrollers and Interfacing	5	-	75	3	20	80	100
IOT-404	OOP Through JAVA	5	-	75	3	20	80	100
IOT-405	Sensors and Actuators in IoT	4	-	60	3	20	80	100
PRACTICAL SUBJECTS								
IOT-406	Web Technologies Lab	-	3	45	3	40	60	100
IOT-407	JAVA Programming Lab	-	3	45	3	40	60	100
IOT-408	Communication Skills	-	3	45	3	40	60	100
IOT-409	Microcontrollers and Interfacing Lab	-	3	45	3	40	60	100
IOT-410	Advanced IoT Lab		3	45	3	40	60	100
	ACTIVITIES	-	3	45				
	Total	24	18	630	-	300	700	1000

401 common with DCME,DAIML
402 common with DCME,DAIML,DCAI, DCBD,DCCN
404 common with DCME,DAIML,DCCN
406 common with DCME,DAIML,DCAI,DCCN
408 common with All branches

DIPLOMA IN INTERNET OF THINGS
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
V SEMESTER

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Semester	Scheme Of Examinations			
		Theory	Pract--icals		Duration (hrs)	Sessio-nal Marks	End Exam Marks	Total Marks
THEORY SUBJECTS								
IOT-501	Industrial Management and Entrepreneurship	5	-	75	3	20	80	100
IOT-502	Big Data & Cloud Computing	5	-	75	3	20	80	100
IOT-503	Hardware Platforms for IoT	5	-	75	3	20	80	100
IOT-504	Industrial IoT & its Security	5	-	75	3	20	80	100
IOT-505	Python Programming	5	-	75	3	20	80	100
PRACTICAL SUBJECTS								
IOT-506	Embedded Systems for IoT Lab	-	4	60	3	40	60	100
IOT-507	Python Programming Lab	—	4	60	3	40	60	100
IOT-508	Life Skills	-	3	45	3	40	60	100
IOT-509	Project work	-	3	45	3	40	60	100
	ACTIVITIES	-	3	45				
	Total	25	17	630	-	300	700	900

501,508 common to all branches
502,505 common with DCME

DIPLOMA IN INTERNET OF THINGS
SCHEME OF INSTRUCTIONS AND EXAMINATION
CURRICULUM-2023
(VI Semester)
IOT-601 Industrial Training(At Industry)

SI.No.	Subject	Duration	Scheme of evaluation		
			Item	*Nature*	*Max. Marks*
1	*Industrial Training*	*6 months*	*1.First Assessment at Industry (After 12 Weeks)*	*Assessment of learning outcomes by both the faculty and training mentor of the industry*	*120*
			2.Second Assessment at the Industry (After 20 weeks))	*Assessment of learning outcomes by both the faculty and training mentor of the industry*	*120*
			Final Summative assessment at institution level	*Training Report*	*20*
				Demonstration of any one of the skills listed in learning outcomes	*30*
				Viva Voce	*10*
TOTAL MARKS					*300*

The industrial training shall carry **300** marks and pass marks are **50**%. A candidate failing to secure the minimum marks should complete it at his own expenses.

During Industrial training the candidate shall put in a minimum of **90%**attendance.

DIPLOMA IN INTERNET OF THINGS

VISION

Develop Internet of Things Engineers to be technologically adept, innovative, self-motivated and responsible citizen with human values , high quality skills and to contribute significantly towards ever changing Computer Engineering and IOT Emerging Technologies.

MISSION

M1	To provide opportunity to Diploma students who are capable of playing pivotal role in wide aspects of modern Computer Engineering and IOT Emerging Technologies.
M2	To make the students understand basic concepts underlie in Computer and IOT Engineering and able to apply them creatively in different fields of Engineering
M3	To train the student sensitive to the Environment, safety and economic context.
M4	To produce technically skilled students through intensive training in Computer and IOT Engineering tools and application and to prepare the students for professional career and further research.

PROGRAMME EDUCATIONAL OBJECTIVIES(PEOs) Diploma in Internet of Things programme is ever changing to transform to transform students Into competent professionals with qualities, ethics and human values . On completion of the integrated programme, the students should have acquired the following characteristics	
PEO1	To produce best Diploma in INTERNET OF THINGS technicians by correlating growing need of the industries in modern topics with the academic input and giving the technical knowledge for further learning.
PEO2	To prepare the students as productive INTERNET OF THINGS Engineers, possessing supportive and leadership skills in multidisciplinary domains, expertise in Practical orientation, Communication Skills and latest developments.
PEO3	To give the depth of related skills and expertise in a single field, and the ability to collaborate with other disciplines and work at the Supervisory cadre.
PEO4	To promote the students in professionalism, by successful completion of the Diploma in INTERNET OF THINGS by emphasizing Field Practices in industry-oriented activities.
PEO5	To sensitize the students on social and economic commitment and to inculcate a nature to guard the values of community and protect environment.

PROGRAMME SPECIFIC OUTCOME(PSOs)

PSO1	Foundation of Computer Systems and Internet of Things: Ability to understand the principles and working of computer systems and Internet of Things and can assess the hardware and software aspects of computer systems and IoT.
PSO2	Foundations of Software and IoT systems development: Ability to understand the structure and development methodologies of software systems and IoT. Possess professional skills and knowledge of software design process. Familiarity and practical competence with a broad range of programming language and open-source platforms.
PSO3	Foundation of mathematical concepts: Ability to apply mathematical methodologies to solve computation task, model real world problem using appropriate data structure and suitable algorithm, methodologies in developing computer related problem solutions as well as apply them in establishing new firms in small scale with the help of experience gained as part of industrial training.

PROGRAM OUTCOMES (POs)

Students completing Diploma in INTERNET OF THINGS are anticipated to have the following abilities	
PO1	Basic and Discipline specific knowledge: Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.
PO2	Problem analysis: Identify and analyse well-defined engineering problems using codified standard methods.
PO3	Design/ development of solutions: Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
PO4	Engineering Tools, Experimentation and Testing: Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.
PO5	Engineering practices for society, sustainability and environment: Apply appropriate technology in context of society, sustainability, environment and ethical practices.
PO6	Project Management: Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.
PO7	Life-long learning: Ability to analyse individual needs and engage in updating in the context of technological changes.

MAPPING OF PEOs WITH MISSIONS

PEO	M1	M2	M3	M4
To produce best Diploma in INTERNET OF THINGS technicians by correlating growing need of the industries in modern topics with the academic input and giving the technical knowledge for further learning.	✓	✓	✓	✓
To prepare the students as productive Computer Engineers, possessing supportive and leadership skills in multidisciplinary domains, expertise in Practical orientation, Communication Skills and latest developments.	✓	✓	✓	✓
To give the depth of related skills and expertise in a single field, and the ability to collaborate with other disciplines and work at the Supervisory cadre.	✓	✓	✓	✓
To promote the students in professionalism, by successful completion of the Diploma in INTERNET OF THINGS by emphasizing Field Practices in industry oriented activities.	✓	✓	✓	✓
To sensitize the students on social and economic commitment and to inculcate a nature to guard the values of community and protect environment.	✓	✓	✓	✓

I YEAR

DIPLOMA IN INTERNET OF THINGS
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
FIRST YEAR

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Year	Scheme Of Examinations			
		Theory	Practicals		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY SUBJECTS								
IOT-101	English	3	-	90	3	20	80	100
IOT-102	Engineering Mathematics-I	5	-	150	3	20	3	100
IOT-103	Engineering Physics	3		90	3	20	80	100
IOT-104	Engineering Chemistry and Environmental studies	3	-	90	3	20	80	100
IOT-105	Basics of Electronics & Computer Engineering	5	-	150	3	20	80	100
IOT-106	Programming in C	5	-	150	3	20	80	100
PRACTICAL SUBJECTS								
IOT-107	Engineering Drawing	-	3	90	3	40	60	100
IOT-108	Programming in C Lab	-	3	90	3	40	60	100
IOT-109	Physics Lab	-	3	90	1.5	20	30	50
IOT-110	Chemistry Lab	-			1.5	20	30	50
IOT-111	Computer Fundamentals Lab	-	3	90	3	40	60	100
IOT-112	Basics of Electronics Engineering Lab		3	90	3	40	60	100
	Activities	-	**3**	**90**	**3**			
	Total	**24**	**18**	**1260**	**-**			**1100**

ENGLISH

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks for FA	Marks for SA
IOT-101	English	3	90	20	80

Time Schedule : C23-Common- 101 : ENGLISH					
S.no.	Title of the Unit	Periods allotted	Weightage of Marks	No. of Short answer questions	No. of Long Answer questions	Mapping of COs
1	English for Employability	8	16	2	1	CO1, CO2, CO3, CO4, CO5
2	Living in Harmony	8			2	CO1, CO2, CO3, CO4, CO5
3	Connect with Care	8	26	2		CO1, CO2, CO3, CO4, CO5
4	Humour for Happiness	8				CO1, CO2, CO3, CO4, CO5
5	Never Ever Give Up!	8	10	1	1	CO1, CO2, CO3, CO4, CO5
6	Preserve or Perish	9	23	2	2	CO1, CO2, CO3, CO4, CO5
7	The Rainbow of Diversity	8				CO1, CO2, CO3, CO4, CO5
8	New Challenges - Newer Ideas	8			1	CO1, CO2, CO3, CO4, CO5
9	The End Point First	8	19	1		CO1, CO2, CO3, CO4, CO5
10	The Equal Halves	8		1	1	CO1, CO2, CO3, CO4, CO5
11	Dealing with Disaster	9	16	1		CO1, CO2, CO3, CO4, CO5
	Total	**90**	**110**	**30**	**80**	

Course Objectives	- To improve grammatical knowledge and enrich vocabulary.
	- To develop effective reading, writing and speaking skills.
	- To comprehend themes related to Personality, Society, Environment to exhibit Universal Human Values.

CO No.	Course Outcomes
CO1	Apply and use various grammatical rules and concepts to communicate in academic, professional and everyday situations
CO2	Use appropriate vocabulary in various contexts.
CO3	Read and comprehend different forms of academic, professional and everyday texts.
CO4	Communicate effectively in speaking and writing in academic, professional and everyday situations.
CO5	Display human values by applying the knowledge of themes related to Self, Society, Science and Environment for holistic and harmonious living through communication.

CO-PO Matrix

Course Code Common-101	Course Title: English Number of Course Outcomes: 5				No. of Periods: 90
POs	Mapped with CO No.	CO Periods Addressing PO in Column 1		Level of Mapping (1,2,3)	Remarks
		Number	Percentage		
PO1		Not directly Applicable for English course, however activities that use content from science and technology relevant to the Programme taken up by the student shall be exploited for communication in the Course.			
PO2					
PO3					
PO4					
PO5	CO5	16	18%		>50%: Level 3
PO6	CO1, CO2, CO3, CO4,	52	58%		21-50%: Level 2 Up to 20%: Level 1
PO7	CO1, CO2, CO3, CO4, CO5	22	24%		

Level 3 – Strongly Mapped,   Level 2- Moderately Mapped;   Level 1- Slightly Mapped

Learning Outcomes

1. English for Employability

1.1.   Perceive the need for improving communication in English for employability

1.2.   Use adjectives and articles effectively while speaking and in writing

1.3.   Write simple sentences

2. Living in Harmony

2.1.   Develop positive self-esteem for harmonious relationships

2.2.   Use affixation to form new words

2.3.   Use prepositions and use a few phrasal verbs contextually

3. Connect with Care

3.1.   Use social media with discretion

3.2.   Speak about abilities and possibilities

3.3.   Make requests and express obligations

3.4.   Use modal verbs and main verbs in appropriate form

3.5.   Write short dialogues about everyday situations

4. Humour for Happiness

4.1.   Realize the importance of humour for a healthy living

4.2.   Improve vocabulary related to the theme

4.3.   Inculcate reading and speaking skills

4.4.   Frame sentences with proper Subject – Verb agreement

4.5.   Understand the features of a good paragraph and learn how to gather ideas as a preliminary step for writing a good paragraph.

5. Never Ever Give Up!

5.1.   Learn to deal with failures in life

5.2.   Use the present tense form for various every day communicative functions such as speaking and writing about routines, professions, scientific descriptions and sports commentary

5.3.   Write paragraphs with coherence and other necessary skills

6. Preserve or Perish

6.1.   Understand the ecological challenges that we face today and act to save the environment.

6.2.   Narrate / Report past events

6.3. Develop vocabulary related to environment
6.4. Write e-mails

7. The Rainbow of Diversity
7.1. Appraise and value other cultures for a happy living in multi-cultural workspace
7.2. Understand the usage of different types of sentences
7.3. Ask for or give directions, information, instructions
7.4. Use language to express emotions in various situations
7.5. Write letters in various real life situations

8. New Challenges – Newer Ideas
8.1. Understand the functional difference between Active Voice and Passive Voice
8.2. Use Passive Voice to speak and write in various contexts
8.3. Understand the major parts and salient features of an essay
8.4. Learn about latest innovations and get motivated

9. The End Point First!
9.1. Understand the importance of setting a goals in life
9.2. Report about what others have said both in speaking and writing
9.3. Write an essay following the structure in a cohesive and comprehensive manner
9.4. Apply the words related to Goal Setting in conversations and in life

10. The Equal Halves
10.1. Value the other genders and develop a gender-balanced view towards life
10.2. Identify the use of different conjunctions in synthesising sentences
10.3. Write various types of sentences to compare and contrast the ideas
10.4. Apply the knowledge of sentence synthesis in revising and rewriting short essays
10.5. Develop discourses in speech and writing

11. Dealing with Disasters
11.1. Speak and write about different kinds of disasters and the concept of disaster management
11.2. Generate vocabulary relevant to disaster management and use it in sentences
11.3. Analyze an error in a sentence and correct it
11.4. Learn and write different kinds of reports

Textbook: **'INTERACT'** (A Textbook of English for I Year Engineering Diploma Courses) - by SBTET, AP
Reference Books:

Martin Hewings	:	*Advanced Grammar in Use,* Cambridge University Press
Murphy, Raymond	:	*English Grammar in Use,*Cambridge University Press
Sidney Greenbaum	:	*Oxford English Grammar*, Oxford University Press

Wren and Martin (Revised byN.D.V. Prasad Rao) : *English Grammar and Composition*, Blackie ELT Books, S. Chand and Co.

| Sarah Freeman | : | *Strengthen Your Writing*, Macmillan |

End Exam = 80 Marks
  PART-A: 10 Questions 3 marks each =30 Marks
  PART-B: 5 out of 8 are to be answered : 10 marks each =50 Marks
  Unit Tests 1,2,3 @ 40 Marks each
Part A: 16 marks: One question for 4 marks + 4 questions for 3 marks each (4+12 Marks=16 Marks)
Part B: 24 marks: 3 questions for 8 marks each with internal choice. (3X8 Marks= 24 Marks)

					Marks Wise Distribution of Weightage (Short answer questions) @3 Marks				
Weightage Table : C23-IOT-101: English									
S. N o.	Name of the Unit	Periods Allocated (Total 90 periods)	Weightage of Marks Allocated (Short + Long Answer question)	Weightage (Long answer questions) @10 Marks	R	U	Ap	An	CO's Mapped
1	English for Employability	8	20+9	2	3+3	3			CO1, CO2, CO3, CO4, CO5
2	Living in Harmony	8						CO1, CO2, CO3, CO4, CO5
3	Connect with Care	8				3			CO1, CO2, CO3, CO4, CO5
4	Humour for Happiness	8	20+9	2					CO1, CO2, CO3, CO4, CO5
5	Never Ever Give Up!	8					3		CO1, CO2, CO3, CO4, CO5
6	Preserve or Perish	9					3		CO1, CO2, CO3, CO4, CO5
7	The Rainbow of Diversity	8					3		CO1, CO2, CO3, CO4, CO5
8	New Challenges - Newer Ideas	8	10+3	1			3		CO1, CO2, CO3, CO4, CO5
9	The End Point First!	8	10+3	1			3		CO1, CO2, CO3, CO4, CO5
10	The Equal Halves	8	10+3	1			3		CO1, CO2, CO3, CO4, CO5
11	Dealing with Disasters	9	10+3	1				3	CO1, CO2, CO3, CO4, CO5
Short Answer Questions			**30**		**6**	**6**	**15**	**3**	
Long Answer Questions			**80**	**8** (Integratio n of the cognitive skills of Understan ding, Applying &Analysing)					
Total			**110**						

S.No. of the Question	Weightage of Marks	Language Skill / grammatical Concept of the question	Sub aspects & Description
C23- IOT-101: ENGLISH: END EXAM (80 Marks) Question Paper Pattern (Division of Topics: Question wise)		
PART-A ; 10 questions X3 marks = 30 Marks		
1	**3** (6 Questions X ½ Mark)	Articles & Prepositions	a) Definite, indefinite articles b) prepositions of place, time, directions
2	**3** (6 Questions X ½ Mark)	Vocabulary	Synonyms, Antonyms, affixes, words& phrases, Phrasal Verbs, words matching with meanings, one word substitutions,
3	**3** (6 Questions X ½ Mark)	Helping Verbs	a) Primary helping verbs (be/do/have) b) Modal verbs
4	**3** (3 questions 1 mark each)	Tenses	Using appropriate Verb forms
5	**3** (3 questions 1 mark each)	Voice	Conversion : Active & Passive voice
6	**3** (3 questions 1 mark each)	Adjectives	Using appropriate adjective form/ conversion : Degrees of comparison
7	**3** (3 questions 1 mark each)	Types of sentences & positive, negative sentences	Conversion from one type of sentence to the other , making negative sentence
8	**3** (3 questions 1 mark each)	Syntheses of Sentences / Conjunctions / linkers	Transformation of sentences : Simple, complex & compound sentences / use of linkers/ conjunctions
9	**3** (3 questions 1 mark each)	Direct& Indirect Speech	Conversion from Direct to Indirect & Vice versa
10	**3** (3 questions 1 mark each)	Correction of Sentences	Remaining grammar aspects (concord & usage based…etc)
PART –B ; 5 QX10 M = 50 Marks		
11	**10 Marks**	Paragraph Writing	From Units 1,2,3 (theme based- focus on importance of learning and using English)
12	**10**	Giving instructions or directions	From Units 4,5,6,7
13	**10**	Dialogue writing	Theme based / Situation based /role play/ general topic
14	**10**	Essay writing	From Units 8,9,10,11 (theme based)
15	**10**	Letter writing	Formal / informal letters
16	**10**	Report Writing	Report on Mini projects/ industrial visits / camps/ events / celebrations
17	**10** (2 questions X 5 Marks)	a) E-Mail writing b) Framing questions	a) E mail etiquette b) Who & Yes-No questions
18	**10** (Ten questions 1 mark each)	Reading Comprehension	An unseen piece of prose with 10 questions for reading comprehension check

C23-IOT-101 :English : Bifurcation of Syllabus for UNIT TESTS 1,2,3			
Unit Test	Lessons / Chapters	Grammar / Language aspects (Topics or Short Answer questions)	Writing Skills (Topics for Long answer/ Essay Questions)
U.T 1	Chapters 1,2,3	a)articles & prepositions, b)Vocabulary: Affixes, synonyms, Antonyms, matching meanings, words & phrases, one word substitutes) c)Adjectives (degrees of comparison) d) Main& Auxiliary Verbs e) phrasal verbs/ word order	a) Theme based Paragraph (focus on LSRW skills, importance of English, Self-esteem, SWOC analysis, Social media) b) Dialogue on themes of lessons 2&3 / Dialogue on General topic / a situation c) Reading comprehension
U.T 2	Chapters 4,5,6,7	a) concord b) Tenses c) Types of sentences d) Framing questions e) words &phrases, linkers	a) Theme based paragraph (Humour for happy living, learning from failures, Environmental protection, multi- culture /global culture) b) Letter writing (formal& informal), c) instructions/ directions, E-mail writing
U.T 3	Chapters 8,9,10,11	a) Voice (active &passive) b) Speech(direct& indirect) c) Synthesis of sentences (simple, complex, compound sentences) d) Error analysis e) words &phrases, linkers	a) Theme based paragraph/ Essay writing (Technical innovations, Goal setting, gender sensitivity, dealing with disaster) b) Essay writing, Report writing c) Reading Comprehension
Unit Test Question Paper pattern (40Marks)	Total 40 Marks (Part A=16 Part B =24)	Short Answer questions (Part-A) Q. 1 = 4 marks Q. 2 to 5 = 3 Marks each Total=16 Marks	Long Answer Questions: (Part-B) Q. 6,7,8 @ 8 marks each ; Each question with Internal choice Total: 8X3 = 24 Marks

C23- IOT-101: ENGLISH:UNIT TEST Exams 1,2,3 (40 Marks each)			
Question Paper Pattern (Division of Topics: Question wise)			
S.No. of the Question	**Weightage of Marks**	**Language Skill / grammatical Concept of the question**	**Sub aspects & Description**
UNIT TEST-1 Marks : 40 ; Time 90 Mnts. (Lessons 1,2,3) :			
PART-A : 16 Marks			
S.No.	**Marks allotted**	**Grammatical concept/ aspect/ skill**	**Sub topics / concepts**
1	**4 Marks** (8 Questions X ½ Mark)	Vocabulary	a) Affixes, b) Synonyms c) antonyms d)one word substitutes
2	**3**(6 Questions X ½ Mark)	Articles &Prepositions	a) Definite, indefinite articles b) Prepositions of place, time direction
3	**3** (3 questions 1 mark each)	Adjectives	a) Using appropriate forms of adjectives b) Conversion of Degrees of comparison
4	**3** (6 questions ½ mark each)	Helping Verbs	a) Primary helping verbs (be/do/have) b)Modal verbs
5	**3 Marks** (3 questions 1 mark each)	Phrasal verbs	Using phrasal verbs in sentences of one's own
Part – B : 8X3 = 24 Marks			
6	**8** Marks	Paragraph question A or B (internal choice)	Theme based questions : Lesson 1 : Focus on LSRW skills, problems and solutions in using English, Importance of English, English for employability, SWOC analysis
7	**8**	Dialogue making A or B (internal choice)	Conversation / Role play between two people : a) Dialogue on themes of lessons 2&3 b) Dialogue on General topic / a situation
8	**8**	Reading Comprehension A or B (internal choice)	Unseen prose passages with 8 different questions (FIVE model questions+ Others)
Unit Test -2: Marks : 40 ; Time 90 Mnts. (Lessons 4,5,6,7)			
Part – A: 16 Marks			
1	**4Marks**	Tenses	Present, Past, Future tenses : Filling in with proper verb forms using the given base form
2	**3**	Concord	Concord: agreement between subject and verb
3	**3**	Framing questions	Framing Wh& Yes-No questions
4	**3**	Types of sentences	Conversion of sentences (except questions) , Using of proper linkers / discourse markers
5	**3 Marks**	Words& Phrases , linkers	Using words& phrases, linkers in sentences of one's own
Part – B : 8X3 = 24 Marks			
6	**8 Marks**	Paragraph writing A or B (internal choice)	a) Themes on lessons 4/5 b) Themes based on lessons 6/7
7	**8**	Letter Writing (internal choice : A or B)	a) Letter writing : formal b) Letter writing: Informal
8	**8**	a) Paragraph: Tenses Reinforcement b) Email & Instructions/ directions	a) Paragraph on Routines/ past narration / Future plans b) i) E- Mail writing (formal or informal) ii) Giving instructions/ directions

Unit Test -3:   Marks : 40 ; Time 90 Mnts. (Lessons 8,9,10,11)
Part – A ; 16 Marks
1	4 Marks	Error Analysis	Find errors and make corrections
2	3	Voice	Conversion: Active & Passive voice
3	3	Synthesis of sentence	Conversion: Simple, complex & compound sentences
4	3	Reported speech	Conversion: Direct & Indirect speech
5	3	Words & phrases, linkers	Matching words with their meanings/ Using words& phrases, linkers in sentences of one's own
Part- B : 8X3 = 24 Marks
6	8 Marks	Essay writing A or B (internal choice)	a) Theme based (lessons 8 / 9) b) Theme based (Lessons 10/11)
7	8	Report writing A or B (internal choice)	a) Report on Mini projects/ industrial visits / camps/ events /exhibitions / celebrations b) themes from lessons 8 to 11 …like disaster management / technical inventions / gender equality/ goal setting
8	8	Reading Comprehension A or B (internal choice)	Reading passages with 8 different questions (FIVE model+ others)

<u>Time: 3 Hrs.</u>   <u>Max.Marks: 80</u>

PART-A   **10X3=30 Marks**

Instructions: Answer all the questions and each question carries 3 marks. Marks will be awarded only for the desired and accurate language / grammatical expressions.

1. A) Fill in the blanks with appropriate articles:
    My father sent me _____ envelope through _____ messenger and _____ cover contained a bank cheque in my favour.
    B) Fill in the blanks with suitable prepositions:
    My mother arranged a beautiful flower vase _____ my study table, just beside my computer,
    _____ which she keeps fresh flowers every day. The vase is made _____ ceramic.

2. A) Give synonyms for the words: i) depressed   ii) caricature
    B) Give antonyms for the words: i) natural   ii) visible
    C) Add affixes to the words: i) prefer   ii) proper

3. A) Fill in the blanks with suitable Primary Helping Verbs (Be/ do/ have forms):
    i) All the books _____ already been sold out.
    Ii) She paid condonation fees as she_____ not attend the classes regularly last semester.
    iii) Why _____ you not giving me reply?
    B) Fill in the blanks with suitable Modal verbs based on the clue given in brackets.
    i) Pratap is an ambidextrous; he _____ write with his two hands. (ability)
    ii) Jyothsna _____ pay the tuition fees by tomorrow. (obligation)
    iii) My grandfather _____ to ride a horse in his youth. (Past habit)

4. Fill in the blanks with suitable verb form using the base form given in the brackets.
    i) Suma_____ (bring) a pup to the class yesterday.
    ii) Johnny _____(play) the piano in a music band every weekend.
    iii) Girija _____ (watch) a movie on TV when I visited her last Sunday.

5. Change the voice of the following:
    i) My elder brother paid my exam fees yesterday. ii) These two chapters will be taught in next month.
    iii) They are constructing a new house.

6. i) Pacific is _____(big) ocean of all. (Fill in with appropriate degree of the adjective given in the bracket)
    ii) No other food item is as nutritious as honey.   (Change into Comparative degree)
    iii) Bangalore is one of the beautiful cities of India.   (Change into Positive degree)

7. i) You need two thousand rupees to buy a new pair of shoes. Write a polite expression asking your father for money.
    ii) Radhika has been invited for the wedding.   (Convert into a negative sentence)
    iii) Our pet pigeons flew away last night.   (Convert into a negative sentence)

8. i) Ramesh can't reach on time _____ he travels by a superfast train. (Fill in with suitable conjunction)

    ii) Though the long bell was given, the children stayed in the classroom. (Change into a simple sentence)

    iii) Get a ticket on a sleeper coach, and then you can sleep during journey. (Change into a complex sentence)

9. i) Tarun said, " Prathima, I shall return your notes tomorrow". (change into a reported speech)

    ii) Arjun requested his sister Priya not to disturb him while he was studying.   (change into a direct speech)

    iii) Teacher said, "Students, why are you talking in the class?" (change into a reported speech)

10. Correct the following sentences:

     i) These flowers are smelling sweet. ii) Either the father or his children has arrived home early.

     iii) Every bike rider should abide to the traffic rules.

PART-B

10X5=50Marks

Instructions: a) Answer any FIVE questions and each question carries TEN marks.

b) The criterion for the award of marks is the appropriate content, quality and clarity of expression but not the length of your answer.

11. Write a paragraph in 120 words about the problems you are experiencing in speaking English and your own solutions to overcome them.

12. Write a set of instructions to create a word file and insert a Table using MS office on a computer.

13. Write a dialogue in at least eight turns between a sales person and you at a readymade garment showroom as you want to buy a readymade dress.

14. Write an essay in about 175 words on valuing opposite gender and show mutual respect.

15. Write a letter to the Municipal Commissioner about the menace of street dogs in your area.

16. Imagine that your class had visited an industry / organisation relevant to your branch of Engineering; write a report about the visit to submit to your HOD.

17. a) Write an E-mail to your cousin requesting him/her to send you the diploma study material by a courier or post.

     b) Frame THREE 'wh' questions & TWO 'Yes-No' questions from the following passage.

     Dolphins are intelligent animals. A dolphin's nose is on top of its head. So, it can easily breathe on the surface of the water. The skin of a dolphin has no scales. It is soft and smooth. They swim in 'pods'; a very large pod is called a 'herd'. They are very social and help each other fight off predators. Dolphins brain has two sides. One side sleeps while the other side stays awake.

18. Read the following passage and answer the questions that follow. Your answer should be accurate, precise and limited to a word or phrase or a simple sentence.

     The Indian Army is the land-based branch and the largest component of the Indian Armed Forces. The President of India is the Supreme Commander of the Indian Army, and it is commanded by the Chief of Army Staff (COAS), who is a four-star general. The primary mission of the Indian Army is to ensure national security and national unity, defending the nation from external aggression and internal threats, and maintaining peace and security within its borders. It conducts humanitarian rescue operations during natural calamities and other disturbances, like Operation

Surya Hope, and can also be requisitioned by the government to cope with internal threats. It is a major component of national power alongside the Indian Navy and the Indian Air Force. The army has been involved in four wars with neighbouring Pakistan and one with China. Other major operations undertaken by the army include: Operation Vijay, Operation Meghdoot and Operation Cactus.

a) What is the largest component of Indian Armed Forces?

b) Who is the four-star general?

c) "Maintaining internal peace and security is not one of the responsibilities of Indian Army". Is the statement True or False ?

d) What is the primary mission of the Indian Army?

e) Name the operation held by the Indian Army during natural disaster.

f) What are the other two forces mentioned in the passage?

g) If you were to join Armed forces, which wing do you prefer? State your reason in a sentence.

h) Pick the word from the passage that would mean: 'forcefulness or violent behavior'

i) Give the antonym for the word: 'internal'

j) Suggest a suitable title for the passage in a word or phrase.

_____

C23-IOT-101 :English : Bifurcation of Syllabus for UNIT TESTS 1,2,3			
Unit Test	Lessons / Chapters	Grammar / Language aspects (Topics or Short Answer questions)	Writing Skills (Topics for Long answer/ Essay Questions)
U.T 1	Chapters 1,2,3	a)articles & prepositions, b)Vocabulary: Affixes, synonyms, Antonyms, matching meanings, words & phrases, one word substitutes) c)Adjectives (degrees of comparison) d) Main& Auxiliary Verbs e) phrasal verbs/ word order	a) Theme based Paragraph (focus on LSRW skills, importance of English, Self-esteem, SWOC analysis, Social media) b) Dialogue on themes of lessons 2&3 / Dialogue on General topic / a situation c) Reading comprehension
U.T 2	Chapters 4,5,6,7	a) concord b) Tenses c) Types of sentences d) Framing questions e) words &phrases, linkers	a) Theme based paragraph (Humour for happy living, learning from failures, Environmental protection, multi-culture /global culture) b) Letter writing (formal& informal), c) instructions/ directions, E-mail writing
U.T 3	Chapters 8,9,10,11	a) Voice (active &passive) b) Speech(direct& indirect) c) Synthesis of sentences (simple, complex, compound sentences) d) Error analysis e) words &phrases, linkers	a) Theme based paragraph/ Essay writing (Technical innovations, Goal setting, gender sensitivity, dealing with disaster) b) Essay writing, Report writing c) Reading Comprehension
Unit Test Question Paper pattern (40 Marks)	Total 40 Marks (Part A=16 Part B =24)	Short Answer questions (Part-A) Q. 1 = 4 marks Q. 2 to 5 = 3 Marks each Total=16 Marks	Long Answer Questions: (Part-B) Q. 6,7,8 @ 8 marks each ; Each question with Internal choice Total: 8X3 = 24 Marks

C23- IOT-101: ENGLISH:UNIT TEST Exams 1,2,3 (40 Marks each)			
Question Paper Pattern (Division of Topics: Question wise)			
S.No. **of the** **Question**	**Weightage of Marks**	**Language Skill / grammatical Concept of the question**	**Sub aspects & Description**
UNIT TEST-1 Marks : 40 ; Time 90 Mnts. (Lessons 1,2,3) :			
PART-A : 16 Marks			
S.No.	**Marks allotted**	**Grammatical concept/ aspect/ skill**	**Sub topics / concepts**
1	**4 Marks** (8 Questions X ½ Mark)	Vocabulary	a) Affixes, b) Synonyms c) antonyms d)one word substitutes
2	**3**(6 Questions X ½ Mark)	Articles &Prepositions	a) Definite, indefinite articles b) Prepositions of place, time direction
3	**3** (3 questions 1 mark each)	Adjectives	a) Using appropriate forms of adjectives b) Conversion of Degrees of comparison
4	**3** (6 questions ½ mark each)	Helping Verbs	a) Primary helping verbs (be/do/have) b)Modal verbs
5	**3 Marks** (3 questions 1 mark each)	Phrasal verbs	Using phrasal verbs in sentences of one's own
Part – B : 8X3 = 24 Marks			
6	**8** Marks	Paragraph question A or B (internal choice)	Theme based questions : Lesson 1 : Focus on LSRW skills, problems and solutions in using English, Importance

			of English, English for employability, SWOC analysis	
7	8	Dialogue making A or B (internal choice)	Conversation / Role play between two people : a) Dialogue on themes of lessons 2&3 b) Dialogue on General topic / a situation	
8	8	Reading Comprehension A or B (internal choice)	Unseen prose passages with 8 different questions (FIVE model questions+ Others)	

Unit Test -2: Marks : 40 ; Time 90 Mnts. (Lessons 4,5,6,7)					
Part – A: 16 Marks				

1	**4Marks**	Tenses	Present, Past, Future tenses : Filling in with proper verb forms using the given base form	
2	3	Concord	Concord: agreement between subject and verb	
3	3	Framing questions	Framing Wh& Yes-No questions	
4	3	Types of sentences	Conversion of sentences (except questions) , Using of proper linkers / discourse markers	
5	**3 Marks**	Words& Phrases , linkers	Using words& phrases, linkers in sentences of one's own	

Part – B : 8X3 = 24 Marks				
6	**8 Marks**	Paragraph writing A or B (internal choice)	a) Themes on lessons 4/5 b) Themes based on lessons 6/7	
7	8	Letter Writing (internal choice : A or B)	a) Letter writing : formal b) Letter writing: Informal	

8	8	a) Paragraph: Tenses Reinforcement b) Email & Instructions/ directions	a) Paragraph on Routines/ past narration / Future plans b) i) E- Mail writing (formal or informal) ii) Giving instructions/ directions	
Unit Test -3: Marks : 40 ; Time 90 Mnts. (Lessons 8,9,10,11)				
Part – A ; 16 Marks				
1	4 Marks	Error Analysis	Find errors and make corrections	
2	3	Voice	Conversion: Active & Passive voice	
3	3	Synthesis of sentence	Conversion: Simple, complex & compound sentences	
4	3	Reported speech	Conversion: Direct & Indirect speech	
5	3	Words & phrases, linkers	Matching words with their meanings/ Using words& phrases, linkers in sentences of one's own	
Part- B : 8X3 = 24 Marks				
6	8 Marks	Essay writing A or B (internal choice)	a) Theme based (lessons 8 / 9) b) Theme based (Lessons 10/11)	
7	8	Report writing A or B (internal choice)	a) Report on Mini projects/ industrial visits / camps/ events /exhibitions / celebrations b) themes from lessons 8 to 11 …like disaster management / technical inventions / gender equality/ goal setting	
8	8	Reading Comprehension A or B (internal choice)	Reading passages with 8 different questions (FIVE model+ others)	

Model Question Papers
Unit Tests
Unit Test-1: C23- IOT-101: English

<u>Time: 90 Mnts.</u> <u>Max. Marks: 40</u>

Part-A 16 Marks

Instructions: Answer all the questions and the first question carries 3 marks. Question numbers from 2 to 5 carry three marks each. The marks will be awarded only for the desired and accurate language / grammatical expressions.

1. A) Give synonyms for the words: i) abruptly ii) advantage (1/2 x 2=1M)

   B) Give antonyms for the words: i) pure ii) dry (1/2 x 2=1M)

   C) Add affixes for the words: i) connect ii) worth (1/2 x 2=1M)

   D) Give one word substitute for the following:

   i) The interactive web page that can be updated frequently by an individual or group.

   ii) An ability that can be acquired by anyone through practice.

2. A) Fill in the blanks with proper Articles: (1/2 x 3=1 1/2M)

   i) My cousin joined M.Tech in _____ University in Tamil Nadu.

   ii) Mrs. Rekha Chatterjee is _____ MLA from the West Bengal.

   iii) My father came to _____ college yesterday to pay my exam fees.

   B) Fill in with appropriate prepositions:

   i) What can I do _____ you ,Sarat?

   ii) Mr. Agarwal distributed his property _____ his two daughters.

   iii) The coach was pleased _____ the performance of the players.

3. a) Fill in the blank with proper form of the adjective given in the brackets :

   BurjKhalifa is one of _____(tall) buildings in the world.

   b) The tiger is more ferocious than the leopard. (Change into Positive degree)

   c) Very few cities in India are as populous as Mumbai. (Change into comparative degree)

4. A) Fill in with proper Primary Helping Verbs (be/do/have forms)

   i) Prasad _____ (be) at the canteen when I saw him a few minutes ago.

   ii) He _____ (do) this work always.

   iii) The teacher _____ just left the classroom.

   B) Fill in with appropriate Modal verbs based on the clue given in the brackets:

   i) We all _____ respect our elders. (moral obligation)

   ii) Sir, _____ I come in please? (seeking permission)

   iii) Tarun _____ easily win the match. (ability)

5. Use the following phrasal verbs in sentences of your own. (1x3=3M)

   i) bring up ii) give away iii) put off

Part-B   **8X3=24 Marks**

Instructions: Answer all the questions. Each question carries 8 marks. The marks will be awarded for the appropriate content, quality and clarity of expressions, but not the length of your answer.

6. A) Write a paragraph in around 120 words about the significance of learning and using English in your present and future life.

<div align="center">OR</div>

   B) Write a paragraph in around 120 words about challenges you are facing in speaking and writing English and the solutions to overcome them.

7. A) Write a dialogue between two friends in at least six turns discussing the advantages and disadvantages of social media.

<div align="center">OR</div>

   B) Write a dialogue between two friends, who have joined different courses in different colleges after their tenth class and now exchanging information about their newly joined courses and colleges.

8. A) Read the following passage and answer the questions that follow. Your answer should be accurate, precise and limited to a word or phrase or a simple sentence:

Treating life as an adventure is the best quality of successful people. A person's security lies not in his comfort zone, but in his initiative, creativity and courage. Effective people do not label others from their past success or failure, but rediscover each time they meet them. These people are not overawed by top celebrities, cine personalities and sadhus. Winning people are excellent team players to take part in the process of creative problem solving. They are skillful at balancing their strengths and weaknesses with others. The final character of victorious people is exercising the four dimensions of life i.e., physical, mental, emotional, and enthusiastic.

Questions:

a) What is the best quality of successful people?
b) List out the three qualities which make a person secure?
c) Why are the effective people not wondered at the lives of celebrities?
d) What do the team players do?
e) What is the special skill of the winning people?
f) What is the final character of victorious people?
g) What qualities of effective or winning people do you want to inculcate?
h) Pick the word from the passage that would mean: "the feeling of respect, wonder and fear all together at something or someone"

<div align="center">OR</div>

  B) Read the following passage and answer the questions that follow. Your answer should be accurate, precise and limited to a word or phrase or a simple sentence:

Benjamin Franklin was born in 1706 in Boston, Massachusetts. He came from a big family. He had 16 brothers and sisters. When Benjamin was 15, his brother started the first Boston newspaper. It was called 'The New England Courant'. He worked for the newspaper for a short time, but he was not happy. So, he went to Philadelphia and worked as a printer. In 1729, he bought a newspaper business. The newspaper was the 'Pennsylvania Gazette'. He was very busy. In 1733, he started publishing 'Poor Richard's Almanac'. His pen name (the name he used as an author) was Richard Saunders. This book came out every year. Almanacs have information about weather and crops. They also have wise sayings. The wise saying "A penny saved is a penny earned" comes

from Poor Richard's Almanac. Benjamin Franklin was also an inventor. In 1743 he invented a very good stove called the Franklin stove. He invented swim fins. He invented bifocal glasses. He also invented the first odometer. He retired from his newspaper business in 1749. He stopped working on it. Then he became busy with science. Benjamin Franklin was also very interested in American politics. He helped Thomas Jefferson write the Declaration of Independence. In 1776, he and other people signed the Declaration of Independence. Franklin died on April 17, 1790. He was 84 years old.

Questions:

a) How many siblings did Benjamin Franklin have?

b) What was the newspaper started by his brother?

c) What did he buy after working as a printer?

d) What information was available in his Almanacs?

e) Mention any two inventions made by Benjamin Franklin?

f) Rewrite the meaning of the saying in your own words: "A penny saved is a penny earned"

g) Which American president was Benjamin Franklin associated with?

h) Pick the word from the passage that would mean: "external limbs of fish that help them swim and steer".

Time: 90 Mnts.   **Max. Marks: 40**

Part-A   **16 Marks**

Instructions: Answer all the questions and the first question carries 4 marks. Question a from 2 to 5 carry Three marks each. The marks will be awarded only for the desired and accurate language / grammatical expressions.

1. Fill in the blank with proper verb form using the base form given in the brackets.   (1x4=4M)
   a) The match _____ (start) already before we entered the stadium.
   b) Rani _____ (clean) dishes when the phone rang.
   c) They _____(hold) the thief tightly until the police arrived.
   d) Mr. Rajesh and his team _____(work) on this project since last month.

2. Fill in the blank with the appropriate word from the pair given in the brackets.   (1x3=3M)
   a) Bread and butter _____ a wholesome breakfast. (is / are)
   b) The minister accompanied by his staff _____already arrived. (have/ has)
   c) Not only the film director but also all the actors _____facilitated by the committee. (was/ were)

3. Frame two different 'Wh' questions and one 'Yes-No' question from the following: (1x3=3M)
   India is the second most populous country just behind China. It is expected that in a few months, India stands top on the list due to our unprecedented birth rate. On the contrary, Japan is losing its population. The rate of death in Japan is double when compared to its birth rate of the country.

4. Convert the following sentences as directed.   (1x3=3M)
   a) I want your bike for one hour. (convert into an imperative sentence)
   b) It is a very beautiful garden. (convert into an exclamatory sentence)
   c) Alas! what a great tragedy. (convert into a declarative sentence)

5. Use the following words/ phrases/ linkers in sentences of your own: (1x3=3M)
    a) struggle   ii) ground breaking   iii) however

Part-B   **8X3=24 Marks**

Instructions: Answer all the questions. Each question carries 8 marks. The marks will be awarded for the appropriate content, quality and clarity of expressions, but not the length of your answer.

6. A)   Write a paragraph in around 120 words about dealing with obstacles and failures in one's life.

OR

   B)   Write a paragraph in around 120 words about protecting our environment.

7. A)   Write a letter to your Principal requesting him / her to issue your Original Tenth marks list as you need to update your ADHAR card with date of birth and other details and return the certificate after the updating work.

OR

   B)   Write a letter to your father requesting him to send you two thousand rupees as you have to pay your hostel fees.

8. A)   Write a paragraph in around 120 words about your future plans after Diploma.

OR

   B)   i) Draft an E-mail to your friend inviting him/her to your village to spend the weekend with you.
        ii) Write a set of instructions at least in five sentences about drawing money from an ATM.

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Unit Test-3:
C23- IOT-101: English

Time: 90 Mnts.   **Max. Marks: 40**

Part-A   **16 Marks**

Instructions: Answer all the questions and the first question carries 4 marks. Question numbers 2 to 5 carry Three marks each. The marks will be awarded only for the desired and accurate language / grammatical expressions.

1. Correct the following sentences: (1 x 4 = 4M)
   a) All the books have been sold out last week.
   b) I, Ramesh and you will together book a cab.
   c) I am feeling terribly cold.
   d) The police has arrested the gang of robbers.

2. Change the voice of the following: (1 x 3 = 3M)
   a) A cat is chasing two rats.
   b) The news has been published recently.
   c) They will certainly win the match.

3. Rewrite the sentences as directed: (1 x 3 = 3M)
   a) Though Rakesh studied well, he could not get the first class.   (Convert into a simple sentence)
   b) It was raining heavily, and so the match was cancelled.   (Convert into a complex sentence)
   c) The horse was too old to gallop. (Convert into a compound sentence)

4. Change the speech of the following as directed: (1 x 3 = 3M)
   a) Satwik said to his mother, "I forgot my water bottle in my classroom."
   b) The teacher ordered the students not to make noise.
   c) Swapna said, "Rajesh, what are you searching for?"

5. Use the following words /phrases/ linkers in sentences of your own: (1 x 3 = 3M)
   i) apologize to   ii) occasionally   iii) for a while

Part-B   **8X3=24 Marks**

Instructions: Answer all the questions. Each question carries 8 marks. The marks will be awarded for the appropriate content, quality and clarity of expressions, but not the length of your answer.

6. A) Write an essay in about 175 words on how the technical inventions changed our lives.

   OR

   B) Write an essay in about 175 words about the significance of the gender equality.

7. A) Write a report about any disaster that you have read in newspaper or witnessed including your suggestions for better preventive measures to mitigate the loss.

   OR

   B) Write a report about the Inter Polytechnics Sports and Games Meet (IPSGM) held in your District head quarters.

8. A) Read the following passage and answer the questions that follow. Your answer should be accurate, precise and limited to a word or phrase or a simple sentence.

   Animals living in modern zoos enjoy several advantages over animals in the wild; however, they must also suffer some disadvantages. One advantage of living in the zoo is that the animals are separated from their natural predators; they are protected and can, therefore, live without risk of being attacked. Another advantage is that they are regularly fed a special, well-balanced diet; thus, they do not have to hunt for food or suffer times when food is hard to find. On the

other hand, zoo animals face several disadvantages. The most important disadvantage is that since they do not have to hunt for food or face their enemies, some animals became bored, discontented or even nervous. Another disadvantage is that zoo visitors can endanger their lives. Some animals can pick up airborne diseases from humans.

Questions:

a) What are the two animal habitations mentioned in the passage?

b) Give the main advantage of animals living in zoo.

c) What kind of food is the zoo animals fed with?

d) What is the most disadvantage aspect faced by the zoo animals?

e) How do you think that the visitors can harm the zoo animals?

f) Do you support keeping the animals in a zoo for our entertainment? Justify your answer in a sentence.

g) Pick the word from the passage that would mean: A violent or bigger animal that kills and eats the other tiny animal.

h) Suggest a suitable title for the passage.

<div align="center">OR</div>

B) Read the following passage and answer the questions that follow. Your answer should be accurate, precise and limited to a word or phrase or a simple sentence.

"I say to you today, my friends, even though we face the difficulties' of today and tomorrow, I still have a dream. I have a dream that one day this nation will rise up, live out the true meaning of its creed. I have a dream that one day on the red hills of Georgia sons of former slaves and sons of former slave-owners will be able to sit down together at the table of brotherhood. I have a dream that my four little children will one day live in a nation where they will not be judged by the colour of their skin but by the content of their character. I have a dream…. I have a dream that one day in Alabama, with its vicious racists, with its governor having his lips dripping with the words of interposition and nullification, one day right there in Alabama little black boys and black girls will be able to join hands with little white boys and white girls as sisters and brothers:" On 28th August in 1963, Dr. Martin Luther King, Jr. spoke these immortal words to a crowd of over 200000 people who had gathered for the now historic march in Washington to demand an end to racial segregation in the USA, and for equality in jobs and civil rights.

Questions:

a) Who is the speaker of the above speech and what is his nationality?

b) What is the occasion of the above speech: (   )

    i) a birthday party   ii) an election campaign

    iii) a movement for a right cause   iv) a government function

c) What sort of discrimination did the speaker fight against?

d) What good does he expect regarding the children of slaves and masters?

e) What is the contextual meaning of the frequently used word "dream" ?

f) How should a nation be judged?

g) What are the two places mentioned by the speaker in his speech?

h) Pick the word from the passage that would mean: "that lives for ever without death"

<div align="center">***</div>

IOT-102, ENGINEERING MATHEMATICS-I
(Common to all Branches)

Course Code	Course Title	No. of Periods/week	Total No. of periods	Marks for FA	Marks for SA
IOT-102	Engineering Mathematics-I	5	150	20	80

S.No.	Chapter	No. of Periods	Marks Allotted	Short type	Essay type	COs mapped
Unit - I: Algebra						
1	Functions	6	3	1	0	CO1
2	Partial Fractions	5	3	1	0	CO1
3	Matrices and Determinants	20	16	2	1	CO1
Unit - II: Trigonometry						
4	Trigonometric Ratios	2	0	0	0	CO2
5	Compound Angles	5	3	1	0	CO2
6	Multiple and Submultiple angles	8	3	1	0	CO2
7	Transformations	6	5	0	1/2	CO2
8	Inverse Trigonometric Functions	6	5	0	1/2	CO2
9	Trigonometric Equations	6	5	0	1/2	CO2
10	Properties of triangles	5	5	0	1/2	CO2
11	Complex Numbers	6	3	1	0	CO2
Unit III: Co-ordinate Geometry						
12	Straight Lines	5	3	1	0	CO3
13	Circles	6	5	0	1/2	CO3
14	Conic Sections	12	5	0	1/2	CO3
Unit – IV: Differential Calculus						
15	Limits and Continuity	6	3	1	0	CO4
16	Differentiation	28	23	1	2	CO4
Unit – V: Applications of Derivatives						
17	Geometrical Applications	4	5	0	1/2	CO5
18	Physical Applications	6	5	0	1/2	CO5
19	Maxima and Minima	4	5	0	1/2	CO5
20	Errors and Approximations	4	5	0	1/2	CO5
	Total	150	110	10	8	
	Marks			30	80	

| Course Objectives | (i) | To apply the principles of Algebra, Trigonometry and Co-Ordinate Geometry to real-time problems in engineering. |
| | (ii) | To comprehend and apply the concept of Differential Calculus in engineering applications. |

Course Outcomes	CO1	Identify functions as special relations, resolve partial fractions and solve problems on matrices and determinants.
	CO2	Solve problems using the concept of trigonometric functions, their inverses and complex numbers.
	CO3	Find the equations and properties of straight lines, circles and conic sections in coordinate system.
	CO4	Evaluate the limits and derivatives of various functions.
	CO5	Find solutions for engineering problems using differentiation.

Learning Outcomes:

UNIT - I

C.O. 1 Identify functions, resolve partial fractions and solve problems on matrices and determinants.

L.O. 1.1 Define Set, ordered pair and Cartesian product of two sets - examples.

1.2 Explain Relations and Functions – examples

1.3 Find Domain & Range of functions – simple examples.

1.4 Define *one-one* and *onto* functions.

1.5 Find the inverse of a function – simple examples.

1.6 Define rational, proper and improper fractions of polynomials.

1.7 Explain the procedure of resolving proper fractions of the types mentioned below into partial fractions

$$i) \quad \frac{f(x)}{(ax+b)(cx+d)} \quad ii) \quad \frac{f(x)}{(ax+b)^2(cx+d)}$$

1.8 Define a matrix and order of a matrix.

1.9 State various types of matrices with examples (emphasis on 3rd order square matrices).

1.10 Compute sum, difference, scalar multiplication and product of matrices. Illustrate the properties of these operations such as commutative, associative and distributive properties with examples and counter examples.

1.11 Define the transpose of a matrix and state its properties – examples.

1.12 Define symmetric and skew-symmetric matrices with examples. Resolve a square matrix into a sum of symmetric and skew-symmetric matrices and provide examples.

1.13 Define determinant of a square matrix; minor, co-factor of an element of a 3x3 square matrix with examples. Expand the determinant of a 3 x 3 matrix using Laplace expansion formula. State and apply the properties of determinants to solve problems.

1.14 Distinguish singular and non-singular matrices. Define multiplicative inverse of a matrix and list properties of adjoint and inverse. Compute adjoint and multiplicative inverse of a square matrix.

1.15 Solve system of 3 linear equations in 3 unknowns using Cramer's rule and matrix inversion method.

UNIT - II

C.O. 2 Solve problems using the concept of trigonometric functions, their inverses and complex numbers.

L.O.
2.1 Define trigonometric ratios of any angle - List the values of trigonometric ratios at specified values.

2.2 Draw graphs of trigonometric functions - Explain periodicity of trigonometric functions.

2.3 Define compound angles and state the formulae of sin(A±B), cos(A±B), tan(A±B) and cot(A±B).

2.4 Give simple examples on compound angles to derive the values of $\sin 15^0$, $\cos 15^0$, $\sin 75^0$, $\cos 75^0$, $\tan 15^0$, $\tan 75^0$ etc.

2.5 Derive identities like sin(A+B) sin(A-B) = $\sin^2 A - \sin^2 B$ etc.

2.6 Solve simple problems on compound angles.

2.7 Derive the formulae of multiple angles 2A, 3A etc and sub multiple angles A/2 in terms of angle A of trigonometric functions.

2.8 Derive useful allied formulae like $\sin^2 A = (1 - \cos 2A)/2$ etc.

2.9 Solve simple problems using the multiple and submultiple formulae.

> Syllabus for Unit test-I completed

2.10 Derive the formulae on transforming sum or difference of two trigonometric ratios in to a product and vice versa - examples on these formulae.

2.11 Solve problems by applying these formulae to sum or difference or product of two terms.

2.12 Explain the concept of the inverse of a trigonometric function by selecting an appropriate domain and range.

2.13 Define inverses of six trigonometric functions along with their domains and ranges.

2.14 Derive relations between inverse trigonometric functions so that the given inverse trigonometric function can be expressed in terms of other inverse trigonometric functions with examples.

2.15 State various properties of inverse trigonometric functions and identities like $\sin^{-1}x + \cos^{-1} x = \dfrac{\pi}{2}$, etc.

2.16 Apply formulae like $\tan^{-1} x + \tan^{-1} y = \tan^{-1}\left(\dfrac{x+y}{1-xy}\right)$, $where\ x \geq 0, y \geq 0, xy < 1$ etc., to solve Simple problems.

2.17 Explain what is meant by solution of trigonometric equations and find the general solutions of sin x=k, cos x =k and tan x=k with appropriate examples.

2.18 Solve models of the type a $\sin^2 x$ + b sin x +c=0 and a sin x + b cos x=c.

2.19 State sine rule, cosine rule, tangent rule and projection rule and solve a triangle using these formulae.

2.20 List various formulae for the area of a triangle with examples.

2.21 Define a complex number, its modulus, conjugate, amplitude and list their properties.

2.22 Define arithmetic operations on complex numbers with examples.

2.23 Represent the complex number in various forms like modulus-amplitude (polar) form, Exponential (Euler) form with examples.

UNIT - III

Coordinate Geometry

C.O. 3 Find the equations and properties of straight lines, circles and conic sections in coordinate system.

L.O. 3.1 Write the different forms of a straight line – general form, point-slope form, slope-intercept form, two-point form, intercept form and normal form (or perpendicular form).

3.2 Find distance of a point from a line, acute angle between two lines, intersection of two non-parallel lines and distance between two parallel lines.

3.3 Define locus of a point and circle.

3.4 Write the general equation of a circle and find its centre and radius.

3.5 Find the equation of a circle, given (i) centre and radius, (ii)two ends of the diameter (iii) three non collinear points of type (0,0) (a,0), (0, b).

3.6 Define a conic section - Explain the terms focus, directrix, eccentricity, axes and latus-rectum of a conic with illustrations.

3.7 Find the equation of a conic when focus, directrix and eccentricity are given.

3.8 Describe the properties of Parabola, Ellipse and Hyperbola in standard forms whose axes are along the co-ordinate axes and solve simple examples on these conics.

> Syllabus for Unit test-II completed

C.O.4 Evaluate the limits and derivatives of various functions.

L.O. 4.1 Explain the concept of limit and meaning of $\lim\limits_{x \to a} f(x) = l$ and state the properties of limits.

4.2 Evaluate the limits of the type $\lim\limits_{x \to l} \dfrac{f(x)}{g(x)}$ and $\lim\limits_{x \to \infty} \dfrac{f(x)}{g(x)}$

4.3 State the Standard limits $\lim\limits_{x \to a} \dfrac{x^n - a^n}{x - a}$, $\lim\limits_{x \to 0} \dfrac{\sin x}{x}$, $\lim\limits_{x \to 0} \dfrac{\tan x}{x}$, $\lim\limits_{x \to 0} \dfrac{a^x - 1}{x}$, $\lim\limits_{x \to 0} \dfrac{e^x - 1}{x}$, $\lim\limits_{x \to 0} (1+x)^{\frac{1}{x}}$, $\lim\limits_{x \to \infty} \left(1 + \dfrac{1}{x}\right)^x$ (without proof) and solve simple problems using these standard limits.

4.4 Explain the concept of continuity of a function at a point and on an interval

4.5 State the concept of derivative of a function y = f(x) – definition, first principle as $\lim\limits_{h \to 0} \dfrac{f(x+h) - f(x)}{h}$ and also provide standard notations to denote the derivative of a function.

4.6 Explain the significance of derivative in scientific and engineering applications.

4.7 Find the derivative of standard algebraic, logarithmic, exponential and trigonometric functions using the first principle.

4.8 Find the derivatives of inverse trigonometric and hyperbolic functions.

4.9 State the rules of differentiation of sum, difference, scalar multiplication, product and quotient of functions with simple illustrative examples.

4.10 Explain the method of differentiation of a function of a function (Chain rule) with illustrative examples.

4.11 Explain the method of differentiation of parametric functions with examples.

4.12 Explain the procedure for finding the derivatives of implicit functions with examples.

4.13   Explain the need of taking logarithms for differentiating some functions of $[f(x)]^{g(x)}$ type – examples on logarithmic differentiation.

4.14   Explain the concept of finding the second order derivatives with examples.

4.15   Explain the concept of functions of several variables, finding partial derivatives and difference between the ordinary and partial derivatives with simple examples.

4.16   Explain the concept of finding second order partial derivatives with simple problems.

C.O. 5 Evaluate solutions for engineering problems using differentiation

L.O. 5.1   State the geometrical meaning of the derivative - Explain the concept of derivative to find the slopes of tangent and normal to a given curve at any point on it with examples.

5.2   Find the equations of tangent and normal to to a given curve at any point on it – simple problems.

5.3   Explain the derivative as a rate of change in distance-time relations to find the velocity and acceleration of a moving particle with examples.

5.4   Explain the derivative as a rate measurer in the problems where the quantities like areas, volumes vary with respect to time- illustrative examples.

5.5   Define the concept of increasing and decreasing functions - Explain the conditions to find points where the given function is increasing or decreasing with illustrative examples.

5.6   Explain the procedure to find the extreme values (maxima or minima) of a function of single variable- simple problems for quadratic and cubic polynomials.

5.7   Apply the concept of derivatives to find the errors and approximations - simple problems.

| Syllabus for Unit test-III completed |

CO/PO – Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3				3	2	2
CO2	3	3	2	2				3	2	2
CO3	3	3	2	2				3	2	2
CO4	3	3	3	3				3	3	3
CO5	3	3	3	3				3	3	3
Avg.	3	2.8	2.4	2.6				3	2.4	2.4

3 = Strongly mapped (High), **2 =**moderately mapped (Medium), **1 =**slightly mapped (Low)

Note: The gaps in CO/PO mapping can be met with appropriate activities as follows:

For PO5:   Appropriate quiz programmes may be conducted at intervals and duration as decided by concerned faculty.

For PO6:   Seminars on applications of mathematics in various engineering disciplines are to be planned and conducted.

For PO7:   Plan activities in such a way that students can visit the Library to refer standard books on Mathematics and access the latest updates in reputed national and international journals. Additionally, encourage them to attend seminars and learn mathematical software tools.

PO- CO – Mapping strength

PO No	Mapped with CO no	CO periods addressing PO in column I		Level (1,2 or 3)	Remarks
		No	%		
1	CO1, CO2, CO3, CO4, CO5	150 (31+44+23+34+18)	100%	3	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately addressed 5% to 25% Level 1 Low addressed <5% Not addressed
2	CO1, CO2, CO3, CO4, CO5	80 (8+23+12+22+15)	53.3%	3	
3	CO1, CO2, CO3, CO4, CO5	61 (9+14+9+14+15)	40.6%	3	
4	CO1, CO2, CO3, CO4, CO5	61 (14+9+9+14+15)	40.6%	3	
PSO 1	CO1, CO2, CO3, CO4, CO5	150 (31+44+23+34+18)	100%	3	
PSO 2	CO1, CO2, CO3, CO4, CO5	62 (10+14+9+14+15)	41.3%	3	
PSO 3	CO1, CO2, CO3, CO4, CO5	62 (10+14+9+14+15)	41.3%	3	

COURSE CONTENT

Unit-I

Algebra

1. **Functions**:

   Definitions of Set, Ordered pair, Cartesian product of two sets, Relations, Functions, Domain & Range of functions – **One-one** and **onto** functions, inverse of a function.

2. **Partial Fractions:**

   Definitions of rational, proper and improper fractions of polynomials. Resolve rational fractions (proper fractions) into partial fractions covering the types mentioned below.

   $$i) \quad \frac{f(x)}{(ax+b)(cx+d)} \qquad\qquad ii) \quad \frac{f(x)}{(ax+b)^2(cx+d)}$$

3. **Matrices:**
   Definition of a matrix, types of matrices - Algebra of matrices, equality of two matrices, sum, difference, scalar multiplication and product of matrices. Transpose of a matrix, Symmetric, skew-symmetric matrices - Minor, cofactor of an element, Determinant of a square matrix, Laplace's expansion, properties of determinants - Singular and non-singular matrices, Adjoint and multiplicative inverse of a square matrix-System of linear equations in 3 variables-Solutions by Cramer's rule and Matrix inversion method.

Unit-II
Trigonometry

4. **Trigonometric ratios:**
   Definition of trigonometric ratios of any angle, values of trigonometric ratios at specified values, draw graphs of trigonometric functions, periodicity of trigonometric functions.

5. **Compound angles:**
   Formulas of sin(A±B), cos(A±B), tan(A±B), cot(A±B), and related identities.

6. **Multiple and sub multiple angles:**
   Formulae for trigonometric ratios of multiple angles 2A, 3A and sub multiple angle A/2.

7. **Transformations:**
   Transformations of products into sums or differences and vice versa.

8. **Inverse trigonometric functions:**
   Definition, domains and ranges-basic properties.

9. **Trigonometric equations:**
   Concept of a solution, principal value and general solution of trigonometric equations:
   Sinx =k, cosx= k, tanx =k, where k is a constant. Solutions of simple quadratic equations and equations of type a sin x + b cos x=c.

10. **Properties of triangles:**
    Relations between sides and angles of a triangle- sine rule, cosine rule, tangent rule and projection rule-area of a triangle.

11. **Complex Numbers:**
    Definition of a complex number, modulus, conjugate and amplitude of a complex number - Arithmetic operations on complex numbers - Modulus-Amplitude (polar) form, Exponential form (Euler form) of a complex number.

UNIT-III
Coordinate geometry

12 **Straight lines:** Various forms of a straight line - Angle between two lines, perpendicular distance from a point, intersection of non-parallel lines and distance between parallel lines.

13. **Circle:** Locus of a point, Circle definition - Circle equation given (i) centre and radius, (ii) two ends of a diameter (iii) three non-collinear points of type (0,0), (a,0), (0, b) - General equation of a circle –its centre and radius.

14. Definition of a conic section - Equation of a conic when focus, directrix and eccentricity are given - Properties of parabola, ellipse and hyperbola in standard forms.

UNIT-IV
Differential Calculus

15. **Concept of Limit-** Definition and Properties of Limits and Standard Limits -Simple Problems- Continuity of a function at a point.

16. **Concept of derivative-** Definition (first principle)- different notations - Derivatives of standard algebraic, logarithmic, exponential, trigonometric, inverse trigonometric and hyperbolic functions - Derivatives of sum, difference, scalar multiplication, product, quotient of functions - Chain rule, derivatives of parametric functions, derivatives of implicit functions, logarithmic differentiation - Second order derivatives - Functions of several variables, first and second order partial derivatives.

UNIT-V
Applications of Derivatives

17. Geometrical meaning of the derivative, equations of tangent and normal to a curve at any point.

18. Physical applications of derivatives – Velocity, acceleration, derivative as a rate measurer.

19. Applications of the derivative to find the extreme values – Increasing and decreasing functions, maxima and minima for quadratic and cubic polynomials.

20. Absolute error, relative and percentage errors - Approximate values due to errors in measurements.

Textbook:

Engineering Mathematics-I, a textbook for first year diploma courses, prepared & prescribed by SBTET, AP.

Reference Books:

1. Shanti Narayan, A Textbook of matrices, S.Chand&Co.
2. Robert E. Moyer & Frank Ayers Jr., Schaum's Outline of Trigonometry, 4th Edition, Schaum's Series.
3. G.B.Thomas, R.L.Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.
4. Frank Ayers & Elliott Mendelson, Schaum's Outline of Calculus, Schaum's Series.
5. M.Vygodsky, Mathematical Handbook, Mir Publishers, Moscow.

Blue print

S.No.	Chapter/Unit title	No. of Periods	Weightage Allotted	Short type			Essay type			COs mapped
				R	U	Ap	R	U	Ap	
				Unit - I: Algebra						
1	Functions	5	3	1	0	0	0	0	0	CO1
2	Partial Fractions	6	3	1	0	0	0	0	0	CO1
3	Matrices and Determinants	20	16	2	0	0	0	0	1	CO1
				Unit - II: Trigonometry						
4	Trigonometric Ratios	2	0	0	0	0	0	0	0	CO2
5	Compound Angles	5	3	1	0	0	0	0	0	CO2
6	Multiple and Submultiple angles	8	3	1	0	0	0	0	0	CO2
7	Transformations	6	5	0	0	0	0	1/2	0	CO2
8	Inverse Trigonometric Functions	6	5	0	0	0	0	1/2	0	CO2
9	Trigonometric Equations	6	5	0	0	0	0	1/2	0	CO2
10	Properties of triangles	5	5	0	0	0	0	0	1/2	CO2
11	Complex Numbers	6	3	1	0	0	0	0	0	CO2
				Unit III: Co-ordinate Geometry						
12	Straight Lines	6	5	0	0	0	0	1/2	0	CO3
13	Circles	5	3	1	0	0	0	0	0	CO3
14	Conic Sections	12	5	0	0	0	0	1/2	0	CO3
				Unit – IV: Differential Calculus						
15	Limits and Continuity	6	6	1	1	0	0	0	0	CO4
16	Differentiation	28	20	0	0	0	1	1	0	CO4
				Unit – V: Applications of Derivatives						
17	Geometrical Applications	4	5	0	0	0	0	0	1/2	CO5
18	Physical Applications	6	5	0	0	0	0	0	1/2	CO5
19	Maxima and Minima	4	5	0	0	0	0	0	1/2	CO5
20	Errors and Approximations	4	5	0	0	0	0	0	1/2	CO5
Total		150	110	9	1	0	1	3 1/2	3 1/2	
Marks				27	3	0	10	35	35	

R: Remembering Type:37 Marks; U: understanding Type : 38 Marks; Ap: Application Type   : 35 Marks

Unit Test Syllabus

Unit Test	Syllabus
Unit Test-I	From L.O. 1.1 to L.O. 2.9
Unit Test-II	From L.O. 2.10 to L.O. 3.8
Unit Test-III	From L.O.4.1 to L.O. 5.7

C –23, IOT -102
Unit Test I
State Board of Technical Education and Training, A. P.
First Year
Subject name: Engineering Mathematics-I
Sub Code: IOT-102

Time: 90 minutes   Max.marks:40
Part-A   **16Marks**

Instructions: **(1) Answer all questions.**
(2) First question carries four marks and the remaining questions carry
Three marks each.

1.   Answer the following:

a.   If $X = \{1,2,3,4\}$ and $Y = \{1,4,9,16,25\}$, then $f : X \to Y$ defined by

$f = \{(1,1),(2,4),(3,9),(4,16)\}$ is a function: State TRUE/FALSE.   (CO1)

b.   If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, then 3A =_____.   (CO1)

c.   The value of $\sin 45° + \cos 45^o$ is _____.   (CO2)

d.   The formula for $\tan 2A$ in terms of $\tan A$ is _____.   (CO2)

2.   If $A = \begin{bmatrix} 1 & 3 \\ 4 & -9 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 4 \\ -3 & 1 \end{bmatrix}$ then find $A + B$.   (CO1)

3.   Find the determinant of $\begin{bmatrix} 2 & -1 & 4 \\ 0 & -2 & 5 \\ -3 & 1 & 3 \end{bmatrix}$.   (CO1)

4.   Find the value of $\sin75^0$.   (CO2)

5.   Prove that $\dfrac{\sin 2A}{1 - \cos 2A} = \cot A$ (CO2)

Instructions: **(1) Answer all questions.**

(2) Each question carries eight marks

(3) Answer should be comprehensive and the criterion for valuation

   is the content but not the length of the answer.

6. A) Resolve $\dfrac{2x}{(x-1)(x-3)}$ into partial fractions. (CO1)

or

B) Resolve $\dfrac{x-4}{(x-2)(x-3)}$ into partial fractions. (CO1)

7. A) If $A = \begin{bmatrix} 2 & 3 & 4 \\ 5 & 7 & 9 \\ -2 & 1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 1 & -5 \\ 2 & 1 & 4 \\ 0 & 3 & 1 \end{bmatrix}$, then find AB (CO1)

Or

B) If $P = \begin{bmatrix} 3 & 1 & 4 \\ 1 & -2 & 0 \\ 3 & 1 & 6 \end{bmatrix}$ and $Q = \begin{bmatrix} 1 & 5 & -3 \\ 0 & 6 & 9 \\ -2 & 7 & 8 \end{bmatrix}$, show that $(P+Q)^T = P^T + Q^T$. (CO1)

8. A) Find the adjoint of the matrix $\begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 5 \\ 2 & 7 & -4 \end{bmatrix}$ (CO1)

or

B) Solve the following system of linear equations by Cramer's rule:

$x - y + z = 2, 2x + 3y - 4z = -4, 3x + y + z = 8$ (CO1)

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State Board of Technical Education and Training, A. P.

First Year

Subject name: Engineering Mathematics-I

Sub Code: IOT- 102

<u>Time: 90 minutes</u>   <u>Max.marks:40</u>

Part-A   **16Marks**

Instructions: **(1) Answer all questions.**

(2) First question carries four marks and the remaining questions carry three marks each

1.   Answer the following.

   a. $\sin C + \sin D = 2\cos\left(\dfrac{C+D}{2}\right)\sin\left(\dfrac{C-D}{2}\right)$: State TRUE/FALSE (CO2)

   b.   If $\sin^{-1}\left(\frac{3}{5}\right) = \tan^{-1}(x)$, then $x = $ _____.   (CO2)

   c.   If $z = 2 + 3i$, then $|z| = $ _____.   (CO2)

   d.   The eccentricity of the rectangular hyperbola is _____.   (CO3)

2.   Express $(3 - 4i)(7 + 2i)$ in terms of $a + ib$ (CO2)

3.   Find the intercepts made by the straight line $x + 5y - 10 = 0$.   (CO3)

4.   Find the centre and radius of the circle $x^2 + y^2 - 2x + 4y - 4 = 0$ (CO3)

5.   Find the vertex and focus of the parabola $y^2 = 8x$.   (CO3)

Part-B   **3×8=24**

Instructions: **(1) Answer all questions.**

(2) Each question carries eight marks

(3) Answer should be comprehensive and the criterion for valuation

is the content but not the length of the answer.

6.   A)   Prove that $\frac{sin5\theta + sin\theta}{cos5\theta + cos\theta} = tan3\theta$.   (CO2)

                or

   B)   Prove that $tan^{-1}\left(\frac{1}{4}\right) + tan^{-1}\left(\frac{3}{5}\right) = \frac{\pi}{4}$ (CO2)

7. A) Solve $2\sin^2\theta - \sin\theta - 1 = 0$ (CO2)

                or

   B) If a =3, b=4, c=5, find the area of the ΔABC.   (CO2)

8. A) Find the equation of the line passing through $(1,1)$ and perpendicular to the line $2x + 3y - 1 = 0$. Also find the perpendicular distance from the given point to the given line.   (CO3)

                or

   B) Find the equation of the ellipse whose focus is (2, 0), directrix is x+y-1= 0 and eccentricity is ½.   (CO3)

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State Board of Technical Education and Training, A. P

First Year

Subject name: Engineering Mathematics-I

Sub Code: IOT-102

<u>Time: 90 minutes</u>   **Max.Marks:40**

Part-A   **16 Marks**

Instructions: **(1) Answer all questions.**

(2) First question carries four marks and the remaining questions carry three marks each.

1.   Answer the following:

    a. $\lim\limits_{x\to1}\dfrac{x^2+1}{x+5}=\dfrac{1}{3}$: State TRUE/FALSE.   (CO4)

    b. $\dfrac{d}{dx}(x^n)=\underline{\hspace{1cm}}$ (CO4)

    c. $\dfrac{d}{dx}\left(3\tan^{-1}x\right)=?$ (CO4)

    d.   Write the formula for finding the percentage error in x.   (CO5)

2.   Evaluate $\lim\limits_{\theta\to0}\dfrac{sin2\theta}{\theta}$ (CO4)

3.   Find the derivative of $3\tan x+4\log x$ w.r.t. x.   (CO4)

4.   Differentiate $x^2\sin x$ w.r.t. x.   (CO4)

5.   Find the slope of the tangent to the curve $y=x^3-3x+2$ at the point $(1,7)$.   (CO5)

Part-B   **3×8=24**

Instructions: **(1) Answer all questions.**

(2) Each question carries eight marks

(3) Answer should be comprehensive and the criterion for valuation

       is the content but not the length of the answer.

6.   A)   if $x=at^2$ and $y=2at$ then find $\dfrac{dy}{dx}$ (CO4)

            or

    B)   Find $\dfrac{dy}{dx}$, if $y=x^x$ (CO4)

7. A) If $y = ae^x + be^{-x}$, then prove that $\dfrac{d^2 y}{dx^2} - y = 0.$ (CO4)

    or

    B) If $u(x, y) = \log(x + y)$, then find $\dfrac{\partial u}{\partial x}$ and $\dfrac{\partial u}{\partial y}$ (CO4)

8. A) The radius of a sphere is decreasing at a rate of 0.2 cm/sec. How fast is its surface area decreasing when the radius is 10 cm.   (CO5)

    or

    B) Find the maximum and minimum values of the function $f(x) = x^3 - 3x$.

       (CO5)

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STATE BOARD OF TECHNICAL EDUCATION, A.P
C-23 ENGINEERING MATHEMATICS-I, IOT- 102

TIME: 3 HOURS   MODEL PAPER- I   MAX.MARKS: 80M
PART-A

Answer All questions. Each question carries THREE marks.   **10x3=30M**

1. If $A = \left\{0, \dfrac{\pi}{4}, \dfrac{\pi}{2}\right\}$ and $f : A \to B$ is a function defined by $f(x) = \cos x$, then find the range of

    f.   (CO1)

2. Resolve the function $\dfrac{x}{(x-1)(x-2)}$ into partial fractions.   (CO1)

3. If $A = \begin{bmatrix} 3 & 9 & 0 \\ 1 & 8 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 0 & 2 \\ 7 & 1 & 4 \end{bmatrix}$, find A+B   (CO1)

4. Find the determinant of the matrix $\begin{bmatrix} 2 & -1 & 4 \\ 0 & -2 & 5 \\ -3 & 1 & 3 \end{bmatrix}$ by Laplace's expansion.   (CO1)

5. Show that $\dfrac{\cos 16^0 + \sin 16^0}{\cos 16^0 - \sin 16^0} = \tan 61^0$.   (CO2)

6. Prove that $\dfrac{\sin 2\theta}{1 - \cos 2\theta} = \cot \theta$.   (CO2)

7. Find the modulus of the complex number $3 + 4i$.   (CO2)

8. Find the equation of the circle with centre (0, 0) and radius 5.   (CO3)

9. Evaluate $\lim\limits_{x \to 0} \dfrac{2x^2 - 3x + 1}{x^2 - 2x + 4}$.   (CO4)

10. Find $\lim\limits_{x \to 0} \dfrac{\sin 77x}{\sin 11x}$.   (CO4)

PART-B

Answer any FIVE questions. Each question carries TEN marks.   **5x10=50M**

11. Solve the system of linear equations $x + y + z = 6$, $x - y + z = 2$ and $2x + y - z = 1$ using matrix

    inversion method.   (CO1)

12. A) Show that $\dfrac{sin7\theta + sin5\theta}{cos7\theta + cos5\theta} = tan6\theta$.   (CO2)

    B) Prove that $tan^{-1}\left(\dfrac{1}{7}\right) + tan^{-1}\left(\dfrac{1}{13}\right) = tan^{-1}\left(\dfrac{2}{9}\right)$ (CO2)

66

13. A) Solve $(2\sin x - 1)(\tan x - \sqrt{3}) = 0$. (CO2)

   B) If a =10, b=12, c =5, then find the area of the ΔABC. (CO2)

14. A) Find the distance between the parallel lines $4x - 3y + 9 = 0$ and

$4x - 3y + 5 = 0$. Also find their slopes. (CO3)

   B) Find the equation of the conic whose focus is (1,0), directrix is 3x+4y+1=0 and

   eccentricity is 2. (CO3)

15. A) Find the derivative of $3tanx - 4logx - 7x^2 + \sqrt{x}$ w.r.t x. (CO4)

   B) Find the derivative of $x^2 e^{3x}$ w.r.t x. (CO4)

16. A) If $x = a(1 - \cos\theta)$, $y = a(\theta + \sin\theta)$, then find $\dfrac{dy}{dx}$. (CO4)

   B) If $u(x,y) = x^2 y + y^2 x$, then find $\dfrac{\partial u}{\partial x}$ and $\dfrac{\partial u}{\partial y}$ (CO4)

17. A) Find the equation of tangent to the curve $y = x^2 + 1$ at (2,1). (CO5)

   B) The radius of a circular plate is increasing at 0.7 cm/sec. What is the rate
   of increase in its area when radius is 10 cm? (CO5)

18. A) Find maximum or minimum value of $f(x) = x^2 - 4x + 3$. (CO5)

   B) If an error of 0.02 cm is made in the side of a square, what is the approximate error in the
   area and perimeter of the square? (CO5)

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TIME: 3 HOURS   **MODEL PAPER- II**   **MAX.MARKS: 80M**

PART-A

Answer All questions. Each question carries THREE marks.   **10x3=30M**

1. If A={-1, 0, 1} and $f : A \rightarrow B$ is defined by $f(x) = x^2 - x + 1$, then find the range of f.

    (CO1)

2. Resolve the function $\dfrac{1}{(x+1)(x-2)}$ into partial fractions.

    (CO1)

3. If A = $\begin{bmatrix} 3 & 9 & 0 \\ 1 & 8 & -2 \end{bmatrix}$ and B= $\begin{bmatrix} 4 & 0 & 2 \\ 7 & 1 & 4 \end{bmatrix}$, then find (A+B)ᵀ.

    (CO1)

4. If A= $\begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$, then find A².

    (CO1)

5. Find the value of $\dfrac{cos36^0 + sin36^0}{cos36^0 - sin36^0} = tan\,81^0$.

    (CO2)

6. Prove that $\dfrac{1+cos2\theta}{sin2\theta} = cot\theta$.

    (CO2)

7. Find the modulus of the complex number 3+2*i*.

    (CO2)

8. Find the equation of the circle with centre (1,2) and radius 4.

    (CO3)

9. Find $\lim\limits_{x\to 0} \dfrac{2x^2-3x+1}{x^2-2x+4}$.

    (CO4)

10. Find $\lim\limits_{x\to 0} \dfrac{\sin 5x}{\tan 3x}$.

    (CO4)

PART-B

Answer any FIVE questions. Each question carries TEN marks.   **5x10=50M**

11. Solve the system of linear equations $x - y + 3z = 5,\ 4x + 2y - z = 0$ and $-x + 3y + z = 5$

    using Cramer's rule.

    (CO1)

12 A) Show that $cos40^0 + cos80^0 + cos160^0 = 0$.

    (CO2)

   B) Prove that $tan^{-1}\left(\dfrac{1}{4}\right) + tan^{-1}\left(\dfrac{3}{5}\right) = \dfrac{\pi}{4}$

    (CO2)

13. A) Solve $2\cos^2\theta - 3\cos\theta + 1 = 0$.

    (CO2)

   B) If a =5, b=7, C =30°, then find the area of the ΔABC.

    (CO2)

14. A) Find the line passing through the point (2,3) and perpendicular to the line

    $x - 7y + 15 = 0$. Also find the distance from the given point to the given line.

    (CO3)

   B) Find the vertex, focus, directrix and latus rectum of the parabola $y^2 = 16x$.

    (CO3)

15. A) Find the derivative of $3\cos x + \log x + 21x + 8e^{-x}$ w.r.t. x.   (CO4)

B) Find the derivative of $\frac{1-x^2}{1+x^2}$ w.r.t. x.   (CO4)

16. A) If $y = x^{\sin x}$, then find $\dfrac{dy}{dx}$.   (CO4)

B) If $y = \tan^{-1} x$, then prove that $\left(1+x^2\right)\dfrac{d^2 y}{dx^2} + 2x\dfrac{dy}{dx} = 0$.   (CO4)

17. A) Find the equation of tangent to the curve $y = x^3 - 2x^2 + 4$ at (2,4).   (CO5)

B) If $s(t) = t^2 + 2t + 3$ is the displacement of a particle, find its velocity and acceleration at the time t=3 sec.   (CO5)

18. A) Find maximum or minimum value of $f(x) = 3 + 10x - 5x^2$.   (CO5)

B) If an error of 0.02 cm is made in the side of a square, then what is the percentage error in the calculated value of its area?   (CO5)

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ENGINEERING PHYSICS

Course code	Course title	No.of periods per week	Total no. of periods	Marks for FA	Marks for SA
IOT-103	Engineering Physics	03	90	20	80

S.No	Major topics	No. of Periods	Weightage of Marks	No. of Short Answer Questions	No. of Essay Questions	COs mapped
1.	Units and measurements	09	03	1	0	CO1
2.	Statics	11	13	1	1	
3.	Gravitation	12	20	0	2	CO2
4.	Concepts of energy	10	13	1	1	
5.	Thermal physics	10	13	1	1	CO3
6.	Sound	12	16	2	1	
7.	Electricity &Magnetism	13	16	2	1	CO4
8.	Modern physics	13	16	2	1	
	Total Periods/Marks	**90**	**110**	**30**	**80**	

Course title : Engineering Physics	
Course objectives	(1) To understand the basic concepts of physics for various Engineering applications as required for industries. (2) To equip the students with the scientific advances in technology and make the student suitable for any industrial or scientific organization.

MATRIX SHOWING MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

COURSE OUTCOMES	CO1	Familiarize with various physical quantities, their SI units and errors in measurements; understand the concepts of vectors and various forces in statics.
	CO2	Understand the concepts of gravitation with reference to applications in satellites, provide the knowledge of various forms of energy and their working principles.
	CO3	Familiarize with the knowledge of transmission of heat and gas laws; provide the knowledge on musical sound and noise as pollution and also the concepts of echo and reverberation.
	CO4	Provide basic knowledge of electricity and concepts of magnetism and magnetic materials; familiarize with the advances in Physics such as photoelectric ell, optical fibers, semiconductors, superconductors and nanotechnology.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	1			2	2		2
CO2	3	2	2	2	2		2	1		2
CO3	2		1		2		1		1	1
CO4	3	2	3	2	2		3	2		2

Matrix showing mapping of Course Outcomes with Program Outcomes

CO-PO Mapping Strength

IOT -103	Engineering Physics				No of periods 90
POs	Mapped with CO No	CO periods addressing PO in Col 1		Level 1,2,3	Remarks
		No	%		
PO1	CO1,CO2,CO3,CO4	44	48.9 %	3	>40% level 3 (highly addressed)
PO2	CO1,CO2, CO4	11	12.2%	1	
PO3	CO1, CO2,CO3, CO4	10	11.1%	1	25% to 40% level 2 (moderately addressed)
PO4	CO1, CO2,CO4	8	8.9%	1	
PO5	CO2,CO3, CO4	8	8.9%	1	5% to 25% level 1 (Low addressed)
PO6					
PO7	CO1, CO2, CO3, CO4	9	10.0%	1	< 5% (not addressed)

3 = strongly mapped,   2 = moderately mapped,   1 = slightly mapped

Note: The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following.
 (i) Seminars   (ii) Tutorials   (iii) Guest Lecturers (iv) Assignments
(v) Quiz competitions   (vi) Industrial visits   (vii) Tech fest   (viii) Mini project
(ix) Group discussions (x) Virtual classes   (xi) Library visit for e-books

Learning outcomes

Upon completion of the course the student shall be able to

1.0   Understand the concept of units and measurements
1.1   Explain the concept of units
1.2   Define the terms
     a) Physical quantity, b) Fundamental physical quantities and
     c) Derived physical quantities
1.3   Define unit
1.4   Define fundamental units and derived units
1.5   State SI units with symbols for fundamental and some derived quantities
1.6   State Multiples and Submultiples in SI system

1.7   State rules of writing S.I units

1.8   State advantages of SI units

1.9   What are direct and indirect measurements.

1.10   Define accuracy and least count

1.11   Define error in measurement

1.12   Define absolute, relative and percentage errors with their formulae

1.13   Solve simple problems on absolute, relative and percentage errors

2.0   Understand the concepts of statics

2.1   Explain the concept of Vectors

2.2   Define scalar and vector quantities with examples

2.3   Represent vectors geometrically

2.4   Define the types of vectors (equal, negative, unit, co-initial, co-planar, position vector)

2.5   Resolve the vector into rectangular components

2.6   State and explain triangle law of addition of vectors

2.7   Define concurrent forces, co-planar forces and equilibrant.

2.8   State and explain Lami's theorem

2.9   State the parallelogram law of addition of forces with diagram.

2.10   Write the expressions for magnitude and direction of resultant (no derivation)

2.11   Illustrate parallelogram law with examples (i) flying of bird and (ii) working of sling.

2.12   Define moment of force and couple.

2.13   Write the formulae and S.I units of moment of force and couple.

2.14   Solve simple problems on (i)Resolution of force and
        (ii) Parallelogram law of forces (finding R,α and θ).

3.0   Understand the concepts of Gravitation

3.1   State and explain Newton's universal law of gravitation.

3.2   Define G and mention its value.

3.3   Explain the acceleration due to gravity (g)

3.4   Explain the factors affecting the value of g

3.5   Derive the relationship between g and G.

3.6.   State and explain the Kepler's laws of planetary motion

3.7   Define a satellite.

3.8   What are natural and artificial satellites? Give examples.

3.9   Define orbital velocity and write its formula.

3.10   Define escape velocity and write its formula.

3.11   Write a brief note on Polar satellites.

3.12   Write a brief note on Geo-stationary satellites.

3.13   Mention the applications of artificial satellites.

3.14   Solve simple problems on (i) Newton's law of gravitation and (ii) calculation of orbital
        and escape velocities.

4.0   Understand the concepts of Energy.

4.1   Define work done and energy. Mention their SI units.

4.2   List various types of energy.

4.3   Define P.E with examples. Write its equation.

4.4   Define K.E with examples. Write its equation.

4.5   Derive relationship between K.E and momentum.

4.6   State the law of conservation of energy. Give various examples.

4.7   Write a brief note on solar energy.

4.8   Explain the principle of solar thermal conversion.

4.9   Explain the principle of photo voltaic effect

4.10 Solve simple problems on (i) work done (ii) P.E & K.E and (iii) Relation between K.E & momentum.

5.0   Understand the concepts of thermal physics

5.1   Define the concepts of heat and temperature

5.2   State different modes of transmission of heat

5.3   Explain conduction, convection and radiation with two examples each.

5.4   State and explain Boyle's law

5.5   Define absolute zero temperature

5.6   Explain absolute scale of temperature

5.7   State the relationship between degree Celsius, Kelvin and Fahrenheit temperatures

5.8   State Charle's law and write its equation

5.9   State Gay-Lussac's law and write its equation

5.10   Define ideal gas

5.11 Derive ideal gas equation

5.12 Explain why universal gas constant (R) is same for all gases

5.13 Calculate the value of R for 1 gram mole of gas.

5.14 Solve simple problems on (i) Inter conversion of temperatures between °C, K and F (ii) Gas laws and (iii) Ideal gas equation.

6.0   Understand the concepts of Sound

6.1   Define the term sound

6.2   Define longitudinal and transverse waves with one example each

6.3   Explain the factors which affect the velocity of sound in air

6.4   Distinguish between musical sound and noise

6.5   Explain noise pollution and state SI unit for intensity of sound

6.6   Explain sources of noise pollution

6.7   Explain effects of noise pollution

6.8   Explain methods of minimizing noise pollution

6.9   Define Doppler effect.

6.10 List the Applications of Doppler effect

6.11 Define reverberation and reverberation time

6.12 Write Sabine's formula and name the physical quantities in it.

6.13 Define echoes and explain the condition to hear an echo.

6.14 Mention the methods of reducing an echo

6.15 Mention the applications of an echo

6.16 What are ultra sonics

6.17 Mention the applications of ultra sonics, SONAR

6.18 Solve simple problems on echo

7.0   Understand the concepts of Electricity and Magnetism

7.1   Explain the concept of P.D and EMF

7.2   State Ohm's law and write the formula

7.3   Explain Ohm's law

7.4   Define resistance and specific resistance. Write their S.I units.

7.5   State and explain Kichoff's first law.

7.6   State and explain Kirchoff's second law.

7.7   Describe Wheatstone bridge with legible sketch.

7.8   Derive an expression for balancing condition of Wheatstone bridge.

7.9   Describe Meter Bridge experiment with necessary circuit diagram.

7.10   Write the formulae to find resistance and specific resistance in meter bridge

7.11   Explain the concept of magnetism

7.12   What are natural and artificial magnets (mention some types)

7.13   Define magnetic field and magnetic lines of force.

7.14   Write the properties of magnetic lines of force

7.15   State and explain the Coulomb's inverse square law of magnetism

7.16   Define magnetic permeability

7.17   Define para, dia, ferro magnetic materials with examples

7.18   Solve simple problems on (i) Ohm's law (ii) Kirchoff's first law (iii) Wheatstone bridge (iv) meter bridge and (v) Coulomb's inverse square law

8.0   Understand the concepts of Modern physics

8.1   State and explain Photo-electric effect.

8.2   Write Einstein's Photo electric equation and name the physical quantities in it.

8.3   State laws of photo electric effect

8.4   Explain the Working of photo electric cell

8.5   List the Applications of photoelectric effect

8.6   Recapitulate refraction of light and its laws

8.7   Define critical angle

8.8   Explain the Total Internal Reflection

8.9   Explain the principle and working of Optical Fiber

8.10   List the applications of Optical Fiber

8.11   Explain the energy gap based on band structure

8.12   Distinguish between conductors, semiconductors and insulators based on energy gap

8.13   Define doping

8.14   Explain the concept of hole

8.15   Explain the types of semiconductors: Intrinsic and extrinsic

8.16   Explain n-type and p-type semiconductors

8.17   Mention the applications of semiconductors

8.18   Define superconductor and superconductivity

8.19   List the applications of superconductors

8.20   Nanotechnology definition, nano materials and applications

COURSECONTENT

1.   **Units and measurements**
     Introduction – Physical quantity – Fundamental and Derived quantities – Fundamental and derived units - SI units – Multiples and Sub multiples – Rules for writing S.I. units-Advantages of SI units – Direct and indirect measurements – Accuracy and least count – Errors : Absolute, relative and percentage errors –Problems.

2.   **Statics**
     Scalars and Vectors– Representation of a vector - Types of vectors - Resolution of vector into rectangular components – Triangle law of vectors – Concurrent forces - Lami's theorem - Parallelogram law of forces : Statement, equations for magnitude and direction of resultant, examples – Moment of force and couple – Problems.

3.   **Gravitation**
     Newton's law of gravitation and G – Concept of acceleration due to gravity (g) – Factors affecting the value of g – Relation between g and G- Kepler's laws – Satellites :

Natural and artificial – Orbital velocity and escape velocity – Polar and geostationary satellites – Applications of artificial satellites – Problems.

4. **Concepts of energy**

   Work done & Energy-Definition and types of energy - potential energy - kinetic energy-- K.E and momentum relation – Law of Conservation of energy, examples - Solar energy, principles of thermal and photo conversion – Problems.

5. **Thermal physics**

   Modes of transmission of heat – Expansion of Gases - Boyle's law – Absolute scale of temperature - Thermometric scales and their inter conversion - Charle's law - Gay-Lussac's law - Ideal gas equation - Universal gas constant (R) - Problems.

6. **Sound**

   Sound - Nature of sound - Types of wave motion, Longitudinal and transverse – Factors affecting the velocity of sound in air - musical sound and noise - Noise pollution – Causes & effects - Methods of reducing noise pollution - Doppler effect - Echo- Reverberation -Reverberation time-Sabine 's formula – Ultrasonics & applications – SONAR - Problems.

7. **Electricity & Magnetism**

   Concept of P.D and EMF - Ohm's law and explanation-Specific resistance - Kirchoff's laws – Wheat stone's bridge - Meter bridge.

   Natural and artificial magnets – magnetic field and magnetic lines of force – Coulomb's inverse square law – Permeability – Magnetic materials – Para, dia, ferro – Examples – Problems.

8. **Modern Physics**

   Photoelectric effect – laws of photoelectric effect – photoelectric cell – Applications of photoelectric cell - Total internal reflection - Fiber optics - Principle and working of an optical fiber - Applications of optical fibers – Semiconductors : Based on Energy gap – Doping – Hole - Intrinsic and extrinsic semiconductors (n-type & p-type) – Applications of semiconductors – Superconductivity – applications – Nanotechnology definition, nano materials, applications.

REFERENCES

1. Intermediate physics - Volume - I & 2   Telugu Academy (English version)
2. Unified physics Volume 1, 2, 3 and 4   Dr. S.L Guptha and Sanjeev Guptha
3. Concepts of Physics, Vol 1 & 2   H.C. Verma
4. Text book of physics Volume I & 2   Resnick & Halliday
5. Fundamentals of physics   Brijlal & Subramanyam
6. Text book of applied physics   Dhanpath Roy
7. NCERT Text Books of physics   Class XI & XII Standard
8. e-books/e-tools/websites/Learning Physics software/eLMS

Blue Print for setting question paper at different levels

S.No	Major Topics	Weightage of Marks	Short Answer Type(Marks)			Essay Type(Marks)		
			R	U	A	R	U	A
1	Units and measurements	03	0	0	3	0	0	0
2	Statics	13	0	0	3	0	10	0
3	Gravitation	20	0	0	0	10	10	0
4	Concepts of energy	13	0	0	3	0	10	0
5	Thermal physics	13	0	3	0	0	0	10
6	Sound	16	0	3	3	0	10	0
7	Electricity & magnetism	16	0	3	3	0	10	0
8	Modern Physics	16	3	0	3	0	0	10
	Total:	110	3	9	18	10	50	20

Table showing the scope of syllabus to be covered for unit tests

Unit test	Learning outcomes to be covered
Unit test - 1	From 1.1 to 3.14
Unit test - 2	From 4.1 to 6.18
Unit test - 3	From 7.1 to 8.20

(C–23) COMMON-103

UNIT TEST - I, FIRST YEAR

ENGINEERING PHYSICS

Time : 90 Minutes   **Total Marks : 40**

PART—A   **16 Marks**

Instructions : (i) Answer all questions.

          (II) Question 1 carries 4 marks. Question numbers from (2) to (5) carries 3 marks each.

1. (i) Which among the following is a fundamental quantity.
   (a) Force (b) Momentum (c) Time (d) Density   (CO1)
   (ii) Pascal is the S.I unit of pressure. (True / False)   (CO1)
   (iii) Displacement is vector quantity   (Yes / No)   (CO1)
   (iv) The formula for orbital velocity is _____ (Fill in the blank)   (CO2)

2. Define absolute, relative errors and percentage errors.   (CO1)

3. Define equal vectors, unit vector and co-initial vectors.   (CO1)

4. A force of 100 N acts at a point at an angle of 60° to the horizontal. Find the horizontal and vertical components of force.   (CO1)

5. Define natural and artificial satellites. Give one example each.   (CO2)

PART— B   **24 Marks**

Instructions : (i) Answer all questions.

          (ii) Each question carries 8 marks with internal choice.

6. (a) Define concurrent and co-planar forces. Explain Lami's theorem.   (CO1)

   (OR)

   (b) Two forces 20 N and 30 N acts at a point with an angle of 60°between them. Find the magnitude and direction of the resultant.   (CO1)

7. (a) State and explain Kepler's laws of planetary motion.   (CO2)
   (OR)
   (b) Define acceleration due to gravity (g). Write the factors affecting the value of g. (CO2)

8. (a) Write a brief note on polar and geo-stationary satellites.   (CO2)
   (OR)
   (b) State the Newton's universal law of gravitation and derive the relationship between g and G.   (CO2)

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UNIT TEST - II, FIRST YEAR
ENGINEERING PHYSICS

Time : 90 Minutes   **Total Marks : 40**

PART — A   **16 Marks**

Instructions : (i) Answer all questions.
(ii) Question 1 carries 4 marks. Question numbers from (2) to (5) carries 3 marks each.

1   (i) Which among the following is unit of Work.

    (a)   newton (b) pascal (c) joule (d) watt   (CO2)

    (ii) In Boyle's law verification, temperature remains constant. (Yes/No)   (CO3)

    (iii) Velocity of sound in a medium varies with temperature   (Yes/No)   (CO3)

    (iv) The S.I unit of intensity of sound _____ (Fill in the blank)   (CO3)

2   Define potential energy, give one example.   (CO2)

3   Explain the absolute scale of temperature.   (CO3)

4   An ideal gas of given mass at temperature 100 °C occupies a volume of 240 CC. If it is heated at

    constant pressure, find its volume at 150 °C.   (CO3)

5.   Write any three differences between musical sound and noise.   (CO3)

PART—B   **24 Marks**

Instructions : (i) Answer all questions.
(ii) Each question carries 8 marks with internal choice.

6. (a) Write about solar energy and solar thermal conversion.   (CO2)
                    (OR)
  (b). Define kinetic energy and derive the relationship between KE and momentum.   (CO2)

7. (a) Write ideal gas equation and calculate the value of R for 1 gram mole of a gas.   (CO3)
                    (OR)
  (b) Define conduction, convection and radiation. Explain with one example each.   (CO3)

8. (a) Write four methods of reducing an echo and four applications of echo.   (CO3)
                    (OR)
  (b) What are ultra sonics. Mention six applications of it.   (CO3)

***

UNIT TEST - III, FIRST YEAR

ENGINEERING PHYSICS

Time : 90 Minutes   *Total Marks* : 40

PART—A   *16 Marks*

Instructions : (i)Answer all questions.
(ii) Question 1 carries 4 marks. Question numbers from (2) to (5) carries 3 marks each.

1.   (i) The S.I unit of specific resistance is

(a) Ω (b) Ω /m   (c) Ω - m   (d) pascal   (CO4)

(ii) Magnetic field lines are open curves. (True/False)   (CO4)

(iii) At the critical angle, the angle of refraction is equal to 90°. (Yes/No)   (CO4)

(iv) Photo eletric cell converts _____ energy into electric energy (Fill in the blank)   (CO4)

2.   Find the current passing through a conductor of resistance 2 Ω when P.D of 50 V is applied

across it.   (CO4)

3.   State the Coulomb's inverse square law of magnetism and write the equation for it. (CO4)

4.   State three laws of photo electric effect.   (CO4)

5.   Write any three applications of superconductors.   (CO4)

PART—B   *24 Marks*

Instructions : (i) Answer all questions.
(ii) Each question carries 8 marks with internal choice.

6.   (a) State and explain Kirchoff's laws.   (CO4)
                                      OR
(b) Draw circuit diagram of Meter bridge. Two resistors of 10 Ω and 30 Ω are connected in the
left and right gaps of a meter bridge. Find the balancing length.   (CO4)

7.   (a) Define para, ferro and dia magnetic materials with two examples each.   (CO4)
                                      OR
(b) Explain the principle and working of an optical fiber.   (CO4)

8.   (a) Explain intrinsic and extrinsic semiconductors.   (CO4)
                                      OR
(b) Explain conductors, semiconductors and insulators based on energy gap.   (CO4)

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Common–103
BOARD DIPLOMA EXAMINATION, (C–23)
FIRST YEAR EXAMINATION
ENGINEERING PHYSICS

<u>Time : 3 hours</u>   **Total Marks : 80**

PART— A   **3 ×10 = 30**

Instructions :   (i) Answer all questions.   (ii) Each question carries three marks.
(iii) Answers should be brief and straight to the point and shall not exceed five
simple sentences.

1. Write any three advantages of S.I units.   (CO1)

2. Define moment of force. Write its SI unit.   (CO1)

3. Find the work done in lifting a body of mass 10 kg through a height of 20 m against gravity.

(CO2)

4. Define absolute zero temperature. Convert -10 °C into Kelvin temperature.   (CO3)

5. Define Doppler effect. Mention one application.   (CO3)

6. Write the Sabine's formula for reverberation time and name the quantities in it.   (CO3)

7. Define specific resistance. Write its S.I unit.   (CO4)

8. Write any three characteristics of magnetic lines of force.   (CO4)

9. Draw a neat diagram of photoelectric cell and name the parts.   (CO4)

10. Write any three applications of optical fibers.   (CO4)

PART—B   **10×5=50**

Instructions : (i) Answer any five questions. (ii) Each question carries ten marks.

(iii) Answers should be comprehensive and the criterion for valuation is the content

but not the length of the answer.

11. (a) State and explain triangle law of vectors.   6

    (b) A force of 100 N acts on a particle at an angle of 30° to the horizontal. Find the horizontal

     and vertical components of force.   4 (CO1)

12. State and explain Kepler's law of planetary motion.   10 (CO2)

13. (a) Derive the relationship between g and G.

    (b) Calculate the orbital velocity of a satellite so that it revolves around the earth if the Radius of

     earth = 6.5×10^6 m, mass of earth = 6×10^{24} kg and Gravitational constant G = 6.67×10^{-11} Nm^2/kg^2.   5+5 (CO2)

14. Explain the principles of solar thermal conversion and photo-voltaic effect.   5+5 (CO2)

15. (a) Derive the ideal gas equation.

   (b) Volume of a gas at 27 °C is 100 CC. Keeping the pressure constant, find its volume at a temperature of 50 °C.   7+3 (CO3)

16. (a) Write any five methods of reducing noise pollution.

   (b) Define echo. Write three applications of it.   5+2+3 (CO3)

17. (a) Derive an expression for balancing condition of Wheat stone's bridge with neat circuit diagram.

   (b) The values of resistance of P, Q, R are 50 Ω, 10 Ω and 15 Ω respectively in the balanced condition of the bridge. Find the unknown resistance S.   7+3 (CO4)

18. Explain n-type and p-type semiconductors.   5+5 (CO4)

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ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES

Course code	Course Title	No. of Periods per week	Total No. of Periods	Marks for FA	Marks for SA
IOT-104	Engineering Chemistry and Environmental Studies	3	90	20	80

S.No	Unit Title/Chapter	No. of Periods	Weightage of Marks	No. of Short Answer Questions	No. of Essay Questions	COs Mapped
1	Fundamentals of Chemistry	14	21	2	1½	CO1
2	Solutions, Acids and Bases	16	21	2	1½	CO1
3	Electrochemistry	12	13	1	1	CO2
4	Corrosion	8	13	1	1	CO2
5	Water Treatment	8	13	1	1	CO3
6	Polymers& Engineering Materials	12	13	1	1	CO4
7	Fuels	6	3	1	0	CO4
8	Environmental Studies	14	13	1	1	CO5
	Total Periods/Marks	**90**	**110**	**30**	**80**	

Course Title: Engineering Chemistry & Environmental Studies	
Course Objectives	1. To familiarize with the concepts of chemistry involved in the process of various Engineering Industrial Applications. 2. To know the various natural and man-made environmental issues and concerns with an interdisciplinary approach that include physical, chemical, biological and socio cultural aspects of environment. 3. to reinforce theoretical concepts by conducting relevant experiments/exercises

Course Outcomes	CO1	Explain Bohr`s atomic model, chemical bonding, mole concept, acids and bases, P^H and Buffer solutions.
	CO2	Explain electrolysis, Galvanic cell, batteries and corrosion
	CO3	Explain the chemistry involved in the treatment of hardness in water.
	CO4	Explain the methods of preparation and applications of Polymers and Elastomers, chemical composition and applications of Alloys, Composite Materials, Liquid Crystals , Nano Materials and Fuels.
	CO5	Explain Global impacts due to air pollution, causes , effects and controlling methods of water pollution and understand the environment, forest resources, e-Pollution and Green Chemistry Principles.

IOT-104	Engineering. Chemistry and Environmental studies				No Of periods 90
POs	Mapped with CO No	CO periods addressing PO in Col NO. 1	%	Level 1,2,3	remarks
PO1	CO1,CO2,CO3	42	46.7 %	3	>40% level 3 (highly addressed) 25% to 40% level 2(moderately addressed) 5% to 25% level 1 (Low addressed) < 5%(not addressed)
PO2	CO2,CO3	16	17.8%	1	
PO3	CO4	12	13.3%	1	
PO4	CO4	6	6.7%	1	
PO5	CO5	14	15.5%	1	
PO6					
PO7					

COs-POs mapping strength (as per given table)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	-	-	-	-	-	-
CO2	3	1	-	-	-	-	-
CO3	3	1	-	-	-	-	-
CO4	-	-	1	1	-	-	-
CO5	-	-	-	-	1	-	-
Average	3	1	1	1	1		-

3=strongly mapped   2= moderately mapped   1= slightly mapped

Note: The gaps in CO and PO mapping will be achieved by one or more appropriate   activities from the following:

i) Seminars ii) Tutorials iii) Guest Lectures iv) Assignments v) Quiz competitions vi) Industrial visit vii) Tech Fest viii) Mini project ix) Group discussions x) Virtual classes xi) Library visit for e-books

LEARNING OUTCOMES:
1.0 Atomic structure
1.1 Explain the charge, mass of fundamental particles of an atom (electron, proton and neutron) and the concept of atomic number and mass number.
1.2 State the Postulates of Bohr's atomic theory and its limitations.
1.3 Explain the significance of four Quantum numbers and draw the atomic structures of Silicon and Germanium.
1.4 Define Orbital of an atom and draw the shapes of s,p and d-orbitals.
1.5 Explain 1. Aufbau principle, 2. Pauli's exclusion principle 3. Hund's principle.
1.6 Write the electronic configuration of elements up to atomic number 30.
1.7 Explain the significance of chemical bonding.
1.8 Explain the Postulates of Electronic theory of valency.
1.9 Define and explain Ionic and Covalent bonds with examples of NaCl , $*H_2, *O_2$ and $*N_2$.(* Lewis dot method).
1.10 List out the Properties of Ionic compounds and covalent compounds and distinguish between their properties.

2.0 Solutions, Acids and Bases
2.1 Define the terms 1. Solution, 2. Solute and 3. Solvent.
2.2 Classify solutions based on solubility.
2.3 Define the terms 1. Atomic weight, 2. Molecular weight and 3. Equivalent weight.

Calculate Molecular weight and Equivalent weight of the given acids (HCl, H_2SO_4, H_3PO_4) Bases (NaOH, $Ca(OH)_2$, $Al(OH)_3$ and Salts (NaCl, Na_2CO_3, $CaCO_3$).

2.4 Define mole and solve numerical problems on mole concept.

2.5 Define molarity, normality and solve numerical problems on molarity and normality.
a) Calculate the Molarity or Normality, if weight of solute and volume of solution are given.
b) Calculate the weight of solute, if Molarity or Normality with volume of solution are given.
c) Problems on dilution to convert high concentrated solutions to low concentrated solutions.

2.6 Explain Arrhenius theory f Acids and Bases and give its limitations.

2.7 Define ionic product of water, pH and solve numerical problems on pH (Strong Acids and Bases).

2.8 Define buffer solution and classify buffer solutions with examples. Give its applications.

3.0 Electrochemistry

3.1 Define the terms 1. Conductor 2. Semiconductor 3. Insulator, 4. Electrolyte 5. Non–electrolyte. Give two examples each.

3.2 Distinguish between Metallic conduction and Electrolytic conduction.

3.3 Explain electrolysis by taking an example of used NaCl and list out the applications of electrolysis.

3.4 Define Galvanic cell. Explain the construction and working of Galvanic cell.

3.5 Distinguish between electrolytic cell and galvanic cell.

3.6 Define battery and list the types of batteries with examples.

3.7 Explain the construction, working and applications of i) Dry cell (Leclanche cell), ii) Lead storage battery, iii) Lithium-Ion battery and iv) Hydrogen-Oxygen fuel cell.

4.0 Corrosion

4.1 Define the term corrosion.

4.2 state the Factors influencing the rate of corrosion.

4.3 Describe the formation of (a)composition cell (b) stress cell (c)concentration cell during corrosion.

4.4 Define rusting of iron and explain the mechanism of rusting of iron.

4.5 Explain the methods of prevention of corrosion by
(a)Protective coatings (anodic and cathodic coatings).
(b) Cathodic protection (Sacrificial anode process and Impressed–voltage process).

5. 0 Water Treatment

5.1 Define soft water and hard water with respect to soap action.

5.2 Define and classify the hardness of water.

5.3 List out the salts that causing hardness of water (with Formulae).

5.4 State the disadvantages of using hard water in industries.

5.5 Define Degree of hardness and units of hardness (mg/L and ppm).

5.6 Solve numerical problems on hardness.

5.7 Explain the methods of softening of hard water by (i) Ion-exchange process and (ii) Reverse Osmosis process.

6.0 Polymers & Engineering materials.

A) Polymers

6.1 Explain the concept of polymerization.

6.2 Describe the methods of polymerization (a) addition polymerization of ethylene (b) condensation polymerization of Bakelite (Only flowchart).

6.3 Define plastic. Explain a method of preparation and uses of the following plastics:
1. PVC 2. Teflon 3. Polystyrene 4. Nylon 6,6.

6.4 Define elastomers. Explain a method of preparation and applications of the following:
1. Buna- S 2. Neoprene.

B) Engineering Materials

6.5 Define an alloy. Write the composition and applications of the following:
1.Nichrome 2. Duralumin 3.Stainless Steel.

6.6 Define Composite Materials and give any two examples. State their Properties and applications.

6.7 Define Liquid Crystals and give any two examples. State their Properties and applications.

6.8 Define Nano Materials and give any two examples. State their Properties and applications.

7.0 Fuels

7.1 Define the term fuel.

7.2 Classify the fuels based on occurrence.

7.3 Write the composition and uses of the following:
1. LPG 2. CNG 3.Biogas 4.Power alcohol

7.4 Write the commercial production of Hydrogen as future fuel. Give its advantages and disadvantages.

8.0 Environmental Studies

8.1 Explain the scope and importance of environmental studies.

8.2 Define environment. Explain the different segments of environment.
1.Lithosphere 2. Hydrosphere 3. Atmosphere 4. Biosphere

8.3 Define the following terms:
1. Pollutant 2.Pollution 3.Contaminant 4. Receptor 5. Sink 6. Particulates 7. Dissolved oxygen (DO) 8. Threshold Limit Value (TLV) 9. BOD 10.COD 11. Eco system 12. Producers 13. Consumers 14. Decomposers with examples.

8.4 State the renewable and non- renewable energy sources with examples.

8.5 State the uses of forest resources.

8.6 Explain the causes and effects of deforestation.

8.7 Define air pollution and explain its Global impacts 1. Greenhouse effect, 2. Ozone layer depletion and 3. Acid rain.

8.8 Define Water pollution. Explain the causes, effects and controlling methods of Water pollution.

8.9 Define e-Pollution, State the sources of e-waste. Explain its health effects and control methods.

8.10 Define Green Chemistry. Write the Principles and benefits of Green Chemistry.

COURSE CONTENT

ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES

1. **Fundamentals of Chemistry**

   Atomic Structure: Introduction - Fundamental particles – Bohr's theory – Quantum numbers – Atomic structure of Silicon and Germanium - Orbitals, shapes of s, p and d orbitals - Aufbau's principle - Hund's rule - Pauli's exclusion Principle -Electronic configuration of elements.

   Chemical Bonding: significance–Electronic theory of valency- Types of chemical bonds – Ionic and covalent bond with examples–Properties of Ionic and Covalent compounds.

2. **Solutions, Acids and Bases**
   Solutions: Types of solutions - Mole concept – Numerical problems on mole concept -Methods of expressing concentration of a solution – Molarity and Normality – Numerical problems on molarity and normality.
   Acids and Bases: Arrhenius theory of acids and bases – Ionic product of water- pH–Numerical problems on pH–Buffer solutions – Classification- applications.

3. **Electrochemistry**
   Conductors, semiconductors, insulators, electrolytes and non-electrolytes – Electrolysis of fused NaCl–Applications of electrolysis - Galvanic cell – Battery-Types- Dry Cell (Leclanche Cell), Lead- Storage battery- Lithium-Ion battery -Hydrogen-Oxygen Fuel cell.

4. **Corrosion**

   Introduction - Factors influencing corrosion - Composition, Stress and Concentration Cells– Rusting of iron and its mechanism – Prevention of corrosion by Protective Coating methods, Cathodic Protection methods.

5. **Water treatment**

   Introduction– Soft and Hard water– Causes of hardness– Types of hardness– Disadvantages of hard water – Degree of hardness (ppm and mg/lit) – Numerical problems on hardness - Softening methods – Ion-Exchange process– Reverse Osmosis process.

6. **Polymers & Engineering materials**

   Polymers:

   Concept of polymerization – Types of polymerization – Addition, condensation with examples – Plastics - Preparation and uses of i).PVC ii) Teflon iii) Polystyrene and iv) Nylon 6,6.

   Elastomers: Preparation and application of i)Buna-s and ii) Neoprene.

   Engineering Materials:

   Alloys- Composition and applications of i) Nichrome, ii) Duralumin and iii) Stainless Steel.

   Composite Materials- Properties and applications.

   Liquid Crystals- Properties and applications.

   Nano Materials- Properties and applications.

7. **Fuels**

   Definition and classification of fuels – Composition and uses of i) LPG ii) CNG iii) Biogas

   and iv) Power alcohol – Hydrogen as a future fuel-production- advantages and disadvantages.

8. **Environmental Studies**

   Scope and importance of environmental studies – Environment - Important terms related to environment–Renewable and non-renewable energy sources–Forest resources – Deforestation – Air pollution–Global impacts on environment –Water pollution – causes – effects – control measures- e-Pollution –Sources of e-waste - Health effects - Control methods - Green Chemistry- Principles -Benefits.

REFERENCE BOOKS

1. Telugu Academy   Intermediate chemistry Vol. 1&2
2. Jain & Jain   Engineering Chemistry
3. O.P. Agarwal, Hi-Tech.   Engineering Chemistry
4. D.K.Sharma   Engineering Chemistry
5. A.K. De   Engineering Chemistry

Table specifying the scope of syllabus to be covered for Unit Test- 1, Unit Test- 2 and Unit Test -3

Unit Test	Learning outcomes to be covered
Unit Test – 1	**From 1.1 to 2.8**
Unit Test – 2	**From 3.1 to 5.7**
Unit Test – 3	**From 6.1 to 8.10**

Model Blue Print with Weightage for Blooms category and questions for each chapter and COs mapped

S.No	Unit Title/Chapter	No of Periods	Weightage of marks	Marks wise distribution of Weightage				Question wise distribution of Weightage				Mapped with CO
				R	U	Ap	An	R	U	Ap	An	
1	Fundamentals of Chemistry	14	21	15	3	3	-	1½	1	1	-	CO1
2	Solutions, Acids and Bases	16	21	8	10	0	3	1½	1	-	1	CO1
3	Electrochemistry	12	13	-	10	3	-	-	1	1	--	CO2
4	Corrosion	8	13	3	10	0	-	1	1	-	-	CO2
5	Water Treatment	8	13	10	0	0	3	1	-	-	1	CO3
6	Polymers & Engineering Materials.	12	13	-	10	3	-	-	1	1	-	CO4
7	Fuels	6	3	-	0	3	-	-	-	1	-	CO4
8	Environmental Studies	14	13	-	13	0	-	-	2	-	-	CO5
	Total	90	110	36	56	12	6	5	7	4	2	

Model question paper for Unit Test with COs mapped
UNIT TEST –I
Model Question Paper (C-23)
ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (104)

<u>TIME: 90 minutes</u>   <u>Total Marks: 40</u>

PART-A

16 Marks

Instructions: (1) Answer all questions.
(2) First question carries 4 marks and each of rest carries 3 marks.
(3) Answers for Q.No. 2 to 5 should be brief and straight to the point and shall not exceed five simple sentences.

1.   a. Number electrons present in Na^+ ion is ----------   (CO1)

      b. The molarity and normality of NaOH is the same (True or False)   (CO1)

      c. Acid with pH 6 is stronger than Acid pH 4 (True or False)   (CO1)

      d. 2s is spherical shaped orbital but 3p is ------------   (CO1)

2.   Distinguish between orbit and orbital.   (CO1)

3.   Define buffer solution. Give two examples.   (CO1)

4.   Calculate the number of moles present 10.6 gm of Na_2CO_3.   (CO1)

5.   Draw the atomic structures of Si and Ge.   (CO1)

PART – B

3x8M = 24M

Instructions: (1) Answer either (A) or (B).
(2) Each question carries 8 marks.

6.   a) Explain Postulations of Bhor's atomic theory. Give its limitations.   (CO1)
                                        (OR)
      b) Explain the significance of Quantum numbers.   (CO1)

7.   a) Define molarity and normality. Calculate the molarity and normality of 10.6 gm
         of Na_2CO_3 present in 500 ml solution.   (CO1)
                                        (OR)

      b) Explain Arrhenius theory of acids and bases. Give its limitations.   (CO1)

8.   a) Define ionic bond. Explain the formation of ionic bond in NaCl.   (CO1)
                                        (OR)
      b) Define solution. Explain the types of solutions based on its solubility.   (CO1)

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Model Question Paper (C-23)
ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (104)

TIME: 90 minuts   Total Marks:40

PART-A

16 Marks

Instructions: (1) Answer all questions.
(2) First question carries 4 marks and each of rest carries 3 marks.
(3) Answers for Q.No. 2 to 5 should be brief and straight to the point and shall not exceed five simple sentences.

1. a) Graphite is an insulator.   (True of False)   (CO2)

    b) ------------ is an electrolyte in Hydrogen-Oxygen fuel cell   (CO2)

    c) Zinc is more active than Iron. (True or False)   (CO2)

    d)Write the Chemical formula of rust.   (CO2)

2. Write any three differences between metallic conduction and electrolytic conduction.(CO2)

3. Write a short note on stress cell.   (CO2)

4. Define hard water. Mention any two salts that cause hardness   (CO3)

5. What is the role of salt bridge?   (CO2)

PART – B   **3x8M = 24M**

Instructions: (1)   Answer either (A) or (B) .
(2)   Each question carries 8 marks.

6. a) Explain construction and working of galvanic cell.Draw the neat diagram.   (CO2)
                                    (OR)
    b) Explain construction and working of Lead -storage battery.   (CO2)

7. a) Calculate the temporary, permanent and total hardness of water containing the following salts:
    $CaSO_4$ =13.6 mg/lit, $Mg(HCO_3)_2$ = 7.3 mg/lit,
    $Ca(HCO_3)_2$ = 16.2 mg/lit, $MgCl_2$ = 9.5 mg/lit   (CO3)
                                    (OR)
    b) Explain Ion-Exchange process of softening of hard water.   (CO3)

8. a) What is rusting of iron? Explain Mechanism of rusting of iron.   (CO2)
                                    (OR)

    b) Explain cathodic protection methods.   (CO2)

***

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Model Question Paper (C-20)
ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (104)

TIME: 90 minutes   Total Marks:40

PART-A

16 Marks

Instructions: (1) Answer all questions.
(2) First question carries 4 marks and each of rest carries 3 marks.
(3) Answers for Q. No. 2 to 5 should be brief and straight to the point and shall not exceed five simple sentences.

1. a) Semiconductor Nano Crystals are called ……………   (CO4)

    b) Chloroprene is the monomer of Neoprene.   (True/False)   (CO4)

    c) Give any two examples for green house gases.   (CO5)

    d) Presence of ozone in stratosphere is a pollutant.(Yes/No)   (CO5)

2. Define liquid crystals. Give their applications.   (CO4)

3. Write a method of commercial production of Hydrogen as a fuel.   (CO4)

4. Define Green Chemistry. List any two benefits.   (CO5)

5. Define TLV and Sink. Give an example each.   (CO5)

PART – B   **3x8M = 24M**

Instructions : (1) Answer either (A) or (B).
(2) Each question carries 8 marks.

6. a) Define polymerisation. Explain condensation polymerisation by taking nylon 6,6 asan example.   .   (CO4)

            (OR)

    b) Define elastomers.   Give a method of preparation and applications of Buna-S.   (CO4)

7. a) What is air pollution? Discuss any one of the Global impacts of air pollution.   (CO5)

            (OR)

    b) Write the composition and uses of the following:

     i) LPG   ii) CNG   iii) Biogas   iv) Power Alcohol   (CO4)

8. a) Define e-pollution. State the sources and controlling methods of e-pollution.   (CO5)

            (OR)

    b) Define water pollution. Write the causes of water pollution.   (CO5)

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Model Question Paper (C-23)

ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (104)

TIME: 3hrs   **Total Marks:80**

PART-A

Instructions: (1) Answer all questions. (2) Each question carries Three marks.   **3x10=30M**

1. Draw the atomic structures of Si and Ge.   (CO1)
2. Write the anomalous electronic configuration of Chromium and Copper.   (CO1)
3. State the limitations of Arrhenius theory of acids and bases.   (CO1)
4. Define solution. Classify solutions based on solubility.   (CO1)
5. State the applications of Li-ion batteries.   (CO2)
6. List the factors that influence the rate of corrosion of metals.   (CO2)
7. Mention disadvantages of hard water used in industries.   (CO3)
8. State any three applications of Nano Materials.   (CO4)
9. Write the composition and uses of LPG.   (CO4)
10. What is e-waste? State the sources of e-waste.   (CO5)

PART – B

Instructions: (1) Answer any five questions. (2) Each question carries Ten marks.   **10x5=50M**

11. Explain the significance of quantum numbers.   (CO1)   10M
12. Define molarity and normality. Calculate the molarity and normality of 250 ml of solution that contains 5.3 gm of sodium carbonate.   (CO1)   10M
13. a) Define ionic bond. Explain the formation of ionic bond in NaCl.   (CO1)   6M
    b) Define Buffer solution. Give any two examples and applications.   (CO1)   4M

14. a) Explain the construction and working of Hydrogen-Oxygen Fuel cells.   (CO2)   6M
    b) State any four differences between electrolytic cells and Galvanic cells.   (CO2)   4M
    a) Explain the mechanism of rusting of iron.   (CO2)   6M
    b) Write a short note on Sacrificial anodic method of prevention of corrosion.   (CO2)   4M
15. Define hard water. Explain ion-exchange process of softening of hard water with a neat diagram.   (CO3)   10M
16. a) Define elastomer. Write a method of preparation and any two applications of Buna-s .   (CO4)   6M
    b) What are Liquid Crystals? Give any two examples and applications.   (CO4)   4M
17. a) Define deforestation. State the impacts of deforestation.   (CO5)   6M
    b) Write a short note on Ozone layer depletion.   (CO5)   4M

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BASICS OF ELECTRONICS AND COMPUTER ENGINEERING

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
IOT-105	BASICS OF ELECTRONICS AND COMPUTER ENGINEERING	5	150	20	80

S No	Unit Title	No. of Periods	Weightage of Marks	No. of Short Answer Questions	No. of Essay Questions	CO's Mapped
1	Passive Components	20	13	1	1	CO1
2	Switches ,Connectors, Relays and PCBs	15	13	1	1	CO1
3	Semiconductor Physics and semiconductor diode	20	16	2	1	CO2
4	BJT and Field effect transistor	20	13	1	1	CO3
5	DC power supplies	15	13	1	1	CO3
6	Fundamentals of Computers & Programming Methodology	30	16	2	1	CO4
7	Computer Hardware and Operating Systems Basics	30	26	2	2	CO5
	Total Periods/Marks	150	110	80	30	

Course Objectives	**1.0** To learn the principles of passive components, switches ,relays and PCBs.
	2.0 To Understand the formation of semiconductor materials and the working of semiconductor diode.
	3.0 To understand the working of BJT and FET circuits
	4.0 To understand different rectifier circuits and regulated power supplies
	5.0 To know the fundamentals of Computers and familiarize programming methodologies like algorithms and flowcharts
	6.0 To know the fundamentals of Operating system and computer Hardware

CO No		COURSE OUTCOMES
CO1	IOT-105.1	Ability to understand different passive components, switches ,relays, PCB manufacturing Techniques and soldering methods
CO2	IOT-105.2	Ability to Analyse the formation of Extrinsic semiconductors and the working of semiconductor diode.
CO3	IOT-105.3	Ability to Analyse the working of BJT , FET and design DC power supplies.
CO4	IOT-105.4	Explain computer fundamentals, flowcharts and algorithms
CO5	IOT-105.5	Explain the importance of Basic Computer operating systems, functioning of various Hardware components

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT-105.1	3	3	2	2			2	3	1	1
IOT-105.2	3	3	2		2		2	3	1	1
IOT-105.3	3	3	2				2	3	1	
IOT-105.4	3	2	2	2	1	3		3	3	1
IOT-105.5	3	1		2	1	1	1	3	1	1
Average	3	3	2	2	2	2	2	3	1	1

3=strongly mapped, 2=moderately mapped, 1=slightly mapped

LEARNING OUTCOMES

1.0   Passive Components

1.1   i)   Define the term resistance

      ii)   Define the term resistor & classify resistors

      iii)   Draw the circuit symbols of fixed and variable resistors

      iv)   List the specifications of a resistor

1.2   State the physical factors that affect the value of a resistor and calculate resistance value by using colour Code.

1.3   Compare the features of carbon and wire wound potentiometers

1.4   Describe the working of rheostat and mention its applications.

1.5   Define temperature co-efficient of resistance and explain the effects of temperature on resistance

1.6   Describe the working of thermistor and sensistor and mention their applications.

1.7   i)   Define the term inductance

      ii)   Define the term inductor & classify inductors

      iii)   Draw the circuit symbols of different types of inductors

      iv)   List the specifications of an inductor

      v)   Explain the term Stray inductance

1.8 List various core materials used in the construction of inductors

1.9 Explain the use of Ferrites in the construction of high frequency inductors

1.10   List the applications of A.F. and R.F chokes.

1.11   i)   Define the term capacitance.

      ii)   Define the term capacitor & classify capacitors.

      iii)   Draw the circuit symbols of fixed and variable capacitors.

      iv)   List the specifications of a capacitor

      v)   Explain the term Stray capacitance

1.12   State the factors affecting the capacitance of a capacitor.

1.13   Define Di-electric constant and Di-electric strength of a material.

1.14   State different types of variable capacitors and mention their applications.

2.0   Switches, Connectors, Relays and PCBs

2.1   Classify switches according to poles and throws (SPST, SPDT, DPST, DPDT, Multi-pole multi-throw)

2.2   Sketch the I.S.I symbols of various switches.

2.3   State the need of fuse in electronic equipment.

2.4   Mention different types of fuses.

2.5   Explain the necessity of connectors in electronic circuits.

2.6   List different types of connectors.

2.7   Mention the use of MCB.

2.8   Define a relay.

2.9   Classify different relays based on principle of operation, polarization and application.

2.10   List the specifications and applications of relays.

2.11   Explain the working of general purpose electromagnetic relay.

2.12   Explain the need of PCB in electronic equipment.

2.13   Classify PCBs and list the types of laminates used in PCBs.

2.14   List the methods of transferring layout on to the copper clad sheet.

2.15   List the materials used in screen-printing.

2.16   List the steps involved in screen-printing for making PCBs.

2.17   Describe the methods of etching, cleaning and drilling of PCB.

2.18   Explain Surface Mount Technology and its uses.

2.19   List the materials used in soldering.

2.20   List the soldering methods of PCBs.

3.0 Semiconductor Physics and semiconductor diode

3.1   Explain the terms conductivity and resistivity, and give their equations

3.2   Describe Energy Level and Energy Band diagrams

3.3   Compare conductors, semiconductors and Insulators

3.4   Explain Valance band, Conduction band and Forbidden energy gap

3.5   Explain Semiconductor materials using Energy Band diagrams

3.6   Describe Intrinsic Semiconductors and Fermi level

3.7   Describe extrinsic Semiconductors , and their EBDs by using Fermi level

3.8   Distinguish between intrinsic and extrinsic semiconductors

3.9   Explain the formation of P type and N type semiconductors

3.10   Compare P-type and N-type semiconductors

3.11   Explain Drift and Diffusion currents

3.12   Explain the formation of PN junction diode.

3.13   Describe the working of PN junction Diode with forward & reverse biasing.

3.14   Sketch the forward and Reverse Bias VI characteristics of a diode.

3.15   Explain diode equation

3.16   Mention the applications of diode

3.17   Explain reverse breakdown phenomenon

3.18   Distinguish between Avalanche & Zener breakdowns

3.19   Describe the construction and working of Zener diode.

3.20   Draw the forward &reverse bias characteristics of Zener diode

3.21   Mention the applications of zener diode

4.0 BJT and Filed Effect Transistor

4.1   Explain the formation of transistor

4.2   Draw the circuit symbol of transistor.

4.3   Explain the construction of PNP and NPN transistors

4.4   Explain the working of PNP and NPN Transistors.

4.5   Draw the different transistor configurations.

4.6   Sketch the input/output characteristics of CB, CE and CC configurations.

4.7   Identify the cut off, saturation and active regions in output characteristics of CB,CE and CC configurations

4.8   Define alpha, beta and gamma Factors.

4.9   Relate alpha, beta and gamma Factors.

4.10   Compare the performance characteristics of CB, CE and CC configurations

4.11   Classify Field Effect Transistors

4.12   Describe the construction and principle of operation of n channel JFET

4.13   Draw and explain the drain characteristics of JFET

4.14   List the advantages of JFET over BJT

4.15   Explain the construction & working of N channel Enhancement type MOSFET

4.16   Explain the construction & working of N channel Depletion type MOSFET

4.17   Compare JFET and MOSFET

5.0 DC Power Supplies

5.1. Explain the necessity of D.C. power supply for Electronic circuits

5.2 Describe the working of Half wave rectifier, Full Wave centre tapped rectifier and Bridge rectifier circuits with wave forms

5.3   Give the equations for RMS value and average value(DC value) voltages and currents for above rectifiers

5.4 Define ripple factor and efficiency for the above circuits

5.5 Give the formulae for ripple factor and efficiency

5.6 Compare HW, FW Centre tapped and Bridge Rectifiers

5.7 Explain the need for a filter circuit in power supplies

5.8 Explain the working of a RC, CRC, CLC filters for a full wave rectifier output

5.9 State the need for a regulated power supply

5.10   Define Voltage Regulation

5.11   Explain the working of a simple Zener regulator

5.12   List the different 3-pin fixed Positive (78xx), fixed negative (79xx) and variable (LM317) IC regulators.

6.0 Fundamentals of Digital Computer & Programming Methodologies

Fundamentals of Digital Computer:

6.1. Define various terms related to computers – Computer, Hardware , Software, Firmware, High Level Language , Low Level Language

6.2. Draw and explain block diagram of a Computer in detail

6.3. Describe the current family of CPUs used in Computers.

6.4. State the use of storage devices used in a Computer.

6.5. List the two types of memory used in a Computer.

6.6. State the importance of cache memory.

6.7. Explain the generations of computers.

6.8. Classification of computers - based on a) size, b) processor.

6.9. State the importance of binary number system for use in Digital Computers

Programming Methodologies:

6.10. State the different steps involved in problem solving.

6.11. Define algorithm.

6.12. List four characteristics of algorithm.

6.13. Define a program

6.14. Differentiate between program and algorithm.

6.15. State the steps involved in algorithm development.

6.16. Differentiate between algorithm and flowchart.

6.17. Develop algorithms for simple problems.

6.18. Draw the symbols used in flowcharts.

6.19. Draw flowcharts for simple problems.

7.0. Computer Hardware Basics And Operating System Basics Computer Hardware Basics

7.1. Identify hardware used for I/P, O/P & inside computer case, system board components used for communication among devices

7.2. Software - 3 types of Software :ROM BIOS, OS, application software

7.3. Explain Functions of BIOS

7.4. Explain boot process

7.5. Explain POST and important beep codes

7.6. Explain various connectors.

Operating Systems Basics

7.7. State the need for an operating system.

7.8. List various operating systems

7.9. List and explain

    7.9.1. Types of dos commands

    7.9.2. Any 10 Internal Commands

    7.9.3. Any 5 External Commands

    7.9.4. Features of Windows desktop.

    7.9.5. Components of a Window.

7.10. State the function of each component of a Window.

7.11. Describe the Method of starting a program using start button

7.12. Explain usage of maximize, minimize, restore down and close buttons.

7.13. State the meaning of a file , folder.

7.14. Describe the Method of viewing the contents of hard disk drive using Explorer

7.15. Describe the Method of finding a file using search option.

7.16. Use control panel for

    7.16.1. installing and uninstalling software

    7.16.2. installing and uninstalling hardware

    7.16.3. Changing the system date and time

    7.16.4. Installing a printer

7.17. Explain Disk defragmentation using System tools

7.18. Explain the procedure for changing resolution, color, appearance, screensaver options of the display

COURSE CONTENT

1. Passive components
   Resistors: Resistance, resistor-Classification- Circuit symbols–Specifications-Physical factors- -Colour code-Carbon and wire wound potentiometers – Rheostat – Applications – Temperature coefficient of resistance - Effect of temperature on resistance – Thermistors, sensistors– Applications
   Inductors: Inductance, Inductor-Classification - Circuit symbols – Specifications- Stray inductance - Core materials – Ferrites - AF and RF Chokes
   Capacitors: Capacitance, Capacitor-Classification - Circuit symbols – Specifications –Stray Capacitance–Factors affecting capacitance- Dielectric constant - Dielectric strength – Variable capacitors - Applications

2. Switches, Connectors, Relays and PCBs: Switch- Classification – ISI symbols – Fuse – Types – Necessity of connectors – Types – MCB – Relay – Classification – Specifications – Applications – General purpose electromagnetic relay
   PCBs: PCB – Classification – Methods of layout preparation - Methods of transferring layout – Screen printing materials- Steps – Etching, cleaning and drilling - Steps-SMT and its uses-Materials used in soldering – Soldering methods

3. Semiconductor Physics: Energy level, Energy Band Diagrams compare conductors , semiconductors and insulators - Valance band, Conduction band and Forbidden energy gap – Semiconductor Materials – Intrinsic Semiconductors - Extrinsic Semiconductors - P type & N type semiconductors- Drift and diffusion currents-

   Semiconductor Diodes: PN junction diode – Working - VI characteristics - Diode equation – Applications - Breakdown phenomenon – Avalanche and Zener breakdowns - Zener diode construction, working – Reverse bias characteristics –Applications.

4. BJT: Transistor formation – PNP & NPN transistors- symbols - Construction – Working - CB, CE and CC configurations - I/p & O/p characteristics - Active, Cut-off and saturation regions – Alpha(α), Beta(β),Gamma (γ)factors- Relation- Comparison of CB,CE,CC

   Field Effect Transistor: Classification –N channel JFET Construction, Principle of operation – Drain characteristics –Advantages of JFET over BJT –N Channel enhancement   MOSFET – Construction,working- N Channel depletion MOSFET – Construction, working - Comparison of JFET and MOSFET.

5. DC Power Supplies: Necessity of DC power supply- Half wave, Full wave and Bridge rectifiers – Working , Wave forms, RMS value, Average value of voltages and currents - Ripple factor and efficiency – Comparison of HW, FW Centre tapped, and bridge rectifiers – Need for filters – Working of RC, CRC, and CLC —— Need for regulated power supply – Voltage regulation – Zener regulator.

6. Fundamentals of Digital Computer

Block diagram of a digital computer- functional parameters of CPU- Clock speed and word length- Functional blocks of a CPU: ALU and Control unit- types of memory RAM, ROM-purpose of cache memory

Programming Methodology.

Steps involved in problem solving – Define algorithm , Program - Characteristics of algorithm - Differentiate between program and algorithm- Steps involved in algorithm development - Differentiate algorithm and flowchart - Algorithms for simple problems - Symbols used in flowcharts -Flowcharts for simple problems.

7. Computer Hardware Basics

Hardware Basics- I/P, O/P - inside computer case- system board components - 3 types of Software - BIOS- boot process - POST - different connectors.

Operating Systems Basics:

Need for an operating system - List the various operating systems - Types of commands, Internal & External Commands   Features of Windows desktop - Components of a Window - Function of each component of a Window - Method of starting a program using start button - Maximize, minimize, restore down and close buttons- Meaning of a file and folder -Viewing the contents of hard disk drive using explorer -Finding a file - Formatting a floppy disk using explore option -   Installing and uninstalling new software using control panel -   installing and un installing a new hardware using control panel - - disk defragmentation - Installing a printer - Changing resolution, colour, appearance and screensaver options of the display - Changing the system date and time

REFERENCE BOOKS

1) G.K.Mithal, Electronic Devices and Circuits, 23rd Edition- Khanna Publication-1988
2) B. Somanathan, Electronic devices and applications, 2nd Edition- PHI.
3) Dr.K.Padmanabham, P.Swaminathan, Electronic components, 2nd Edition,-Laxmi Publications (P) Ltd
4) Walter c bosshard, Printed circuit boards: design and technology -TMH
5) Bernard Grob, Basic Electronics, 4th edition- TMH-1977
6) Millman&Halkias, Electronic devices & Circuits, 4th edition- TMH
7) Information Technology   - Curtin.
8) Computer Science Theory & Application   - E. Balaguruswamy, B. Sushila
9) Introduction to Computers (Special Indian Edition)   - Peter Norton

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1.1 to 3.12
Unit test-2	From 3.13 to 5.12
Unit test-3	From 6.1 to 7.17

(Model Paper)   C –23, IOT-105
State Board of Technical Education and Training, A. P
Diploma in Internet of Things (DIOT)
First Year
Subject Name: BASICS OF ELECTRONICS AND COMPUTER ENGINEERING

Sub Code: IOT - 105

Time : 90 minutes   Unit Test-I   Max.Marks:40
_____

Part-A   16Marks

Instructions: (1)   Answer all questions.
               (2)   First question carries four marks, each question of remaining carries three marks

1.   Draw the circuit symbols of following
      a)Variable Resistor   (CO1)
      b) Single pole double throw (SPDT) switch   (CO1)
      c) Iron core inductor   (CO1)
      d) Double pole single throw (DPST) switch   (CO1)
2.   Classify the different types of inductors   (CO1)
3.   Define the term capacitance   (CO1)
4.   List the materials used in soldering.   (CO1)
5.   Define the terms resistivity and conductivity and give their equations.   (CO2)

Part-B   3×8=24

Instructions: (1)   Answer all questions.
               (2)   Each question carries eight marks
               (3)   Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.
6.   (a)   Explain the use of Ferrites in the construction of high frequency inductors   (CO1)
                                    (or)
      (b)   Explain the working of thermistor and sensistor.   (CO1)

7.   (a)   Explain the working of general-purpose electromagnetic relay and mention its applications.
                                                                                   (CO1)
                                    (or)

      (b)   Explain the methods of etching, cleaning and drilling of PCB   (CO1)

3.22 8.   (a) Explain Valance band, Conduction band and Forbidden energy gap.   (CO2)
                                    (or)
            (b)Compare conductors, semiconductors and insulators   (CO2)

(Model Paper)   C –23, IOT-105

State Board of Technical Education and Training, A. P
Diploma in Internet of Things (DIOT)
First Year
Subject Name: BASICS OF ELECTRONICS AND COMPUTER ENGINEERING

Sub Code: IOT - 105

Time : 90 minutes   Unit Test-II   Max.Marks:40

_____

Part-A   16Marks

Instructions: (1) Answer all questions.
                 (2) First question carries four marks, each question of remaining carries three marks

1. Draw the circuit symbols of following
   a) PN diode   (CO2)
   b) Zener Diode PNP Transistor   (CO2)
   c) NPN Transistor   (CO3)
   d) PNP Transistor   (CO3)
2. Draw the VI characteristics of diode   (CO2)
3. Sketch V-I characteristics of CB configuration   (CO3)
4. Define alpha, beta and gamma factors of a transistor.   (CO3)
5. List the advantages of JFET over BJTs   (CO3)

Part-B   3×8=24M

Instructions: (1) Answer all questions.
                 (2) Each question carries eight marks
                 (3) Answer should be comprehensive and the criterion for valuation
                 is the content but not the length of the answer.

6. (a) Describe the working of PN junction Diode with forward & reverse biasing. (CO2)

(or)

   (b) Describe the construction and working of Zener diode   (CO2)

7. (a) Explain the construction & working of JFET   (CO3)

(or)

   (b)   Explain the construction & working of N channel Enhancement type MOSFET(CO3)

8. (a) Explain the working of half wave rectifier and a neat circuit diagram and wave forms
                                                                       (CO3)

(or)
   (b) Explain the working of half wave rectifier and a neat circuit diagram and wave forms (CO3)

(Model Paper)   C –23, IOT-105

State Board of Technical Education and Training, A. P
Diploma in Internet of Things (DIOT)
First Year
Subject Name: BASICS OF ELECTRONICS AND COMPUTER ENGINEERING

Sub Code: IOT - 105

Time : 90 minutes   Unit Test-III   Max.Marks:40

_____

Part-A   16Marks

Instructions: (1) Answer all questions.
                   (2) First question carries four marks, each question of remaining carries three marks

1. a) All computer physical components are treated as software (True/False)   (CO4)

   b) --------------------is the fastest memory in the computer   (CO4)

c) Step by step procedure to solve problem is ---------------------   (CO4)

d) Which one of the following is not an internal command [   ]   (CO4)

i) FORMAT II) RD III) COPY IV) CLS

2) State the importance of binary number system for use in Digital Computers   (CO4)
3) List different steps involved in problem solving   (CO4)
4) What is the need for an operating system?   (CO5)
5) Write about analog computers.   (CO5)

Part-B   3×8=24

Instructions: (1)   Answer all questions.
               (2)   Each question carries eight marks
               (3)   Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. a) Draw and explain block diagram of computer in detail   (CO4)
                              Or
   b) Explain various generation of computers   (CO4)

7. a) Draw the flow chart to find biggest of three numbers   (CO4)
                              Or
   b) Write an algorithm to find the area of triangle when base and height are given. (CO4)

8. a) Explain any three external commands in detail   (CO5)
                              Or
   b) Explain components of a window.   (CO5)

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MODEL PAPAER
BOARD DIPLOMA EXAMINATIONS
C-23, IOT-105, BASICS OF ELECTRONICS AND COMPUTER ENGINEERING
FIRST YEAR
YEAR END EXAMINATION

TIME:3 HOURS   MAX MARKS:80

Part-A   10×3=30

Instructions: (1) Answer all questions.
                  (2) Each question carries three marks
                  (3) Answer should be brief and straight to the point and shall not exceed
                      five simple sentences.

1. Define the term capacitance   (CO1)
2. Sketch the I.S.I symbols of any three switches.   (CO1)
3. Write the relationship equations between alpha, beta and gamma Factors.   (CO2)
4. Mention the applications of zener diode   (CO2)
5. Draw the circuit symbols of NPN and PNP transistors   (CO3)
6. Compare Half wave, Full wave Centre tapped, Bridge rectifiers in any 3 aspects   (CO3)
7. Define terms Hardware and Software.   (CO4)
8. Define algorithm.   (CO4)
9. State the importance of POST   (CO5)
10. Define the terms FILE and FOLDER   (CO5)

Part-B   5×10=50

Instructions: (1) Answer any FIVE questions.
                    (2) Each question carries TEN marks
                    (3) Answer should be comprehensive and the criterion for valuation is the content
                    but not the length of the answer.

11. Explain the working of thermistor and sensistor.   (CO1)
12. Explain Surface Mount Technology and its uses   (CO1)
13. Explain the working of PN junction Diode with forward & reverse biasing.   (CO2)
14. Explain the construction and working of NPN transistors   (CO3)
15. Explain the working of full wave bridge rectifier with wave forms   (CO3)
16. Differentiate algorithm and flowchart with suitable examples?   (CO4)
17. Explain the 3 types of Software in detail.   (CO5)
18. Explain Installation of Printer in detail.   (CO5)

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PROGRAMMING IN C

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
IOT-106	PROGRAMMING IN C	5	150	20	80

S.No	Major topics	No. of Periods	Weightage of Marks	No. of Short Answer Questions	No. of Essay Questions	COs Mapped
1.	Introduction to C Language	20	16	2	1	CO1,CO2
2.	Input and output statements, Operators and Expressions inC	25	16	1	1	CO1,CO2,C3
3.	Decisionmaking, iterative and other control statements	40	26	2	1	CO1,CO2,CO3
4.	Arrays and strings , Structures and Unions	30	26	2	2	CO1,CO2,CO3
5.	User definedfunctions, pointers, file management and pre-processor directives	35	26	2	2	CO1,CO2,CO3,CO4,CO5
	Total Periods/Marks	**90**	**110**	**30**	**80**	

Course Objectives	- To Relate basics of programming language constructs using C Language - To classify and implement data types, derived data types, pointers, files, statements - To analyse and develop effective modular programming - To construct mathematical, logical and scientific problems and real time applications using C language

CO NO		COURSE OUTCOMES
CO1	IOT-106.1	Develop, compile and debug programs using C- fundamentals and different programming statements in C language.
CO2	IOT-106.2	Evaluate various operations using primary and derived data types in C.
CO3	IOT-106.3	Analyse programs using predefined functions, modules and recursive techniques
CO4	IOT-106.4	Write scientific and logical programs using pointers, file pointers
CO5	IOT-106.5	Develop programs using information passing

CO-PO/PSO MATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT-106.1	3		2	2				3	2	
IOT-106.2				2				3	3	
IOT-106.3		2	3	3				3	1	2
IOT-106.4	3		1	1	2			3	2	2
IOT-106.5			2	2		2	2	3	2	3
Average	3	2	2	2	2	2	2	3	2	2.3

3=Strongly mapped , 2=moderately mapped, 1=slightly mapped

LEARNING OBJECTIVES

1.0   Introduction to C-Language
1.1   Describe the history of C-language, structure of C-language program
1.2   Describe the programming style of C language
1.3   Explain the steps involved in Editing, compiling ,executing and debugging of C program
1.4   Describe character set, C-Tokens, Keywords, Identifiers, Constants, Variables
1.5   Define Data Type
1.6   Classify Data Types and explain them with examples.
1.7   Explain declaration of constants and variables
1.8   Explain initializing values to variables in declaration
1.9   Explain about user defined data types with a simple program
1.10 Explain the usage of type qualifiers

2.0   Input and output statements, Operators and Expressions in C
2.1   Explain the importance of Pre-processor Directive #include
2.2   Illustrate
    2.2.1   Reading a character using getch(), getche() and getchar()
    2.2.2 writing a character using putch(), putchar()
    2.2.3 formatted input using scanf() & write sample programs using it.
    2.2.4 formatted output usingprintf()& write sample programs using it.
2.3   Explain character functions
2.4   Define an operator, an expression
2.5   Explain
    2.5.1   Various arithmetic operators and explain the evaluation of arithmetic
        expressions   with example.
    2.5.2   Various relational operators and discuss evaluation of relational expressions
    2.5.3   Various logical operators and discuss evaluation of logical expressions
2.6   Explain the difference between unary and binary operators
2.7   Describe various assignment operators, increment and decrement operators
2.8   Illustrate nested assignment
2.9   Explain conditional operators with an example
2.10 Explain
    2.10.1 Bit-wise operators and explain each with an example
    2.10.2 Special operators with examples
    2.10.3 Precedence and Associativity of operators
2.11 Describe evaluation of compound expression
2.12 Illustrate type conversion techniques
2.13 Write sample programs by using all the operators

3.0 Decision making, iterative and other control statements

3.1 Explain decision making statements and its need in programming

3.2 Explain

    3.2.1 Simple if and if-else statement with syntax and sample program

    3.2.2 Nested if..else statements with syntax and sample program

    3.2.3 if-else-if ladder with syntax and sample program

    3.2.4 switch statement with syntax and sample program

3.3 State the importance of break statement with switch and illustrate

3.4 Compare

    3.4.1 Conditional operator with if-else statement

    3.4.2 if-else with switch statement

3.5 Define looping or iteration

3.6 List and explain iterative statements with syntax and examples

3.7 Compare different loop statements

3.8 What is nested loop and illustrate.

3.9 Explain the usage of goto, break and continue statements with loop statements

3.10 Differentiate break and continue statements.

3.11 Define structured programming.

4.0 Arrays, strings, Structures and Unions

4.1 Define Array

4.2 Describe

    4.2.1 Declaration and initialization of One Dimensional(1D) Array with syntax and sample programs.

    4.2.2 Accessing the elements in 1D-Array with sample programs.

    4.2.3 Reordering an array in ascending order.

4.3 Explain declaration and initialization and usage of two Dimensional(2D)Arrays.

4.4 Illustrate the concept of arrays with sample programs on matrix addition, subtraction and matrix multiplication

4.5 DefineString

4.6 Describe

    4.6.1 Declare and initialize of String variables.

    4.6.2 gets() and puts()

    4.6.3 Reading and displaying of strings from terminal with sample programs.

    4.6.4 Explain about various String handling functions with sample programs.

4.7 Explain Character arithmetic.

4.8 Define a structure.

4.9 Explain

    4.9.1 Initializing structure, Declaring structure, Declaring Structure Variables.

    4.9.2 Accessing of the structure members

    4.9.3 Structure assignment.

    4.9.4 How to find size of a structure.

    4.9.5 Nested structure concept.

    4.9.6 Structures containing arrays

    4.9.7 Array of structures

4.10 Define Union, declare, initialize and use of union.

4.11 Distinguish between Structures and Unions

4.12 Write sample programs for all the concepts of structures and unions

5.0 User defined functions, pointers, file management and preprocessor directives

5.1 Explain
   1. Need of user defined functions
   2. Advantages of the functions
   3. Elements of function
   4. Return values and their types

5.2 Define a function call, function prototype

5.3 Explain
   5.3.1 Function declaration in programs
   5.3.2 Functions with no arguments and no return values with sample programs
   5.3.3 Functions with arguments with no return values with sample programs
   5.3.4 Functions with arguments with return values with sample programs
   5.3.5 Functions with no arguments with return values with sample programs
   5.3.6 Functions that return multiple values with sample programs
   5.3.7 Recursion with sample programs
   5.3.8 Passing arrays to functions with sample programs
   5.3.9 Structure as function arguments and structures as function values.
   5.3.10 Structures containing pointers.
   5.3.11 Self referential structures with examples.
   5.3.12 Storage classes-auto, register, static, extern
   5.3.13 Scope, visibility and lifetime of variables in functions

5.4 Differentiate Local and External variables

5.5 Define Global variable

5.6 Discuss passing the global variables as parameters using sample programs

5.7 Explain
   5.7.1 Declaration and initialization of Pointers.
   5.7.2 Accessing the address of a variable using &operator
   5.7.3 Accessing the value of a variable through pointer
   5.7.4 Pointer Arithmetic
   5.7.5 Precedence of address and de-referencing operators.
   5.7.6 Relationship between arrays and pointers.
   5.7.7 Accessing array elements using pointers
   5.7.8 Pointers as function arguments
   5.7.9 Pointer arrays with examples.

5.8 Differentiate between address and de-referencing operators.

5.9 Explain
   5.9.1 Dynamic memory management functions with examples.
   5.9.2 Structures containing pointers.
   5.9.3 Pointer to structure.
   5.9.4 Self referential structures with examples.

5.10 Explain
   5.10.1 Files and how to declare file pointer to a file
   5.10.2 Illustrate the concept of file opening using various modes
   5.10.3 Illustrate the concept of closing of a file
   5.10.4 Illustrate the concept of Input / Output operations on a file
   5.10.5 Illustrate the concept of random accessing files
   5.10.6 Explain different file handling functions

5.11 Explain
   5.11.1 Preprocessor directives
   5.11.2 Need of preprocessor directives.

5.12 Write

5.12.1 Simple programs using preprocessor directives.

5.12.2 Simple program using command line arguments(argc and argv)

COURSE CONTENT

1. **Introduction to C Language**: History of C language - importance of C Define language - structure of C language - programming style of C language - steps involved in executing the C program-Character set - C Tokens - Keywords and Identifiers- Constants and Variables - Data Types and classification - declaration of constants and variables-initializing values to variables-user defined data types-usage of type qualifiers.

2. **Input and output statements, Operators and Expressions in C:** importance of Pre-processor #include-reading and writing a single character functions- formatted input and output statements-operators-classification of operators-operator precedence and associativity-expressions and expression evaluation-type conversion techniques.

3. **Understand Decision making, iterative and other control statements :**simple if,if-else, if else ladder, nested if-else-switch statement   - else if, nested if , else if ladder, switch statements- Classification of various loop statements- while statement – do.. while statement ram - for loop statement - nesting of loops- Comparisons of different loop statements –goto statement- break and continue statements –concept of structured programming

4. Understand Arrays and strings , basics of Structures and Unions: Arrays -One Dimensional Arrays – array programs -two Dimensional Arrays- programs on matrix - Strings –- String handling functions - Structure- Array of structures - Nested structures- pointer to structure Self referential structures - Union and illustrate use of a union – difference between Structures and Union

5. Understand User defined functions, basics of pointers, file management and preprocessor directives: Function – user defined functions – Advantages - Recursion concept - parameter passing –storage classes - scope, visibility and lifetime of variables in functions- Local and External variables -Global variable- - Pointer - Differentiate address and de-referencing operators - Pointer Arithmetic- precedence of address and de- referencing operators - - Relationship between Arrays and Pointers - Pointers as Function Arguments - Dynamic memory management- Files - file pointers - file opening in various modes - Concept of closing of a file –operations on files - Need of Preprocessor directives - Various Preprocessor directives- Macros – Command line arguments

REFERENCE BOOKS

1   Programming in ANSI C E. Balaguruswamy   TataMcGrawHill
2   Programming with C   Gottfried   Tata McGrawHill
3   C The complete Reference   Schildt   Tata McGrawHill

Model Blue print

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1.1 to 2.13
Unit test-2	From 3.1 to 4.6
Unit test-3	From 4.7 to 5.12

S.No.	Chapter/Unit title	No.of periods	Weightage Allocatd	Marks Wise Distribution of Weightage			Question wise Distribution of Weightage			CO's Mapped
				R	U	Ap	R	U	Ap	
1	Introduction to C Language	20	16	6	10		2	1		CO1,CO2
2	Input and output statements, Operators and Expressions inC	25	16	6	10		2	1		CO1,CO2,C3
3	Decisionmaking, iterative and other control statements	40	26	6	20		2	2		CO1,CO2,CO3
4	Arrays and strings , Structures and Unions	30	26	6	20		2	2		CO1,CO2,CO3
5	User definedfunctions, pointers, file management and pre-processor directives	35	26	6	20		2	2		CO1,CO2,CO3,CO4,CO5
	Total	150	110	30	80		10	8		

SCHEME: C-23   SUBJ CODE:IOT-106

MAX MARKS:40   TIME: 90Minutes

……

PART-A   **16Marks**

Instructions:1) Answer all questions

        2) First question carries 4marks, and each question of remaining carries 3 marks

1. a) Int is a Data type in C language. (True/False)   (CO1)

b) 'a' is an example for _____ constant.   (CO1)

c) scanf() is used for _____.   (CO2)

d) Which one of the following is a Relational operator [   ]   (CO2)

    I)+   II)-   III)*   IV)>=

2) List any three data types of C language.   (CO1)

3) Define a) Keyword b) Identifier c) Constant   (CO1)

4) Write a sample program using Conditional operator?   (CO2)

5) Distinguish between pre-increment and post-increment operators.   (CO2)

PART-B   3X8=24Marks

Instructions:1) Answer all questions

      2)Each question carries 8 Marks

      3)Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer

6.a) Write the C-Programming structure and explain each part of it   (CO1)

      (Or)

 b) Explain various generation of computers   (CO1)

7.a) Explain Arithmetic, Relational, Logical operators with examples.   (CO2)

      Or

b) Evaluate the following C-Expression and write the final value   (CO2)

X= ((2 + 6 / 2 + 3 * 6) – ((4 + 6) / 2 +5) /10) + 1) / 5.0

8. a) Illustrate Type Conversion techniques in detail   (CO2)

      Or

 b) Write the C-program using formatted input and output functions.   (CO2)

DIPLOMA IN INTERNET OF THINGS
MODEL PAPER
PROGRAMMING IN C
UNIT TEST-2

SCHEME: C-23   SUBJ CODE:IOT-106
MAX MARKS:40   TIME: 90Minutes

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PART-A   16Marks

Instructions:1) Answer all questions

        2) First question carries 4marks, and each question of remaining carries 3 marks

1. a) if-else is an interatve statement.   (True/False)   (CO3)

b) For is a _____ statementt.   (CO3)

c)String is defined as _____   (CO4)

d) Which one of the following is a control statement   [   ]   (CO3)

        I)IF THEN ELSE   II)DO LOOP   III)WHILE   IV) NONE OF THE ABOVE

2) Differentiate break and continue statements.   (CO3)

3) Give syntax of one dimensional array.   (CO4)

4) State the importance of gets().   (CO4)

5) Distinguish between structures and Union.   (CO4)

PART-B   3X8=24Marks

Instructions:1) Answer all questions
        2)Each question carries 8 Marks
        3)Answer should be comprehensive and the criterion for valuation is the
        content but not the length of the answer

6.a) Explain Iterative statements in detail with an example program   (CO3)
        (Or)
  b) Explain the usage of goto, break and continue statements with loop statements   (CO3)

7.a) Explain nested loop with an example program   (CO3)
        Or
b) Conditional operator with if-else statement   (CO3)

8. a) Explain arrays using Matrix Multiplication program   (CO4)
        Or
  b) Explain about various String handling functions with sample programs   (CO4)

DIPLOMA IN INTERNET OF THINGS
MODEL PAPER
PROGRAMMING IN C
UNIT TEST-3

SCHEME: C-23   SUBJ CODE:IOT-106
MAX MARKS:40   TIME: 90Minutes

………

PART-A   16Marks

Instructions:1) Answer all questions

2) First question carries 4marks, and each question of remaining carries 3 marks

1. a) The scope of a variable is its lifetime in the program   (True/False)   (CO4)

b) _____ operator is used to calculate the size of structure   (CO4)

c) Which one of Union and Structurer takes less space_____   (CO4)

d) elements of functions in C Language are   [   ]   (CO4)

   I)Input parameters   II)Output parameters   III)Return value   IV) All of the above

2) Distinguish between Structures and Unions   (CO4)

3) Differentiate Local and External variables   (CO5)

4) List any three Advantages of the functions   (CO5)

5) Differentiate between address and de-referencing operators   (CO5)

PART-B   3X8=24Marks

Instructions:1) Answer all questions
          2)Each question carries 8 Marks
          3)Answer should be comprehensive and the criterion for valuation is the
          content but not the length of the answer

6.a) Explain with a program for the concept of UNION   (CO4)
          (Or)
  b) Explain Array of structures with an example program   (CO4)
7.a) Explain nested loop with an example program   (CO3)
          Or
b) Explain different file handling functions with examples   (CO5)

8. a) Explain Pointer arrays with examples.   (CO5)
          Or
  b) Explain preprocessor directives using a C Program   (CO5)

BOARD DIPLOMA EXAMINATIONS
DIPLOMA IN INTERNET OF THINGS
MODEL PAPER - END EXAMINATION
PROGRAMMING IN C

SCHEME: C-23   SUBJ CODE:IOT-106
MAX MARKS:80   TIME: 3HOURS
....

PART-A

Note: Answer all questions. Each question carries 3 marks   **10 X 3=30M**

1.	Define an identifier and write two valid identifiers	CO1
2.	Write a short note on type qualifiers	CO1
3.	Write the syntax of formatted output statement	CO2
4.	Write a program to print the biggest of two numbers using conditional operators	CO2
5.	Differentiate between break and continue	CO3
6	What is nesting? Give an example.	CO3
7	What is an array? how to declare an array?	CO4
8	List any three sting functions	CO4
9	Define a pointer. Write the syntax to declare a pointer variable	CO5
10	State the importance of "void"	CO5

PART-B

Note: 1. Answer all the question and making use of internal choice.

   2. Each question carries 10 marks   **5 X 10=50M**

11. Write the C-Programming structure and explain each part of it   CO1

12. Explain all the operators supported by C-language with examples   CO2

13.Write a program to print the following pattern   CO3


```
          1
       1  2  1
    1  2  3  2  1
```
" " up to nth level

14. Explain any four control statements in C-language.   CO3

15.Write eight differences between structures and unions   CO4

16. Write a C-program to input 3X4 matrix and print in the form of matrix   CO4

17. Write a program to calculate the factorial of a function using recursive concept with the help of
        parameter passing and return value   CO5

18. Explain any four file handling functions.   CO5

ENGINEERING DRAWING

Course code	Course Title	No. of periods /week	Total No. of periods	Marks for FA	Marks for SA
IOT-107	ENGINEERING DRAWING	3	90	40	60

S. No	Unit Title	No. of periods	Weightage of Marks	No. of Short Answer Questions	No. of Essay Questions	CO's Mapped
1	Use of Drawing Instruments, Free Hand Lettering and Dimensioning Practice	10	10	2	-	CO1
2	Principles of Geometric Constructions	15	15	1	1	CO2
3	Projections of points, lines, planes and solids	20	25	1	2	CO3
4	Sectional Views	20	10	-	1	CO4
5	Orthographic projection	25	20	-	2	CO5
	Total Periods/Marks	**90**	**80**	**20**	**60**	

Course Objectives and Course Outcomes

Course Objectives	Upon completion of the course the student shall be able to understand the basic graphic skills and use them in preparation, reading and interpretation of engineering drawings.

COURSE OUTCOMES

CO1	IOT-107.1	Practice the use of engineering drawing instruments and Familiarise with the conventions to be followed in engineering drawing as per BIS
CO2	IOT-107.2	Construct the i) basic geometrical constructions ii) engineering curves
CO3	IOT-107.3	Visualise and draw the projections of i) Points ii) Lines iii) Regular Planes iv) Regular Solids
CO4	IOT-107.4	Visualise and draw the sectional views of components
CO5	IOT-107.5	Visualise and draw the orthographic projections of components

LEARNING OUTCOMES

Upon completion of the course the student shall able to

1.0 Use of Drawing Instruments, Free Hand Lettering and Dimensioning Practice

1.1   State the importance of drawing as an engineering communication medium
1.2   Select the correct instruments to draw the different lines / curves.
1.3   Use correct grade of pencil and other instruments to draw different types of lines and for different purposes
1.4   Identify the steps to be taken to keep the drawing clean and tidy.
1.5 Write titles using vertical and slopping (inclined) lettering and numerals of 7mm, 10mm and 14mm height.
1.6   Acquaint with the conventions, notations, rules and methods of dimensioning in engineering drawing as per the B.I.S.
1.7 Dimension a given drawing using standard notations and desired system of dimensioning.

2.0 Principles of Geometric Constructions

2.1   Practice the basic geometric constructions like i) dividing a line into equal parts
         i) Exterior and interior tangents to the given two circles
         ii) Tangent arcs to two given lines and arcs
2.2   Draw any regular polygon using general method when i) side length is given
         i) Inscribing circle radius is given   ii) describing circle radius is given
2.3   Draw the engineering curves like i) involute ii) cycloid

3.0   Projections of points, lines, planes and solids (All in first quadrant only)

3.1 Explain the basic principles of the orthographic projections
3.2 Visualise and draw the projection of a point with respect to reference planes (HP & VP)
3.3 Visualise and draw the projections of straight lines with respect to two reference Planes (up to lines parallel to one plane and inclined to other plane)
3.4 Visualise and draw the projections of planes (up to planes   perpendicular to one plane and inclined to other plane)
3.5 Visualise and draw the projections of regular solids like Prisms, Pyramids, Cylinder, Cone (up to axis of solids parallel to one plane and inclined to other plane)

4.0 Sectional Views

4.1   Identify the need to draw sectional views.
4.2   Draw sectional views of regular solids by applying the principles of hatching.

5.0 Orthographic projection

5.1   Draw the orthographic views of an object from its pictorial drawing.
5.2   Draw the minimum number of views needed to represent a given object fully.

Competencies and Key competencies to be achieved by the student

S.No	Major topic	Key Competency
1.	Use of Drawing Instruments, Free Hand Lettering and Dimensioning Practice	• Explain the linkages between Engineering drawing and other subjects of study in Diploma course. • Select the correct instruments to draw various entities in different orientation • Write titles using sloping and vertical lettering and numerals as per B.I.S (Bureau of Indian standards) • Dimension a given drawing using standard notations and desired system of dimensioning
2.	Geometrical construction	• Dividing a line into equal parts, tangents to circles, Construct involute, cycloid from the given data.
3.	Projection of points, Lines, Planes & Solids	• Draw the projections of points, straight lines, planes & solids with respect to reference planes (HP& VP)
4.	Sectional Views	• Differentiate between true shape and apparent shape of section • Apply principles of hatching. • Draw simple sections of regular solids
5.	Orthographic Projection	• Draw the minimum number of views needed to represent a given object fully.

COURSE CONTENTS:

NOTES: 1. B.I.S Specification should invariably be followed in all the topics.

2. A-3 Size Drawing Sheets are to be used for all Drawing Practice Exercises.

1.0 Use of Drawing Instruments, Free Hand Lettering and Dimensioning Practice

Explanation of the scope and objectives of the subject of Engineering Drawing . Its importance as a graphic communication -Need for preparing drawing as per standards – SP-46 –1988 – Mention B.I.S - Role of drawing in -engineering education - Basic Tools, tools for drawing– Mentioning of names under each classification and their brief description -Scales: Recommended scales reduced & enlarged -Lines: Types of lines, selection of line thickness - Selection of Pencils -Sheet Sizes: A0, A1, A2, A3, A4, A5, Layout of drawing sheets in respect of A0, A1, A3 sizes, Sizes of the Title block and its contents - Care and maintenance of Drawing Sheet,

Importance of lettering – Types of lettering -Guide Lines for Lettering Practicing of letters & numbers of given sizes (7mm, 10mm and 14mm)-Advantages of single stroke or simple style of lettering - Use of lettering stencils-   Purpose of engineering Drawing, Need of B.I.S code in dimensioning -Shape description of an Engineering object -Definition of Dimensioning size description -Location of features, surface finish, fully dimensioned Drawing -Notations or tools of

dimensioning, dimension line extension line, leader line, arrows, symbols, number and notes, rules to be observed in the use of above tools -Placing dimensions: Aligned system and unidirectional system (SP-46-1988)-Arrangement of dimensions Chain, parallel, combined progressive, and dimensioning by co-ordinate methods-The rules for dimensioning standard, features "Circles (holes) arcs, angles, tapers, chamfers, and dimension of narrow spaces.

2.0   Geometric Constructions

Division of a straight line into given number of equal parts –Drawing interior and exterior tangents to two circles of given radii and centre distance-Drawing tangent arc of given radius to touch two lines inclined at given angle (acute, right and obtuse angles), Tangent arc of given radius touching a circle or an arc and a given line, Tangent arcs of radius R, touching two given circles internally and externally-Construction of any regular polygon by general method for given side length, inscribing circle radius and describing/superscripting circle radius - Involute, Cycloid, explanations as locus of a moving point, their engineering application, viz., Gear tooth profile, screw threads, springs etc. – their construction

3.0   Projection of points, lines and planes and Solids (All in first quadrant only)
Classification of projections, Observer, Object, Projectors, Projection, Reference Planes, Reference Line, Various angles of projections –Differences between first angle and third angle projections

Projections of points -Projections of straight line –(a) Parallel to both the planes, (b)Perpendicular to one of the planes and (c) Inclined to one plane and parallel to other planes-Projections of regular planes-(a) Plane parallel to one of the reference planes, (b) Plane perpendicular to HP and inclined to VP and vice versa-   Projections of regular solids- (a) Axis perpendicular to one of the planes, (b) Axis parallel to VP and inclined to HP and vice versa.

4.0   Sectional Views
Need for drawing sectional views – what is a sectional view - Hatching – Section of regular solids inclined to one plane and parallel to other plane

5.0   Orthographic Projections

Meaning of orthographic projection - Using a viewing box and a model – Number of views obtained on the six faces of the box, - Legible sketches of only 3 views for describing object - Concept of front view, top view, and side view sketching these views for a number of engineering objects - Explanation of first angle projection. – Positioning of three views in First angle projection -Projection of points as a means of locating the corners of the surfaces of an object – Use of meter line in drawing a third view when other two views are given -Method of representing hidden lines -Selection of minimum number of views to describe an object fully.

REFERENCE BOOKS

1 Engineering Graphics by P I Varghese – (McGraw-hill)
2 Engineering Drawing by Basant Agarwal & C.M Agarwal - (McGraw-hill)
3 Engineering Drawing by N.D.Bhatt.
4 T.S.M. & S.S.M on " Technical Drawing" prepared by T.T.T.I., Madras.
5 SP-46-1998 – Bureau of Indian Standards.

PO-CO Mapping

IOT-107	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2		1		1	2	3	1
CO2	3	2	2			2	1	2	3	1
CO3	3	2	2	1	1		1	2	3	1
CO4	3	2	2	1		2	1	2	3	1
CO5	3	2	2	1	1	2	1	2	3	1
CO6	3	2	2	1	1	2	1	2	3	1
AVERAGE	**3**	**3**	**3**	**1**	**1**	**2**	**1**	**2**	**3**	**1**

3: High, 2: Moderate,1: Low

BLUE PRINT

S.No	Unit Title	No. of Periods	Weightage Allocated	Marks wise distribution of weightage			Question wise distribution of weightage			CO'S Mapped
				R	U	AP	R	U	AP	
1	Use of Drawing Instruments, Free Hand Lettering and Dimensioning Practice	10	10	05	05	00	01	01	00	CO1
2	Principles of Geometric Constructions	15	15	00	00	15	00	00	02	CO2
3	Projections of points, lines, planes and solids	20	25	00	00	25	00	00	03	CO3
4	Sectional Views	20	10	00	00	10	00	00	01	CO4
5	Orthographic projection	25	20	00	00	20	00	00	02	CO5
	Total	**90**	**80**	**05**	**05**	**70**	**01**	**01**	**08**	

Table specifying syllabus to be covered for UNIT TEST I, II and III.

Unit Test	Learning Outcomes to be Covered
Unit Test – I	From 1.1 to 2.3
Unit Test – II	From 3.1 to 3.5
Unit Test – III	From 4.1 to 5.2

ENGINEERING DRAWING

TIME:90 MINUTES   MAX MARKS: 40

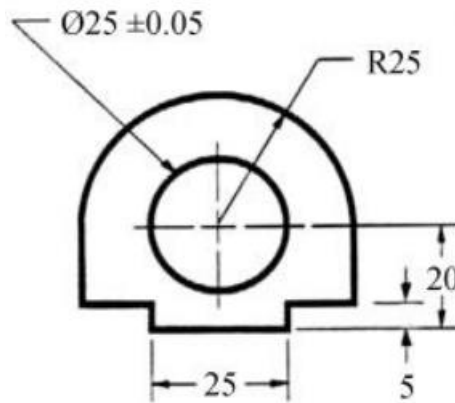**PART-A**   **(4X5=20)**

Instructions :

(1) Answer all questions. (2) Each question carries five marks. (3) All dimensions are in mm.

1. Write the following using single-stroke capital inclined letters of 14mm size   **CO1**

"ALL THE BEST FOR YOUR EXAMINATION"

2. The component and its dimensions are shown in the fig. below. Redraw it to a full scale adopting the recommendations of SP : 46–1988.   **CO1**

3. Divide a line of length 60 mm into seven equal parts.   **CO2**

4.. Construct regular pentagon of side 25 mm by any one method.   **CO2**

PART-B   **(2X10=20)**

5. . Draw an internal common tangent to two circles of radii 30 mm and 20 mm.   **CO2**

6. . A circle of 50 mm diameter rolls along a line for one revoluation clock wise. Draw the locus of a point on the circumference of circle which is in contact with the line.   **CO2**

7. Draw an involute to a circle of radius 20 mm.   **CO2**

8. Draw a helix of pitch 60 mm on a cylinder of diameter of 50 mm.   **CO2**

UNIT TEST-II, C-23, 1ˢᵗ YEAR, IOT-107, ENGINEERING DRAWING

TIME:90 MINUTES   **MAX MARKS: 40**

<u>   </u>

PART-A   **(4X5=20M)**

Answer all questions and each question carries four marks.

1. A point A is lying at 30 mm behind V.P and 60 mm below H.P. Draw its projections.

                                                                                    CO3

2. A 60 mm long line pq has an end p at 20 mm above the H.P. and 30 mm in front of the VP. The line is inclined at 45° to the HP. And 30° to the VP. Draw its projections.

                                                                                    CO3

3. A circular plane of diameter 60 mm is touching the VP with a point on its circumference. The plane is inclined at 45° to VP and perpendicular to HP. The centre of the plane is 40 mm above HP. Draw its projections.

                                                                                    CO3

4. A square prism 40 mm base side and height 60 mm is standing vertically on its square base 10 mm above HP and one of its rectangular faces making an angle of 60° with V.P. Draw its projections.   **CO3**

PART-B   **(2X10=20 M)**

Answer any two questions and Each question carries ten marks

5. A pentagonal lamina of side 25 mm rest on the HP on one of its edges, such that the surface is inclined at 45° to the HP, and the edge on which it rests is inclined at 60° to the VP. Draw its projections   **CO3**

6. A rectangular plane ABCD of size 40mm X 30mm is inclined to the HP at 30°. Its shorter side AB is parallel to HP and inclined at 45° to VP. Draw its projections.   **CO3**

7.   A hexagonal pyramid of base side 25 mm and height 60 mm is standing on HP with one of its base edges making an angle of 60o with VP and axis making an angle of 45° with HP. Draw its projection.   **CO3**

8. Draw the projections of a cone , base 30mm diameter and axis 50mm long resting on HP on a point of its base circle with the axis making an angle 45°with HP and parallel to VP. **CO3**

<u>**TIME:90 MINUTES**</u>   **MAX MARKS 40**
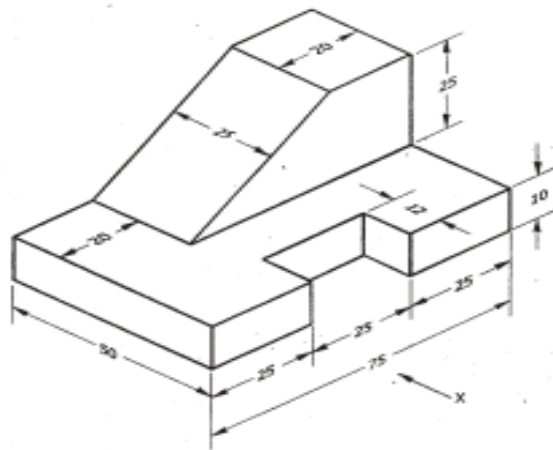
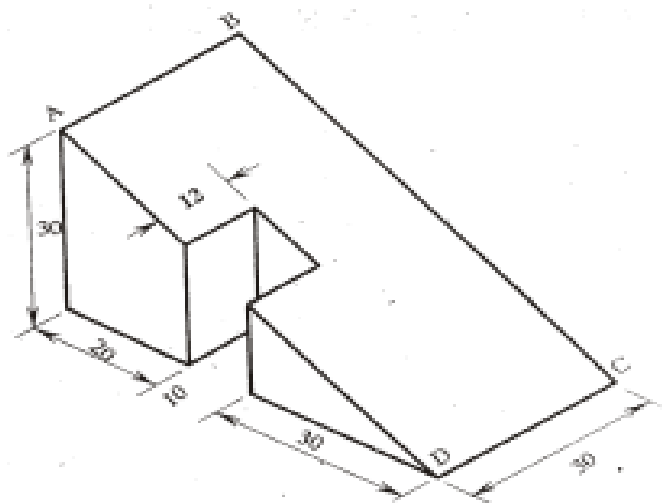**PART-A**   **(4X5=20M)**

Answer all questions and each question carries four marks.

1. A triangular prism with a base side of 50 mm and height 70 mm is resting on one of its rectangular faces on HP with the axis perpendicular to VP. The prism is cut by a horizontal section plane passing through the axis. Draw front view and sectional top view of the prism.   **CO4**

2. A square pyramid of base side 50mm and axis 75 mm long is resting on the ground with its axis vertical and sides of the base equally inclined to the VP. It is cut by a section plane perpendicular to VP inclined at 45° to HP and bisecting the axis. Draw its sectional top view.   **CO4**

3. Draw the front view and top view of the following figure :   **CO5**

4. Draw the front view and top view of the following figure   **CO5**

Answer any Two questions, Each question carries ten marks.

1. A pentagonal pyramid of base side 40 mm and height 80mm is resting on HP on its base with one of its base side parallel to VP. It is cut by a plane inclined at 30° to HP, perpendicular to VP and is bisecting the axis. Draw its front view, sectional top view and the true shape of section.   **CO4**

2. A cone of diameter 60 mm and height 70 mm is resting on ground on its base. It is cut by a section plane perpendicular to VP inclined at 45° to HP and cutting the axis at a point 40 mm from the bottom. Draw the front view , sectional top view and true shape.   **CO4**

7. Draw the front view, side view and top view of the following figure: **CO5**
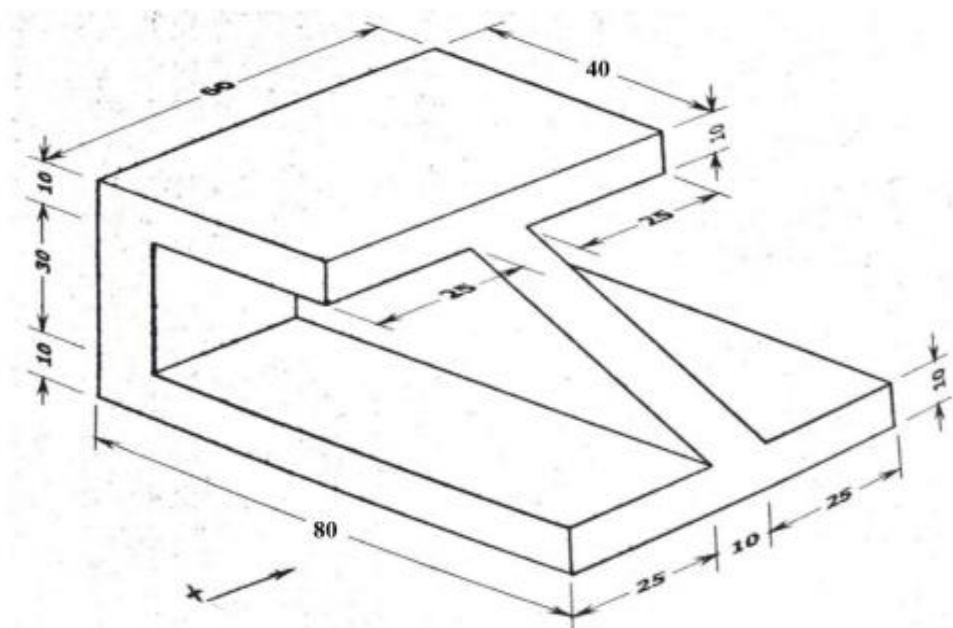
8. Draw orthographic views of front view and top view of the given isometric figure below. **CO5**
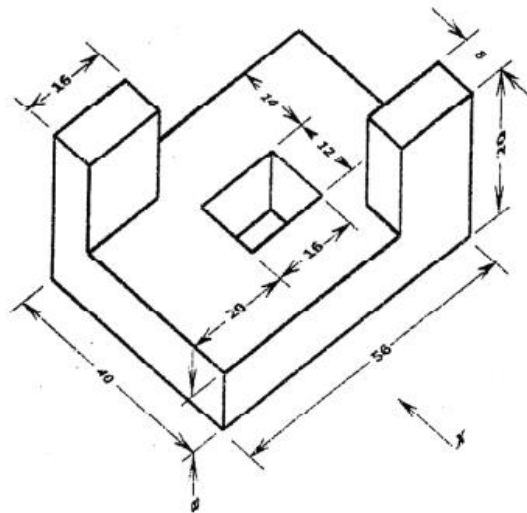
BOARD DIPLOMA EXAMINATIONS
MODEL QUESTION PAPER
DIOT – I-YEAR
IOT-107 :: ENGINEERING DRAWING

Time: 90 Minutes   **Total Marks: 40**

Instructions: i.   **All the dimensions are in mm**

ii.   **Use first angle projections only**

iii.   **Due weightage will be given for the dimensioning and neatness**

PART – A   **05 x 04=20**

i.   **Answer all the questions**
ii.   **Each question carries FIVE marks**

1.   Write the following in single stroke capital vertical lettering of size 10mm

ORTHOGRAPHIC PROJECTIONS

2.   Redraw the given fig. and dimension it according to SP-46:1988.Assume suitable scale
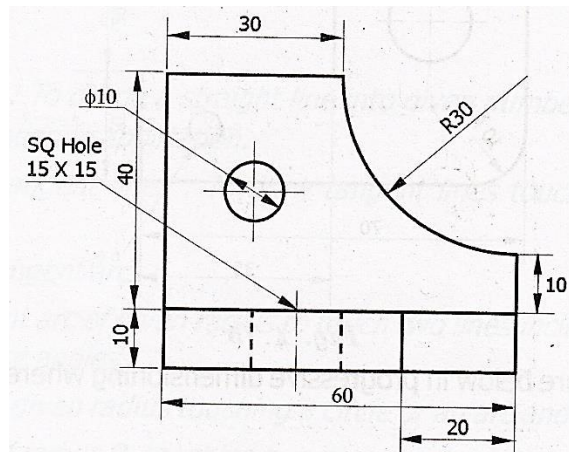
3.   Draw internal common tangents to two unequal circles of radii 26mm and 20mm. The distance between the circles is 75mm.

4.   Draw the projections of a point A lying on HP and 25mm in front of V.P.

PART – B   **10 X 04 = 40**

i.   **Answer any FOUR questions**

ii.   **Each question carries TEN marks**

5. Draw the involute of a circle of diameter 30 mm and also draw a tangent to the curve at a distance of 60 mm from the centre of the circle.

6. A right circular cone of height 80 mm and base radius 60 mm is resting in the H.P. on one of its generators and its axis is parallel to V.P. Draw the projections of the solid.

7. A cylinder with base 40mm diameter and 50mm long rests on a point of its base on HP such that the axis makes an angle of 30° with HP. Draw the projections of the cylinder.

8. A regular hexagonal prism of height 80 mm and base side 40 mm is resting in the H.P. on its base. It is cut by an auxiliary inclined plane of 60^0 inclination passing through the axis at a distance of 30 mm from the top base. Draw the sectional views of the solid and the true section.

9.   Draw the front view, top view and left side view of the object shown in the fig.
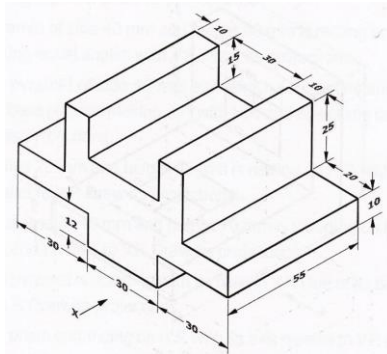
10. Draw the front view, top view and left side view of the object shown in the fig.
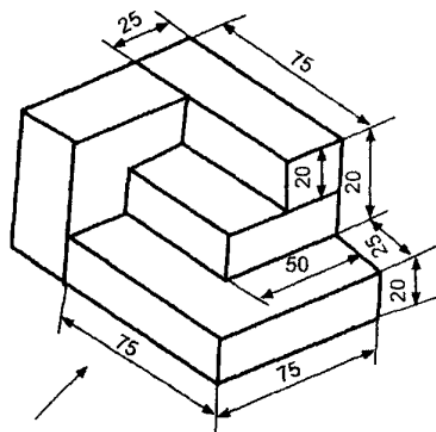
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PROGRAMMING IN C LAB

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
IOT-108	Programming in C Lab	03	90	40	60

S No	Chapter/ Unit Title	No. of Periods	COs Mapped
1.	Fundamentals and Input/Output statements	10	CO1,CO2
2.	Control statements	35	CO1,CO2,CO4
3.	Arrays, structures and unions	20	CO1,CO2,,CO3,CO4
4.	User defined functions, pointers	25	CO1,CO2,CO3,CO4,CO5
	Total	90	

COURSE OBJECTIVES	**Upon completion of the course the student shall be able to** 1. Edit, compile and debug execution of C-Programs 2. Learn the syntax of all the statements, keywords, user defied identifiers and usage of writing statements in C-Program. 3. Evaluate all the expressions using different primary types of data, derived data, operators and with their precedence, 4. Write C-programs using I/O statements, decision making statements. 5. Write structured and modular C-programs 6. Write C-programs on text files using different file operating modes and file pointers. 7. Write C-programs to implement dynamic memory allocation using pointer concepts

CO No		COURSE OUTCOMES
CO 1	IOT-108.1	Perform Edit, compile and debug and execution of C-Programs
CO 2	IOT-108.2	Develop programs using different predefined functions, keywords, user defined identifiers
CO 3	IOT-108.3	Write different expressions using available C-operators and valid data supported by C-language
CO 4	IOT-108.4	Develop C-programs using control statements, array's, structures, unions, files
CO 5	IOT-108.5	Develop C-programs using user defined functions and recursion

CO-PO/PSO MATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT-108.1	2	2			1			2		
IOT-108.2	2	3		2					2	2
IOT-108.3					2			2		3
IOT-108.4	2		3	2	3	3	2		2	2
IOT-108.5	2			2	3	2			2	2
Average	2	2.5	1	1.5	2.4	1.5	2	2	2	2.2

3=Strongly mapped , 2=moderately mapped, 1=slightly mapped

LEARNING OUTCOMES:

1.0 Fundamentals and Input/Output statements

    1.1 Exercise on structure of C Program

    1.2 Exercise on Keywords and identifiers
    1.3 Exercise on constants and variables
    1.4 Execution of simple C program
    1.5 Exercise on operators and expressions
    1.6 Exercise on special operators
    1.7 Exercise on input and output of characters
    1.8 Exercise on formatted input and output
    1.9 Exercise on escape sequence characters

2.0 Control statements

(Note: Every statement must be repeated with at least 5 different applications)
    2.1 Exercise on simple if statement

    2.2 Exercise on if..else statement

    2.3 Exercise on if..else..if ladder statement

    2.4 Exercise on switch statement

    2.5 Exercise on conditional operator comparing with if-else statement

    2.6 Exercise on while statement

    2.7 Exercise on for statement

    2.8 Exercise on do. While statement

3.0 Arrays, structures and unions

    3.1 Exercise on one dimension alarrays

    3.2 Exercise on two dimension alarrays

    3.3 Exercise on strings

    3.4 Exercise on structure

    3.5 Exercise on union

    3.6 Exercise on array of structures

4.0 User defined functions, pointers

4.1 Exercise on user-defined function

4.2 Exercise on parameter passing techniques

4.3 Exercise on recursion

4.4 Exercise on pointers

The competencies and key competencies to be achieved by the student

S.No.	Name of the experiment	Objectives	Key Competencies
1	Exercise on structure of C program	For a given C program, identify the different building blocks	❖ Identify different building block in a C program
2	Exercise on Keywords and identifiers	For a given C program identify the keywords and identifiers	❖ Identify different keywords ❖ Check whether the keywords are in lowercase ❖ Differentiate identifiers and keywords
3	Exercise on constants and variables	For a given C program identify the constants and variables	❖ Identify the constants ❖ Identify the variables ❖ Declare variables with proper names ❖ Know the assignment of values to variables
4	Execution of simple C program	Execute a simple C program	❖ Acquaint with C program editing ❖ Compile the program ❖ Rectify the syntactical errors ❖ Execute the program
5	Exercise on operators and expressions	Write a C program that uses different arithmetic operators	❖ Identify different arithmetic operators ❖ Build arithmetic expressions ❖ Identify the priorities of operators ❖ Evaluate arithmetic expression ❖ Compile the program ❖ Rectify the syntactical errors ❖ Execute the program ❖ Check the output for its correctness
6	Exercise on special operators	Write a C program that uses special operators	❖ Identify different special operators ❖ Build expressions using special operators ❖ Compile the program ❖ Rectify the syntactical errors ❖ Execute the program ❖ Check the output for its correctness
7	Exercise on input and output of characters	Write a C program for reading and writing characters	❖ Know the use of getchar() function ❖ Know the use of putchar() function ❖ Compile the program ❖ Rectify the syntactical errors ❖ Execute the program ❖ Check whether the correct output is printed for the given input
8	Exercise on formatted input and output	Write a C program using formatted input and formatted output	❖ Know the use of format string for different types of data in scanf() function ❖ Know the use of format string for different types of data in printf() function ❖ Check whether the data is read in correct format ❖ Check whether the data is printed in correct format
9	Exercise on Escape Sequence Characters	Write a C program using Escape Sequence Characters	❖ Know the use of Escape sequence characters ❖ Use the Escape sequence characters ❖ Check whether the data is read in correct format ❖ Rectify the syntax errors ❖ Check the output for correctness
10	Exercise on simple if statement	Write a C program using simple if statement	❖ Build a relational expression ❖ Use the if statement for decision making ❖ Rectify the syntax errors ❖ Check the output for correctness

11	Exercise on if..else statement	Write a C program using if..else statement	❖ Build a relational expression ❖ Use the if..else statement for decision making ❖ Rectify the syntax errors ❖ Check the output for correctness
12	Exercise on else..if ladder statement	Write a C program using else..if ladder statement	❖ Use else..if ladder statements with correct syntax ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check the output for correctness
13	Exercise on switch statement	Write a C program using switch statement	❖ Use switch statement with correct syntax ❖ Identify the differences between switch and else..if ladder ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check the output for correctness
14	Exercise on conditional operator	Write a C program using (? :) conditional operator	❖ Build the three expressions for conditional operator ❖ Use conditional operator with correct syntax ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Differentiate conditional operator and if..else statement
15	Exercise on while statement	Write a C program using while statement	❖ Build the termination condition for looping ❖ Use while statement with correct syntax ❖ Check whether correct number of iterations are performed by the while loop ❖ Rectify the syntax errors ❖ Debug logical errors
16	Exercise on **for** statement	Write a C program using for statement	❖ Build the initial, increment and termination conditions for looping ❖ Use for statement with correct syntax ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check whether correct number of iterations are performed by the **for** loop ❖ Differentiate **for** and **while** statements
17	Exercise on **do..while** statement	Write a C program using do statement	❖ Build the termination condition for looping ❖ Use do statement with correct syntax ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check whether correct number of iterations are performed by the while loop ❖ Differentiate **do..while,while** and **for** statements
18	Exercise on one dimensional arrays	Write a C program to create and access one dimensional array	❖ Create a one dimensional array with correct syntax ❖ Store elements into array ❖ Read elements from array ❖ Validate boundary conditions while accessing elements of array ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check for the correctness of output for the given input

19	Exercise on two dimensional arrays	Write a C program to create and access two dimensional array	❖ Create a two dimensional array with correct syntax ❖ Store elements into array ❖ Read elements from array ❖ Validate boundary conditions while accessing elements of array ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check for the correctness of output for the given input
20	Exercise on strings	Write a C program for reading and writing strings	❖ Declare and initialize string variables ❖ Read strings from keyboard ❖ Print strings to screen
21	Exercise on structure	Write a C program using structure	❖ Define a structure with correct syntax ❖ Identify different members of a structure ❖ Declare a structure variable ❖ Access different members of structure ❖ Observe the size of the structure ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check for the correctness of output for the given input
22	Exercise on union	Write a C program using union	❖ Define a union with correct syntax ❖ Identify different members of a union ❖ Declare a union variable ❖ Access different members of union ❖ Observe the size of the union ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check for the correctness of output for the given input
23	Exercise on array of structures	Write a C program to create an array of structures and store and retrieve data from that array	❖ Define a structure with correct syntax ❖ Identify different members of a structure ❖ Declare a structure variable ❖ Create an array of structure ❖ Access individual element of the array of structure ❖ Access different members of structure ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check for the correctness of output for the given input
24	Exercise on user-defined function	Write a C program to define and call user-defined functions	❖ Identify the different parts of function declaration ❖ Define function with correct syntax ❖ Classify functions based on it parameters and return types ❖ Identify parameters passed ❖ Identify parameter passing method used ❖ Identify return value ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check for the correctness of output for the given input

25	Exercise on parameter passing techniques	Write a C program using parameter passing techniques	❖ Know the use of parameter passing ❖ Use the different parameter passing techniques ❖ Check whether the parameters passed correctly or not. ❖ Rectify the syntax errors ❖ Check the output for correctness
26	Exercise on recursion	Write a C program using recursion	❖ Identify where recursive call is made in the function ❖ Validate the termination condition ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check for the correctness of output for the given input
27	Exercise on pointers	Write a C program using pointer data type	❖ Declare pointer variable ❖ Initialize pointer variable ❖ Access a variable through its pointer ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check for the correctness of output for the given input

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
IOT-109	Physics Lab	1.5	45	20	30

Course Objectives	(1) To provide strong practical knowledge of Physics to serve as a tool for various device applications in Engineering. (2) To enhance scientific skills of the students by incorporating new experiments so as to enrich the technical expertise of the students as required for industries.

COURSE OUTCOMES	CO1	Improving accuracy in various measurements; understanding the nature of the forces keeping the body in equilibrium.
	CO2	Estimating the acceleration caused by the gravity of earth; Practical study of the concepts of refraction of light at curved/plane surface
	CO3	Understanding the pressure of the gas as function of its volume; study of the combined magnetic field of the earth and an artificial magnet to estimate its pole strength; Estimating the velocity of sound in air through resonance phenomenon.
	CO4	Applying Kirch off's laws to evaluate the specific resistance of a wire; Study of exchange of heat from system to surrounding by graphical analysis; Conversion of light energy to micro currents as potential engineering application.

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	2	2	1	2
CO2	3		1	1	1	1	1
CO3	3	2			1		
CO4	3	2	2			1	2

CO-PO Mapping Strength

IOT -109	Engineering Physics Lab				No of periods 90	
POs	Mapped with CO No	CO periods addressing PO in Col 1		Level 1,2,3	Remarks	
		No	%			
PO1	CO1,CO2,CO3,CO4	15	33.3 %	2	>40% level 3 (highly addressed)	
PO2	CO1,CO3, CO4	8	17.8%	1		
PO3	CO1, CO2, CO4	6	13.3%	1	25% to 40% level 2 (moderately addressed)	
PO4	CO1, CO2	3	6.7%	1		
PO5	CO1,CO2, CO3	5	11.1%	1	5% to 25% level 1 (Low addressed)	
PO6	CO1, CO2, CO4	3	6.7%	1		
PO7	CO1, CO2, CO4	5	11.1%	1	< 5% (not addressed)	

3 = strongly mapped,   2 = moderately mapped,   1 = slightly mapped

Note: The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following.

(i) Seminars   (ii) Viva-voce   (iii) Assignments
(iv) Quiz competitions (v) Industrial visits (vi) Tech fest   (vii) Mini project
(viii) Group discussions (ix) Virtual labs   (x) Library visit for e-books

TIME SCHEDULE

S.No	List of experiments	No.of
1.	Vernier calipers	03
2.	Micrometer (Screw gauge)	03
3.	Verification of Lami's theorem using concurrent forces	03
4.	Determination of 'g' using simple pendulum	03
5.	Focal length and focal power of convex lens	03
6.	Refractive index of solid using travelling microscope	03
7.	Verification of Boyle's law using Quill tube	03
8	Determination of pole strength of the bar magnet through magnetic field lines	03
9	Resonance apparatus – Determination of velocity of sound in air	03
	Experiments for demonstration	
10	Meter bridge – Determination of resistance and specific resistance of a wire	03
11	Verification of Newton's law of cooling	03
12	Photo electric cell – Study of its characteristics	03
	Revision	06
	Test	03
	Total:	**45**

LEARNING OUTCOMES
Upon completion of the course the student shall be able to

1.0   Practice with Vernier calipers to determine the volumes of cylinder and sphere.
2.0   Practice with Screw gauge to determine thickness of a glass plate and cross sectional area of a wire.
3.0   Verify the Lami's theorem using concurrent forces.
4.0   Determine the value of acceleration due to gravity (g) using Simple Pendulum. To verify the result from l-T^2 graph.
5.0   Calculate the Focal length and focal power of convex lens using distant object method and U-V method. To verify the result from U-V graph and $1/U – 1/V$ graph methods.
6.0   Determine the refractive index of a solid using travelling microscope
7.0   Verify the Boyle's law using Quill tube. To draw a graph between P and 1/l.
8.0   Determination of magnetic pole strength of a bar magnet by drawing magnetic lines of force and locating null points (either N - N or N - S method)
9.0   Determine the velocity of sound in air at room temperature and its value at zero degree Centigrade using resonance apparatus.
10.0   Determine the resistance and specific resistance of material of a wire using Meter Bridge
11.0   To verify the Newton's law of cooling.
12.0   To study the characteristics of photo electric cell.

Course Outcomes

S.No	List of experiments	No.of	COs
1.	Vernier calipers	03	
2.	Micrometer (Screw gauge)	03	CO1
3.	Verification of Lami's theorem using concurrent forces	03	
4.	Determination of g using simple pendulum	03	
5.	Focal length and power of convex lens	03	CO2
6.	Refractive index of solid using travelling microscope	03	
7.	Verification of Boyle's law using Quill tube	03	
8	Determination of pole strength of the bar magnet through magnetic	03	CO3
9	Resonance apparatus – Determination of velocity of sound in air	03	
10	Meter bridge – Determination of resistance and specific resistance of a	03	
11	Verification of Newton's law of cooling	03	CO4
12	Photo electric cell – Study of its characteristics	03	

Competencies and Key competencies to be achieved by the student

Name of the Experiment	Competencies	Key competencies
1 . Practice on Vernier Calipers (03)	- Find the Least count - Fix the specimen in position - Read the scales - Calculate the physical quantities of given object	- Read the scales - Calculate the requisite physical quantities of given objects - Calculating volumes of the cylinder and sphere
2. Practice on Screw gauge(03)	- Find the Least count - Fix the specimen in position - Read the scales - Calculate thickness of glass plate and cross section of wire from radius	- Read the scales - Noting zero error - Calculate thickness of given glass plate - Calculate cross section of wire from radius
3. Verification of Lami's theorem forces(03)	- Making experimental set up - Fix suitable weights - Note the positions of threads on drawing sheet - Find the angles between the concurrent forces - Changing weights appropriately - Verify Lami's theorem	- Measuring angles between the forces - Marking the directions of forces on a paper - Verifying Lami's theorem from the weights and measured angles between the forces.

4. Simple pendulum(03)	- Fix the simple pendulum to the stand - Adjust the length of pendulum - Find the time for number of oscillations (say 20) - Find the time period - Calculate the acceleration due to gravity - Draw l-T^2 graph	- Find the time for number of oscillations - Find the time period - Calculate the acceleration due to gravity - Verify form l-T^2 graph
5. Focal length and Focal power of convex lens (03)	- Fix the object distance - Find the Image distance - Calculate the focal length and power of convex lens - Draw u-v and 1/u – 1/v graphs	- Find focal length from distant object method. - Calculate the focal length and power of convex lens - Verify result from u-v and 1/u – 1/v graphs
6 Refractive index of solid using traveling microscope(03)	- Find the least count of Vernier on microscope - Place the graph paper below microscope - Read the scales - Calculate the refractive index of glass slab	- Reading the scales on Microscope. - Fiding real and apparent thickness of the slab - Calculate the refractive index of glass slab
7 . Boyle's law verification (03)	- Note the atmospheric pressure - Fix the Quill tube to retort stand - Find the length of air column - Find the pressure of enclosed air - Find and compare the calculated values of P x l	- Fixing Quill tube in various positions on retort stand. - Find the length of air column - Find the pressure of enclosed air - Find the values of Px l - Verify Boyle's law.
8. Mapping of magnet lines of force (03)	- Draw magnetic meridian - Place the bar magnet in N-N or N-S directions - Draw magnetic lines of force - Locate the neutral points	- Draw the pattern of magnetic lines of force - Locate the neutral points - Calculating pole strength of the bar magnet
9. Velocity of sound in air – Resonance method (03)	- Arrange the resonance apparatus - Adjust the reservoir level for booming sound - Find the first and second resonanting lengths - Calculate velocity of sound	- Adjust the reservoir level - Find the first and second resonanting lengths - Calculate velocity of sound at room temperature and at 0^0 C

10. Meter bridge(03)	• Make the circuit connections • Find the balancing length • Calculate unknown resistance • Find the radius of wire • Calculate the specific resistance	• Making connections as per circuit diagram. • Find the balancing length • Calculate unknown resistance • Calculate the specific resistance of the given
11. Verification of Newton's law of Cooling (03)	• Heating liquid in a beaker using a heating element • Inserting thermometer in liquid in calorimeter • Stirring liquid • Measuring temperatures as a function of time using thermometer • Plotting a cooling curve	• Measuring temperature of a liquid as function of time. • Plotting a cooling curve. • Verifying Newton's law of cooling.
12. Photo electric cell – Study of its Characteristics (03)	• Experimental set up and making connections • Veryfying intensity of light by varying distances between light source and photocell. • Measuring Voltage and current values.	• Making connections for experimental set up. • Varying distances appropriately • Measuring Voltage and current values. • Study of V- I Characteristics form graph.

Scheme of Valuation for End Practical Examination

Activity	Marks
For writing, Apparatus, formulae, least count (if applicable)	5
Procedure & precautions	5
Drawing Tables	3
Readings, calculations, graph (if applicable), reporting the findings	12
Viva-voce	5
Total marks	**30**

CHEMISTRY LABORATORY
(C-23 curriculum common to all Branches)

CHEMISTRY LAB

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
IOT-110	Chemistry Lab	1.5	45	20	30

CO1	Operate and practice volumetric apparatus and preparation of standard solution.
CO2	Evaluate and judge the neutralization point in acid base titration.
CO3	Evaluate the end point of reduction and oxidation reaction.
CO4	Judge the stable end point of complex formation, stable precipitation.
CO5	Judge operate and demonstrate and perform precise operations with instrument for investigation of water pollution parameters.

PO- CO mapping

IOT-110	Chemistry Laboratory No. of CO's:5				No. of periods : 45
POs	Mapped with CO No.	CO periods addressing PO in Col. No. 1	%	Level 1,2,3	Remarks
PO1	CO1,CO2,CO3, CO4,CO5	12	26.66	2	>40% Level 3 (highly addressed)
PO2	CO1,CO2,CO3, CO4,CO5	9	20	1	
PO3					25% to 40% Level 2 (moderately addressed)
PO4	CO1,CO2,CO3, CO4,CO5	12	26.66	2	
PO5	CO2,CO3, CO4,CO5	12	26.66	2	5% to 25% Level1 (Low addressed)
PO6					< 5%(not addressed)
PO7					

COs-POs mapping strength (as per given table)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	1	-	2	-	-	-	-	-	-
CO2	2	1	-	2	2	-	-	-	-	-
CO3	2	1	-	2	2	-	-	-	-	-
CO4	2	1	-	2	2	-	-	-	-	-
CO5	2	1	-	2	2	-	-	-	-	-

3=strongly mapped 2= moderately mapped 1= slightly mapped

Note: The gaps in CO and PO mapping will be achieved by one or more appropriate activities

from the following: i) Seminars ii) Tutorials iii) Guest Lectures iv) Assignments v) Quiz competitions vi) Industrial visit vii) Tech Fest viii) Mini project ix) Group discussions x) Virtual classes xi) Library visit for e-books

TIME SCHEDULE

S.No	Name of the Experiment	No. of Periods	Mapped with COs
1.	a) Recognition of chemical substances and solutions used in the laboratory by senses. b) Familiarization of methods for Volumetric analysis.	03	CO1
2.	Preparation of Std.Na_2CO_3solution and making solutions of different dilutions	03	CO1
3.	Estimation of HCl solution using Std.Na_2CO_3solution.	03	CO2
4.	Estimation of NaOH using Std. HCl solution.	03	CO2
5.	Determination of acidity of water sample.	03	CO2
6.	Determination of alkalinity of water sample.	03	CO2
7.	Estimation of Mohr's Salt usingStd.$KMnO_4$. Solution.	03	CO3
8.	Estimation of Ferrous ion by using Std. $K_2Cr_2O_7$ solution.	03	CO3
9.	Determination of total hardness of water sample using Std. EDTA solution.	03	CO4
10.	Estimation of Chlorides present in water sample by using Std. $AgNO_3$ solution.	03	CO4
11.	Estimation of Dissolved Oxygen(D.O) in water sample by using Std. hypo solution.	03	CO5
12.	Determination of pH using pH meter..	03	CO5
13.	Determination of conductivity of water and adjusting ionic strength required	03	CO5
14.	Determination of turbidity of water.	03	CO5
15.	Estimation of total solids present in water sample.	03	CO5
	Total:	**45**	

LEARNING OUTCOMES:

Upon completion of the course the student shall be able to

1.0 To identify the chemical compounds and solutions by senses.
Practice volumetric measurements (using pipettes, measuring jars, volumetric flask, burettes) and gravimetric measurements (using different types of balances), making dilutions, etc.

2.0 Practice making standard solutions with pre weighed salts and to make solutions of desired dilutions using appropriate techniques.

3.0 Conduct titrations adopting standard procedures and using Std. Na_2CO_3 solution for estimation of HCl.

4.0 Conduct titrations adopting standard procedures and using Std. HCl solution for estimation of NaOH.

5.0 Conduct titrations adopting standard procedures to determine the acidity of given samples of water (One ground water and one surface / tap water, and rain water if available).

6.0 Conduct titrations adopting standard procedures to determine the alkalinity of given samples of water (One ground water and one surface / tap water).

7.0 Conduct titrations adopting standard procedures and using Std.$KMnO_4$ solution for estimation of Mohr'sSalt.

8.0 Conduct titrations adopting standard procedures and using Std.$K_2Cr_2O_7$ solution for estimation of Ferrous ion.

9.0 Conduct titrations adopting standard procedures to determine the total hardness of given samples of water (One ground water and one surface / tap water) using Std. EDTA solution.

10. Conduct titrations adopting standard procedures to determine the chlorides present in the given samples of water (One ground water and one surface / tap water) using Std. $AgNO_3$ solution.

11. Conduct the test using titrimetric / electrometric method to determine. Dissolved Oxygen (D.O) in the given water samples (One sample from closed container and one from open container / tap water) by Std. Hypo solution.

12. Conduct the test on given samples of water / solutions (like soft drinks, sewage, etc.) to determine their pH using standard pH meter.

13. Conduct the test on given samples of water / solutions.
a) to determine conductivity.
b) to adjust the ionic strength of the sample to the desired value.

14. Conduct the test on given samples of solutions (coloured and non-coloured) to determine their turbidity in NTU.

15. Determine the total solids present in given samples of water (One ground water and one surface / tap water).

Competencies and Key competencies to be achieved by the student

Name of the Experiment (No of Periods)	Competencies	Key competencies
Recognition of chemical substances and solutions. Familiarization of methods for Volumetric analysis. (03)	-	--
Preparation of Std.Na_2CO_3 solution and making solutions of different dilutions. (03)	- Weighing the salt to the accuracy of .01 mg. - Measuring the water with volumetric flask, measuring jar, volumetric pipette and graduated pipette. - Making appropriate dilutions.	- Weighing the salt to the accuracy of 0.01 mg. - Measuring the water with volumetric flask, measuring jar, volumetric pipette and graduated pipette. - Making appropriate dilutions.
Estimation of HCl solution using Std. Na_2CO_3 solution. (03) Estimation of NaOH using Std. HCl solution. (03) Determination of acidity of water sample. (03) Determination of alkalinity of water sample. (03) Estimation of Mohr's Salt usingStd.$KMnO_4$solution. (03) Estimation of Ferrous ion by using Std.$K_2Cr_2O_7$solution (03) Determination of total hardness of water using Std. EDTA solution. (03) Estimation of Chlorides present in water sample using Std. $AgNO_3$ solution (03) Estimation of Dissolved Oxygen(D.O) in water sample (By titration method) (03)	- Cleaning the glassware and rinsing with appropriate solutions. - Making standard solutions. - Measuring accurately the standard solutions and titrants. - Filling the burette with titrant. - Fixing the burette to the stand. - Effectively Controlling the flow of the titrant. - Identifying the end point. - Making accurate observations. - Calculating the results.	- Making standard solutions. - Measuring accurately the standard solutions and titrants. - Effectively Controlling the flow of the titrant. - Identifying the end point. - Making accurate observations.
Determination of pH using pH meter. (03)	- Familiarize with instrument. - Choose appropriate 'Mode' /	Prepare standard solutions / buffers, etc.

Determination of conductivity of water and adjusting ionic strength to required level. (03)	'Unit'. • Prepare standard solutions / buffers, etc. • Standardize the instrument with appropriate standard solutions. • Plot the standard curve. • Make measurements accurately. • Follow Safety precautions.	• Standardize the instrument with appropriate standard solutions. • Plot the standard curve. • Make measurements accurately.
Determination of turbidity of water. (03)		
Estimation of total solids present in water sample. (03)	• Measuring the accurate volume and weight of sample. • Filtering and air drying without losing any filtrate. • Accurately weighing the filter paper, crucible and filtrate.	• Measuring the accurate volume and weight of sample. • Filtering and air drying without losing any filtrate. • Accurately weighing the filter paper, crucible and

SCHEME OF VALUATION

A) Writing Chemicals, apparatus, principle and procedure.   5M
B) Demonstrated competencies.   20M
   Making standard solutions.
   Measuring accurately the standard solutions and titrants.
   Effectively controlling the flow of the titrant.
   Identifying the end point.
   Making accurate observations.
C) Viva-voce.   5M

                        Total   **30M**

IOT-111, COMPUTER FUNDAMENTALS
LABORATORY
(C-23 curriculum common to all Branches)

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
IOT-111 (common to all branches)	Computer Fundamentals Lab	3	90	40	60

Time schedule:

S.No.	Chapter/Unit Title	No. of sessions each of 3 periods duration	No. of Periods
1.	Computer hardware Basics	2	6
2.	Windows Operating System	2	6
3.	MS Word	8	24
4.	MS Excel	7	21
5.	MS PowerPoint	5	15
6.	Adobe Photoshop	6	18
	Total periods	**30**	**90**

S.No.	Chapter/Unit Title	No. of Periods	CO's Mapped
1.	Computer hardware Basics	6	CO1
2.	Windows Operating System	6	CO1
3.	MS Word	24	CO2
4.	MS Excel	21	CO3
5.	MS PowerPoint	15	CO4
6	Adobe Photoshop	18	CO5
	Total periods	**90**	

Course Objectives	i)To know Hardware Basics ii)To familiarize operating systems iii)To use MS Office effectively to enable to students use these skills in future courses iv) To use Adobe Photoshop in image editing.

Course Outcomes	At the end of the course students will be able to		
	CO1	IOT-111.1	Identify hardware and software components
	CO2	IOT-111.2	Prepare documents with given specifications using word processing software
	CO3	IOT-111.3	Use Spread sheet software to make calculation and to draw various graphs / charts.
	CO4	IOT-111.4	Use Power point software to develop effective presentation for a given theme or topic.
	CO5	IOT-111.5	Edit digital or scanned images using Photoshop

CO-PO/PSO MATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT-111.1	3	3	3	3	3	3	3	3	2	3
IOT-111.2	3	3	3	3	3	3	3	3	2	3
IOT-111.3	3	3	3	3	3	3	3	3	2	3
IOT-111.4	3	3	3	3	3	3	3	3	2	3
IOT-111.5	3	3	3	3	3	3	3	3	2	3
Average	3	3	3	3	3	3	3	3	2	3

3=Strongly mapped, 2=moderately mapped, 1=slightly mapped

Learning Outcomes:
I.   Computer Hardware Basics
1.   a) To Familiarize with Computer system and hardware connections
       b) To Start and Shut down Computer correctly
       c)To check the software details of the computer
2.   To check the hardware present in your computer

II.   Windows's operating system
3.   To Explore Windows Desktop
4.   Working with Files and Folders
5.   Windows Accessories: Calculator – Notepad – WordPad – MS Paint

III. Practice with MS-WORD
6.   To familiarize with Ribbon layout of MS Word
      Home – Insert- Page layout – References – Review- View.
7.   To practice Word Processing Basics
8.   To practice Formatting techniques
9.   To insert a table of required number of rows and columns
10.   To insert Objects, Clipart and Hyperlinks
11.   To use Mail Merge feature of MS Word
12.   To use Equations and symbols features

IV.   Practice with MS-EXCEL
13.   To familiarize with MS-EXCEL layout
14.   To access and enter data in the cells
15.   To edit a spread sheet- Copy, Cut, Paste, and selecting Cells
16.   To use built in functions and Formatting Data
17.   To create Excel Functions, Filling Cells
18.   To enter a Formula for automatic calculations
19.   To sort and filter data in table.
20.   To present data using Excel Graphs and Charts.
21.   To develop lab reports of respective discipline.
22.   To format a Worksheet in Excel, Page Setup and Print

V. Practice with MS-POWERPOINT
23.   To familiarize with Ribbon layout features of PowerPoint 2007.
24.   To create a simple PowerPoint Presentation
25.   To set up a Master Slide in PowerPoint

26. To insert Text and Objects
27. To insert a Flow Charts
28. To insert a Table
29. To insert a Charts/Graphs
30. To insert video and audio
31. To practice Animating text and objects
32. To Review presentation

VI. Practice with Adobe Photoshop

33. To familiarize with standard toolbox
34. To edit a photograph.
35. To insert Borders around photograph.
36. To change Background of a Photograph.
37. To change colors of Photograph.
38. To prepare a cover page for the book in your subject area.
39. To adjust the brightness and contrast of the picture so that it gives an elegant look.
40. To type a word and apply the shadow emboss effects.

Key competencies:

Expt No	Name of Experiment	Competencies	Key competencies
1 (a).	To familiarize with Computer system and hardware connections	a. Identify the parts of a computer system: i). CPU ii). Mother Board iii) Monitor iv) CD/DVD Drive v) Power Switch vi) Start Button vii) Reset Button b. Identify and connect various peripherals c. Identify and connect the cables used with computer system d. Identify various ports on CPU and connect Keyboard & Mouse	Connect cables to external hardware and operate the computer
1 (b).	To Start and Shut down Computer correctly	a. Log in using the password b. Start and shut down the computer c. Use Mouse and Key Board	a. Login and logout as per the standard procedure b. Operate mouse &Key Board
1 (c).	To Explore Windows Desktop	a. Familiarize with Start Menu, Taskbar, Icons and Shortcuts b. Access application programs using Start menu, Task manager c. Use Help support	a. Access application programs using Start menu b. Use taskbar and Task manager

2.	To check the software details of the computer	a. Find the details of Operating System being used b. Find the details of Service Pack installed	Access the properties of computer and find the details
3.	To check the hardware present in your computer	a. Find the CPU name and clock speed b. Find the details of RAM and Hard disk present c. Access Device manager using Control Panel and check the status of devices like mouse and key board d. Use My Computer to check the details of Hard drives and partitions e. Use the Taskbar	a. Access device manager and find the details b. Type /Navigate the correct path and Select icon related to the details required
4.	Working with Files and Folders	a. Create folders and organizing files in different folders b. Use copy / paste move commands to organize files and folders	a. Create files and folders Rename, arrange and search for the required folder/file
	Working with Files and Folders Continued....	c. Arrange icons – name wise, size, type, Modified d. Search a file or folder and find its path e. Create shortcut to files and folders (in other folders) on Desktop f. Familiarize with the use of My Documents g. Familiarize with the use of Recycle Bin	b. Restore deleted files from Recycle bin
5.	To use Windows Accessories: Calculator – Notepad – WordPad – MS Paint	a. Familiarize with the use of Calculator b. Access Calculatorusing Run command c. Create Text Files using Notepad and WordPad and observe the difference in file size d. Use MS paint and create .jpeg, .bmp files using MS Paint	a. Use windows accessories and select correct text editor based on the situation. b. Use MS pain to create /Edit pictures and save in the required format.
6.	To familiarize with Ribbon layout of MS word. –	a. Create/Open a document b. Use Save and Save as features	a. Create a Document and name

		Home – Insert- page layout- References- Review-View	c. Work on two Word documents simultaneously d. Choose correct Paper size and Printing options	appropriately and save b. Set paper size and print options
7.	To practice Word Processing Basics		a. Typing text b. Keyboard usage c. Use mouse (Left click / Right click / Scroll) d. Use Keyboard shortcuts e. Use Find and Replace features in MS- word f. Use Undo and Redo Features g. Use spell check to correct Spellings and Grammar	a. Use key board and mouse to enter/edit text in the document. b. Use shortcuts c. Use spell check/ Grammar features for auto corrections.
8.	To practice Formatting techniques		a. Formatting Text b. Formatting Paragraphs c. Setting Tabs d. Formatting Pages e. The Styles of Word f. Insert bullets and numbers g. Themes and Templates h. Insert page numbers, header and footer	a. Format Text and paragraphs and use various text styles. b. Use bullets and numbers to create lists c. Use Templates /Themes d. Insert page numbers date, headers and footers
9.	To insert a table of required number of rows and columns		a. Edit the table by adding the fields – Deleting rows and columns –inserting sub table –marking borders. Merging and splitting of cells in a Table b. Changing the background colour of the table c. Use table design tools d. Use auto fit – fixed row/ column height/length – Even distribution of rows / columns features e. Convert Text to table and Table to Text f. Use Sort feature of the Table to arrange data in ascending/descending order	a. Insert table in the word document and edit b. Use sort option for arranging data.
10.	To Insert objects, clipart and Hyperlinks		a. Create a 2-page document. &Insert hyperlinks and t Bookmarks. b. Create an organization chart	a. Insert hyperlinks &Bookmarks b. Create organization charts/flow charts

		c. Practice examples like preparing an Examination schedule notice with a hyperlink to Exam schedule table.	
11.	To Use Mail merge feature of MS Word	a. Use mail merge to prepare individually addressed letters b. Use mail merge to print envelopes.	Use Mail merge feature
12.	To use Equations and symbols features.	a. Explore various symbols available in MS Word b. Insert a symbol in the text c. Insert mathematical equations in the document	Enter Mathematical symbols and Equations in the word document
13.	To Practice with MS-EXCEL	a. Open /create an MS Excel spreadsheet and familiarize with MS Excel 2007 layout like MS office Button- b. Use Quick Access Toolbar- Title Bar- Ribbon-Worksheets- Formula Bar- Status Bar	a. Familiarize with excel layout and use b. Use various features available in toolbar
14.	To access and Enter data in the cells	a. Move Around a Worksheets- Quick access -Select Cells b. Enter Data-Edit a Cell-Wrap Text-Delete a Cell Entry-Save a File-Close Excel	a. Access and select the required cells by various addressing methods b. Enter data and edit
15.	To edit spread sheet Copy, Cut, Paste, and selecting cells	a. Insert and Delete Columns and Rows-Create Borders- Merge and Center b. Add Background Color-Change the Font, Font Size, and Font Color c. Format text with Bold, Italicize, and Underline-Work with Long Text-Change a Column's Width	Format the excel sheet
16.	To use built in functions and Formatting Data	a. Perform Mathematical Calculations verify -AutoSum b. Perform Automatic Calculations-Align Cell Entries	Use built in functions in Excel
17.	To enter a Formula for automatic calculations	a. Enter formula b. Use Cell References in Formulae	Enter formula for automatic calculations

		c. Use Automatic updating function of Excel Formulae d. Use Mathematical Operators in Formulae e. Use Excel Error Message and Help	
18.	To Create Excel Functions, Filling Cells	a. Use Reference Operators b. Work with sum, Sum if, Count and CountIf Functions c. Fill Cells Automatically	a. Create Excel sheets involving cross references and equations b. Use the advanced functions for conditional calculations
19.	To sort and filter data in table	a. Sort data in multiple columns b. Sort data in a row c. Sort data using Custom order d. Filter data in work sheet	a. Refine the data in a worksheet and keep it organized b. Narrow a worksheet by selecting specific choice
20.	To Practice Excel Graphs and Charts	a. Produce an Excel Pie Chart b. Produce c. Excel Column Chart	a. Use data in Excel sheet to Create technical charts and graphs Produce Excel Line Graph b. Produce a Pictograph in Excel
21.	To develop lab reports of respective discipline	Create Lab reports using MS Word and Excel	a. Insert Practical subject name in Header and page numbers in Footer
22.	To format a Worksheet in Excel, page setup and print	a. Shade alternate rows of data b. Add currency and percentage symbols c. Change height of a row and width of a column d. Change data alignment e. Insert Headers and Footers f. Set Print Options and Print	a. Format Excel sheet b. Insert headers &footers and print
23.	To familiarize with Ribbon layout &features of PowerPoint 2007.	Use various options in PowerPoint a. Home b. Insert c. Design d. Animation e. Slideshow f. View g. Review	Access required options in the tool bar

24.	To create a simple PowerPoint Presentation	a. Insert a New Slide into PowerPoint b. Change the Title of a PowerPoint Slide c. PowerPoint Bullets d. Add an Image to a PowerPoint Slide e. Add a Textbox to a PowerPoint slide	a. Create simple PowerPoint presentation with photographs/ClipArt and text boxes b. Use bullets option
25.	To Set up a Master Slide in PowerPoint and add notes	a. Create a PowerPoint Design Template b. Modify themes c. Switch between Slide master view and Normal view d. Format a Design Template Master Slide e. Add a Title Slide to a Design Template f. The Slide Show Footer in PowerPoint g. Add Notes to a PowerPoint Presentation	a. Setup Master slide and format b. Add notes
26.	To Insert Text and Objects	a. Insert Text and objects b. Set Indents and line spacing c. Insert pictures/ clipart d. Format pictures e. Insert shapes and word art f. Use 3d features g. Arrange objects	Insert Text and Objects Use 3d features
27.	To insert a Flow Chart / Organizational Charts	a. Create a Flow Chart in PowerPoint b. Group and Ungroup Shapes c. Use smart art	Create organizational charts and flow charts using smart art
28.	To insert a Table	a. PowerPoint Tables b. Format the Table Data c. Change Table Background d. Format Series Legend	Insert tables and format
29.	To insert a Charts/Graphs	a. Create 3D Bar Graphs in PowerPoint b. Work with the PowerPoint Datasheet c. Format a PowerPoint Chart Axis d. Format the Bars of a Chart e. Create PowerPoint Pie Charts f. Use Pie Chart Segments	Create charts and Bar graphs, Pie Charts and format.

		g. Create 2D Bar Charts in PowerPoint h. Format the 2D Chart e. Format a Chart Background	
30.	To Insert audio & video, Hyperlinks in a slide Add narration to the slide	a. Insert sounds in the slide and hide the audio symbol b. Adjust the volume in the settings c. Insert video file in the format supported by PowerPoint in a slide d. Use automatic and on click options e. Add narration to the slide f. Insert Hyperlinks	a. Insert Sounds and Video in appropriate format. b. Add narration to the slide c. Use hyperlinks to switch to different slides and files
31.	To Practice Animation effects	a. Apply transitions to slides b. To explore and practice special animation effects like Entrance, Emphasis, Motion Paths &Exit	Add animation effects
32.	Reviewing presentation	a. Checking spelling and grammar b. Previewing presentation c. Set up slide show d. Set up resolution e. Exercise with Rehearse Timings feature in PowerPoint f. Use PowerPoint Pen Tool during slide show g. Saving h. Printing presentation (a) Slides (b) Hand-out	a. Use Spell check and Grammar feature b. Setup slide show c. Add timing to the slides d. Setup automatic slide show

33	To familiarize with standard toolbox	a. Open Adobe Photoshop
		b. Use various tools such as
		  i. The Layer Tool
		  ii. The Color& Swatches Tool
		  iii. Custom Fonts & The Text Tool
		  iv. Brush Tool
		  v. The Select Tool
		  vi. The Move Tool
		  vii. The Zoom Tool
		  viii. The Eraser
		  ix. The Crop Tool
		  x. The Fill Tool
			Open a photograph and save it in Photoshop

34	To edit a photograph	a. Use the Crop tool b. Trim edges c. Change the shape and size of a photo d. Remove the part of photograph including graphics and text	a. Able to edit image by using corresponding tools.
35	To insert Borders around photograph	a. Start with a single background layer b. Bring the background forward c. Enlarge the canvas d. Create a border color e. Send the border color to the back f. Experiment with different colors	Able to create a border or frame around an image to add visual interest to a photo
36	To change Background of a Photograph	a. open the foreground and background image b. Use different selection tools to paint over the image c. Copy background image and paste it on the foreground. d. Resize and/or drag the background image to reposition. e. In the Layers panel, drag the background layer below the foreground image layer.	Able to swap background elements using the Select and Mask tool and layers.
37	To change colors of Photograph	a. Change colors using: i) Color Replacement tool ii) **Hue/Saturation adjustment layer tool**	Able to control color saturation
38	To prepare a cover page for the book in subject area	a. opens a file with height 500 and width 400 for the cover page. b. apply two different colors to work area by dividing it into two parts using Rectangle tool. c. Copy any picture and place it on work area→ resize it using free transform tool. d. Type text and apply color and style e. Apply effects using blended options	Able to prepare cover page for the book

39	To adjust the brightness and contrast of picture to give an elegant look	a. opens a file. b. Go to image→ adjustments→ Brightness/Contrast. c. adjust the brightness and contrast. d. Save the image.	Able to control brightness/contrast.
40	To type a word and apply the shadow emboss effects	a. open a file b. Select the text tool and type text. c. Select the typed text go to layer→ layer style→ blended option→ drop shadow, inner shadow, bevel and emboss→ contour→ satin→ gradient overlay d. Save the image.	Able to apply shadow emboss effects

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1 to 8
Unit test-2	From 9 to 22
Unit test-3	From 23 to 40

I Year Internal Lab Examination
UNIT TEST - I
MODEL QUESTION PAPER
COMPUTER FUNDAMENTALS LAB

SCHEME: C-23   **SUBJ CODE: IOT-111**

MAX MARKS:40   **Time:90Min**

……….

1. Identify the internal hardware components of a PC and assemble them.

2. Identify the external components or peripherals of a PC and connect them.

3. Identify the components on motherboard.

4. Perform the process of placing processor on CPU slot.

5. Perform the process of removing and placing the RAM in the corresponding slot.

6. Identify the CMOS battery and test whether it is working it or not.

7. Find details of following:

   a) Operating System being used.

   b) Processor name

   c) RAM

   d) Hard disk

8. Create a folder by your name, search a file or folder and find its path.

9. Draw the National Flag using MS Paint.

10. Create a word document that contains TEN names of your classmates (boys-5 & girls-5) and

    perform the following tasks:

    a) Save the document to your desktop.

    b) Sort the names in each list alphabetically.

    c) Set line spacing to 1.15.

    d) Use bullet points for the names in both lists separately.

I Year Internal Lab Examination
UNIT TEST - II
MODEL QUESTION PAPER
COMPUTER FUNDAMENTALS LAB

SCHEME: C-23   **SUBJ CODE: IOT-111**
MAX MARKS:40   **Time:90Min**
....

1. Write individually addressed letters to your friends about the Republic Day celebration using Mail Merge.

2. Create a Word document about your college and insert page numbers in footer and College Name in header.

3. Create your class time table using Tables in MS Word.

4. Create a 2-page document about your College& insert hyperlinks for courses offered in the college and insert Bookmarks next to College Name.

5. Write individually addressed letters to your friends (at least 5 members) to intimate the External Examination time table using Mail Merge.

6. Write an equation $\frac{(x+y)^2}{(x-y)^2} = \frac{x^2+2xy+y^2}{x^2-2xy+y^2}$ in MS word.

7. Create the organizational structure of your college in MS Word.

8. Create a spreadsheet by totaling marks of 3 or more subjects, then calculate percentage and hence find grade based on boundary conditions of FIVE students:

   Grades O >= 90%, A >=80%, B >=70%, C >=60%, D >=50%, E >=40%, F <40%

9. Create aExcel spreadsheet for the following data, making sure that the cell marked with Category (A1) is pasted in cell A1 in the spreadsheet and perform the questions below.

Category (A1)	Product Name	Quantity	Inventory	Price per Unit	Total Price
Office Supplies	Binder	2	20	12.99	25.98
Office Supplies	Pencil	20	20	0.99	
Electronics	Samsung 4K Smart TV	1	5	399.00	
Electronics	Bluetooth Speakers	4	5	44.49	
Computers	Lenovo X230 12in Laptop	2	2	279.90	

   a). Change the format of the "Total Price" column to "Currency" format.

   b) Calculate Total Price by writing formula.

   c) Turn on filtering for the table.

   d) Sort the table by column "Category" from A to Z.

10. Create a spreadsheet to calculate Cumulative monthly attendance for a period of Three months.

I Year Internal Lab Examination

UNIT TEST - III
MODEL QUESTION PAPER
COMPUTER FUNDAMENTALS LAB

SCHEME: C-23   **SUBJ CODE: COMMON-111**
MAX MARKS:40   **Time:90Min**

…….

1. Create a PowerPoint Presentation about your College in 5 slides only.

2. Create a PowerPoint Presentation on Computer Hardware in minimum 5 slides.

3. Create a PowerPoint Presentation on Computer Fundamentals with *Entrance, Emphasis*effectsin minimum 5 slides.

4. Create a PowerPoint Presentation on any topic with special animation effects like *Entrance, Motion Paths & Exit.*

5. Resize the image using photoshop.

6. Change the background of a Photograph.

7. Edit an image by using

   a) Crop tool.

   b) Resize the image

   c) Save the new image with new name keeping original image as it is.

8. A Picture of two parrots (parrots.jpg) is given to you. Make anyone of one of the parrots in Black & White.

9. Convert a color image to monochrome and improve quality of photograph.

10. Copy three pictures and fit into the empty frames.
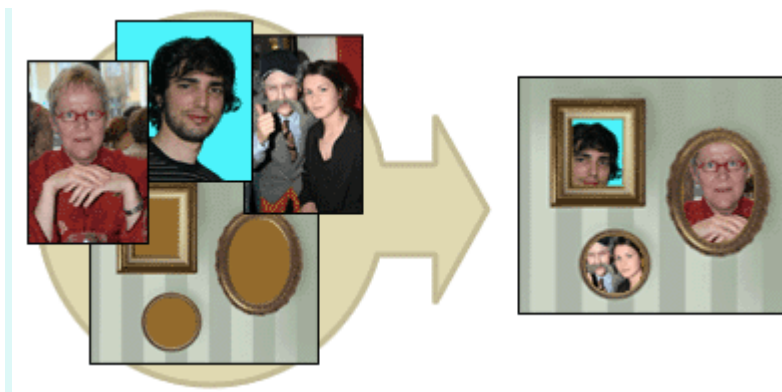
BOARD DIPLOMA EXAMINATIONS
DIPLOMA IN INTERNET OF THINGS
MODEL PRACTICAL QUESTION PAPER-YEAR END EXAM
COMPUTER FUNDAMENTALS LAB

SCHEME: C-23   **SUBJ CODE: IOT-111**
MAX MARKS:60   **TIME: 3HOURS**

…….

1.   Identify the internal hardware components of a PC and assemble them.

2.   Identify the external components or peripherals of a PC and connect them.

3.   Write the procedure to create the files and folders

4.   Write the procedure to access Calculator, Paint and Notepad application

5.   Write the procedure to perform the following in MS Word

   (a)   Change the Font Size

   (b)   Change the Font Style

   (c)   Change the Text Size

6.   Write the procedure to perform the following in MS Word

   (a) Change the Font Color.

   (b) Use Various Text Alignment Options.

   (c) Format text in Bold, Italic and Underline.

7.   Create the hierarchy of your family in MS Word.

8.   Write the procedure to perform the following in MS Word:

   (a)   Insert a Table

   (b)   Add a Row

   (c)   Add a column

   (d)   Delete a Row

   (e)   Delete a column

9.   Write the procedure to use Equation $\frac{(x+y)^2}{(x-y)^2} = \frac{x^2+2xy+y^2}{x^2-2xy+y^2}$ and Symbols.

10.   Write the procedure to perform the following in MS Excel

   (a)   To Modify Column Width

   (b)   To Modify Row Height

(c)   Format text in Bold, Italic, and Underline.

11.   Write the procedure to create charts and Graphs in MS Excel

12.   Write the procedure to create simple Power Point Presentation on your college in Three slides.

13.   Write the procedure to perform Animation on Text and Objects in your presentation.

14.   Take a photographic image. Give a title for the image. Put the border. Write your names. Write the Name of Institution and Place.

15.   Prepare a cover page for the book in your subject area. Plan your own design.

16.   You are given a picture of a flower and associated background (Extract.jpg).Extract the Flower only from that and organize it on a background. Select your own background for organization.

17.   You are given a picture (BrightnessContrast.jpg). Adjust thebrightness and contrast of the picture so that it gives an elegant look.

18.   You are given a picture (position.jpg). Position the picture preferablyon a plain background of a color of your choice - Positioning include rotation and scaling.

19.   Remove the arrows and text from the given photographic image(Filename: photo.jpg).

20.   Type a word; apply the following effects. Shadow Emboss.

BASIC ELECTRONICS LAB

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
IOT-112	Basic Electronics Lab	03	90	40	60

S No	Unit Title	No. of Periods	COs Mapped
1	Identifying different electronic components	06	CO1
2	Soldering practice, Study and use of Electronic equipment	33	CO2
3	Testing of electronic devices	9	CO3
4	Measurement of electrical parameters using CRO	9	CO4
5	Rectifiers, Power supplies and batteries	33	CO5
	Total	90	

LEARNING OUTCOMES:

1.0 Identify different Electronic Components and devices
   a) Identify the components, its terminals, and test :
      i) colour coded resistors, different fixed and variable type resistors, different Inductors-different types of capacitors: ceramic, disc, paper, mica, gang etc.
      ii) different SMD resistors, SMD inductors, SMD capacitors
      iii) Diodes, Transistors, JFETs, MOSFETs
      iv) Relays, Switches –SPST,SPDT,DPST,DPDT- Toggle-Push button –Rotary-Slider –Thumb Wheel
      v) Diode, transistor & IC's SMD packages (SOT,PLCC),
      vi) Different LEDs-Red LED, Blue LED, Green LED, Bi colour LED, Infrared LED, different sizes and forms, their specifications
   b) Familiarise with Bread Board

2.0 Soldering practice, Study and use of Electronic equipment
   a) Familiarise with Temperature controlled Soldering Station
   b) Technique of using soldering iron, Soldering different components and ICs
   c) Soldering components on to general purpose PCB as per the given circuit diagram
   d) Technique of de-soldering using de-soldering pump and wick.
   e) Study of AC/DC voltmeter, AC/DC ammeter, ohm meter, Analogy multimeter, Digital Multi meter.
   f) Study of RPS unit, CRO, Function Generator using their manuals and familiarise with the operation of each equipment.
   g) i)Measure Resistance using multimeter and compare with the calculated value using the colour code.
      ii) Measure L and C using digital LCR meter and compare with the calculated value using the code.

3.0 Testing of electronic devices

    a)   Identify and test PN junction diode, Zener diode, LED, BJT and FET using multi meter

    b)   Control a load using relay

          i)Turn On and Off DC load (LED/Buzzer/DC motor)

          ii) Turn On and Off AC load (Bulb/Tube light/Fan)

4.0 Measurement of electrical parameters using CRO

a) Study the function of front panel controls of CRO

b) Measure DC voltage using CRO

c) Measure amplitude and Time period of a sinusoidal signal using CRO.

5.0 Rectifiers, Power supplies and batteries

a) Obtain output waveforms and measure DC o/p voltage, ripple voltage of a Bridge rectifier with/ without filter at different loads and compare with that of theoretical values

b) Construct and test the regulated power supply for any given DC voltage using 78XX/79XX

c) DC to DC (Ex: 12V to 5V) converter as a device

d) Study different types of batteries

e) Identify the given batteries/ cells and test whether they are in good condition or not

f) Connect the given two batteries in series and measure the voltage across the series connection. What do you learn from the measured equivalent voltage   and the voltage of each battery

g) Connect the given two batteries in parallel and measure the voltage across the parallel connection. What do you learn from the measured equivalent voltage   and the voltage of each battery

h)Study various sections of Battery charger circuit

-O0O-

III SEMESTER

DIPLOMA IN INTERNET OF THINGS
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
III SEMESTER

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Semester	Scheme Of Examinations			
		Theory	Practicals		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY SUBJECTS								
IOT-301	Mathematics–II	4		60	3	20	80	100
IOT-302	Digital Electronics	5		75	3	20	80	100
IOT-303	Operating systems	5	-	75	3	20	80	100
IOT-304	Data Communication & Computer Networks	4		60	3	20	80	100
IOT-305	DBMS	5	-	75	3	20	80	100
IOT-306	IoT Architecture & its Protocols	4		60	3	20	80	100
PRACTICAL SUBJECTS								
IOT-307	Digital Electronics Lab	-	3	45	3	40	60	100
IOT-308	Data Communication & Computer Networks Lab	-	3	90	3	40	60	100
IO -309	DBMS Lab	-	3	45	3	40	60	100
IOT-310	Basic IoT Lab	-	3	45	3	40	60	100
	ACTIVITIES	-	3	45				
	Total	27	15	630		260	640	1000

301 common with DCME
302 common with DCME
303 common with DCME,DAIML,DCCN
305 common with DCME,DAIML,DCAI,DCCN,DWD
307 common with DCME,DCAI, DCBD,DWD
308 common with DAIML,DCAI,DCCN,DW & 309 common with DCCN

ENGINEERING MATHEMATICS-II
C23-IOT-301
(Common to CME, AIML,AMG,AMT,CAI,CCB,CCN, WD)

Course Code	Course Title	No. of Periods/week	Total No. of periods	Marks for FA	Marks for SA
IOT-301	Engineering Mathematics-II	4	60	20	80

S.No.	Chapter	No. of Periods	Marks Allotted	Short type	Essay type	COs mapped
Unit – I: Integral Calculus						
1	Indefinite integration	17	26	2	2	CO1
2	Definite integrals	5	16	1	1	CO1
Unit – II: Differential Equations						
3	Differential equations	2	3	1	0	CO2
4	Solutions of Differential equations of first order	6	10	0	1	CO2
Unit – III: Graph Theory and Probability						
12	Straight Lines	5	6	2	0	CO3
13	Circles	12	26	2	2	CO3
Unit – IV : Statistics						
6	Measures of Central Tendency	1	0	1	0	CO4
7	Measures of Dispersion	3	3	1	0	CO4
8	Correlation	4	10	0	1	CO4
9	Simple linear regression	5	10	0	1	CO4
	Total	60	110	10	8	
			Marks	30	80	

Course Objectives	(iii) To understand the concepts of indefinite integration and definite integration. (iv) To understand the formation of differential equations and learn various methods of solving first order differential equations. (v) To comprehend the concepts of graph theory and probability. (vi) To learn different statistical techniques for data analysis.

Course Outcomes	CO1	Integrate various functions using different methods and evaluate definite integrals.
	CO2	Obtain differential equations and solve differential equations of first order and first degree.
	CO3	Able to define the basic concepts of Graph Theory and use the principles of Probability in computational systems.
	CO4	Apply various statistical techniques for data analysis.

Unit-I
Integral Calculus

C.O. 1 Integrate various functions using different methods and evaluate definite integrals.

L.O.1.1. Explain the concept of Indefinite integral as an anti-derivative.

1.2. State the indefinite integral of standard functions and properties of $\int (u+v)\,dx$ and $\int k\,u\,dx$ where *u, v* are functions of *x* and *k* is constant.

1.3. Solve problems involvingstandard functions using the above rules.

1.4. Evaluate integrals involving simple functions of the following type by the method of substitution.

i) $\int f(ax+b)\,dx$,where *f(x)*is in standard form.

ii) $\int (f(x))^n\, f'(x)\,dx$

iii) $\int [f'(x)/\, f(x)]\,dx$

iv) $\int [f(g(x))]\,g'(x)\,dx$

1.5. Find the integrals of *tan x, cot x, sec x* and *cosec x* using the above.

1.6. Evaluate the Standard integrals of the functions of the type

$i)\dfrac{1}{a^2+x^2},\dfrac{1}{a^2-x^2},\dfrac{1}{x^2-a^2}$

$ii)\dfrac{1}{\sqrt{a^2+x^2}},\dfrac{1}{\sqrt{a^2-x^2}},\dfrac{1}{\sqrt{x^2-a^2}}$

$iii)\sqrt{x^2-a^2},\sqrt{x^2+a^2},\sqrt{a^2-x^2}$

1.7. Evaluate integrals using decomposition method.

1.8. Solve problems using integration by parts.

1.9Use Bernoulli's rule for evaluating the integrals of the form $\int u.v\,dx$.

1.10. Evaluate the integrals of the form $\int e^x[f(x)+f'(x)]\,dx$

1.11. State the fundamental theorem of integral calculus

1.12. Explain the concept of definite integral.

1.13. Solve simple problems on definite integrals over an interval using the above concept.

1.14. State various properties of definite integrals.

1.15. Evaluate simple problems on definite integrals using the above properties.

Unit -II
Differential Equations

C.O. 2Obtain differential equations and solve differential equations of first order and first degree.

L.O.2.1. Define a Differential equation, its order and degree

2.2 Find order and degree of a given differential equation.

2.3 Form a differential equation by eliminating arbitrary constants.

2.4Solve the first order and first degree differential equations by variables separable method.

2.5 Solve linear differential equation of the form $\dfrac{dy}{dx}+Py=Q$, where P and Q are functions of *x* or constants.

Syllabus for Unit test-I completed

Unit-III
Graph Theoryand Probability

C.O. 3 Able to define the basic concepts of Graph Theory and use the principles of Probability in computational systems.

L.O. 3.1 Define a graph.

   3.2 Explain the terminology of a graph, vertices, edges, parallel edges, adjacent vertices, self-loops.

   3.3 State the significance of Graph Theory in Computer Science applications.

   3.4 Explain incidence and degree of a graph.

   3.5 Explain the relation between degree and edges of a graph.

   3.6 Explain various types of graphs, null graph, trivial graph, simple graph, multigraph, directed graph, non-directed graph and cyclic graph.

   3.7 Define walk, path, circuit, length of a graph, distance between two vertices.

   3.8 Explain the formation of adjacency matrix of a graph.

   3.9 Recall the basic probability principles

   3.10Define permutations and combinations with examples.

   3.11 State addition theorem of probability for two mutually exclusive and exhaustive events.

   3.12Solve simple problems on addition theorem.

   3.13 Explain conditional event and conditional probability.

   3.14 Solve simple problems on conditional probability.

   3.15 Explain dependent, independent events and state Multiplication theorem.

   3.16 Solve simple problems on multiplication theorem.

   3.17 Explain the concept of priori and posteriori probabilities.

   3.18 State Baye's theorem and solve simple problems.

Unit-IV
Statistics

C.O. 4 Apply various statistical techniques for data analysis.

L.O. 4.1 Recall the measures of central tendency.

4.2 Explain the significance of measures of dispersion to determine the degree of heterogeneity of the data.

4.3   Find the measures of dispersion, Range, Mean Deviation and Standard Deviation for ungrouped data.

4.4 Explain the merits and demerits of the above measures of dispersion

4.5 Explain bivariate data.

4.6 Explain the concept of covariance and correlation between two variables.

4.7Calculate Pearson's correlation coefficient between two variables.

4.8 Find Spearman's rank correlation coefficient.

4.9Explain predictor variables, outcome variables and simple linear regression.

4.10 Calculate the regression coefficients and regression equations with simple problems.

> Syllabus for Unit test-II completed

CO/PO – Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	2	2				2	1	2
CO2	2	2	2	2				2	1	2
CO3	3	3	3	3				3	3	3
CO4	3	3	3	3				3	3	3
Avg.	2.5	2.5	2.5	2.5				2.5	2	2.5

3 =Strongly mapped (High), **2 =** Moderately mapped (Medium), **1 =** Slightly mapped (Low)

PO5:   Appropriate quiz programme may be conducted at intervals and duration as decided by concerned teacher.

PO6: Seminars on applications of mathematics in various engineering disciplines are to be planned and conducted.

PO7: Such activities are to be planned that students visit library to refer standard books on Mathematics and latest updates in reputed national and international journals, attending seminars, learning mathematical software tools.

PSO1: An ability to understand the concepts of basic mathematical techniques and to apply them in computer engineering discipline.

PSO2: An ability to solve the Engineering problems using latest software tools, along with analytical skills to arrive at faster and appropriate solutions.

PSO3: Wisdom of social and environmental awareness along with ethical responsibility to have a successful career as an engineer and to sustain passion and zeal for real world technological applications.

PO- CO – Mapping strength

PO no	Mapped with CO no	CO periods addressing PO in column I		Level (1,2 or 3)	Remarks
		Number	%		
1	CO1, CO2, CO3,CO4	60	100%	3	>40% Level 3 Highly addressed
2	CO3, CO4	30	50%	3	
3	CO3, CO4	30	50%	3	25% to 40%
4	CO3, CO4	30	50%	3	Level 2
5					Moderately
6					addressed
7					
PSO 1	CO1, CO2, CO3,CO4	45	75%	3	5% to 25% Level 1 Low addressed
PSO 2	CO3, CO4	30	50%	3	
PSO 3	CO1, CO2, CO3,CO4	45	75%	3	<5% Not addressed

COURSE CONTENTS

<div align="center">

Unit-I

Indefinite Integration:

</div>

1. Integration regarded as anti-derivative – Indefinite integrals of standard functions. Properties of indefinite integrals. Integration by substitution or change of variable. Integrals of tan x, cot x, sec x, cosec x.

Evaluation of integrals which are of the following forms:

$$i) \frac{1}{a^2 + x^2} , \frac{1}{a^2 - x^2} , \frac{1}{x^2 - a^2}$$

$$ii) \frac{1}{\sqrt{a^2 + x^2}} , \frac{1}{\sqrt{a^2 - x^2}} , \frac{1}{\sqrt{x^2 - a^2}}$$

$$iii) \sqrt{x^2 - a^2} , \sqrt{x^2 + a^2} , \sqrt{a^2 - x^2}$$

Integration by decomposition of the integrand into simple rational, algebraic functions.

Integration by parts, Bernoulli's rule and integrals of the form $\int e^x [f(x) + f'(x)]\, dx.$
Definite integral-fundamental theorem of integral calculus, properties of definite integrals, evaluation of simple definite integrals.

Unit -II
Differential Equations:

2. Definition of a differential equation-order and degree of a differential equation- formation of differential equations-solutions of differential equations of first order and first degree using methods,

variables separable, linear differential equation of the type $\dfrac{dy}{dx} + \mathrm{P}y = \mathrm{Q}.$

Unit-III
Graph Theory and Probability

3. Definition of a graph – terminology of a graph, significance in computer science applications. Incidence and degree – relationship between degree and edges. Various types of graphs - null graph, trivial graph, simple graph, multigraph, directed graph, non-directed graph and cyclic graph. Walk, path, circuit, length of a graph, distance between two vertices. Formation of adjacency matrix.

   Permutations and Combinations, Addition theorem of probability with simple problems, conditional probability with simple problems, dependent and independent events with multiplication theorem – simple problems, priori and posteriori probability – Baye's theorem with simple problems.

Unit III
Statistics

4. Measures of dispersion – range, mean deviation and standard deviation of ungrouped data – merits and demerits. Bivariate data – correlation, Pearson's correlation coefficient, Spearman's rank correlation coefficient. Predictor and outcome variables – simple linear regression coefficients and regression equations.

Reference Books:
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
2. Schaum's Outlines Differential Equations, Richard Bronson & Gabriel B. Costa
3. Trembley and Manohar,Discrete Mathematical Structures with Applications to Computer Science, Tata-McGraw-Hill.
4. Narsing Deo, Graph Theory, PHI India.
5. Schaum's Outline: Introduction to Probability and Statistics, Seymour Lipschutz & John J. Schiller.

BLUE PRINT

S.No.	Chapter/Unit title	No. of Periods	Weightage Allotted	Short type				Essay type				COs mapped
				R	U	Ap	An	R	U	Ap	An	
Unit – I: Integral Calculus												
1	Indefinite integration	17	26	2	0	0	0	0	2	0	0	CO1
2	Definite integrals	5	16	2	0	0	0	0	0	1	0	CO1
Unit – II: Differential Equations												
3	Differential equations	2	3	0	1	0	0	0	0	0	0	CO2
4	Solutions of Differential equations of first order	6	10	0	0	0	0	0	0	1	0	CO2
Unit – III: Graph Theory and Probability												
5	Graph theory	5	6	1	1	0	0	0	0	0	0	CO3
6	Probability	12	26	0	1	1	0	0	0	1	1	CO3
Unit – IV : Statistics												
6	Measures of Central Tendency	1	0	0	0	0	0	0	0	0	0	CO4
7	Measures of Dispersion	3	3	1	0	0	0	0	0	0	0	CO4
8	Correlation	4	10	0	0	0	0	0	0	0	1	CO4
9	Simple linear regression	5	10	0	0	0	0	0	0	0	1	CO4
	Total	60	110	6	3	1	0	0	2	3	3	
	Marks			18	9	3	0	0	20	30	30	

R: Remembering Type   **: 18 Marks**
U: understanding Type   **: 29 Marks**
Ap: Application Type   **: 33 Marks**
An: Analyzing Type   **:30 Marks**

Unit Test Syllabus

Unit Test	Syllabus
Unit Test-I	From L.O 1.1 to L.O 2.5
Unit Test-II	FromL.O 3.1 to L.O 4.10

Unit Test I

State Board of Technical Education and Training, A. P

III SEM

Subject name: **Engineering Mathematics-II**

Sub Code: **IOT-301**

Time: 90 minutes   Max. Marks: 40

Part-A   **16 Marks**

Instructions: (1) Answer **all** questions.

(2) First question carries **four** marks and the remaining questions carry **three** marks each.

1. Answer the following:

    a. $\int x^6 dx = ---$ **(CO1)**

    b. $\int \dfrac{1}{16+x^2} dx = --$ **(CO1)**

    c. $\int_0^1 x dx = --$ **(CO1)**

    d.   Degree of $\left(\dfrac{dy}{dx}\right)^2 + \dfrac{dy}{dx} = 3$ is _____   **(CO2)**

2. Evaluate $\int \left(\sec^2 x + 2e^x\right) dx.$ **(CO1)**

3. Evaluate $\int \dfrac{\sin(\log x)}{x} dx.$ **(CO1)**

4. Evaluate $\int_0^{\frac{\pi}{2}} \cos x dx$ **(CO1)**

5. Find the differential equation to the family of curves $y = mx + 1,$ where m is arbitrary constant.   **(CO2)**

Part-B   **3×8=24 Marks**

Instructions: (1) Answer **all** questions.(2) Each question carries **eight** marks

(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

1. A) Evaluate $\int \sin^4 x \cos x dx.$ **or**   **(CO1)**

    B) Evaluate $\int \dfrac{1}{(x+1)(x+2)} dx.$ **(CO1)**

2. A) Evaluate $\int_{-1}^{1} \dfrac{\sin^{-1} x}{\sqrt{1-x^2}} dx$ **or**   **(CO1)**

    B) Evaluate $\int_0^{\pi/2} \dfrac{\sin^8 x}{\sin^8 x + \cos^8 x} dx$ **(CO1)**

3. A) Solve $\dfrac{dy}{dx} = \sqrt{\dfrac{1-y^2}{1-x^2}}$ **or**   **(CO2)**

    B) Solve $\dfrac{dy}{dx} + \dfrac{2y}{x} = \dfrac{1}{x^2}$ **(CO2)**

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State Board of Technical Education and Training, A. P
III Sem
Subjectname:**Engineering Mathematics-II**
Sub Code: **IOT-301**

Time : 90 minutes   Max.marks:40

_____

Part-A   **16 Marks**

Instructions: (1) Answer **all** questions.
(2) First question carries **four** marks and the remaining questions carry **three** marks each

1.   Answer the following:
    a.   A null graph has _____ edges

                                    (CO3)

    b.   P(at least one) = 1-P(None): State TRUE/FALSE

                                    (CO3)

    c. $P(A) + P(B) - P(A \cap B) = $ _____

                                    (CO3)

    d.   Range = Highest value - Lowest value: State TRUE/FALSE

                                    (**CO4**)

2.   Define a simple graph.   **(CO4)**
3.   Two cards are drawn at random from a well-shuffled pack of 52 cards. Find the probability
      that one is a king and the other is a queen.   **(CO5)**

4.   Let A and B are events with $P(A) = \dfrac{1}{5}$, $P(B) = \dfrac{2}{3}$ and $P(A \cap B) = \dfrac{1}{15}$, find $P(A \cup B)$**(CO5)**

5.   Find the probability of getting at least one head when two coins are tossed.   **(CO5)**

Part-B   **3×8=24 Marks**

Instructions: (1) Answer **all** questions.   (2) Each question carries **eight** marks
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length
of the answer.

6.   A) A problem is given to three students, A,B,C whose chances of solving at are 1/2, 1/3, and
      1/4 respectively. If they try it independent, what is the probability that the problem will be
      solved?   **or**   **(CO3)**
      B) In a class, 2% of boys and 3% of girls passed in the Programming subject. There are 30%
      girls in the class. If a student is selected who has passed the subject, what is the probability
      that the student is a girl.   **(CO3)**

7.   A) Find the mean deviation about mean for the data:85,96,76,108,85,80,100,85,70,95(**CO4**)
                    or
      B) The number of runs made by six players   in a cricket match is: 12, 18, 21, 26, 17, 20.
      Find the standard deviation.   (**CO4**)

8.   A) Calculate the Spearman's rank correlation coefficient for the following data: (**CO4**)

x	5	10	5	11	12	4	3	2	7	1
y	1	6	2	8	5	1	4	6	5	2

                    or
      B) Calculate the regression coefficient of Y on X and obtain the regression equation for the
      following data: (**CO4**)

X	1	2	3	4	5	6	7
Y	9	8	10	12	11	13	14

TIME: 3 HOURS   TOTAL MARKS:80

PART – A

Note: (1) Answer all questions.   Marks:10 x 3 = 30
        (2) Each question carries three marks.

1. Evaluate $\int (e^x + 2\cos x + \dfrac{6}{\sqrt{1-x^2}})\,dx$ (CO1)

2. Evaluate $\int \dfrac{\tan^{-1} x}{1+x^2}\,dx$ (CO1)

3. Evaluate $\int_1^2 (x-1)(x+2)\,dx$ (CO1)

4. Evaluate $\int_0^\pi \sin x\,dx$ (CO1)

5. Find the differential equation of the family of the curves $x^2 - y^2 = a^2$ where 'a' is an arbitrary constant.   (CO2)

6. How many edges are there in a graph with 10 vertices each of degree 6? (CO3)

7. Draw the graph with vertices A, B, C whose adjacency matrix is $\begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 2 \\ 1 & 2 & 0 \end{bmatrix}$ (CO3)

8. Two cards are drawn from a well-shuffled deck of 52 cards. What is the probability that both are aces?   (CO3)

9. A ball is drawn at random from a bag containing 4 red and 3 blue balls. Find the probability that the ball is either red or blue.   (CO3)

10. Find the range of the set of integers 14, -12, 7, 0, -5, -8, 17, -11, 19?   (CO4)

Part B

                                                                                    Marks: 5 x 10 = 50
Note: Answer any **five** questions and each question carries 10 marks.

11. a) Evaluate $\int \dfrac{14x+11}{7x^2 +11x+1}\,dx$ (CO1)

    b) Evaluate $\int \dfrac{x}{(x-2)(x+1)}\,dx$ (CO1)

12. a) Evaluate $\int e^x (\sin x + \cos x)\,dx$ (CO1)

    b) Evaluate $\int x^2 e^{2x}\,dx$ (CO1)

13. Show that $\int_0^{\pi/2} \dfrac{1}{1+\tan x}\,dx = \dfrac{\pi}{4}$.   (CO1)

14. Solve $\dfrac{dy}{dx} + y\,\cot x = \operatorname{cosec} x$ (CO2)

15. a) Compute $P(A/B)$ and $P(B/A)$ if $P(A) = \frac{3}{8}, P(B) = \frac{5}{8}$ and $P(A \cup B) = \frac{3}{4}$

(CO3)

   b) A bag contains 10 black and 5 white balls. Two balls are drawn from the bag one after the other without replacement. What is the probability that both balls drawn are black?

(CO3)

16. It is observed that 50% of mails are spam. There is a software that filters spam mail before reaching the inbox. Its accuracy for detecting a spam mail is 99% and chances of tagging a non-spam mail as spam mail is 5%. If a certain mail is tagged as spam, find the probability that it is not a spam mail. (CO3)

17. Calculate Spearman's rank correlation coefficient from the following data: (CO4)

Rank1	1	2	3	4	5	6	7	8
Rank2	2	4	1	5	3	8	7	6

18. Calculate the regression coefficient of Y on X and obtain the regression equation for the following data: (CO4)

X	10	12	13	12	16	15
Y	40	38	43	45	37	43

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TIME: 3 HOURS   TOTAL MARKS:80

PART – A

Note: (1) Answer all questions.   Marks:10 x 3 = 30
        (2) Each question carries <u>three</u> marks.

1. Evaluate $\int (\frac{1}{x} - e^x + x^4)dx$ (CO1)

2. Evaluate $\int \frac{\sin \sqrt{x}}{\sqrt{x}}dx$ (CO1)

3. Evaluate $\int_0^2 x^4 dx$ (CO1)

4. Evaluate $\int_0^1 \frac{1}{1+x^2} dx$ (CO1)

5. Find the differential equation of the family of curves $y = Ae^x + Be^{-x}$ where A and B are arbitrary constants.   (CO2)

6. Define a multigraph and draw a multigraph with 4 vertices   (CO3)

7. Write the adjacency matrix for a graph with V={x, y, z} and E={xy,xz,zx}   (CO3)

8. Two students are selected from a group of two boys and two girls. Find the probability that the selected students both are boys?   (CO3)

9. Compute $P(A \cup B)$ when $P(A) = \frac{1}{5}, P(B) = \frac{2}{3}$ and $P(A \cap B) = \frac{1}{15}$ (CO3)

10. Find the range of the observations: 32, 41, 28, 54, 35, 26, 23, 33, 38, 40 (CO4)

Part B

Marks: 5 x 10 = 50

Note: Answer any **five** questions and each question carries 10 marks.

11. a) Evaluate $\int sec^2 (2x + 3)dx$ (CO1)
    b) Evaluate $\int \frac{1}{(x-2)(x-3)} dx$ (CO1)

12. a) Evaluate $\int \frac{e^{m\tan^{-1} x}}{1+x^2} dx$ (CO1)
    b) Evaluate $\int x^2 cosx \, dx$ (CO1)

13. Show that $\int_0^{\pi/2} \frac{sin^{20}x}{sin^{20}x+cos^{20}x} dx = \frac{\pi}{4}$.   (CO1)

14. Solve $\frac{dy}{dx} + \frac{2y}{x} = \frac{1}{x^2}$ (CO2)

15. a) Let A and B are two events with $P(A) = \frac{1}{2}, P(B) = \frac{1}{3}$ and $P(A \cap B) = \frac{1}{4}$, find $P(A/B)$ and $P(B/A)$ (CO3)
    b) A fair die is rolled twice. What is the probability that an odd number will follow an even number?   (CO3)

16. Three machines A, B and C produce respectively 50%, 30% and 20% of the total number of items of a factory. The percentages of defective output of these machines are respectively 2%, 3% and 4%. An item is selected at random and is found defective. Find the probability

that the item was produced by machine C.
(CO3)

17. Calculate Spearman's rank correlation coefficient from the following data:
(CO4)

x	78	89	97	69	59	79	68
y	125	137	156	112	107	136	124

18. Calculate the regression coefficient of X on Y and obtain the regression equation for the following data: (CO4)

X	2	4	6	8
Y	6	8	12	15

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DIGITAL ELECTRONICS

Course code	Course Title	No. of Periods/ Weeks	Total No. of periods	Marks for FA	Marks for SA
IOT-302	Digital Electronics	5	75	20	80

S.No.	Chapter/Unit title	No.of periods	Weightage Allocated	Short type	Essay type	CO's Mapped
1	Number systems	15	16	2	1	CO1
2	Logic Gates ,Boolean Algebra and basic Combinational circuits	17	26	2	2	CO2
3	Flip-Flops	15	26	2	2	CO3
4	Counters and registers	17	26	2	2	CO4
5	Additional Combinational circuits	11	16	2	1	CO5
	TOTAL	75	110	30	80	

Course Objectives	Upon completion of the course the student shall be able
	i)To acquire the basic knowledge of digital logic levels and apply of knowledge to understand digital logic circuits.
	ii)To prepare students to perform the analysis and design of various digital electronic circuits.

Course Outcomes

Upon completion of the course the student shall be able to		
CO1	IOT-302.1	Explain the structure of various number systems.
CO2	IOT-302.2	Describe fundamental concepts and techniques used in digital electronics, the switching algebra theorems and logic gates and apply them to design logic circuits using K-Maps
CO3	IOT-302.3	Explain operation of flip flops
CO4	IOT-302.4	Design the counting circuits, Registers using flipflop operations.
CO5	IOT-302.5	Explain design and implement various sequential circuits, combinational circuits and PLD

CO-PO/PSO Matrix:

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT-302.1	3	3	3		2			3	2	3
IOT-302.2	3	3	3	2	1	1		3	2	2
IOT-302.3	2	1	1	1			1	1	1	3
IOT-302.4	2	2	3	1		2	1	2	2	1
IOT-302.5	2	2	3	1	1	1	2	3		1
Average	2.4	2.2	2.6	2.25	1.3	1.3	1.3	2.4	1.75	2

3=Strongly mapped , 2=moderately mapped, 1=slightly mapped

Learning Outcomes:

1.0 Number systems
- 1.1   List the various number systems used in digital Computer.
- 1.2   Explain Decimal number system
- 1.3   Explain Binary number system
- 1.4   Explain octal number system
- 1.5   Explain Hexadecimal number system
- 1.6   Convert decimal number to other base conversion.
    - 1.6.1   Decimal to Binary
    - 1.6.2   Decimal to Octal
    - 1.6.3   Decimal to Hexadecimal
- 1.7   Convert binary number to other base conversion.
    - 1.7.1   Binary to Decimal
    - 1.7.2   Binary to octal
    - 1.7.3   Binary to Hexadecimal
- 1.8   Convert octal number to other base conversion.
    - 1.8.1   Octal to Decimal
    - 1.8.2   Octal to Binary
    - 1.8.3   Octal to Hexadecimal

- 1.9   Convert hexadecimal other base conversion.
    - 1.9.1   Hexadecimal to Decimal
    - 1.9.2   Hexadecimal to Binary
    - 1.9.3   Hexadecimal to Octal
- 1.10   Binary numbers representation.
    - 1.10.1   Define Binary numbers representation.
    - 1.10.2   List the types of Binary numbers representation.
    - 1.10.3   Explain Unsigned binary number representation.
    - 1.10.4   Explain Signed binary number representation.
- 1.11   Signed binary arithmetic.
    - 1.11.1   Illustrate addition of two signed binary numbers.
    - 1.11.2   Illustrate subtraction of two signed binary numbers.
    - 1.11.3   Illustrate binary multiplication.
    - 1.11.4   Illustrate Binary division.
- 1.12   Binary coded decimal (BCD) coding scheme.
    - 1.12.1   Define Binary coded decimal (BCD) coding scheme.
    - 1.12.2   List the types of Binary coded decimal (BCD)
    - 1.12.3   Draw and explain 8421 code.
    - 1.12.4   Draw and explain 2421 code.
    - 1.12.5   Draw and explain 8 4-2-1 code.
    - 1.12.6   Draw and explain Excess 3 code.
- 1.13   Character representation
    - 1.13.1   List character representation codes
    - 1.13.2   Explain the ASCII coding scheme.
    - 1.13.3   Explain the EBCDIC coding scheme.

2.0 Boolean algebra , Logic gates and Basic Combinational Circuits

- 2.1   Boolean algebra
    - 2.1.1   Define Boolean algebra
    - 2.1.2   Explain AND, OR, NOT operations with truth tables.
    - 2.1.3   Explain the working of EX-OR and EX-NOR operations with truth tables.
    - 2.1.4   List the different postulates in Boolean algebra.

2.1.5   State De-Morgan's theorems.
2.1.6   Prove De-Morgan's theorems using truth tables.
2.1.7   Apply De-Morgan's theorems and other postulates of Boolean algebra to simplify the given Boolean expression.
2.1.8   Generate Boolean expression for given truth table.
2.1.9   Using Sum-Of-Products(SOP) method
2.1.10   Using Product-Of-Sums(POS)method
2.1.11   Use K – map to simplify Boolean expression (up to 4 variables).
2.1.12   Using Two variable K-Map
2.1.13   Using Three variable K-Map
2.1.14   Using Four variable K-Map

2.2   Logic Gates
2.2.1   Define Logic gate
2.2.2   List basic gates
2.2.3   Define OR gate
2.2.4   Explain OR gate with logic symbol and truth table.
2.2.5   Define AND gate
2.2.6   Explain AND gate with logic symbol and truth table.
2.2.7   Define NOT gate
2.2.8   Explain NOT gate with logic symbol and truth table.
2.2.9   What is universal gate? List universal gates
2.2.10   Define NOR gate
2.2.11   Explain NOR gate with logic symbol and truth table.
2.2.12   Define NAND gate
2.2.13   Explain NAND gate with logic symbol and truth table.
2.2.14   Define EX-OR and EX-NOR gates
2.2.15   Explain the working of EX-OR and EX-NOR gates with truth tables.
2.2.16   Implement AND, OR, NOT gates using NAND gates only
2.2.17   Implement AND, OR, NOT gates using NOR gate only.
2.3   Basic Combinational Circuits
2.3.1   Define the Half Adder.
2.3.2   Explain the function of Half Adder.
2.3.3   Draw Half-Adder circuit using an exclusive OR and an AND gate .
2.3.4   Draw a Half–Adder using only NAND gates or only NOR gates.
2.3.5   Define the Full Adder.
2.3.6   Explain the function of Full Adder.
2.3.7   Construct Full Adder using two Half-Adder and an OR gate
2.3.8   Define the parallel Adder
2.3.9   Explain the function of parallel Adder using logic symbol.
2.3.10   Draw and explain 4-bit parallel adder using full adders.
2.3.11   Draw and explain 4-bit parallel adder/ 2's complement subtractor circuit.
2.3.12   Explain the working of a serial adder with a block diagram.
2.3.13   List the advantage and disadvantages of a serial adder
2.3.14   List the advantage and disadvantages of a parallel adder.
2.3.15   Distinguish between serial adder and parallel adder.
2.3.16   Explain the operation of a digital comparator circuit for two 4-bitwords.

3.0 Flipflops
3.1   List the details of different logic families**.**
3.2   Define positive and negative logic levels.
3.3   Define Flip flop
3.4   Draw and explain the basic principle of operation of a Flip-flop.

3.5   Define Latch.
3.6   Explain the working of a NAND latch circuit with truth table and Timing diagram
3.7   Explain the working of a NOR latch circuit with truth table and Timing diagram
3.8   Differentiate between Latch and Flip-flop.
3.9   Define Triggering
3.10   List the types of Triggering
3.11   Draw and explain the concept of edge triggering(positive, negative)
3.12   Draw and explain the concept of level triggering. (positive, negative)
3.13   Explain with block diagram, waveforms and truth tables the working of RS Flip-flop.
3.14   Explain with block diagram, waveforms and truth tables the working of RST Flip-flop.
3.15   Explain with block diagram, waveforms and truth tables the working of D Flip-flop.
3.16   Explain with block diagram, waveforms and truth tables the working of JK Flip-flop.
3.17   Explain with block diagram, waveforms and truth tables the working of T Flip-flop.
3.18   Distinguish between synchronous and asynchronous inputs of a flip- flop
3.19   State the need for a Master-Slave flip-flop.
3.20   Explain the working of a Master-Slave flip-flop using suitable circuit diagram and truth table.

4.0 Counters and Registers

4.1   Counters
    4.1.1   Define Counter
    4.1.2   List the types of counters.
    4.1.3   Define terms Synchronous counter, Asynchronous counter
    4.1.4   Distinguish between asynchronous and synchronous counters.
    4.1.5   Draw and explain module-8 ripple counter circuit diagram with waveforms and truth tables
    4.1.6   Draw and explain module-16 ripple counter circuit diagram with waveforms and truth tables
    4.1.7   Draw and explain module-10 (decade) Asynchronous counter circuit diagram with waveforms and truth tables
    4.1.8   Draw and explain module-8 synchronous counter circuit diagram with waveforms and truth tables
    4.1.9   Draw and explain module-16 synchronous counter circuit diagram with waveforms and truth tables
    4.1.10   List the draw backs of ripple counters.
    4.1.11   List the advantages of synchronous counters
    4.1.12   Explain the operation of a up/down counter circuit diagram with waveforms and truth tables
    4.1.13   State the need of Programmable counter
    4.1.14   Draw and explain Programmable counter
    4.1.15   Draw and explain the operation of a 4-bit ring counter.
    4.1.16   List the applications of counter.
4.2   Register
    4.2.1   Define Register
    4.2.2   State the need of Register.
    4.2.3   List the methods of data transfer in register.
    4.2.4   List the types of Registers

4.2.5	Define Serial in – Serial out register
4.2.6	Define Serial in – Parallel out register
4.2.7	Define Parallel in – Serial out register
4.2.8	Define Parallel in – Parallel out register
4.2.9	Explain the working of serial in – serial out register with circuit diagram.
4.2.10	Explain the working of serial in – parallel out register with circuit diagram.
4.2.11	Explain the working of shift left Register with circuit diagram.
4.2.12	Explain the working of shift right registers with circuit diagram.
4.2.13	Explain the working of universal shift register.
4.2.14	Draw and explain the use of shift register as memory.

5.0 Additional Combinational Circuits

5.1   Define data selector and state its importance.
5.2   Define data distributor and state its importance.
5.3   Define the terms Multiplexer and Demultiplexer
5.4   Draw and explain the operation of a Multiplexer circuit diagram with truth table.
5.5   Draw and explain the operation of Demultiplexer circuit diagram with truth table.
5.6   List the applications of Multiplexers.
5.7   List the applications of Demultiplexers.
5.8   Define the terms Encoder and Decoder.
5.9   Draw and explain the operation of a 4 to 10 line decoder circuit diagram with truth table.
5.10 Draw and explain the operation of a 8 to 3 encoder circuit diagram with truth table.
5.11 List   applications of Decoders.
5.12 List   applications of Encoders.
5.13 Define Programmable logic Devices.
5.14 List the types of Programmable logic Devices.
5.15 Draw and explain the Programmable Logic Array (PLA).

COURSE CONTENTS

1.   Number Systems: Number Systems, Decimal, Binary, Hexadecimal and Octal codes, Conversion from one number system to another number system, Binary numbers representation ,Binary Arithmetic, BCD ,Character representation-ASCII and EBCDIC code for characters.

2.   Boolean algebra and Logical Gates :AND, OR, NAND, NOT, NOR & EX-OR gates. Logical definitions – Symbols – truth tables. Boolean theorems, Boolean simplifications of Boolean expressions, Using De-Morgan's theorems, Formation and implementation of Logic expressions, Karnaugh's mapping, Applications involving developing of combinational logic circuits. Half-Adder, Full-adder, Subtractor series – Parallel Binary adder – Parallel adder/subtractor circuits.

3. FLIP FLOP: Different logic families, Basic principles of Flip Flop operation (with help of wave form & truth tables) of RS,T,D,JK and Master Slave JK flip flop concept of Edge Triggering and Level Triggering , Synchronous and Asynchronous device.

4. Counters: Basic Asynchronous, Synchronous Binary and Decade counter and the Ripple

counter, their use Decade counter, Up and Down counters, Ring counter

Registers : Shift registers, Serial, Parallel register, Serial-in Parallel out, Parallel-in– serial out devices, Universal shift registers, Applications.

5.Additional Combinational Circuits: Multiplexers, Demultiplexers and Encoders, Decoders-operation of a multiplexer with a circuit diagram - operation of a demultiplexer with a circuit diagram - applications of multiplexers and demultiplexers-operation of a 4 to 10 line decoder - operation of an 8 to 3 line encoder –programmable logic array.

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8. https://atozmath.com/example/NumToBaseConv.aspx?he=e&b1=111&b2=2

Model Blue Print:

S.No.	Chapter/Unit title	No.of periods	Weightage Allocated	Marks Wise Distribution of Weightage			Question wise Distribution of Weightage			CO's Mapped
				R	U	APP	R	U	APP	
1	Number systems	15	13	6	10		2	1		CO1
2	Logic Gates ,Boolean Algebra and basic Combinational circuits	17	26	6	20		2	2		CO2
3	Flip-Flops	15	26	6	20		2	2		CO3
4	Counters and registers	17	26	6	20		2	2		CO4
5	Additional Combinational circuits	11	16	6	10		2	1		CO5
	TOTAL	75	80	30	80		10	8		

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1.1 to 3.7
Unit test-2	From 3.8 to 5.7

DIPLOMA IN INTERNET OF THINGS
MODEL PAPER
DIGITAL ELECTRONICS
UNIT TEST-1

SCHEME: C-23   SUBJ CODE:IOT-302
MAX MARKS:40   TIME: 90Minutes

…….

PART-A   **16Marks**

Instructions:1) Answer all questions
                2) First question carries 4marks, and each question of remaining carries 3marks

1. a) K-map is not used to simplify Boolean expression (True/False)   (CO2)

b) --------------------is the base of octal number system   (CO1)

c)logic gate gives ---------------------number of outputs   (CO2)

d) TTL stands for ---------------------------------------   (CO3)

2) Convert 101010_2 into decimal number   (CO1)

3) State and prove Demorgan's theorems using truth table   (CO2)

4) Implement OR gate using NAND gate   (CO2)

5) Define positive and negative logic levels of FLIP FLOP   (CO3)

                        PART-B   3X8=24Marks
Instructions: 1) Answer all questions
                2)Each question carries 8 Marks
                3)Answer should be comprehensive and the criterion for valuation is the
                content but not the length of the answer
6. a) Explain addition and subtraction of two signed binary numbers   (CO1)
                                Or
  b) List and explain character representation codes   (CO1)
7. a) Derive the Boolean expression using Karnaugh map if F(A,B,C,D)=∑(0,2,5,7,8,10,13,15) (CO2)
                                Or
b) Draw and explain 4-bit parallel adder using full adders.   (CO2)

8. a) Define Half Adder, give its truth table and draw the Half–Adder using only NOR gates.
                                                                                  (CO2)
                                Or
b) Explain the working of a NAND latch circuit with truth table and Timing diagram   (CO3)

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BOARD DIPLOMA EXAMINATIONS
DIPLOMA IN COMPUTER ENGINEERING
MODEL PAPER – END EXAMINATION
DIGITAL ELECTRONICS

SCHEME: C-23   SUBJ CODE:IOT-302
MAX MARKS:80   TIME: 3HOURS
……

PART-A   10X3=30Marks

Note: Answer all questions

1. Convert $(34.56)_{10}$ into binary number system.   (CO1)
2. List the types of Binary coded decimal (BCD).   (CO1)
3 Write about De-Morgan's theorems.   (CO2)
4 Draw the logic symbols for AND gate and OR gate with truth tables.   (CO2)
5 Define full adder.   (CO2)
5 Define positive and negative logic levels.   (CO3)
6 Distinguish between Latch and Flip-flop.   (CO3)
7 Distinguish between asynchronous and synchronous counters.   (CO4)
8 List the types of Registers   (CO4)
9 List the applications of Demultiplexers.   (CO5)
10. Define Programmable logic Devices.   (CO5)

PART-B   5x10=50Marks

Note: Answer any five questions and each question carries 10Marks

11. Illustrate subtraction of two signed binary numbers.   (CO1)
12. Draw and explain 4-bit parallel adder using full adders.   (CO2)
13. Implement AND, OR, NOT, EX-OR gates using NAND gates only.   (CO2)
14. Explain the working of a NAND latch circuit with truth table and Timing diagram   (CO3)
15. Explain the working of a Master-Slave flip-flop using suitable circuit diagram and truth table.
                                                                         (CO3)

16. Draw and explain module-10 (decade) Asynchronous counter circuit diagram with   waveforms
and truth tables.   (CO4)
17.Explain the working of shift left register with circuit diagram.   (CO4)

18.Draw and explain the operation of a Multiplexer in detail.   (CO5)

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OPERATING SYSTEMS

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
IOT-303	**Operating Systems**	5	75	20	80

S.No.	Chapter/Unit title	No.of periods	Weightage Allocated	Short type	Essay type	CO's Mapped
1	Introduction to Operating system	15	16	2	1	CO1
2	Process management	15	16	2	1	CO2
3	Synchronization & Deadlocks	15	26	2	2	CO3
4	Memory management	15	26	2	2	CO4
5	Disk scheduling and File management	15	26	2	2	CO5
	TOTAL	75	110	30	80	

Course Objectives	i)To know about the basics of Operating Systems ii)To familiarize with process management, Scheduling algorithms, Synchronization and deadlock techniques iii)To understand various Memory management techniques iv)To familiarize with File management

	CO1	IOT-303.1	Explain basic concepts of Operating System
Course Outcomes	CO2	IOT-303.2	Explain process scheduling algorithm
	CO3	IOT-303.3	Describe Semaphores, synchronization and Deadlock handling techniques
	CO4	IOT-303.4	Use memory management techniques and page replacement algorithms
	CO5	IOT-303.5	Use Disk scheduling algorithms and File allocation methods with respect to different operating systems

CO-PO/PSO MATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT-303.1	3	2	2	2	3	3	3	3	2	2
IOT-303.2	3	3	3	2	2	3	3	2	2	2
IOT-303.3	3	3	3	2	3	3	3	3	2	3
IOT-303.4	3	3	3	3	3	3	3	3	3	3
IOT-303.5	3	3	2	2	2	3	3	3	3	3
Average	3	3	2.5	2	2.5	3	3	3	2.5	2.5

3=Strongly mapped , 2=moderately mapped, 1=slightly mapped

Learning Outcomes:

1.0   Introduction to operating systems
1.1   Define an operating system
1.2   Discuss history of operating system
1.3   Discuss about various types of operating systems
1.4   Distinguish spooling and buffering
1.5   Explain the concepts multiprogramming and timesharing
1.6   Differentiate between distributed and real time systems
1.7   Describe multiprocessor systems
1.8   Describe the operating system components
1.9   Discuss operating system services
1.10   Define system call with an example
1.11   List and explain different types of system calls
1.12   Define single user, multi user operating system structure

2.0   Process management
2.1   Define process and process control block
2.2   Explain process state diagram
2.3   Describe process creation and termination
2.4   Discuss the relation between processes
2.5   Define Thread and describe multithreading
2.6   Explain scheduling concepts
2.7   Describe scheduling queues and schedulers
2.8   Explain CPU scheduling and scheduling criteria
2.9   Explain various scheduling algorithms
        2.9.1 FCFS
        2.9.2 SJF
        2.9.3 Round Robin
        2.9.4 Priority
        2.9.5 Multilevel Scheduling

3.0   Synchronization & Deadlocks
3.1   Describe semaphores
3.2   Explain inter process communication
3.3   Define Deadlock
3.4   State the necessary conditions for arising deadlocks
3.5   State various techniques for deadlock prevention
3.6   Discuss Deadlock avoidance and detection
3.7   Describe the process of recovering from deadlock

4.0   Memory management
4.1   Describe briefly address binding, dynamic loading, dynamic linking
4.2   Define overlays
4.3   Describe briefly on swapping
4.4   Explain single partition allocation
4.5   Explain multiple partition allocation
4.6   Explain the concept of fragmentation
4.7   Explain paging concept
4.8   Explain how logical address is translated into physical address
4.9   Explain segmentation and segmentation with paging

COURSE CONTENT
1.0 Introduction to operating systems

Operating System –Evolution of operating system-Types of Operating Systems - Multi Programming and Time Sharing - Distributed and Real time Systems - spooling and buffering - Multi processor systems-Components of Operating Systems - operating System Services - system Calls - single User and Multi user operating System Structure.

2. Process management

Processes - Sequential Processes - Process State Diagram - Process Control Block - Process Creation and Termination - Relations between Processes - Threads and Multi Threading - Scheduling Concepts - Schedulers - CPU scheduling and Scheduling criteria - scheduling algorithms.

3. Synchronization & Deadlocks

Inter Process Communications - semaphores – monitors
Deadlocks - principal of deadlock - deadlock prevention - deadlock detection - deadlock avoidance.

4. Memory management
Address binding -Dynamic Loading- dynamic linking-overlays-swapping- memory allocation-fragmentation-paging-segmentation- segmentation with paging-
Benefits of virtual memory - virtual memory techniques - demand paging - page replacements - page replacement algorithms – thrashing.

5.Disk scheduling and File management
Disk performance parameters - Disk scheduling policies –
Introduction to file systems - File management-File Operations - Access methods - Directory structure organization - File Protection.

REFERENCE BOOKS

1. Operating Systems   --   Silber Schatz and Galvin
2. Operating Systems   --   William Stallings, PHI
3. Operating Systems   --   Dietel and Dietel
4. Operating Systems   --   Dhamdhere (TMH)
5. Advanced Operating Systems   --   Tanenbaum

Model Blue Print:

S.No.	Chapter/Unit title	No.of periods	Weightage Alloca	Marks Wise Distribution of Weightage			Question wise Distribution of Weightage			CO's Mapped
				R	U	Ap	R	U	Ap	
1	Introduction to Operating system	15	16	6	10		2	1		CO1
2	Process management	15	16	6	10		2	1		CO2
3	Synchronization & Deadlocks	15	26	6	10	10	2	1	1	CO3
4	Memory management	15	26	6	20		2	2		CO4
5	Disk scheduling and File management	15	26	6	20		2	2		CO5
	Total	75	80				8	6		

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1.1 to 3.2
Unit test-2	From 3.3 to 5.7

DIPLOMA IN INTERNET OF THINGS
MODEL PAPER
OPERATING SYSTEMS
UNIT TEST-1

SCHEME: C-23   SUBJ CODE:IOT-303
MAX MARKS:40   TIME: 90Minutes

....

PART-A   **16Marks**

Instructions:1) Answer all questions

        2) First question carries 4marks, and each question of remaining carries 3 marks

1. a) Operating system is a Hardware. (True/False)   (CO1)
   b) Operating system is also known as _____ manager.   (CO1)
   c) Full form of FCFS is _____.   (CO2)
   d) Which one of the following is not a process state [   ]   (CO2)
       i)New   II) Scheduling   III) Suspend   IV) Running
2) List any three types of Operating Systems.   (CO1)
3) Define spooling and buffering.   (CO1)
4) Draw Process state diagram.   (CO2)
5) Distinguish between process and Thread.   (CO2)

PART-B   3X8=24Marks

Instructions:1) Answer all questions

    2)Each question carries 8 Marks

    3)Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer

6. a) Explain the concept of Multiprogramming and Time sharing.   (CO1)
      (Or)
  b) Explain various system calls with an examples.   (CO1)

7. a) Differentiate Distributed and Real-time systems.   (CO1)
      (Or)
  b) Explain various operating system services.   (CO1)

8. a) Explain various CPU scheduling algorithms.   (CO2)
      (Or)
  b) Describe Inter process communication.   (CO2)

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BOARD DIPLOMA EXAMINATIONS
DIPLOMA IN INTERNET OF THINGS
MODEL PAPER - END EXAMINATION
OPERATING SYSTEMS

SCHEME: C-23   SUBJ CODE:IOT-303
MAX MARKS:80   TIME: 3HOURS
……

PART-A   10X3=30Marks

Note: Answer all questions

1.   Define Operating system.   (CO1)

2.   List any three types of system calls   (CO1)

3   what is program and process?   (CO2)

4   State the importance of multithreading   (CO2)

5   List necessary conditions for deadlock   (CO3)

6   Define Semaphore   (CO3)

7   State the importance of address binding   (CO4)

8   Define Overlay.   (CO4)

9   What is disk scheduling?   (CO5)

10   List any three file allocation methods   (CO5)

PART-B   5x10=50Marks

Note: Answer any five questions

11.   Differentiate multiprogramming and time sharing.   (CO1)

12.   Draw and explain process state diagram.   (CO2)

13.   Explain inter process communication   .   (CO3)

14.   Explain Deadlock avoidance and detection.   (CO3)

15.   Explain paging concept.   (CO4)

16.   Explain virtual memory techniques   (CO4)

17.   Explain Disk scheduling algorithms.   (CO5)

18.   Explain disk organization and structure   (CO5)

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IOT-304, DATA COMMUNICATION AND COMPUTER NETWORKS

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
IOT-304	Data Communication and Computer Networks	04	60	20	80

S No	Unit Title	No. of Periods	Weightage of Marks	No. of Short Answer Questions	No. of Essay Questions	COs Mapped
1	Basics of Data communication and OSI Reference Model	12	16	2	1	CO1
2	Physical Layer and Data Link Layer	13	19	3	1	CO2
3	Network Layer, Transport Layer and Application Layer	15	36	2	3	CO3
4	Wireless Network Protocols	12	26	1	2	CO4
5	Cyber Security	8	16	2	1	CO5
	Total Periods/Marks	60	110	30	80	

Course Objectives	1. To familiarize with Basics of Data Communcation and the layers of OSI Model
	2. To analyze various wireless network protocols
	3. To analyze wireless Security protocols

CO No		COURSE OUTCOMES
CO1	IOT-304.1	Describe data communication and OSI model
CO2	IOT-304.2	Describe Physical and data link layers
CO3	IOT-304.3	Analyze network layers
CO4	IOT-304.4	Describe Wireless Network Protocols
CO5	IOT-304.5	Describe Cyber Security

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT-304.1	3	2	2		3		3	3	1	
IOT-304.2	3	2	2	3	3		3	3	3	3
IOT-304.3	3	3	1		3		1	3		1
IOT-304.4	3	3	2		3		1	3		1
IOT-304.5	3	3	2	3	3		3	3	3	3
Average	3	2.6	1.8	3	3		2.2	3	2.3	2

3=strongly mapped 2=moderately mapped 1=slightly mapped

1.0 Basics of Data communication and OSI Reference Model
1.1 Define data and information
1.2 Define data communication
1.3 State the characteristics of data communication
1.4 State the components of data communication
1.5 Explain briefly about data representation of numbers, text, images, audio and video
1.6 Define the different modes of data flow (simplex, half duplex and full duplex)
1.7 Distinguish between serial communication and parallel communication
1.8 Define computer network and state its use
1.9 State the need for data communication networking.
1.10 Define network topology
1.11 List different network topologies
1.12 Explain Bus, Star, Ring network topologies
1.13 Compare the performances of the above three topologies.
1.14 Draw the ISO: OSI 7-layer architecture and State the functions of each layer.
1.15 Draw TCP/IP reference model and State the functions of each layer
1.16 Compare ISO: OSI7-layer model with TCP/IP reference model

2.0 Physical Layer and Data Link Layer
a) Physical Layer:

2.1 List the different types of physical transmission media used in networking
2.2 Explain the cross-sectional diagrams of UTP, STP, Coaxial and Fiber optic cables and their use in networking.
2.3 List the three types of switching techniques used in networking
2.4 Explain circuit switching and packet switching
2.5 Define virtual circuit and datagram approaches in packet switching
2.6 State the use of repeater/ hub
b) Data Link Layer:

2.7 Define the word protocolused in computer networks
2.8 State the need for protocols in computer networks.
2.9 Explain CSMA/CD, CSMA/CA
2.10 Explain Ethernet LAN
2.11 Give the frame format for Ethernet and State the different fields in it.
2.12 Explain the working of token ring network

3.0 Network Layer, Transport Layer and Application Layer
a) Network Layer:

3.1 Define the terms Internet and Intranet.
3.2 Explain classful addressing in IPv4.
3.3 Explain classless addressing (CIDR) in IPv4.
3.4 State the use of routers in networking
3.5 Explain the concept of routers and routing packets in computer networks
3.6 Distinguish among cut through, store-and-forward and adaptive switch mechanisms.
3.7 Explain the packet transfer mechanism using routers and IP address.

b) Transport Layer

3.8 List the features of Transmission Control Protocol (TCP)
3.9 Explain the flow control in TCP
3.10 Explain error control in TCP
3.11 Explain the connectivity of systems using TCP (Three-way hand shake)
3.12 Explain end-to-end connectivity in TCP using ports and sockets.
3.13 Describe the features of User Datagram Protocol (UDP)
3.14 Compare the features of TCP and UDP
3.15 State the use of Gateway Router.

c) Application Layer:

3.16 Mention the role of DNS server
3.17 Explain how email is transferred
3.18 Discuss POP server and SMTP server
3.19 Explain file transfer operation using FTP
3.20 Explain the working of Web server
3.21 Describe the web browser architecture
3.22 Explain the internal architecture of ISP
3.23 Write the purpose of proxy server
3.24 Explain remote login

4.0 Wireless Network Protocols

4.1 Define Wireless LAN.
4.2 List the advantages of WLAN.
4.3 Explain the infrastructure based topology of wireless LAN
4.4 Explain the Ad hoc topology of wireless LAN
4.4 Compare the features of IEEE 802.11n and IEEE 802.11b.
4.5 State the necessity of Bluetooth technology
4.6 Explain the features of Bluetooth technology.
4.7 State the applications of Bluetooth technology.
4.8 State the purpose of Zigbee technology
4.9 Explain the features of Zigbee technology and its topologies.
4.10 State the need of WiMax technology
4.11 List the applications of WiMax
4.12 Differentiate between WiFi and WiMax
4.13 Explain the features of WiMax technology

5.0 Cyber Security
5.1 Define the term Cyber Security.
5.2 State the necessity of Cyber Security.
5.3 State the fundamentals of Cyber Securtiy.
5.4 List the layers of Cyber Security.
5.5 Explain the active and passive attacks in Cyber attacks.
5.6 Explain the functions of firewall
5.7 Define the terms: i) virus ii) malware iii) adware iv) trogan v) worm related to computer security
5.8 Explain the features of a typical "total security" tools
5.9 List different types of viruses and various ways of removing viruses
5.10 List any six popular Anti-Virus Software available in market

COURSE CONTENTS:

1.0   Basics of Data communication and OSI Reference Model

Need for data communication networking, networktopology, different network topologies, Bus, Star, Ring network topologies, OSI 7-layer architecture- functions of each layer, TCP/IP reference model- functions of each layer

2.0   Physical Layer and Data Link Layer

a)   Physical Layer:

Different physical transmission media- UTP, STP, Coaxial and Fiber optic cable, switching techniques - circuit switching, packet switching and message switching, virtual circuit and datagram approaches in packet switching, use of repeater/hub

b)   Data Link Layer:

Protocol, need for protocols, need for framing, need for flow control and error control protocols, medium access control (MAC) - its functions, CSMA/CD and CSMA/CA, Local area network - its use, Ethernet and its frame format, working of token ring network.

3.0   Network Layer, Transport Layer and Application Layer

a)   Network Layer:

Internet and Intranet, classful addressing and classless addressing in IPv4, use of routers in networking, concept of routers and routing, cut through & store-and-forward and adaptive switch mechanism, packet transfer mechanism using routers and IP address.

b)   Transport Layer

Features of Transmission Control Protocol (TCP), flow control in TCP, error control in TCP, connectivity of systems using TCP (Three-way hand shake), end-to-end connectivity in TCP using ports and sockets, features of User Datagram Protocol (UDP), use of Gateway Router

c)   Application Layer:

Role of DNS server, how email is transferred, POP server and SMTP server, FTP working of Web server, web browser architecture, internal architecture of ISP, purpose of proxy server, remote login

4.   Wireless Network Protocols

Define Wireless LAN-List the advantages of WLAN-Explain the infrastructure based topology of wireless LAN -Explain the Ad hoc topology of wireless LAN-Compare the features of IEEE 802.11n and IEEE 802.11g-State the necessity of Bluetooth technology-Explain the features of Bluetooth technology-State the applications of Bluetooth technology-State the purpose of Zigbee technology-Explain the features of Zigbee Technology and its topologies- State   the need of WiMax technology-List the applications of WiMax-Differentiate between WiFi and WiMax-Explain the features of WiMax technology.

5. **Cyber Security**

   Basic Cyber Security Concepts, fundamentals and layers of security, Cyber attacker actions, active attacks, passive attacks, functions of firewall, define the terms: i) virus ii) malware iii) adware iv) trogan v) worm related to computer security, List the features of a typical "total security" tool, List different types of viruses and various ways of removing viruses, List any six popular Anti-Virus Software available in market

Reference Books:

1. Ata Elahi Thomson, Network communication Technology
2. Godbole, Data Communication and Networking,TMH
3. William Stallings ,Data and Computer Communications, 7thedition. PHI
4. BehrouzForouzan, Data Communication and Networking, 3rdedition.TMH
5. Nina Godbole and SunitBelpure, Cyber Security Understanding Cyber Crimes,Computer Forensics and Legal Perspectives,Wiley
6. B.B.Gupta,D.P.Agrawal,HaoxiangWang,ComputerandCyber Security:Principles, Algorithm, Applications, and Perspectives, CRC Press
7. Wayne Tomasi, Introduction to data communication and networking, Pearson India Publications
8. Thomas Robertazzi, Basics of computer networking, Springer publishers.

BLUE PRINT

| Sl No | Unit Title | No of Periods | Weightage Allotted | Weightage of Marks | | COs mapped |
				No of Essay Questions	No of Short answer Questions	
1	Basics of Data communication and OSI Reference Model	10	16	1	2	**CO1**
2	Physical Layer and Data Link Layer	15	19	1	3	**CO2**
3	Network Layer, Transport Layer and Application Layer	28	36	3	2	**CO3**
4	Wireless Network Protocols	12	26	2	1	**CO4**
5	Cyber Security	10	16	1	2	**CO5**
		75	110	80	30	

Table specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to be covered
Unit Test-I	From 1.1 to 3.7
Unit Test-II	From 3.8 to 5.8

<div align="center">

(Model Paper)   C –23, IOT -304

State Board of Technical Education and Training, A. P

Diploma in Internet of Things (DIOT)

III Semester

Subject Name: Data Communication and Computer Networks

Sub Code: IOT-304

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Time: 90 minutes   **Unit Test I**   **Max.Marks:40**

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Part-A   **16Marks**

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Instructions: (1) Answer **all** questions.

                (2) First question carries **four** marks, each question of remaining carries **three** marks

1   a) Write any one antivirus software name available in market   (CO2)

      b) What is the full form of NTFS   (CO1)

      c) What is the full form of USB   (CO1)

      d) What is the full form of FAT   (CO1)

2. State the need for data communication networking   (CO1)

3. List the three types of switching techniques used in networking   (CO2)

4. State the need for protocols in computer networks.   (CO2)

5. Define the terms Internet and Intranet.   (CO3)

<div align="center">

Part-B   **3×8=24**

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Instructions: (1) Answer **all** questions.

                (2) Each question carries **eight** marks

                (3) Answer should be comprehensive and the criterion for valuation

                is the content but not the length of the answer.

6. (a) Draw the ISO: OSI 7-layer architecture and State the functions of each layer. (CO1)

<div align="center">or</div>

    (b) Draw TCP/IP reference model and State the functions of each layer.   (CO1)

7. (a) Explain CSMA/CD, CSMA/CA.   (CO2)

<div align="center">or</div>

    (b). Explain the frame format for Ethernet and State the different fields in it

                (CO2)

8. (a) Explain classful addressing in IPv4.   (CO3)

<div align="center">or</div>

    (b)Distinguish among cut through, store-and-forward and adaptive switch mechanisms.

                (CO3)

<div align="center">

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State Board of Technical Education and Training, A. P
Diploma in Internet of Things (DIOT)
III Semester
Subject Name: Data Communication and Computer Networks
Sub Code: IOT-304

Time: 90 minutes   Unit Test II   Max.Marks:40

Part-A   **16Marks**

Instructions: (1) Answer **all** questions.

(2) First question carries **four** marks, each question of remaining carries **three** marks

1. a) What is the full form of FTP   (CO3)

    b) What is the full form of UDP   (CO3)

    c) What is the full form of WLAN   (CO4)

    d) What is the full form of DNS   (CO4)

2. Compare the features of TCP and UDP   (CO3)
3. List the advantages of WLAN.   (CO4)
4.   State the applications of Bluetooth technology.   (CO4)
5. Define the term Cyber Security.   (CO5)

Part-B   **3×8=24**

Instructions: (1) Answer **all** questions.

(2) Each question carries **eight** marks

(3) Answer should be comprehensive and the criterion for valuation

is the content but not the length of the answer.

6. (a) Explain the working of Web server   (CO3)

or

(b Explain the internal architecture of ISP   (CO3)

7. (a) Explain the Infrastructure based topology of wireless LAN   (CO4)

or

(b) Explain the features of Zigbee Technology and its topologies.   (CO4)

8. (a) Explain the active and passive attacks in Cyber-attacks.   (CO5)

or

(b) Explain the functions of firewall.   (CO5)

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State Board of Technical Education and Training, A. P
Diploma in Internet of Things (DIOT)
III Semester
Subject Name: Data Communication and Computer Networks
Sub Code: IOT-304

Time: 90 minutes   **END SEMESTER EXAMINATION** _____ **Max.Marks:40**

Part-A   **16Marks**

Instructions: (1) Answer **all** questions.

(2) Each question carries **three** marks

(3) Answer should be brief and straight to the point and shall not exceed

five simple sentences.

1. State the need for data communication networking   (CO1)
2. List different network topologies.   (CO1)
3. List the three types of switching techniques used in networking   (CO2)
4. State the need for protocols in computer networks.   (CO2)
5. State the use of repeater/ hub   (CO2)
6. Define the terms Internet and Intranet.   (CO3)
7. Mention the role of DNS server   (CO3)
8. List the advantages of WLAN.   (CO4)
9. Define Cyber Security.   (CO5)
10. State the necessity of Cyber Security.   (CO5)

Part-B   **5×10=50**

Instructions: (1) Answer **all** questions.

(2) Each question carries **TEN** marks

(3) Answer should be comprehensive and the criterion for valuation

is the content but not the length of the answer.

11. Draw the ISO: OSI 7-layer architecture and State the functions of each layer.   (CO1)

12. Explain the frame format for Ethernet and State the different fields in it.   (CO2)

13. Distinguish among cut through, store-and-forward and adaptive switch

mechanisms.   (CO3)

14. Explain the connectivity of systems using TCP (Three-way hand shake)   (CO3)

15. Explain the internal architecture of ISP.   (CO3)

16. Explain the Ad hoc topology of wireless LAN   (CO4)

17. Explain the features of Zigbee Technology and its topologies.   (CO4)

18. Explain the active and passive attacks on Computer networks.   (CO5)

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DBMS

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
IOT-305	**DBMS**	5	75	20	80

S.No.	Chapter/Unit title	No.of periods	Weightage Allocated	Short type	Essay type	CO's Mapped
1	Concepts of DBMS & RDBMS	18	29	3	2	CO1
2	Concepts of SQL	22	26	2	2	CO2
3	Basics of PL/ SQL	15	26	2	2	CO3
4	Advanced PL/SQL	10	16	2	1	CO4
5	Concepts of NoSQL & MongoDB.	10	13	1	1	CO5
	TOTAL	75	110	30	80	

Course Objectives	i)To know the fundamentals of DBMS ii)To familiarize insert, retrieve, update, delete data in database iii)To familiarize programming skills for insert, retrieve, update, delete data in database

Course outcome:

CO1	IOT-305.1	Describe fundamentals, types and Overall structure of DBMS
CO2	IOT-305.2	Apply SQL commands to create, retrieve, update, delete data from the Relational data bases.
CO3	IOT-305.3	Describe PL/SQL programming constructs, control statements and sub programs.
CO4	IOT-305.4	Apply cursors, triggers and Exception handling concepts
CO5	IOT-305.5	Use NOSQL database concepts and MongoDB data base concepts in designing database Schema.

CO-PO/PSO MATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT-305.1	3	2	2	2	2	3	2	2	3	1
IOT-305.2	2	3	3	3	3	3	3	2	1	2
IOT-305.3	3	2	2	2	1	3	2	2	3	1
IOT-305.4	3	3	3	2	2	3	3		3	3
IOT-305.5	3	1	3	1	3	3	2	2	2	3
Average	2.4	2.2	2.6	2	2.2	3	2.8	2	2	2

3=Strongly mapped , 2=moderately mapped, 1=slightly mapped

Learning Outcomes:

1.0   Concepts of DBMS &RDBMS
   1.1   Define Database Management System(DBMS)
   1.2   List the advantages of DBMS
   1.3   Explain Database Abstraction, Data Independence
   1.4   Define Instances and Schemas
   1.5   Explain Data Models.
   1.6   Define Database languages DDL, DML, TCL
   1.7   Explain Database Administrator, Users and Database System Architecture with diagram.
   1.8   Define Entity, Entity sets, Relationship, Relationship sets, Super Key , Candidate Key and Primary Key, Foreign Key
   1.9   Explain Mapping Cardinalities.
   1.10   List the symbols used in ER model.
   1.11   Know The Entity-Relationship Model.
   1.12   Reduce the ER-diagrams to tables
   1.13   Explain Generalization, Specialization & Aggregation.
   1.14   Explain Functional Dependencies, Normalizations– 1 NF, 2 NF and 3NF

2.0   Concepts of SQL

   2.1   Explain SQL and benefits of SQL.
   2.2   Describe about Embedded SQL and Lexical conventions
   2.3   Describe Naming of the Objects and parts and how to refer them.
   2.4   Explain literals & different data types like character, number, long, date, raw and long raw etc.
   2.5   Illustrate the comments within SQL Statement
   2.6   Explain SQL Operators
   2.7   Describe Data Definition Language commands CREATE, ALTER and DROP.
   2.8   Explain integrity constraints through creating a table and altering table.
   2.9   Describe Data Manipulation Language commands INSERT, UPDATE and DELETE
   2.10   Explain SELECT statement   with   WHERE, ORDER BY, GROUP BY and HAVING clauses with examples
   2.11   List and explain single row(Number, character, date and conversion) functions
   2.12   List and Explain group functions
   2.13   Explain Transaction Control Commands COMMIT, SAVEPOINT, ROLLBACK, GRANT, and REVOKE.
   2.14   Explain Subqueries with examples
   2.15   Explain   Joins (Equi Join, Non-Equi Joins, Inner Join, Outer Join, cross join and Self join) with syntax and examples.

3.0   PL/SQL
   3.1   Explain PL/SQL Block structure.
   3.2   List the features of PL/SQL
   3.3   Explain the data types of PL/SQL
   3.4   Declaration of variables
   3.5   Explain PL/SQL tables and userdefined records.
   3.6   Explain Input/Output statements
   3.7   Explain decision making statements and illustrate
   3.8   Explain looping statements and illustrate
   3.9   Define procedure and function
   3.10   Describe the advantages of subprograms.

COURSE CONTENT

1.   Concepts of DBMS & RDBMS

Define DBMS –Purpose of DBMS - Data Abstraction – Data Models – Instances and Schemas – Data Independence – Data Definition Language - Data Manipulation Language – Database Administrator - Database Users – Database system Structure.

Entities – Relationships and Relationship sets – Mapping constraints – Entity – Relationship Diagram – Super key , Candidate key and Primary key - Reducing E- R Diagrams to tables – Generalization and Specialization – Aggregation – Functional Dependencies - Normal forms 1NF , 2 NF , 3 NF

2.   Concepts of SQL

Benefits of SQL – Embedded SQL – Lexical conventions – Naming objects and parts – Referring objects and parts – Literals – Text –Integer – Number – Data types – Character data types –

Number data type – Long data type –Raw and Long Raw data types –Pseudo columns – comments within SQL statements – comments on schema objects.

Operators – Unary and Binary operators – Precedence- Arithmetic operators – character operators – comparison operators – logical operators- set operators – other operators –DDL Commands – Integrity Constraints – DML Commands - functions – single row functions – numeric functions – character functions – date functions – conversion functions – other functions- Group functions. Transaction control commands-Sub queries - Joins.

3.   **Basics of PL/SQL**

Main features – architecture – advantage of PL/SQL – fundamentals – character set – Lexical units – Data types – data type conversion – Declaration - scope and visibility – assignments – expressions and comparisons – PL/SQL tables – user defined records.

Conditional control- IF statement – sequential control- GOTO and NULL statements. SQL support – national language support – Remote Access

Advantages of subprograms – procedures – Functions RETURN statement – forward declarations – actual versus formal parameters – positional and named notation - parameter modes

4.   **Advanced PL/SQL**

Cursors – Implicit cursor – Explicit cursor – Triggers – Advantages - creating trigger – raising trigger -

5.   **NoSQL& Basics of MongoDB**

Classification of Databases : RDBMS, OLAP, NoSQL.-Introduction to NoSQL- need for NoSQL – Comparison of RDBMS and NoSQL- Advantages and Disadvantages of NoSQL - BASE system – ACID System – Comparison of ACID and BASE properties – Classification of NoSQL as Key-value stores, Column-oriented, Graph and Document oriented Databases

Introduction to MongoDB - advantages of MongoDB - applications of MongoDB - Installation of MongoDB - Creation of Database - Dropping of Database - Creation of Collection - Dropping of Collection - Data types of MongoDB - different Commands of MongoDB - Inserting Document - Query Document - Updating Document – Deleting Documents - Sorting Documents

REFERENCE BOOKS

1.   Database System Concepts   -- Silberschatz, Henry F. Korth, S. Sudarshan
2.   Oracle Database 11g :The Complete Reference - Kevin Loney
3.   Understanding ORACLE -- James T. Peary & Joseph G. Laseer.
4.   RDBMS with ORACLE   -- Rolland.
5.   ORACLE series books of ORACLE Press   – TMH.
6.   Starting out with Oracle – Covering Databases- John Day &CraigVan
7.   PL/SQL, Developer Tools & DBA -- Slyke, Dreamtech
8.   www.nosql-database.org
9.   www.mongodb.org
10.   https://www.guru99.com/nosql-tutorial.html#5

Model Blueprint:

S.No.	Chapter/ Unit title	No.of	Weightage	Marks Wise Distribution of Weightage			Question wise Distribution of Weightage			CO's Mapped
				R	U	Ap	R	U	Ap	
1	Concepts of DBMS & RDBMS	18	29	9	10	10	3	1	1	CO1
2	Concepts of SQL	22	26	6	20		2	2		CO2
3	Basics of PL/ SQL	15	26	6	20		2	2		CO3
4	Advanced PL/SQL	10	16	6	10		2	1		CO4
5	Concepts of NoSQL&MongoDB.	10	13	3	10		1	1		CO5
	Total	75	110	30	70	10	10	7	1	

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1.1 to 3.5
Unit test-2	From 3.6 to 5.2.5

DIPLOMA IN INTERNET OF THINGS
MODEL PAPER
DBMS
UNIT TEST-1

SCHEME: C-23   SUBJ CODE:IOT-305
MAX MARKS:40   TIME: 90Minutes

………..……

PART-A   **16Marks**

Instructions:1) Answer all questions

        2) First question carries 4marks, and each question of remaining carries 3 marks

1. a) File system is more advantageous than DBMS.(True/False)   (CO1)
   b) Entity is defined as ……….   (CO1)
   c) Full form of DML is ………..   (CO1)
   d) Which one of the following is not a Database Language [   ]   (CO1)
      i) DML   II)DDL   III)TCL   IV)TLL
2) Define Instance & Schema.   (CO1)
3) List any three data types in SQL.   (CO2)
4) Write the syntax for CREATE command in SQL.   (CO2)
5) Differentiate CHAR and VARCHAR data types in SQL.   (CO2)

PART-B   3X8=24Marks

Instructions:1) Answer all questions

     2)Each question carries 8 Marks

     3)Answer should be comprehensive and the criterion for valuation is the
content but not the length of the answer

6. a) Explain Database System Architecture   (CO1)
        (Or)
   b) Explain Generalization, Specialization and Aggregation   (CO1)

7. a) Explain ER diagram with an example.   (CO1)
        (Or)
   b) Explain TCL commands in SQL in detail.   (CO2)

8. a) Explain SELECT statement with syntax and example.   (CO3)
        (Or)
   b) Explain Joins in SQL.   (CO3)

BOARD DIPLOMA EXAMINATIONS
DIPLOMA IN INTERNET OF THINGS
MODEL PAPER - END EXAMINATION
DBMS

SCHEME: C-23   SUBJ CODE: IOT-305
MAX MARKS: 80   TIME: 3HOURS
....

PART-A   **10x3=30M**

Instructions *:1.Answer **all** questions.*
*2.Each question carries **Three** marks.*
3.Answers should be brief and straight to the point and should not exceed five simple sentences.

1.   Define Database Management System.   (CO1)

2.   Define Primary Key.   (CO1)

3.   List any three integrity constraints.   (CO1)

4.   Write a SQL Query to retrieve maximum value from sal column of employee table.
                                                             (CO2)

5.   Write syntax for adding rows to the table   (CO2)

6.   List any three features of PL/SQL.   (CO3)

7.   List decision making statements in PL/SQL   (CO3)

8.   Define Cursor.   (CO4)

9.   List any three advantages of Triggers.   (CO4)

10.   Compare features of RDBMS with that of NoSQL.   (CO5)

PART-B   **5x10=50M**

Instructions *: 1. Answer any fiver questions and each question carries   TEN marks.*
2. Answers should be comprehensive and criteria for valuation is the content but not the length of the
                      answer.

11.Explain Database System Architecture   (CO1)
12. Explain Generalization, Specialization and Aggregation   (CO1)
13. Explain SELECT statement with syntax and example   (CO2)
14. Explain Joins in SQL   (CO2)
15. Write a PL/SQL procedure to find biggest of three given numbers.   (CO3)
16. Write a PL/SQL program to find factorial of a given number.   (CO3)
17. Explain Implicit cursors in PL/SQL   (CO4)
18. Explain Column-oriented Databases in NoSQL.   (CO5)

IoT Architecture and its Protocols

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
IOT-306	**IoT Architecture and its Protocols**	04	60	20	80

S No	Unit Title	No. of Periods	Weightage of Marks	No. of Short Answer Questions	No. of Essay Questions	COs Mapped
1	Introduction to Industry 4.0 and Internet of Things	12	26	2	2	CO1
2	IoT Architecture	10	16	2	1	CO2
3	IoT Protocols: Network layer	10	16	2	1	CO3
4	IoT Protocols: Application Layer	13	26	2	2	CO4
5	Elements of IoT & IoT Case Studies	15	26	2	2	CO5
	Total	60	110	30	80	

Course Objectives	To Introduce Industry 4.0 and Internet of Things
	To familiarise with IoT Architecture & Network layer and Application layer protocols
	To familiarise with the elements of Iot and to explore case IoT case studies

CO No		COURSE OUTCOMES
CO1	IOT-306.1	Introduce Industry 4.0 and Internet of Things
CO2	IOT-306.2	Get acquaint with the Architecture of IoT
CO3	IOT-306.3	Get acquaint with the Network layer protocols of IoT
CO4	IOT-306.4	Get acquaint with the Application layer protocols of IoT
CO5	IOT-306.5	Explore Elements of IoT & IoT Case Studies

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT-306.1	3				1			3		1
IOT-306.2	3	2	1		2			3	1	
IOT-306.3	3	1	1		1			3		1
IOT-306.4	3	3	2	1	2			3		2
IOT-306.5	3	3	1	2	3		1	3	1	2
Average	3	1.8	1.25	1.5	1.8			3	1	1.5

3=strongly mapped, 2=moderately mapped, 1=slightly mapped

LEARNING OUTCOMES

1.0 Introduction to Industry 4.0 and Internet of Things

    1.1 Explain the concept of Industry 4.0 and its benefits.

    1.2 Explain the components of futuristic industrial plant in industry 4.0 with a block diagram

    1.3 Define IoT and state its role in Industry 4.0

    1.4 List the goals of industry 4.0

    1.5 List the advantages of industry 4.0

    1.6 Explain what technologies are driving industry 4.0

    1.7 Explain about various challenges in industry 4.0

    1.8 State the impact of IoT on businesses and society

    1.9 List the applications of IoT in different industries.

    1.10 State the characteristics of IoT

    1.11 Explain the concepts of different IoT enabling Technologies such as: i) Wireless Sensor networks ii) Cloud Computing iii)Big Data Analytics iv)Communication Protocols iv)Embedded Systems

    1.12 Explain the concepts of different IoT Levels (IoT Level-1 to Level-5) and Development Templates

    1.13 Explain M2M and IoT Technology Fundamentals such as: i)Devices and Gateways ii) Data Management iii) Business Process in IoT iv) Everything as a Service (XaaS)

    1.14 State the role of cloud in IoT

    1.15 State the Security aspects of IoT

2.0 IoT Architecture

    2.1 Draw the 5-layer model of IoT Architecture and list different layers

    2.2   Explain about the functions of Perception layer (or Object layer)

    2.3   Explain about the functions of Data Transmission layer (or Network Layer)

    2.4   Explain about the functions of Middleware layer (or Information Processing Layer)

    2.5   Explain about the functions of Application Layer

    2.6   Explain about the functions of Business Layer

    2.7   State the need of sensors in the perception layer

    2.8   State the need of communication technologies used in the data transmission layer

    2.9   List different communication technologies

    2.10 State the need of middleware technologies in the information processing layer

    2.11 List different middleware technologies used in IoT

    2.12 State the need of application layer technologies

    2.13 List different application layer technologies used in IoT

    2.14 State the need of business layer technologies

    2.15 List different business layer technologies used in IoT

3.0 IoT Protocols: Network Layer

    3.1 Classify network layer protocols of IoT into:

        i) Short Range Communication, Low Data Rate, Low Power (Ex: Bluetooth, Zigbee, 6LoWPAN)

        ii) Short Range Communication, High Data Rate (Ex: WiFi)

        iii) Long Range Communication, High Data Rate, Low power (Ex: LoRaWAN, LTE-M)

iv) Long Range, Low Data Rate, Low Power Consumption (Ex: Sigfox)

v) Long Range, Low Data Rate, High Power Consumption (Ex: Cellular: 2G,3G,4G,5G)

3.2 State the features of 6LoWPAN

3.3 Explain and Compare Bluetooth, Zigbee and 6LoWPAN based on : i) frequency of operation ii) Data rate iii) Mobility iv) Security v) power consumption vi) coverage range vii) applications

3.4 State the features of NFC (Near Field Communication) and List its applications

3.5 State the features of WiFi (Wireless LAN) and List its applications

3.6 Differentiate between NFC and WiFi technologies

3.7 State the features of LoRaWAN and list its applications.

3.8 State the features of Sigfox and list its applications.

3.9 State the features of Z-Wave and list its applications

3.10 State the features of Mobile IoT Technologies – LTE-M, NB-IoT, and EC-GSM-IoT and list their applications

4.0 IoT Protocols: Application Layer

4.1 State the need of application layer protocols in IoT

4.2 List different common application layer protocols in IoT such as i) MQTT ii) HTTP iii) AMQP iv) LwM2M v) XMPP vi) DDS vii) USSD viii) SSI

4.3 Explain about the features and functions of MQTT (Message Queueing Telemetry Transport) protocol

4.4 Explain about the features and functions of HTTP (Hyper Text Transfer Protocol)

4.5 Explain about the features and functions of AMQP (Advanced Message Queuing Protocol)

4.6 Explain about the features and functions of LwM2M (Lightweight Machine-to-Machine) protocol

4.7 Explain about the features and functions of XMPP (Extensive Messaging and Presence Protocol

4.8 Explain about the features and functions of DDS(Data Distribution Service) protocol

4.9 Explain about the features and functions of USSD (Unstructured Supplementary Service Data) protocol

4.10 Explain about the features and functions of SSI (Simple Sensor Interface) Protocol

5.0 Elements of IoT & IoT Case Studies

5.1 Draw the general block diagram of IoT based system consisting of the elements such as: i) Sensors & Actuators ii) Edge Gateway iii) Communication Protocols iv) computing hardware v) Software components and explain.

5.2 Classify sensors used in IoT based on i) Passive & Active ii) Analog & digital iii) Scalar & vector and give examples

5.3 List the common actuators used in IoT

5.4 State the role of edge gateway in IoT

5.5 State the function of computing hardware in IoT

5.6 State the purpose of communication technologies used in IoT

5.7 List different software components used in IoT

5.8 Explain the functions of Sensors & actuators in IoT

5.9 Explain the function of software components in data storage and data analytics in IoT

5.10 Explain the IoT based system for Home Automation with block diagram

5.11   Explain the IoT based system for Smart lighting with block diagram

5.12   Explain the IoT based system for Home intrusion detection with block diagram

5.13   Explain the IoT based system for Air pollution monitoring system with block diagram

5.14   Explain the IoT based system for Smart irrigation with block diagram

5.15   Explain the IoT based system for Healthcare with block diagram

COURSE CONTENT:

1. **Introduction to Industry 4.0 and Internet of Things**

Concept of Industry 4.0 and its benefits- components of futuristic industrial plant in industry 4.0- Define IoT and state its role in Industry 4.0-List the goals of industry 4.0- advantages of industry 4.0- technologies driving industry 4.0-various challenges in industry 4.0- the impact of IoT on businesses and society- applications of IoT in different industries- the concepts of different IoT enabling Technologies - M2M and IoT Technology Fundamentals -role of cloud in IoT - the Security aspects of IoT

2. **IoT Architecture**

Five layer model of IoT Architecture -Explain about the functions of Perception layer (or Object layer), Data Transmission layer (or Network Layer), Middleware layer (or Information Processing Layer), Application Layer and Business Layer- need of sensors -Classify the sensors – need of communication technologies used in the data transmission layer-different communication technologies - need of middleware technologies -Dfferent middleware technologies used in IoT- need of application layer technologies-List different application layer technologies used in IoT- need of business layer technologies-List different business layer technologies used in IoT

3. **IoT Protocols: Network Layer**

Classify network layer protocols of IoT - features of Bluetooth, Bluetooth, Zigbee and 6LoWPAN -Explain and Compare Bluetooth, Bluetooth, Zigbee and 6LoWPAN -State the features of NFC (Near Field Communication) and List its applications-State the features of WiFi (Wireless LAN) and List its applications-Differentiate between NFC and WiFi technologies-State the features of LoRaWAN and list its applications-State the features of Sigfox and list its applications-State the features of Z-Wave and list its applications-State the features of Mobile IoT Technologies – LTE-M, NB-IoT, and EC-GSM-IoT and list their applications

4. **IoT Protocols: Application Layer**

State the use of Standard Wireless Access connecting technologies such as i) WiFi ii) 2G, 3G and standard LTE, 5G in IoT-State the use of Private Long Range – LoRA based platform, Zigbee, and SigFox. -State the use of Mobile IoT Technologies – LTE-M, NB-IoT, and EC-GSM-IoT-State the specifications (coverage range, data rate) and IoT specific applications of the following connecting technologies: i) WiFi ii) 2G iii) 3G iv) 4G v) 5G vi) LoRA based platform vii) Zigbee viii) SigFox-What is NFC (Near Field Communication) and List its applications-Differences between NFC and Bluetooth and WiFi technologies-List the typical specifications and applications of i) WiFi ii) Bluetooth iii) Zigbee iv) GSM v) GPS modules designed for Arduino, Raspberry Pi hardware platforms-Explain the use of Computing Hardware (Arduino, Raspberry Pi) in IoT

5. Elements of IoT & IoT Case Studies

Draw the general block diagram of IoT based system-Classify sensors-List the common actuators used in IoT- role of edge gateway in IoT- function of computing hardware in IoT -purpose of communication technologies used in IoT-List different software components used in IoT-Explain the functions of Sensors & actuators in IoT-Explain the function of software components in data storage and data analytics in IoT-Explain the IoT based system for Home Automation with block diagram-Explain the IoT based system for Smart lighting with block diagram-Explain the IoT based system for Home intrusion detection with block diagram-Explain the IoT based system for Air pollution monitoring system with block diagram-Explain the IoT based system for Smart irrigation with block diagram-Explain the IoT based system for Healthcare with block diagram-Explain the following IoT Case Studies with block diagrams -i) Home Automation-ii)Smart lighting -iii)Home intrusion detection -iv) Air pollution monitoring system -v) Smart irrigation -vi)Healthcare

Reference Books:

1   Vijay Madisetti, ArshdeepBahga, Ïnternet of Things, "A Hands on Approach", University Press
2   Dr. SRN Reddy, RachitThukral and Manasi Mishra, "Introduction to Internet of Things: A practical Approach", ETI Labs
3   Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press
4   Jeeva Jose, "Internet of Things", Khanna Publishing House, Delhi
5   Adrian McEwen, "Designing the Internet of Things", Wiley
6   Raj Kamal, "Internet of Things: Architecture and Design", McGraw Hill
7   Cuno Pfister, "Getting Started with the Internet of Things", O Reilly Medi
8   Internet of Things Reference Architecture – Whitepaper – CISCO
9   IoT and Edge Computing for Architects: Implementing edge and IoT systems from sensors to clouds with communication systems, analytics, and security, 2nd Edition – Perry Lea, Packt Publishing Limited, ISBN-10: 189214805
10 IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press, 2017
11 The Internet of Things – Key applications and Protocols, Olivier Hersent, David Boswarthick, Omar Elloumi and Wiley, 2012 (for Unit 2).
12 "From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence", Jan Ho¨ ller, Vlasios Tsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand. David Boyle and Elsevier, 2014.
13 Architecting the Internet of Things, Dieter Uckelmann, Mark Harrison, Michahelles and Florian (Eds), Springer, 2011

Table specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to be covered
Unit Test-I	From 1.1 to 3.5
Unit Test-II	From 3.6 to 5.15

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State Board of Technical Education and Training, A. P
Diploma in Internet of Things (DIoT)
III Semester
Subject Name: IoT Architecture and its Protocols
Sub Code: IoT - 306

Time : 90 minutes   **Unit Test I**   **Max.Marks:40**

Part-A   **16Marks**

Instructions: (1) Answer **all** questions.

(2) First question carries **four** marks, each question of remaining carries **three** marks

2   a) IIoT stands for _____   **(CO1)**
    b) The automation of communication between devices, with no human
       Intervention is called Machine to Machine (M2M).   (True/False)   **(CO1)**
    c) Which of the following is not an advantage of IoT?   **(CO1)**
       (A) Improved Customer Engagement
       (B) Security
       (C) Reduced Waste
       (D) Enhanced Data Collection
    d) Gateway provides the connection between _____ and _____   **(CO1)**

6.   List the goals of industry 4.0   **(CO1)**

7.   State the need of sensors in the perception layer   **(CO2)**

8.   List different application layer technologies used in IoT.   **(CO2)**

9.   State the features of Near Field Communication and List its applications.   **(CO3)**

Part-B   **3×8=24**

Instructions: (1) Answer **all** questions.

(2) Each question carries **eight** marks

(3) Answer should be comprehensive and the criterion for valuation

is the content but not the length of the answer.

10. (a) Draw the Explain the components of futuristic industrial plant in industry 4.0 with a block
    diagram   **(CO1)**

or

(b) Explain the concepts of different IoT Levels (IoT Level-1 to Level-5)   **(CO1)**

7. (a) Explain about the functions of Middleware layer.   **(CO2)**

or

(b) Explain about the functions of Data Transmission layer   **(CO2)**

8. (a) Explain and Compare Bluetooth, Bluetooth, Zigbee and 6LoWPAN based on : i) frequency
       of operation ii) Data rate iii) Mobility iv) Security v) power consumption vi) coverage range
    vii) applications   **(CO3)**

or

(b) State the features of Bluetooth, Bluetooth, Zigbee and 6LoWPAN   **(CO3)**

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State Board of Technical Education and Training, A. P
Diploma in Internet of Things (DIoT)
III Semester
Subject Name: IoT Architecture and its Protocols
Sub Code: IoT - 306

Time : 90 minutes   **Unit Test II**   **Max.Marks:40**

Part-A   **16Marks**

Instructions: (1) Answer **all** questions.

(2) First question carries **four** marks; each question of remaining carries **three** marks

2. a) What is the full form of NFC   **(CO3)**

b) What is the full form of WiFi   **(CO3)**

c) What is the full form of LoRaWAN   **(CO3)**

d) What is Sigfox   **(CO3)**

8. State the need of application layer protocols in IoT   **(CO4)**
9. List different common application layer protocols in IoT   **(CO4)**
10.   Classify sensors used in IoT   .   **(CO5)**
11. State the function of computing in hardware in IoT   **(CO5)**

Part-B   **3×8=24**

Instructions: (1) Answer **all** questions.

(2) Each question carries **eight** marks

(3) Answer should be comprehensive and the criterion for valuation

is the content but not the length of the answer.

12. (a) Explain about the features and functions of MQTT Protocol   **(CO4)**
                              or

(b Explain about the features and functions of HTTP   **(CO4)**

13. (a) Explain the functions of sensors & actuators in IoT   **(CO5)**
                              or

(b)Explain the IoT based system for smart lighting with block diagram.   **(CO5)**

8. (a) Explain about the features and functions of SSI protocol   **(CO4)**
                              or

(b) Explain the IoT based system for Home Automation with block diagram   **(CO5)**
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BOARD DIPLOMA EXAMINATIONS
C-23, IoT-306, IoT Architecture and its Protocols
III SEMESTER
SEMESTER END EXAMINATION

TIME:3 HOURS   **MAX MARKS:80**

Part-A   **10×3=30**

Instructions: (1) Answer **all** questions.

(2) Each question carries **three** marks

(3) Answer should be brief and straight to the point and shall not exceed

five simple sentences.

1. State the role of cloud in IoT   (CO1)
2. List State the impact of IoT on businesses and society   (CO1)
3. State the need of middleware technologies in the information processing layer   (CO2)
4. List different business layer technologies used in IoT   (CO2)
5. Classify network layer protocols of IoT   (CO3)
6. State the features of Bluetooth, Zigbee.   (CO3)
7. List different common application layer protocols in IoT   (CO4)
8. State the features of Simple Sensor Interface Protocol   (CO4)
9. List the common actuators used in IoT   (CO5)
10. List different software components used in IoT   (CO5)

Part-B   **5×10=50**

Instructions: (1) Answer **all** questions.

(2) Each question carries **TEN** marks

(3) Answer should be comprehensive and the criterion for valuation

is the content but not the length of the answer.

11. Explain the concepts of different IoT Levels (IoT Level-1 to Level-5) and Development

templates   (CO1)

12. Explain about various challenges in industry 4.0   (CO1)

13. Explain about the functions of Data Transmission layer   (CO2)

14. Explain the features of Bluetooth, Bluetooth, Zigbee and 6LoWPAN   (CO3)

15. Explain about the features and functions of AMQP   (CO4)

16. Explain about the features and functions of DDS(Data Distribution Service) protocol(CO4)
17. Explain the IoT based system for Home Automation with block diagram   (CO5)
18. Explain the IoT based system for Smart irrigation with block diagram   (CO5)

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DIGITAL ELECTRONICS LAB

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
IOT-307	Digital Electronics Lab	3	45	40	60

S No	Chapter/ Unit Title	No. of Periods	COs Mapped
1	Logic Gates	10	CO1
2	Combinational logic circuits	10	CO2
3	Sequential Logic Circuits	15	CO3
4	Additional combination circuits	10	CO4
	TOTAL	45	

Course Objectives	1. To construct different combinational, sequential logic circuits and obtain truth tables.. 2. To simulate combinational and sequential logic circuits using simulation software 3. To learn the practical importance of Digital Electronic Circuits.

COURSE OUTCOMES:

At the end of the course the student able to learn following		
CO1	IOT-307.1	Demonstrate the truth tables of logic gates
CO2	IOT-307.2	Design combinational logic circuits and verify truth tables.
CO3	IOT-307.3	Design Sequential logic circuits and verify with truth tables
CO4	IOT-307.4	Construction of Additional combination circuits

CO-PO/PSO Matrix:

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT-307.1	2	2	3	3	1	2	1	2	3	1
IOT-307.2	2	2	3	3	2	2	1	2	3	1
IOT-307.3	2	2	3	3	2	2	1	2	3	1
IOT-307.4	2	2	3	3	2	2	2	2	3	2
Average	2	2	3	3	1.75	2	1.25	2	3	1.25

3=Strongly mapped , 2=moderately mapped, 1=slightly mapped

LEARNING OUTCOMES:
Logic Gates

1. Identification of Digital ICs and noting down pin details from data sheets.
   Identify the given digital ICs and draw the pin diagrams. (use TTL and CMOS
   ICs of AND, OR, NOT, NAND, NOR and XOR gates with two and three inputs)
2. Verify the truth tables of AND, OR,NOT, NAND, NOR, XOR Gates.

3. Realize AND, OR, NOT, XOR gates using 2 input NAND and NOR Gates.
4. Verify Demorgan's Laws using given digital trainer kit and given TTL gates.

Combinational logic circuits
5. Implement Half adder circuit using TTL/CMOS gates, and verify the truth tables
6. Implement Full adder circuits using TTL/CMOS gates, and verify the truth tables
7. Verify parallel adder using Digital Trainer kit/simulator software
8. Verify the function of 4-bit magnitude comparator 7485 IC

Sequential Logic Circuits
9. Verify the truth tables RS, JK, T and D Flip-flops
10. Construct a ripple counter using JK-FFs and obtain its timing waveforms
11. Verify the function of 7490 as decade and modulus counter, obtain timing waveforms.
12. verify the function of up/down counter using 74190/ 74193, change the modulus of the counter and verify its truth table
13. To construct and verify the function of mod-16 Synchronous counters
14. Verify the function of shift register (ICs like 7495, 74194 etc.)

Additional Combinational logic circuits
15. Verify the truth table of Multiplexer IC 74153
16. Verify the truth table of Demultiplexer ICIC 74138
17. Verify the truth table of BCD to 7 segment Decoder 7448 IC
18. Verify the Truth table of 74148 Encoder & 74138 Decoder IC

Time Schedule

Sno	Experiment Name	Allotted Periods
1	Identification of Digital ICs and noting down pin details from data sheets. Identify the given digital ICs and draw the pin diagrams. (Use TTL and CMOS ICs of AND, OR, NOT, NAND, NOR and XOR gates with two and three inputs).	3
2	Verify the truth tables of AND, OR, NOT, NAND, NOR, XOR Gates.	
3	Realize AND, OR, NOT, XOR gates using 2 input NAND and NOR Gates.	3
4	Verify DE Morgan's Laws using given digital trainer kit and given TTL gates	3
5	Implement Half adder circuit using TTL/CMOS gates, and verify the truth tables.	3
6	Implement Full adder circuits using TTL/CMOS gates, and verify the truth tables.	
7	Verify parallel adder using simulator software.	3
8	Verify the function of 4-bit magnitude comparator 7485 IC.	3
9	Verify the truth tables RS, JK, T and D Flip-flops.	3
10	Construct a ripple counter using JK-FFs and obtain its timing waveforms.	3
11	Verify the function of 7490 as decade and modulus counter, obtain timing waveforms.	3
12	verify the function of up/down counter using 74190/ 74193, change the modulus of the counter and verify.	3

13	To construct and verify the function of mod-16 Synchronous counters.	**3**
14	Verify the function of shift register (ICs like 7495, 74194 etc.)	**3**
15	Verify the truth table of Multiplexer IC 74153	**3**
16	Verify the truth table of Demultiplexer ICIC 74138	
17	Verify the truth table of BCD to 7 segment Decoder 7448 IC.	**3**
18	Verify the Truth table of 74148 Encoder & 74138 Decoder IC.	**3**

DIGITAL ELECTRONICS LAB OBJECTIVES AND KEY COMPETENCIES

SNO	Name of the experiment	Objectives	Key competencies
1	Identification of Digital ICs and noting down pin details from data sheets. Identify the given digital ICs and draw the pin diagrams. (Use TTL and CMOS ICs of AND, OR, NOT, NAND, NOR and XOR gates with two and three inputs).	Identify various ICs and their specification a. OR gate b. AND gate c. NAND gate d. NOR gate e. XOR gate	Familiarization of ICs
2	Verify the truth tables of AND, OR, NOT, NAND, NOR, XOR Gates.	Use various inputs and identify the outputs of various gates a. OR gate b. AND gate c. NAND gate d. NOR gate e. XOR gate	▢▢Verification of outputs as per the designated inputs for various gates ▢▢Familiarization of ICs ▢▢Usage of Bread boards ▢▢Usage of connectors ▢▢Usage of simulator software (or) Digital trainer kits
3	Realize AND, OR, NOT, XOR gates using 2 input NAND and NOR Gates.	Use NAND and NOR gates (known as the universal gate) implementation of : a. AND using NAND b. AND using NOR c. OR using NAND d. OR using NOR e. NOT using NAND f. NOT using NOR	▢▢Verification of outputs as per the designated inputs for combinatorial circuits. ▢▢Familiarization of IC ▢▢Usage of Bread boards ▢▢Usage of connectors ▢▢Usage of simulator software (or) Digital trainer kits
4	Verify DE Morgan's Laws using given digital trainer kit and given TTL gates.	I. Make the connections according to the circuit diagram. II. Verify De-Morgan's theorem for two variables	▢▢Verification outputs as per the designated inputs for Demorgan's theorem ▢▢To verify POS and SOP ▢▢To verify truth tables. ▢▢Usage of Bread boards ▢▢Usage of connectors

		III. Realize sum of product(SOP) and product of sum (POS) expressions IV. Verify the truth table for different values.	□□Usage of simulator software(or) Digital trainer kit
5	Implement Half adder circuit using TTL/CMOS gates, and verify the truth tables.	I. Design, realize and verify the adder circuits using basic gates and universal gates. II. Verify the truth table.	□□Verification of outputs as per the designated inputs for Half adder circuits as per truth table □□Understand TTL , CMOS families. □□Usage of Bread boards □□Usage of connectors □□Usage of simulator software (or) Digital trainer kits
6	Implement Full adder circuits using TTL/CMOS gates, and verify the truth tables.	I. Design, realize and verify the adder circuits using basic gates and universal gates. II. Design, realize and verify full adder using two half adders. III. Verify the truth table.	□□Verification of outputs as per the designated inputs for Full adder circuits as per truth table □□Understand TTL , CMOS families. □□Usage of Bread boards □□Usage of connectors □□Usage of simulator software (or) Digital trainer kit
7	Verify parallel adder using simulator software.	I. Make the connections as per the logic diagram. II. Connect +5v and ground according to pin configuration. III. Apply diff combinations of inputs to the i/p terminals. IV. Note o/p for summation. V. Verify the truth table.	□□Verification of outputs as per the designated inputs for Parallel adder circuits as per truth table □□Familiarization of IC 7483 □□Usage of Bread boards □□Usage of connectors □□Usage of simulator software (or) Digital trainer kits
8	Verify the function of 4-bit magnitude comparator 7485 IC.	I. Make the connections according to the circuit diagram. II. The output is high if both the inputs are equal. III. Verify the truth table for different values.	□□Verification of outputs as per the designated inputs for 4-bit magnitude comparator circuits as per truth table □□Familiarization of IC 7485 □□Usage of Bread boards □□Usage of connectors □□Usage of simulator software (or) Digital trainer kits
9	Verify the truth tables RS, JK, T and D Flip-flops.	I. Connect the circuit II. Apply VCC & ground signal to every IC.	□□Usage of various flipflops □□Usage of Bread boards □□Usage of connectors

			III. Observe the input & output according to the truth table	⯀⯀Usage of simulator software or) Digital trainer kits
10	Construct a ripple counter using JK-FFs and obtain its timing waveforms.	I. Connect the circuit II. Apply VCC & ground signal to every IC. III. Observe the input & output according to the truth table. IV. Obtain the timing waveform	⯀⯀Verification of outputs of Ripple clunter ⯀⯀Usage of JK FFs ⯀⯀Usage of Bread boards ⯀⯀Usage of connectors ⯀⯀Usage of simulator software (or) Digital trainer kits
11	Verify the function of 7490 as decade and modulus counter, obtain timing waveforms.	I. Make the connections according to the circuit diagram. II. Verify the truth table for different values. III. Obtain the Timing waveform	⯀⯀Familiarization of IC 7490 ⯀⯀Usage of Bread boards ⯀⯀Usage of connectors ⯀⯀Usage of simulator software (or) Digital trainer kits
12	verify the function of up/down counter using 74190/ 74193, change the modulus of the counter and verify.	I. Connect the circuit. II. Apply VCC & ground signal to every IC. III. Observe the input & output according to the truth table	⯀⯀Usage of IC 74190/74193 ⯀⯀Usage of Bread boards ⯀⯀Usage of connectors ⯀⯀Usage of simulator software ⯀⯀(or) Digital trainer kits
13	To construct and verify the function of mod-16 Synchronous counters.	I. Make the connections as per the logic diagram. II. Connect VCC and ground according to pin configuration. III. Apply diff combinations of inputs to the i/p terminals. IV. Note o/p for summation. V. Verify the truth table.	⯀⯀Implement mod-16 synchronous counter ⯀⯀Understanding the propose of VCC and Ground. ⯀⯀Usage of Bread boards ⯀⯀Usage of connectors ⯀⯀Usage of simulator software ⯀⯀(or) Digital trainer kits
14	Verify the function of shift register (ICs like 7495, 74194 etc.).	I. Make the connections according to the circuit diagram. II. Verify the truth table for different values.	⯀⯀Implement shift register. ⯀⯀Demonstration usage d of ICs 7495,74194 ⯀⯀Usage of Bread boards ⯀⯀Usage of connectors ⯀⯀Usage of simulator

			software (Or) Digital trainer kits
15	Verify the truth table of Multiplexer IC 74153.	I. Fix the IC's on the bread board &give the input supply. II. Make connection according to the circuit. III. Give select signal and strobe signal at respective pins. IV. Connect +5 v VCC supply at pin no 24 & GND at pin no 12. V. Verify the truth table for various inputs.	⬜⬜Implementing Multiplexers. ⬜⬜Familiarization of IC 74153 ⬜⬜Usage of Bread boards ⬜⬜Usage of connectors (or) Digital trainer kits
16	Verify the truth table of Demultiplexer IC 74138	I. Fix the IC's on the bread board &give the input supply. II. Make connection according to the circuit. III. Give select signal and strobe signal at respective pins. IV. Connect +5 v VCC supply at pin no 24 & GND at pin no 12. V. Verify the truth table for various inputs.	⬜⬜Implementing Multiplexers. ⬜⬜Familiarization of IC 74138 ⬜⬜Usage of Bread boards ⬜⬜Usage of connectors (or) Digital trainer kits
17	Verify the truth table of BCD to 7 segment Decoder 7448 IC.	III. Make the connections according to the circuit diagram. IV. Verify the truth table for different values.	⬜⬜Implementing BCD 7 segment Decoder. ⬜⬜Familiarization of IC 7448 ⬜⬜Usage of Bread boards ⬜⬜Usage of connectors ⬜⬜Usage of simulator software (Or) Digital trainer kits
18	Verify the Truth table of 74148 Encoder & 74138 Decoder IC.	I. Make the connections according to the circuit diagram. II. Verify the truth table for different values.	⬜⬜Implementing Encoder and Decoder. ⬜⬜Familiarization of IC 74148 &74138 ⬜⬜Usage of Bread boards ⬜⬜Usage of connectors ⬜⬜Usage of simulator software (or) Digital trainer kits

NOTE: The student can implement above experiments either by using hardware components
or by simulators to get acquaintance to various digital electronic experiments

IOT-308, DATA COMMUNICATION AND NETWORKING LAB

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
IOT-308	Data Communication and Networking Lab	03	45	40	60

S No	Chapter/ Unit Title	No. of Periods	COs Mapped
1.	Computer Hardware	15	CO1
2.	Computer Networking	15	CO2
3.	Familiarization of Advanced communication gadgets	15	CO3
	Total	45	

Course Objectives	1. To familiarization with Computer hardware
	2. To familiarization with Computer networking.
	3. Familiarization of Advanced communication gadgets.

Course Outcomes	CO1	IOT-308.1	Ffamiliarization with Computer hardware
	CO2	IOT-308.2	Familiarization with Computer networking.
	CO3	IOT-308.3	Familiarization of Advanced communication gadgets.

CO-PO/PSO MATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	1	0	1	2	1	0	2	3	0	0
CO2	1	0	2	2	1	0	1	3	1	0
CO3	1	0	2	1	0	0	1	2	2	1
Average	1	0	1.6	1.6	0.5	0	1.3	2.7	1.5	1

3=strongly mapped, 2=moderately mapped, 1=slightly mapped

Learning Outcomes:

Computer Hardware

1. A) Identify and note down mother board, components and chips
   B) Identify various Internal and external slots in the mother board and clean them with blower/ brush
   C) Practice Inserting and Removing RAM with care
2. Measure the Output voltages of SMPS
3. Disassemble the PC
4. Assemble the PC
5. Change the CMOS Setup
6. Install Windows Operating system
7. Perform Partition and format of hard disks.
8. Print the summary of your system Hardware and verify for correctness

9. Hard drive, optical drive installation.
10. How to recover lost data on hard drive.

Computer Networking

11. Identify and note down the specifications of various networking devices & Cables, Jacks, Connectors, tools etc used in local area networks.
12. Preparing the Ethernet cable for cross and direct connections using crimping tool and test using LAN tester.
13. Installation of a switch and connecting systems to a network switch.
14. Setup LAN by configuring IP addresses, subnet mask, default gateway and a) transfer files between systems in LAN b) share the printer in a network
15. Test the network using ipconfig, ping / tracert and netstat utilities and debug the network issues
16. Install and Configure wireless NIC and transfer files between systems in LAN and wireless LAN
17. Installation of a modem (internal, external or USB) and connecting to internet.
18. Using FTP for uploading and downloading files.
19. Installation and configuring the proxy server for internet access.
20. Setting of IP address to an existing terminal

Advanced communication gadgets/apps

21. Perform bluetooth pairing between smartphone and bluetooth headset/speaker and transfer audio signal
22. Perform video transfer from smart phone to internet connected desktop PC/Laptop through IP based streaming
23. Perform file transfer from one smart phone to another through Shareit application
24. Perform Remote login using Team viewer
25. Perform scanning QR code/Bar code using scanner App in smart phone
26. Know the usage and features of health band by performing an experiment
27. Perform audio/video conference through googleduo

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DBMS LAB

Course Code	Course Title	No. of periods/week	Total No. of periods	Marks for FA	Marks for SA
IOT-309	DBMS Lab	3	45	40	60

Sno	UNIT TITLE	NO. OF PERIODS	COS
1	Concepts of DBMS & RDBMS	3	CO1
2	Concepts of SQL	12	CO2
3	Basics of PL/ SQL	12	CO3
4	Advance PL/SQL	12	CO4
5	Concepts of NoSQL & MongoDB.	6	CO5
		45	

COURSE OBJECTIVES	Upon completion of the course the student shall able to learn: i. Insert, update, delete and select data into/from Relation Database ii. Develop PL/SQL programs iii. Insert, update, delete and select data from MongoDB

COURSE OUTCOMES:

CO1	IOT-309.1	Develop SQL Queries to Create, modify and drop tables and Queries to Insert, update, delete data from tables.
CO2	IOT-309.2	Execute SQL Queries to display data on different conditions from different tables
CO3	IOT-309.3	Execute PL/SQL Programs
CO4	IOT-309.4	Demonstrate the usage of cursors and triggers
CO5	IOT-309.5	Execute commands to Insert, update, delete and select data in NOSQL and Mongo DB databases

CO-PO/PSO MATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT-309.1	2		3			2	3	3	2	
IOT-309.2	2	2	1			2			2	
IOT-309.3	2		1					2		2
IOT-309.4	2	2	3	3	3	3		2	2	2
IOT-309.5	2	3		3		3	3	2	2	
Average	2	2.3	2	3	3	2.6	3	2.3	2	2

3=Strongly mapped , 2=moderately mapped, 1=slightly mapped

LEARNING OUTCOMES

1 Know installation of Oracle
2 Exercise on creating tables.
3 Exercise on inserting records
4 Exercise on updating records

5   Exercise on modifying the structure of the table
6   Exercise on Select command
7   Exercise on querying the table using clauses like WHERE, ORDER BY, IN, AND, OR,NOT, IS NULL
8   Exercise on GROUP BY, HAVING
9   Exercise on Number functions, character functions, conversion functions and date functions, group functions
10   Exercise on set operators
11   Exercise on sub queries
12   Exercise on Joins
13   Exercise on various date and number format models
14   Exercise on creating tables with integrity constraints
15   Write programs using PL/SQL control statements
16   Exercise on Procedures
17   Exercise on Functions
18   Exercise on Cursors
19   Exercise on Triggers
20   Exercise on Installation of MongoDB
21   Exercise on Creation and Dropping of Database
22   Exercise on Creation and Dropping of Collections.
23   Exercise on Commands of MongoDB- Insert, update , find, delete and sorting of Documents.

Mini Project : Student has to develop a Mini project applying the skills acquired from the learning outcomes of this course.

Time Schedule:

Sl.No	Name of the Experiment	Periods
1	Know installation of Oracle	1
2	Exercise on creating tables.	1
3	Exercise on inserting records	2
4	Exercise on updating records	2
5	Exercise on modifying the structure of the table	1
6	Exercise on SELECT command	2
7	Exercise on querying the table using clauses like WHERE, ORDER, IN,AND, OR,NOT, IS NULL	9
8	Exercise on GROUP BY, HAVING	2
9	Exercise on Number functions, character functions, conversion functions and date functions, group functions	2
10	Exercise on SET operators	2
11	Exercise on sub queries	3
12	Exercise on Joins	2
13	Exercise on various date and number format models	1

Sl.No	Name of the Experiment	Periods
14	Exercise on creating tables with integrity constraints	2
15	Write programs using PL/SQL control statements	2
16	Exercise on Procedures	2
17	Exercise on Functions	1
18	Exercise on Cursors	2
19	Exercise on Triggers	2
20	Exercise on Installation of MongoDB	1
21	Exercise on Creation and Dropping of Database	1
22	Exercise on Creation and Dropping of Collections	1
23	Exercises on commands of MongoDB	1
	Total	45

KEY COMPETENCIES

Sl.No	Name of the Experiment	Objectives	Key Competencies
1	Know installation of Oracle	Perform the following: i. To identify the version of Oracle being installed ii. To understand the RAM and HDD requirements for Oracle installation iii. To comprehend the installation steps correctly iv. Setting up of Oracle Administrative Password v. Configuring the Oracle database after post-installation steps of Oracle viz configuring administrative rights for performing vi. To login to Oracle as administrator account and Oracle user account	❖ Observe Oracle version being installed ❖ Observe the RAM & HDD requirements ❖ Rectify for any Oracle installation errors ❖ Able to login as Administrator and as Oracle user account
2	Exercise on creating tables.	Perform the following: i. To login with Oracle user account ii. To give correct syntax for table creation iii. To give correct data type for the required fields with appropriate size iv. To display the structure of the table	❖ Correct Table creation syntax errors ❖ Correct the wrong data types and inappropriate sizes for the respective fields ❖ Check for displaying the structure of the table
3	Exercise on inserting records	Perform the following: i. Check for the required table present already ii. To insert the records correctly iii. To display the records correctly	❖ Correct syntax errors for Insertion of record ❖ Check for insertion of proper values for the required fields ❖ Verify the correct values pertaining to the record are inserted in the required table ❖ Check for displaying of the records correctly

Sl.No	Name of the Experiment	Objectives	Key Competencies
4	Exercise on updating records	Perform the following: i. Check for the required table present already ii. To update the records correctly iii. To display the updated records	❖ Correct syntax errors for updation of record ❖ Check for updation of proper values for the required fields ❖ Check for displaying of the updated records correctly
5	Exercise on modifying the structure of the table	Perform the following i. To identify the required table present in the system already ii. To add new column iii. To display the records correctly	❖ Correct syntax errors in modifying the structure of the table ❖ Check whether required field is newly added to the existing table ❖ Check for displaying of the modified table correctly
6	Exercise on SELECT command	Perform the following i. To identify the required table present already ii. To display the records in the required table	❖ Check for syntax error in usage of Select command ❖ Check whether Select command is given correctly to display all the records
7	Exercise on querying the table using clauses like WHERE, ORDER, IN,AND, OR,NOT, IS NULL	Perform the following: i. To use the Select command ii. To use the clauses WHERE, ORDER, IN,AND, OR, NOT, IS NULL along with Select command on the given records in the table	❖ Check for syntax error in usage of Select command with appropriate clauses ❖ Check whether Select command along with appropriate clause is given correctly for the required condition ❖ Check the usage of clauses WHERE, ORDER, IN,AND, OR, NOT along with Select command appropriately
8	Exercise on GROUP BY, HAVING	Perform the following: i. To use the Select command To use the clauses GROUP BY, HAVING along with Select command on the given records in the table	❖ Check for syntax error in the usage GROUP BY, HAVING ❖ Check for usage of GROUP BY, HAVING ❖ Verify output values based on certain condition on few records

Sl.No	Name of the Experiment	Objectives	Key Competencies
9	Exercise on Number functions, character functions, conversion functions and date functions, group functions	Perform the following i. To use functions ii. To use set command along with WHERE condition, GROUP BY, HAVING	❖ Check for syntax error of various functions ❖ Check for usage of various functions ❖ Verify output values based on certain condition on few records
10	Exercise on SET operators	Perform the following iii. To use set command iv. To use set command along with WHERE condition	❖ Check for syntax error in the usage of SET command ❖ Check for usage of SET command for updating values based on certain condition on few records
11	Exercise on sub queries	Perform the following i. To use Select command ii. To use appropriate Operators IN	❖ Check for the syntax error in usage of sub queries ❖ Check for the correctness of the usage of appropriate operators used
12	Exercise on Joins	Perform the following i. To create two tables ii. To use the common field if two tables aroused iii. To know different types of Join	❖ Check for the correctness of the syntax used for joining ❖ Check if the join is created between two tables ❖ Check if self join is created
13	Exercise on various date and number format models	Perform the following: i. To use date formats correctly ii. To use number formats correctly	❖ Check for the syntax of the date formats ❖ Check for the syntax of the number formats
14	Exercise on creating tables with integrity constraints	Perform the following i. Create Primary key ii. Create Foreign key or referential integrity constraint iii. Create NOT NULL constraint iv. Create UNIQUE Key constraint v. Create CHECK constraint	❖ Check for the syntax errors in usage of all types of Integrity constraints ❖ Check whether different types of Integrity constraints are used

Sl.No	Name of the Experiment	Objectives	Key Competencies
15	Write programs using PL/SQL control statements	Perform the following i. To use IF .. ELSE statements ii. To use iterative statements – Simple loop, While Loop, For Loop	❖ Check for the syntax of IF.. ELSE statements ❖ Check for the syntax of all iterative statements
16	Exercise on Procedures	Perform the following i. To know the concept of stored procedures ii. To declare procedures iii. The type of parameters IN,IN OUT,OUT iv. To call procedures from other procedures	❖ Check for proper declaration of procedures ❖ Check for syntax of parameters and its type ❖ Check for proper calling of procedures
17	Exercise on Functions	Perform the following i. To know the concept of stored functions ii. To declare function with return data iii. To call functions from other functions	❖ Check for proper declaration of function ❖ Check for syntax of parameters and its data type ❖ Check for proper return data type from the functions ❖ Check for variable assignment to get the returned value from the function
18	Exercise on Cursors	Perform the following i. To know the concept cursors ii. To know the fetch data from database	❖ Check for the syntax of cursor ❖ Check for open cursor, fetch data, close cursor ❖ Check for the result
19	Exercise on Triggers	Perform the following i. To know the concept of triggers ii. Validation before and after insert, before and after update and , before and after delete data	❖ Check for the syntax of trigger ❖ Write a trigger which raises before insert data ❖ Raise trigger ❖ Repeat the procedure for remaining ❖ Check for the result

Sl.No	Name of the Experiment	Objectives	Key Competencies
20	Exercise on Installation of MongoDB	Perform the following i. To download and install MongoDB	❖ Observe MongoDB version being installed ❖ Observe the RAM & HDD requirements ❖ Rectify for any MongoDB installation errors Able to login as Administrator
21	Exercise on Creation and Dropping of Database	Perform the following i. Create the Database ii. Drop the Database	❖ Know the use of create Database() and dropDatabase() ❖ Correct Database creation syntax errors ❖ Check for displaying the database name
22	Exercise on Creation and Dropping of Collections	Perform the following i. Create the Collection ii. Drop the Collection	❖ Know the use of create Collection() and drop() ❖ Correct Database creation syntax errors ❖ Check for collection name ❖ Check for the collection dropped
23	Exercises on commands of MongoDB	Execute the following commands of MongoDB i. Insert the Document ii. update the Document iii. find the Document iv. Delete the Document v. sort the Documents	❖ Know the syntax of insert(), update(), find(), remove(), sort() functions. ❖ Correct syntax errors. ❖ Check out for different input values.

IOT-310, BASIC IOT LAB

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
IoT-310	Basic IoT LAB	03	45	40	60

S.No	Unit Title	No. of Periods	COs Mapped
1	Familiarization with Arduino Uno Board	03	CO1
2	Basic I/O interfacing using Arduino	24	CO2
3	Interfacing with basic sensors and actuators	18	CO3
	Total	45	

Course Objectives	1. To Familiarization with Arduino Uno Board
	2. To interface basic I/O using Arduino
	3. To learn the practical importance of basic sensors and actuators using Aurduino

CO No		COURSE OUTCOMES
CO1	IoT-310.1	Describe the usage of Arduino Uno board
CO2	IoT-310.2	Apply I/O Interfacing using Arduino
CO3	IoT-310.3	Build basic prototype with sensors and actuator using Arduino

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IoT-310.1	3	3	3	3			3	3	3	
IoT-310.2	3	3	3	3	3			3	3	3
IoT-310.3	3	3	3	3	3	2	3	3	3	3
Average	3	3	3	3	3	2	3	3	3	3

3=strongly mapped 2=moderately mapped 1=slightly mapped

LEARNING OUTCOMES:

I. **Familiarization with Arduino Board**

   1. Familiarize with Arduino Uno/Nano/Mega Boards
   2. Familiarize with Arduino IDE (or equivalent software)
   3. Install the Arduino IDE and write a program using Arduino IDE to blink LED

II. Basic I/O interfacing using Arduino

4. Interface LED and buzzer with Arduino to buzz for a period of time
5. Interface push button with Arduino to switch ON/OFF the LED
6. Interface push button with Arduino to activate the buzzer
7. **Interface 4x3 Keypad using Arduino and Display the status of the keys on LCD display
8. Interface LCD with Arduino and write a program to display given Text message on LCD
9. Interface LDR using Arduino to Vary the Light Intensity of LED
10. Interfacing a seven segment display with Arduino mega and learn to display a count down from nine with a delay of a second, on seven segment display.
11. Interfacing LED bar with Arduino and turns on a series of LEDs based on the value of analog sensor

III. Interfacing with basic sensors and actuators

12. Interface **temperature sensor** with Arduino and turn on the fan when temperature exceeds the threshold level
13. Interface a **LDR** to the Arduino board and write a program to turn ON the AC LAMP when it is dark and turn OFF the AC LAMP when there is light on the sensor.
14. Design and write the program of an Arduino based **DC motor speed control** using a potentiometer
15. Interface a **heat sensor** to the Arduino board and display its reading on an LCD

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IV SEMESTER

DIPLOMA IN INTERNET OF THINGS
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
IV SEMESTER

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Semester	Scheme Of Examinations			
		Theory	Practicals		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY SUBJECTS								
IOT-401	Software Engg.	5	-	75	3	20	80	100
IOT-402	Web Technologies	5	-	75	3	20	80	100
IOT-403	Microcontrollers and Interfacing	5	-	75	3	20	80	100
IOT-404	OOP Through JAVA	5	-	75	3	20	80	100
IOT-405	Sensors and Actuators in IoT	4	-	60	3	20	80	100
PRACTICAL SUBJECTS								
IOT-406	Web Technologies Lab	-	3	45	3	40	60	100
IOT-407	JAVA Programming Lab	-	3	45	3	40	60	100
IOT-408	Communication Skills	-	3	45	3	40	60	100
IOT-409	Microcontrollers and Interfacing Lab	-	3	45	3	40	60	100
IOT-410	Advanced IoT Lab		3	45	3	40	60	100
	ACTIVITIES	-	3	45				
	Total	24	18	630	-	300	700	1000

401 common with DCME,DAIML
402 common with DCME,DAIML,DCAI, DCBD,DCCN
404 common with DCME,DAIML,DCCN
406 common with DCME,DAIML,DCAI,DCCN
408 common with All branches

SOFTWARE ENGINEERING

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
IOT-401	Software Engineering	5	75	20	80

S.No.	Chapter/Unit title	No.of periods	Weightage Allocated	Short type	Essay type	CO's Mapped
1	Basics of Software Engineering Designs & Life Cycle Models	10	16	2	1	CO1
2	Software Project Management	18	16	2	1	CO2
3	Requirement Analysis & Specifications	10	13	1	1	CO3
4	Software Design, Coding	22	39	3	3	CO4
5	Software testing, Debugging, Reliability, Quality Management & Maintenance	15	26	2	2	CO5
	TOTAL	75	110	30	80	

Course Objectives	i)To know the fundamentals of software engineering&life cycle modes ii)To familiarize project managements iii)To design software projects with the help of software engineering principles and UML models

COURSE OUTCOMES:

At the end of the course the student able to learn following:		
CO1	IOT -401.1	Explain Software life cycle models and basics of software engineering.
CO2	IOT -401.2	Describe Software Project Management
CO3	IOT -401.3	Prepare SRS document
CO4	IOT -401.4	Apply Design, coding techniques.
CO5	IOT -401.5	Apply Testing Techniques, Quality and reliability metrics

CO-PO/PSO Matrix:

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT -401.1	3	2	3	2	2	1	1	2	2	2
IOT -401.2	3	3	3	3	1	3	2	2	2	3
IOT -401.3	3	3	1		3		1	2	2	3
IOT -401.4	3	3	3	3	2	2	2	2	3	3
IOT -401.5	3	2	3	3	2	2	3	2	2	3
Average	3	2.6	2.6	2.6	2.75	2	1.8	2	2.2	2.8

3=stronglymapped, 2=moderately mapped, 1=slightly mapped

Learning Outcomes:
1.0 Basics of Software Engineering Designs & Life Cycle Models

    1.1 Know the Evolution and Impact of the Software Engineering

        1.1.1   Evolution of an Art to an Engineering Discipline

        1.1.2   A Solution to the Software Crisis?

    1.2 Know the difference between Programs and Software Products

    1.3 Understand the evolution of Software Engineering Design

        1.3.1   Early Computer Programming

        1.3.2   High Level Language Programming

        1.3.3   Control Flow-Based Design

        1.3.4   Data Structure-Oriented Design

        1.3.5   Data Flow-Oriented Design

        1.3.6   Object Oriented Design

        1.3.7   Other Developments

    1.4 Explain the Software Life Cycle Models

        1.4.1   Classical Waterfall Model

        1.4.2   Iterative Water fall Model

        1.4.3   Prototyping Model

        1.4.4   Evolutionary Model

        1.4.5   Spiral Model

        1.4.6   **AGILE Model**

        1.4.7   Comparison of Different Life Cycle Models

2.0 Software Project Management

    2.1 Software Project Manager

        2.1.1   Job Responsibilities of a Software Project Manager

        2.1.2   Skills Necessary for Software Project Management

    2.2 Know about Software Project Planning

    2.3 The SPMP Document

    2.4 Metrics for Project Size Estimation

        2.4.1   Lines of Code

        2.4.2   Function Point Metric

    2.5 Project Estimation Techniques

        2.5.1   Empirical Estimation Technique

        2.5.2   Heuristic Technique

    2.6 Staffing Level Estimations

        2.6.1   Nordens Work

        2.6.2   Putnam's Work

    2.7 Scheduling

        2.7.1   Work Break Down Structure

        2.7.2   Activity Networks

        2.7.3   Gantt Charts

        2.7.4   PERT Charts

    2.8 Learn how to do Staffing

    2.9 Who is a Good Software Engineer?

2.10 Risk Management

        2.10.1 Risk Identification

        2.10.2 Risk Assessment

        2.10.3 Risk Containment

3.0 Requirement Analysis & Specifications

    3.1 Requirements Gathering and Analysis

    3.2 Software Requirement Specifications

        3.2.1 List Contents of the SRS Document

        3.2.2 Explain Functional Requirements

        3.2.3 Describe Procedure to identify the Functional Requirements

    3.3 How to Document the Functional Requirements

    3.4 Explain requirementsTraceability

    3.5 List Characteristics of a Good SRS Document

    3.6 Give Examples of Bad SRS Document

    3.7 Explain Organization of the SRS Document

4.0 Software Design, Coding

    4.1 What is a good Software Design?

    4.2 Cohesion and Coupling

        4.2.1 Define Terms Cohesion, Coupling

        4.2.2 Classification of Cohesiveness

        4.2.3 Classification of Coupling

    4.3 Approaches of Software Design

        4.3.1 Function-Oriented Design

        4.3.2 Object-Oriented Design

        4.3.3 Function-Oriented vs Object-Oriented Design

    4.4 User Interface Design

        4.4.1 List the Characteristics of a good User Interface

        4.4.2 Understand the Basic Concepts

            4.4.2.1 User Guidance and Online Help

            4.4.2.2 Mode Based vs Modeless Interface

            4.4.2.3 Graphical User Interface (GUI) vs Text-Based User Interface

        4.4.3 Types of User Interface

            4.4.3.1 Command Language Based Interface

            4.4.3.2 Menu Based Interface

            4.4.3.3 Direct Manipulation Interfaces

        4.4.4 Component Based GUI Development Window System and Types of Widgets.

    4.5 Unified ModelingLanguage

        4.5.1 List the goals ofUML

        4.5.2 Role of UML in Object orientedDesign

        4.5.3 List Building blocks of UML

        4.5.4 Explain Building blocks of UML

        4.5.5 List different symbols used in UMLnotation

        4.5.6 Classify and list standard UMLdiagrams

5.9 Explain Software Quality Management systems
5.10   Explain SEI Capability Maturity Model

COURSE CONTENT
1. Introduction to Software Engineering- Life Cycle Models.

2. Software Project Management- Responsibilities of a Software Project

   Manager- Project planning – Metrics-Project Estimation Techniques- Staffing Level Estimation - Scheduling – Risk Management

3. Requirement Analysis and Specification: Requirement Gathering and Analysis - SRS document

4. Software Design , Coding : Good software design, Cohesion and Coupling, Software Design Approaches, User interface Design, Software Coding and Goals of UML - Role of UML in Object oriented Design - Building blocks of UML : Things, Relationships, and Diagrams - Symbols used in UML notation - Classify and list standard UML diagrams - Class diagram, purposes of class diagram, draw the class diagram - Use case diagram, define the term Use case, purposes of Use case diagram, draw the Use case diagram - Interaction diagram, purposes of Interaction diagram, the types of interaction diagrams : Sequence diagram and Collaboration diagram, draw the Interaction diagrams.
5. Software Testing, Debugging,Reliability, Quality Management and maintenance – Testing, Debuggingsoftware Reliability- Statistical Testing, Software Quality, Software Quality Management System, SEI capability Maturity Model

REFERENCE BOOKS
1. Fundamentals of Software Engineering – Rajib Mall (PHI)Second Edition.
2. Software Engineering   - Jawadekar (TMH)
3. Software Engineering Concepts   -   Fairley (TMH)
4. Pankaj Jalote international approach to software engineering ":2nd edition
   Narosal publishing house 1997
5. http://www.tutorialspoint.com/uml/
6.The Unified Modelling Language User guide…Grady Booch
Model Blue Print:

S. N o.	Chapter/Unit title	No.of perio ds	Weight age Allocat ed	Marks Wise Distribution of Weightage				Question wise Distribution of Weightage				CO's Mappe d
				R	U	Ap	AN	R	U	Ap	AN	
1	Basics of Software Engineering Designs & Life Cycle Models	10	16	6	10			2	1			C01
2	Software Project Management	18	16	6		10		2		1		CO2
3	Requirement Analysis & Specifications	10	13	3	10			1	1			C03
4	Software Design, Coding	22	39	9	30			3	3			CO4
5	Software testing, Debugging, Reliability, Quality Management & Maintenance	15	26	6	20			2	2			CO5
	Total	75	110	30	70	10		10	7	1		

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1.1 to 3.7
Unit test-2	From 4.1 to 5.7

DIPLOMA IN INTERNET OF THINGS
MODEL PAPER
SOFTWARE ENGINEERING
UNIT TEST-1

SCHEME: C-23   SUB CODE: IOT -401
MAX MARKS:40   TIME: 90Minutes

………..

PART-A16 Marks

Instructions:1) Answer all questions

2) First question carries 4marks, and each question of remaining carries 3marks

1. a) Water fountain model is not a software life cycle model (True/False)   (CO1)

b) Set of instructions is ……………………………………………………………   (CO1)

c) What is the purpose of SPMP?   (CO2)

d) Which one the following is not an external interface requirement [   ]   (CO3)

I) User Interface II) Hardware Interface III) personal interface IV) Software interface

2) What is software crisis and how do you solve it?   (CO1)
3) List any three job responsibilities of software project manager.   (CO2)
4) Describe Lines of code?   (CO2)
5) What is the purpose of Requirements Traceability?   (CO3)

                    PART-B   3 X 8=24Marks
   Instructions: 1) Answer all questions

2)Each question carries 8 Marks

3)Answer should be comprehensive and the criterion for valuation is the
content but not the length of the answer

6. a) Explain Classical water fall model in detail. (CO1)
                    Or
   b) Explain spiral model in detail   (CO1)
7. a) Explain the two different works of Staffing Level Estimations.   (CO2)
                    Or
   b) Explain Risk Management. (CO2)
8. a) Explain functional requirements in detail.   (CO3)
                    Or
   b) Explain Requirement gathering and analysis   (CO3)

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BOARD DIPLOMA EXAMINATION
DIPLOMA IN INTERNET OF THINGS
MODEL PAPER-END EXAMINATION
SOFTWARE ENGINEERING

SCHEME: C-23   SUBJ CODE: IOT -401
MAX MARKS:80   TIME: 3HOURS
………..

PART-A   10X3=30Marks

Note: Answer all questions

1. Define the term High Level Language Programming   (CO1)
2. Describe the Solution to the Software Crisis   (CO1)
3. List any three Responsibilities of a Software Project Manager   (CO2)
4. State the Metrics for Project Size Estimation   (CO2)
5. What is Requirement analysis?   (CO3)
6. Define the terms Cohesion and Coupling   (CO4)
7. List any three Characteristics of a good User Interface   (CO4)
8. State the importance of Code Review   (CO4)
9. Define Software Quality   (CO5)
10. List any three Reliability Metrics   (CO5)

PART-B   5x10=50Marks

Note: Answer any five questions and each question carries 10 marks

11.   Explain the Software Life Cycle Models?   (CO1)
12.   Explain the three Project Estimation Techniques?   (CO2)
13.   Explain Organization of the SRS Document?   (CO3)
14.   Explain the two approaches of Software Design?   (CO4)
15.   List and explain Building blocks of UML   (CO4)
16.   Explain any two Types of User Interface   (CO4)
17.   Explain the concept of Debugging?   (CO5)
18.   Explain in detail about Software Quality Management System?   (CO5)

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Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
IOT-402	Web Technologies	5	75	20	80

S.No.	Chapter/Unit title	No.of periods	Weightage Allocated	Short type	Essay type	CO's Mapped
1	Principles of Web Designing and HTML Introduction.	11	21	2	1½	CO1
2	Understand various HTML tags and usage of style sheets.	14	21	2	1½	CO2
3	Understand XML and Client side scripting using Java Script.	18	26	2	2	CO3
4	JQuery	10	13	1	1	CO4
5	Web servers and Server side scripting using PHP	22	29	3	2	CO5
	TOTAL	75	110	30	80	

Course Objectives	i)Understand the basic elements of web page ii) Know the working with HTML, CSS iii) To familiarize the various Technologies like Java Script, JQuery, PHP. iv)To understand Database connectivity Using PHP

Course Outcomes	CO1	Implement interactive web page(s) using HTML and CSS
	CO2	Know how to format and validate Web page elementsusing JavaScript and describe data in a web page using XML.
	CO3	To know the Usage of JQuery
	CO4	Build Dynamic web site using server side PHP Programming and database connectivity using PHP.

LEARNING OUTCOMES:

1. **Principles of Web Designing and HTML Introduction.**

    1.1 **Understand the principles of Web Designing**

    1.1.1 Basic web Terminology.

    1.1.2 Describe Anatomy of web page.

    1.1.3 Understand different Web page elements.

       1.1.4   Navigate through web pages

       1.1.5   Narrate steps in building web site

       1.1.6   Narrate steps in launching

       1.1.7   Narrate maintaining web site.

   1.2   **HTML Introduction**

       1.2.1   Introduction and Overview of HTML

       1.2.2   Discuss the rules for designing a HTML document.

       1.2.3   Explain the structure of HTML document.

       1.2.4   Define HTML element and Attribute.

       1.2.5   Study the basic tags in HTML <html>, <head>, <title>, <body>.

       1.2.6   Study the header tags <h1> to <h6>

       1.2.7   Discuss the Physical formatting tags <b>, <i>, <u>, <strike>, <sub>, <sup>, big>, <small>, <tt>

       1.2.8   Discuss the Logical formatting tags <q>, <strong>, <cite>, <<ins>, <del>,<em>

       1.2.9   Discuss the <marquee> with attributes.

       1.2.10 List Character entities.

       1.2.11 Explain the List tags like <ul>, <ol>, <li>, <dl>, <menu> with attributes.

   1.3   Describe the setting of tables.

       1.3.1   Describe the tags <table>, <tr>, <td>, <th>,<tbody>, <thead>, <tfoot>

2. Understand various HTML tags and usage of style sheets.

   2.1   Explain the link and imaging tags <a>, <img> with attributes.

   2.2   Explain<object> tag with attributes.

      2.2.1Explain the tags, <form>, <input>, <button>, <label>, <select>, <options>, <textarea>, <legend> with attributes.

   2.3   Explain the tags, <frame>, <frameset>, <noframe>, <iframe> with attributes.

   2.4   Illustrate about cascading style sheets

      2.4.1 Understandthe level of styles inline, internal and external style sheets.

      2.4.2 Explain ID and Class selectors in CSS

      2.4.3 Explain about Color and background properties

      2.4.4 Explain about Box properties like Border, position, margin, padding of elements.

3. Understand XML and Java Script.

   3.1   Understand XML

      3.1.1 Describe how to organize data in the form of XML.

      3.1.2 Explain the rules for designing XML document.

      3.1.3 Understand the significance of Namespace.

      3.1.4 List the various applications of XML.

   3.2   Types of scripting-JavaScript

      3.2.1Differentiate between Client-side and Server-side scripting.

      3.2.2List Client side and server side scripting languages.

      3.2.3Describe the features of Java Script.

      3.2.4Placing JavaScript code in HTML.

      3.2.5   Understand functions

         3.2.5.1 Know how to define and call a function.

         3.2.5.2 Know how to pass parameters.

         3.2.5.3 Understand the purpose of GetElementBId method

         3.2.5.4 Describe the global functions provided by JavaScript.

      3.2.6Form Handling in Java Script

      3.2.7Illustrate Arrays

3.2.7.1 Understand single and multi dimensional arrays.

3.2.7.2 Design small programs using arrays.

3.2.8 Various Objects provided by JavaScript

3.2.8.1 Math object

3.2.8.2 String object

3.2.8.3 Date object

3.2.8.4 Boolean and Number object

3.2.9 Describe events in java script.

4. JQuery

4.1. Define JQuery

4.2. List the features of JQuery

4.3. List JQuery plugins

4.4. Explain the steps for to includejQuery in Web Pages

4.5. Explain JQuery Syntax with example program

4.6. Describe the jQuery Selectors

4.7. Accessing HTML elements by usingElement Selectors, ID, Class Selectors

4.8. Explain the JQuery Document Ready Event

4.9. Describe the JQuery Event handling methods

  4.9.1. Mouse Events

  4.9.2. Keyboard Events

  4.9.3. Form Events,

  4.9.4. Document/Window events

4.10. Explain effects of JQuery like hide, show, fadeIn, fadeout, fadeToggle,fadeTo, slideDown, SlideUp, SlideToggle

4.11. Explain Functions in JQuery like text(),html(), val(), attr(),css().

5 Web servers and Server-side scripting using PHP.

5.1 Web servers:

5.1.1 Understand the architecture of a Web server.

5.1.2 List various web servers.

5.1.3 Illustrate the various HTTP request types and their difference.

5.1.4 Compare the properties of IIS and Apache.

5.2 Fundamentals of PHP

5.2.1 State the importance of PHP

5.2.2 Explain how to combine HTML and PHP.

5.2.3 Explain how to access HTML, PHP documents from web servers.

5.3 Data types, Variables and Constants

5.3.1 List Data types

5.3.2 Explain Data types with examples

5.3.3 Explain how to declare Variables and Constants.

5.4 List and explain string manipulation functions.

5.5 Understand Arrays

5.5.1 Explaintypes of arrays.

5.5.2 Design small programs using arrays.

5.6 Explain form handling in PHP

5.6.1 Access elements of form using $_GET,$_POST

5.7 Know how to accessMySQL Database

5.7.1 List and explain MySQL database functions in PHP.

5.7.2 Explain the steps of connecting to a Database.

5.7.3 Know about retrieving data from a table.

5.7.4 Know about inserting data into a table.
5.7.5 Know about updating the data in a table.
5.7.6 Know about deleting data from a table.
5.7.7 Design some simple programs to insert, delete, update and retrieve data from database.
5.8 Cookies
5.8.1 Define Cookie.
5.8.2 Know how to create and delete a cookie.
5.8.3 Know the purpose of cookie.
5.9 Sessions
5.9.1 Define Session
5.9.2 Understand how to create a session.
5.9.3 Know how to destroy a session.
5.9.4 Know the purpose of session.
5.9.5 Differentiate Sessions and Cookies.
5.10 Passing data from one web page to other webpage using query string.

COs-POs Mapping Strength:

Course Code IOT-402	Course Title: Web Technologies Number of course outcomes:04				No. of periods:75
Pos	**Mapped with CO No.**	**CO Periods Addressing PO in column1**		**Level (1,2,3)**	**Remarks**
		No	%		
PO1	CO1	25	30	2	>40% Level3
PO2	CO2,CO3,CO4	60	70	3	Highly addressed
PO3	CO1,CO2,CO3,CO4	60	70	3	25% to 40% Level 2
PO4					Moderately Addressed
PO5	C01,CO2,CO3,CO4	50	60	3	5% to 25% Level1
PO6					Low addressed
PO7	CO3	60	70	3	<5% Not addressed

COURSE CONTENTS
1. Principles of Web Designing and HTML Introduction

Principles of Web Designing:
Anatomy of Web page, Format, Elements, Navigation, Building, Launching and maintaining web site
HTML:
 Introduction to HTML, Format of web page, Tags and attributes, Formatting text, Adding images, Positioning. Lists, Colors, Tables.
2. HTML & CSS
Connecting to hyperlinks and Imaging, Forms, Frames, Frame
CSS: Introduction, Inline styles, Embedded style sheets, conflicting styles, Linking external Style sheets, Positioning elements, Backgrounds, Element dimensions
3. XML & JavaScript
XML: Introduction, Structuring Data, XML Namespaces, Applications of XML
JAVA SCRIPT
Introduction to Scripting, Client-Side versus Server-Side Scripting, JavaScript features,

Functions – Function definitions, Use of GetElementById, GetElementByName,Global functions, Form handling.

Arrays – Declaring and allocating arrays, References and reference parameters, passing arrays to functions, sorting and Searching arrays, Multiple-Subscripted arrays

Objects – **Math** object, **String** object, **Date** object, **Boolean** and **Number** object.

4. JQuery

Introduction to Jquery, Features of JQuery, Plugin used in JQuery, steps for to include JQuery in Web Page, JQuery Syntax, jQuery Selectors- Element, Selectors, ID, Class, Document Ready Event, JQuery Event handling methods, effects of JQuery, Functions in JQuery

5. Web servers and Server side scripting using PHP.

Web servers: Introduction, HTTP Request Types, System Architecture, Client-Side versus Server-Side Scripting, Accessing Web Servers-IIS, Apache, Requesting HTML, PHP documents.

 PHP: Fundamentals of PHP, Data types, String functions, Arrays, form handling, Databases, Cookies, Sessions, Passing data from one web page to other web page.

REFERENCE BOOKS
1) Principles of Web Design, Sklar, TMH
2) HTML complete reference, Powell, TMH
3) Basics of Web Site Design, NIIT – PHI
4) WWW Design with HTML, Xavier (TMH)
5) Internet & World Wide Web, Dietel and Dietel, Pearson education Asia.
6) Complete Reference PHP, Steven Holzer-McGraw Hill
7) JQuery Cookbook,O'Reilly Media
8) www.w3schools.com
9) www.php.net

Table specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to be covered
Unit Test-I	From 1.1 to 3.2
Unit Test-II	From 3.3 to 5.10

Model Blue Print:

S.No.	Chapter/Unit title	No.of periods	Weightage Allocatd	Marks Wise Distribution of Weightage				Question wise Distribution of Weightage				CO's Mapped
				R	U	Ap	AN	R	U	Ap	AN	
1	Principles of Web Designing and HTML Introduction.	11	21	6	10	5		2	1	1/2		CO1
2	Understand various HTML tags and usage of style sheets.	14	21	6	5	10		2	1/2	1		CO2
3	Understand XML and Client side scripting using Java Script.	18	26	6	10	10		2	1	1		CO2
4	JQuery	10	13	3	10	-		1	1			CO3
5	Web servers and Server side scripting using PHP	22	29	9	10	10		3	1	1		CO4
	Total	75	110	30	45	35		10	4.5	3.5		

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DIPLOMA IN INTERNET OF THINGS
MODEL PAPER
Web Technologies
UNIT TEST-1

SCHEME: C-23   SUBJ CODE:IOT-402
MAX MARKS:40   TIME: 90Minutes
…….

PART-A   **16Marks**

Instructions: 1) Answer all questions
                          2) First question carries 4marks, and each question of remaining carries 3marks

1. a) the external Java script file must contains <script> tag (True/False)   (CO3)
   b) --------------------is used to choose the client-side java script object.   (CO2)
c) Which of the following selector selects the element that is the target of a referring URI [   ]
   I) :target II) :selection III) :: selection IV) :URI   (CO1)
d) Which one of the following is not in table tag   [   ]   (CO1)
         I) <tr>II)<td>III) <tbody> IV) all of the above
2. Write different steps to launching a website.   (CO1)
3. Write any four formatting tags.   (CO2)
4.List the application of XML.   (CO2)
5. What is the significance of Namespace?   (CO2)
                          PART-B   3X8=24Marks
   Instructions: 1) Answer all questions
                          2)Each question carries 8 Marks
                          3)Answer should be comprehensive and the criterion for valuation is the
                          content but not the length of the answer

6. a) Explain List tags with an example.   (CO1)
                          Or
   b) Write about any five table tags with example.   (CO2)
7. a) Explain different Form tags with example.   (CO2)
                          Or
   b) Explain any five Box properties with sample code.   (CO3)
8. a) Write about the following objects in Java scripts
         i)Math ii) String   iii)Date   (CO3)
                          Or
   b) Describe how to define and call functions in java scripts.   (CO2)

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BOARD DIPLOMA EXAMINATIONS
DIPLOMA IN INTERNET OF THINGS
MODEL PAPER – YEAR END EXAMINATION
WEB TECHNOLOGIES

SCHEME: C-23   SUBJ CODE:IOT-402
MAX MARKS:80   TIME: 3HOURS

……..…

PART-A   **3×10=30**

Instructions: 1) Answer all questions
                     2) Each question carries three marks.
                     3) Answers should be brief and straight to the point and shall not exceed five simple
                        sentences.

1. Write the steps to launch a web site.   (CO1)
2. Describe the following tags.   (CO1)
   a)   <strong> (b)<cite> (c) <ins>
3. Write any 3 attributes of <a>   (CO1)
4. What is the purpose of CSS?   (CO1)
5. List the various applications of XML.   (CO2)
6. Write a JavaScript program to print the message.   (CO2)
7. Write any three plugins.   (CO3)
8. List any 3 features of jQuery.   (CO3)
9. What is the difference between GET and POST methods (CO4)
10. Define Cookie.   (CO4)

                        PART-B   5×10=50

Instructions: 1) Answer any five questions

                     2) Each question carries ten marks.

                     3) Answers should be comprehensive and the criterion for valuation is the content
                        but not the length of the answer.

11. Explain various formatting tags in HTML.   (CO1)
12. (a)Explain various Table tags with attributes.   (CO1)
    (b)Explain different types of CSS.   (CO2)

13. Design a student registration form using form elements. (CO2)

14. Explain the rules for designing XML document. Write an Example XML   document.(CO2)

15. Explain Properties and methods of various Table Object. (CO2)
16. Explain jQuery Selectors with example.   (CO3)

17. Explain any 5 String function in PHP with syntax and example.(CO4)

18. Explain how to pass data from one web page to other web page using query string. (CO4)

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MICROCONTROLLERS AND INTERFACING

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
IOT-403	Microcontrollers and Interfacing	05	75	20	80

S No	Unit Title	No. of Periods	Weightage of Marks	No. of Short Answer Questions	No. of Essay Questions	COs Mapped
1	Architecture of Microcontroller 8051	20	26	2	2	CO1
2	Instruction set of 8051 microcontrollers	15	26	2	2	CO2
3	8051 Programming Concepts	15	26	2	2	CO3
4	Interfacing Simple I/O devices	15	16	2	1	CO4
5	Programming in Embedded C	10	16	2	1	CO5
	Total Periods/Marks	75	110	30	80	

Course Objectives	1. To familiarize with various microcontrollers
	2. To understand the programming and applications of 8051 microcontrollers
	3. To learn the practical importance and applications of Microcontrollers.

CO No		COURSE OUTCOMES
CO1	IOT-403.1	Describe the Architecture of 8051 microcontroller
CO2	IOT-403.2	Explain the instruction set of 8051 microcontrollers
CO3	IOT-403.3	Analyse 8051 programming for Arithmetic and Logical operations
CO4	IOT-403.4	Describe the Interfacing techniques of I/O devices with 8051 microcontrollers.
CO5	IOT-403.5	Analyse 8051 programming using Embedded C.

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT-403.1	3							3		
IOT-403.2	3	3						3		
IOT-403.3	3	3	3		3			3	3	3
IOT-403.4	3	3	3		3		2	3	3	3
IOT-403.5	3	3	3		3		3	3	3	3
Average	3	3	3		3		2.5	3	3	3

3=strongly mapped 2=moderately mapped 1=slightly mapped

1.0   Architecture of Microcontroller 8051
1.1   List the features of microcontrollers.
1.2   Compare microprocessors and microcontrollers
1.3   State the details of 8051 microcontroller family chips
1.4   Draw the functional block diagram of 8051 microcontroller and state the function of each block
1.5   Draw the pin diagram of 8051 microcontroller and specify the purpose of each pin
1.6   Explain the internal memory organization of 8051 with suitable diagram
1.7   Explain the external memory organization of 8051
1.8   List various special function registers of 8051 and state their functions
1.9   Explain PSW register of 8051
1.10 Explain the SFRs associated with timer/counters of 8051
1.11 Explain the modes of operations of counters & timers in 8051
1.12 List the interrupts of 8051
1.13 Explain the SFRs associated with interrupts of 8051
1.14 Explain the SFRs associated with serial communication of 8051
1.15 List the modes of operation of serial communication with 8051
1.16 Describe various I/O ports of 8051

2.0   Instruction set of 8051 micro controllers
2.1   State the need for an instruction set
2.2   Mention the instruction format of 8051
2.3   State the terms operation code, operand and illustrate these terms by writing an instruction
2.4   Define fetch cycle, execution cycle and instruction cycle.
2.5   Distinguish between machine cycle and T-state.
2.6   Define the terms machine language, assembly language, and mnemonics.
2.7   Classify the 8051 instructions into one byte, two byte and three-byte instructions
2.8   Classify the 8051 instructions based on their function
2.9   List the various addressing modes of 8051and explain them with examples.
2.10 Explain various data transfer group of instructions of 8051 with examples
2.11 Explain various arithmetic instructions of 8051
2.12 State the effect of arithmetic operations on flags of 8051 with examples
2.13 Explain the logic instructions and recognize the flags that are set or reset for given data conditions
2.14 List various bit manipulation instructions of 8051 and illustrate with examples
2.15 Explain unconditional jump instructions of 8051
2.16 Explain conditional jump instructions of 8051
2.17 Explain CALL and RET instructions of 8051
2.18 State the use of NOP instruction of 8051

3.0   8051 Programming Concepts using assembly language
3.1   List the various symbols used in drawing flow charts
3.2   Write programs in 8051 assembly language to illustrate the application of data copy instructions
3.3   Write programs in 8051 assembly language to perform single byte and double byte addition and subtraction.
3.4   Write programs in 8051 assembly language which use jump instructions
3.5   Write a delay subroutine to introduce time delay of given time period (in milliseconds) without using 8051 internal timers.
3.6   Write a program to introduce time delay of given time period (in milliseconds) using 8051 internal timer.
3.7   Define a subroutine and state its use.

3.8   Explain the sequence of program when subroutine is called and executed.
3.9   Explain information exchange between the program counter and the stack and identification of stack pointer register when a subroutine is called and executed.
3.10 Illustrate PUSH, POP instructions with an example.
3.11 Define the term debugging a program
3.12 Explain the principles of single step and break point debugging techniques

4.0   Interfacing Simple I/O devices
4.1   Explain the Interfacing concepts of push button switches and LEDs with 8051
4.2   Draw a diagram to connect an LED to a port pin and write an8051-assembly language program to blink it with a given time delay.
4.3   Interface a common cathode/anode seven segment display with 8051 and write a program to display a given decimal number
4.4   List reasons for the popularity of LCDs
4.5   State the functions of pins of 16×2 LCD module
4.6   List the instruction command codes for programming 16×2 LCD module
4.7   Explain Interfacing of 16×2 LCD module to 8051
4.8   Write an 8051 ALP to display a given message on 16×2 LCD module
4.9   Describe key bouncing problem and de-bouncing solutions
4.10 Explain the Interfacing concepts of a 4x4 Matrix Key Board with 8051 with diagram
4.11 Explain the interfacing concepts of stepper motor with 8051 and write a program to run the motor continuously
4.12 Interface 8051 with Relay to drive a lamp

5.0   Programming using Embedded C
5.1   List the differences between C and Embedded C
5.2   List the reasons for writing programs in Embedded C
5.3   Explain the C data types for 8051
5.4   Write an 8051 C program to store the data in the accumulator
5.5   Write a program to load three numbers into Accumulator and send them to port 1
5.6   Write an 8051 C program to send values 00 – FF to port P1
5.7   Write an 8051 C program to toggle all the bits of P1 continuously.
5.8   Write an 8051 C program to toggle bits of P1 ports continuously with 250 ms.
5.9   Write a C program for 8051 to transfer the letter "A" serially at 9600 baud continuously. Use 8-bit data and 1 stop bit.
5.10 Write an 8051 C program to toggle all the bits of port P1 continuously with some delay in between. Use Timer 0, 16-bit mode to generate the delay.

COURSE CONTENTS:

1.   **Architecture of Microcontroller 8051**
     Features of micro controllers, Compare Microprocessors and Microcontrollers, block diagram of 8051 microcontroller, pin diagram of 8051 microcontroller, internal memory & external memory organizations, various special function registers, PSW, SFRs,counters & timers, interrupts in 8051, Serial communication of 8051, I/O ports of 8051,

2.   **Instruction set of 8051 micro controllers**
     Need for an instruction set, instruction format of 8051, opcode, operand, machine cycle and T-state, major groups in the instruction set, various addressing modes of 8051, data transfer, arithmetic, logical, branching and Boolean instructions, one byte, two byte and three-

byteinstructions, unconditional and conditional jump instructions, CALL and RET instructions, NOP instruction

3. **8051 Programming Concepts**

Various symbols used in drawing flow charts, programs in mnemonics to illustrate the application of data copy instructions, programs to perform single byte, double byte and multi byte addition and subtraction, the application of jump instruction in the program, program using delay subroutines, subroutine and its use, PUSH, POP instructions, single step and break point debugging techniques.

4. **Interfacing Simple I/O devices**

Interfacing of push button switches and LEDs, seven segment display interface, functions of pins of LCD, Interfacing 16x2 LCD to 8051, Program LCD in assembly language, Interfacing of a 4x4 Matrix Key Board, key bouncing problem and de-bouncing solutions

5. **Programming using Embedded C**

Introduction to Embedded C, Compare C and Embedded C, Data types, Embedded C Programs

REFERENCE BOOKS:

1. Mazidi and Mazidi, The 8051 Microcontroller and Embedded Systems Using Assembly and C, 2nd edition Pearson
2. Kenneth J. Ayala, 8051 Microcontroller
3. MykePredko , Programming customizing the 8051 Microcontroller,TMH
4. Ajay V Deshmukh , Microcontrollers (theory andapplications)
5. Subratha Ghospal,8051 Microcontroller (Instruction, programme & interfacing), PEARSON
6. Kenneth Ayalla,The 8051 Microcontroller, 3rd Edition, CENGAGE learning India Edition
7. Dr. Rajiv Kapadia,8051 Microcontroller Embedded systems, Jico student Edition

BLUE PRINT

Sl No	Unit Title	No of Periods	Weightage Allotted	Weightage of Marks		COs mapped
				No of Essay Questions	No of Short answer Questions	
1	Architecture of Microcontroller 8051	20	26	2	2	**CO1**
2	Instruction set of 8051 micro controllers	15	26	2	2	**CO2**
3	8051 Programming Concepts	15	26	2	2	**CO3**
4	Interfacing Simple I/O devices	15	16	1	2	**CO4**
5	Programming in Embedded C	10	16	1	2	**CO5**
		75	110	80	30	

Table specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to be covered
Unit Test-I	From 1.1 to 2.18
Unit Test-II	From 3.1 to 5.14

State Board of Technical Education and Training, A. P
Diploma in Internet of Things (DIOT)
IV Semester
Subject Name: Microcontrollers and Interfacing
Sub Code: IOT-403

Time: 90 minutes   Unit Test I   Max.Marks:40

Part-A   **16Marks**

Instructions: (1) Answer **all** questions.

(2) First question carries **four** marks, each question of remaining carries **three** marks

1. Write the importance of following registers in one sentence

   a) Stack pointer   (CO1)
   b) Program counter   (CO1)
   c) Accumulator   (CO1)
   d) PSW   (CO1)
2.   List any three featured of microcontrollers   (CO1)

3.   Distinguish between machine cycle and T-state   (CO2)

4.   List any three data transfer instructions of 8051 microcontroller.   (CO2)

5.   Explain the status of flag register after executing the following two instructions.   (CO2)

   MOV A, #42H
   ADD A, #44H

Part-B   **3×8=24**

Instructions: (1) Answer **all** questions.

(2) Each question carries **eight** marks

(3) Answer should be comprehensive and the criterion for valuation

is the content but not the length of the answer.

6. (a) Draw the functional block diagram of 8051 microcontroller and explain about each block   (CO1)

or

(b) Draw the PIN diagram of 8051 microcontroller and explain the function of each PIN   (CO1)

7. (a) Explain the internal memory organization of 8051 with suitable diagram   (CO1)

or

(b) Explain the SFRs associated with timer/counters of 8051 microcontroller.   (CO1)

8.   (a)Explain the operation carried out on execution of the following instructions. (CO2)
   (i) MUL AB   (ii) DIV AB   (iii) DA A   (iv) ADDC A, @R0

or

(b) Explain various addressing modes of 8051microcontroller with suitable examples. (CO2)

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State Board of Technical Education and Training, A. P
Diploma in Internet of Things (DIOT)
IV Semester
Subject Name: Microcontrollers and Interfacing
Sub Code: IOT-403

Time: 90 minutes   UNIT TEST-II   Max.Marks:40

Part-A   **16Marks**

Instructions: (1) Answer **all** questions.

(2) First question carries **four** marks, each question of remaining carries **three** marks

1. Draw symbols used in flow charts to indicate the following

   a) End or Beginning   (CO3)
   b) Process   (CO3)
   c) Decision   (CO3)
   d) Input and Output   (CO3)
2. Draw the interfacing diagram of push button switch and LED with 8051.   (CO4)
3. List the reasons for the popularity of LCDs   (CO4)

4. List the differences between C and Embedded C   (CO5)
5. List the reasons for writing programs in Embedded C   (CO5)

Part-B   **3×8=24**

Instructions: (1) Answer **all** questions.

(2) Each question carries **eight** marks

(3) Answer should be comprehensive and the criterion for valuation

is the content but not the length of the answer.

6. (a) Write an assembly language to generate a square wave of 1 KHz from the P1.0 pin of 8051, using Timer-1 mode-1. Assume Clock Frequency of 12 MHz.   (CO3)

(or)

(b) Write an assembly language to add a series of 10 bytes. The series begins from location 2000H in External RAM. Store the result at locations 3000 and 3001H.   (CO3)

7. (a) Explain the Interfacing concepts of push button switches and LEDs with 8051 (CO4)

(or)

(b) Explain Interfacing of 16×2 LCD module to 8051   (CO4)

8. (a) Write an 8051 C program to send values 00 – FF to port P1   (CO5)

(or)

(b) Write an 8051 C program to toggle bits of P1 ports continuously with 250 ms (CO5)

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State Board of Technical Education and Training, A. P
Diploma in Internet of Things (DIOT)
IV Semester
Subject Name: Microcontrollers and Interfacing
Sub Code: IOT-403

TIME:3 HOURS	END SEMESTER EXAMINATION	MAX MARKS:80

Part-A   **10×3=30**

Instructions: (1) Answer **all** questions. (2) Each question carries **three** marks
(3) Answer should be brief and straight to the point and shall not exceed
five simple sentences.

1. List any three features of microcontrollers (CO1)
2. List the interrupts of 8051 (CO1)
3. List any three data transfer instructions of 8051 microcontroller. (CO2)
4. Mention the instruction format of 8051 (CO2)
5. Define a subroutine and state its use (CO3)
6. Explain PUSH and POP instructions. (CO3)
7. List the reasons for the popularity of LCDs (CO4)
8. Draw the interfacing diagram of push button switch and LED with 8051. (CO4)
9. List the differences between C and Embedded C (CO5)
10. List the reasons for writing programs in Embedded C (CO5)

Part-B   **5×10=50**

Instructions: (1) Answer **any five** questions.
(2) Each question carries **10** marks
(3) Answer should be comprehensive and the criterion for valuation is the content but
not the length of the answer.

11. Draw the functional block diagram of 8051 microcontroller and explain about each block (CO1)
12. Explain the internal memory organization of 8051 with suitable diagram (CO1)
13. Explain the operation carried out on execution of the following instructions. (CO2)
    (i) MUL AB   (ii) DIV AB   (iii) DA A   (iv) ADDC A, @R0
14. Explain various addressing modes of 8051microcontroller with suitable examples (CO2)
15. Write an assembly language to generate a square wave of 1 KHz from the P1.0 pin of 8051, using Timer-1 mode-1. Assume Clock Frequency of 12 MHz. (CO3)
16. Write an assembly language to add a series of 10 bytes. The series begins from location 2000H in External RAM. Store the result at locations 3000 and 3001H. (CO3)

17. Explain the Interfacing concepts of push button switches and LEDs with 8051 (CO4)
18. Write an 8051 C program to toggle bits of P1 ports continuously with 250 ms (CO5)

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Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
IOT-404	OOP through Java	5	75	20	80

S.No.	Chapter/Unit title	No.of periods	Weightage Allocated	Short type	Essay type	CO's Mapped
1	Object oriented programming concepts and Basics of java and over loading	13	13	1	1	CO1
2	Concepts of inheritance, overriding, Interfaces and Packages	13	26	2	2	CO2
3	I/O Streams and Collections.	15	21	2	1½	CO3
4	Exception handling and Multi-threaded programming	14	21	2	1½	CO4
5	Applets, AWT, Event Handling	20	29	3	2	CO5
	TOTAL	75	110	30	80	

Course Objectives	i) Toknow applying object oriented programming paradigm in problem solving on the platform of Sun Microsystems. ii) Able to design multi tasking application with the knowledge of multi threading. iii) Familiarized todevelop graphical user interface with event handling mechanism.

		At the end of the course the student able to learn following:	
Course Outcomes	CO1	IOT-404.1	Know the object oriented programming concepts in problem solving. Use syntaxes and semantics of object oriented paradigm.
	CO2	IOT -404.2	Design optimized definition for an application with reusability features and packages in project development.
	CO3	IOT -404.3	Knows the usage of utilities in real time data structures.
	CO4	IOT -404.4	Demonstrate multithreading concepts to implement multitasking and multi programming applications.
	CO5	IOT -404.5	Demonstrate to design effective dynamic user interface for any front end applications using Applets and events.

CO-PO/PSO Matrix:

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT -404.1	2	1	1	2	2	2	1	2	2	2
IOT -404.2	1	3	3	3	1	3	1	1	3	1
IOT -404.3	3	2	3	2	2	3	1	1	3	3
IOT -404.4	1	1	3	2	2	3	2	2	3	2
IOT -404.5	3	3	3	3	2	3	2	2	3	3
Average	2	2	2.5	2.4	1.6	3	1.5	1.6	3	2.2

3=Strongly mapped , 2=moderately mapped, 1=slightly mapped

Learning Outcomes:

1.0   Object oriented programming concepts and Basics of java and over loading

1.1   Know about object oriented programming

1.2   Compare procedure oriented programming and object oriented programming

1.3   List and explain features of object oriented programming

1.4   Importance of Java in Internet programming.

1.5   Explain features of Java. Define Byte codes of Java, JVM.

1.6   How to write and executing a Java program. List different keywords and comment statements in Java.

1.7   Explain data types ,scope and life time of variables.

1.8   Describe conversion and casting features.

1.9   Apply one-dimensional and two–dimensional arrays give example programs.

1.10   Illustrates usage of conditional and iteration statements of Java with an example programs.

1.12   Describe usage of jump statements, break, and continue statements.

1.13   Describe how to create classes and objects.

1.14   Demonstrate Usage of new operator and methods.

1.15   Explain usage of constructors with an example programs.

1.16   Apply method overloading and construction overloading in applications.

1.17   Describe usage of 'this' pointer with example.

1.18   Explain usage of static in variables, methods, and blocks.

1.19   Explain about string classes.

1.20   Usage of command-line arguments.

2.0   Concepts of inheritance, overriding, Interfaces and Packages

2.1   Explain implementation of inheritance with an example program.

2.2   Illustrate how to implement multilevel inheritance with an example program.

2.3   Explain method overriding and usage of super keyword.

2.4   Describe concept of Interfaces.

2.5   Define an Interface.

2.6   Differences between abstract classes and interface.

2.7   Explain how to implement interfaces with sample program.

2.8   Define a package.

2.9   Explain the concept of class path.

2.10   Describe concept of Access protection.

2.11   Illustrate the mechanism of importing packages.

2.12   Give simple application to design packages with sample programs.

3.0 I/O Streams and Collections.

3.1   List different types of I/O streams.

3.2   Explain how to read and write data through console input and output streams.

3.3   Explain various file access operation by using File Streams.

3.4   Explain sample programs on above streams.

3.5   What is collection frame work and Hierarchy of collection frame work.

3.6   List Collection Interfaces and explain the following with examples

      3.6.1   List

      3.6.2 Set

3.6.3 Queue

3.6.4 Deque

3.7 List Collection classes and explain the following with examples

3.7.1   ArrayList

3.7.2   LinkedList

3.7.3   HashSet

3.8 How to access a Collection via an Iterator?

4.0 Exception handling and Multi threaded programming.

4.1   Describe sources of errors.

4.2   Give advantages of Exception handling.

4.3   Types of exceptions: Checked & Unchecked

4.4   Apply following key words to handling exceptions through sample programs

4.4.1   Try

4.4.2   Catch

4.4.3   Finally

4.4.4   Throw

4.4.5   Throws

4.5   Explain concept of Multi-catch statements with example.

4.6   Explain how to write nested try in exception handling with example.

4.7   Describe built in exceptions.

4.8   Describe multithreading.

4.9   Explain Thread life cycle and states

4.10   Explain how to Creating single thread with example program.

4.11   Explain how to Creating multi thread with example program.

4.12   Illustrate thread priorities in multiple threads with an example.

4.13   Describe the concept of synchronization with example program.

5.0 Applets, AWT, Event Handling.

5.1 Describe the basics of Applets – Life cycle of an applet.

5.2 Describe steps for design and execute sample applet program

5.3 Explain Graphics class methods

5.3.1   Update()

5.3.2   Paint()

5.3.3   Drawing Lines, Rectangle, circles, polygons

5.4 Working with Color Font classes.

5.5 Describe AWT classes

5.6   Explain how to design Frame window with example.

5.7   Describe Types of Events

5.8   List and explain sources of events.

5.9   List and explain different event classes.

5.10 List and explain event listener interfaces

5.11 Demonstrate event handling mechanism.

5.12 Demonstrate handling mouse events with sample program.

5.13 Demonstrate handling keyboard events with sample program.

5.14 Explain how to use AWT controls in applet programming

5.14.1 Labels.

5.14.2 Buttons.

5.14.3 Text Fields

5.14.4 Checkboxes.

COURSE CONTENTS

1. Basics of java and overloading: object oriented programming -Importance of Java to Internet – Byte codes.Features of Java: OOPS concepts –Data types –type conversions – casting – Arrays. Usage of classes – objects – new – methods – constructors – method overloading, string classes – command line arguments-static members-this pointer

2. Concepts Inheritance Overriding Interfaces and Package:-Usages of Inheritance: inheritance super class, sub classes – Multi level inheritance – super keyword -overriding –Abstract classes-Interfaces-Packages.

3. **Concepts of I/O Streams and Collections**:I/O streams-Accessing data through console input and output-Collection Frame work- Collection Interfaces – Collection Classes-Iterator

4   **Exception Handling and Multi threading:** – Exception handling: Source of errors – error handling – Exception handling-Multi catch statements- Define thread – life cycle of thread - Multi threading –Synchronization- Inter thread communication – Dead locks – Thread properties.

5   **Applets, AWT and Event Handling:** Basics of Applets – life cycle of an applet-Working with Graphics-color-fonts-AWT classes-Event classes-Listener interfaces-keyboard and Mouse events-AWT controls-Buttons-TextFields-CheckBox-List

REFERENCE BOOKS

1   The complete reference Java, Pattrick Naughten, Herbert Schildt TMH Company Limited, New Delhi.
2   Programming in JAVA, P. Radhakrishna, University Press
3   Programming in Java, Muthu - Thomson
4   Java Foundations of Programming, NIIT, PHI
5   Programming with Java, Balagurusamy, TMH

Table specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to be covered
Unit Test-I	From 1.1 to 3.4
Unit Test-II	From 3.5 to 5.14

Model Blue Print:

S.No.	Chapter/Unit title	No.of periods Allocated	Weightage Allocatd	Marks Wise Distribution of Weightage				Question wise Distribution of Weightage				CO's Mapped
				R	U	Ap	AN	R	U	Ap	AN	
1	Object oriented programming concepts and Basics of java and over loading	13	13	3	10			1	1			C01
2	Concepts of inheritance,overriding,Interfaces and Packages	13	26	6	10	10		2	1	1		CO2
3	I/O Streams and Collections.	15	21	6	10	5		2	1	½		CO3
4	Exception handling and Multi threaded programming	14	21	6	10	5		2	1	½		C04
5	Applets, AWT, Event Handling	20	29	9	10	10		3	1	1		CO5
	Total	75	110	30	50	30		10	5	3		

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DIPLOMA IN INTERNET OF THINGS
MODEL PAPER
OOP through JAVA
UNIT TEST-1

SCHEME: C-23   SUBJ CODE:IOT-404
MAX MARKS:40   TIME: 90Minutes

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PART-A   **16Marks**

Instructions: 1) Answer all questions
                2) First question carries 4marks, and each question of remaining carries 3marks

1. a) is 'this' keyword is refers currently invoked object proprieties (True/False)   (CO1)
b) --------------------is fully abstract class.   (CO2)
c) Which of the following is not a java access specifier   [ ]   (CO2)
        I) public II) default III) private IV) super
d) Which one of the following are java translator   [ ]   (CO1)
        I) interpreter II) compiler III) assembler IV) I &II
2. What is the use of constructor and list different types of constructors?   (CO1)
3. Write the differences b/w abstract class and interface   (CO2)
4.List different types of I/O streams.   (CO3)
5. What is the use of super keyword?   (CO3)

                                  PART-B   3X8=24Marks

    Instructions: 1) Answer all questions
                2)Each question carries 8 Marks
                3)Answer should be comprehensive and the criterion for valuation is the
                content but not the length of the answer

6. a) Explain method over loading with an example.   (CO1)
                                  Or
   b) Explain how to use static members in java with example.   (CO1)

7. a) Explain multilevel inheritance with example program.   (CO2)
                                  Or
   b) How java implements multiple inheritance with interface? Explain with example.(CO2)
8. a) Explain how to create and import package.   (CO3)
                                  Or
   b) Describe how to access primitive data types through keyboard with an example.(CO3)
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Board Diploma Examination
Model Question paper-End Exam
DIPLOMA IN INTERNET OF THINGS
OOPS THROUGH JAVA IOT-404

Part-A
Answer All Questions each carries three marks 10X3=30

1. Define Byte code and JVM (CO1)
2. What is the use of label break?. (CO2)
3. Define overriding and give the syntax. (CO2)
4. What is the use of super keyword? (CO3)
5. List different Access modifiers in java. (CO3)
6. Write any three methods in ArrayList class. (CO3)
7. Write the advantages of exceptions. (CO4)
8. List different methods in thread life cycle. (CO4)
9. What is an event? List different event Listeners. (CO5)
10. Write different constructors in TextField. (CO5)

Part-B
Answer any Five Questions carries eight marks 5X10=50

11. Explain the concept of method overloading with an example program. (CO1)
12. Explain how to implements multi-level inheritance with example. (CO2)

13. Explain how create and import a package with example packages. (CO2)
14. Explain HashSet class methods with simple program. (CO3)
15. (a)Write a java program to read data through command line arguments and write it into file and display file contents . (CO3)

(b) Explain Multi catch statements (CO4)
16. Explain how to create multi-threading in java with an example program. (CO4)

17. Design an applet program that implements simple calculator with basic arithmetic operations. (CO5)
18. Explain mouse events with an example program. (CO5)

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SENSORS AND ACTUATORS IN IOT

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
IOT-405	Sensors and Actuators in IoT	04	60	20	80

S No	Unit Title	No. of Periods	Weightage of Marks	No. of Short Answer Questions	No. of Essay Questions	COs Mapped
1	Introduction to Transducers, Sensors and Actuators	10	16	2	1	CO1
2	Principle of operation of Sensors in IoT	13	26	2	2	CO2
3	Principle of operation of Actuators	12	16	2	1	CO3
4	Principles of signal acquisition, signal conditioning, measurement and calibration of sensors	12	26	2	2	CO4
5	Wired and Wireless communication protocols used in IoT based system	13	26	2	2	CO5
	Total	60	110	30	80	

Course Objectives	To Introduce Transducers, Sensors and Actuators
	To familiarise with Principle of operation of Sensors and actuators in IoT
	To familiarise with the elements of Iot and to explore case IoT case studies
	To familiarise with Principles of signal acquisition, signal conditioning, measurement and calibration of sensors
	To familiarise with Wired and Wireless communication protocols used in IoT based system

	CO No	COURSE OUTCOMES
CO1	IOT-405.1	Introduce Transducers, Sensors and Actuators
CO2	IOT-405.2	Get acquaint with the Principle of operation of Sensors in IoT
CO3	IOT-405.3	Get acquaint with the Principle of operation of Actuator in IoT
CO4	IOT-405.4	Get acquaint with the Principles of signal acquisition, signal conditioning, measurement and calibration of sensors
CO5	IOT-405.5	Explore Wired and Wireless communication protocols used in IoT based system

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT-405.1	3				1			3		1
IOT-405.2	3	2	1		2			3	1	
IOT-405.3	3	1	1		1			3		1
IOT-405.4	3	3	2	1	2			3		2
IOT-405.5	3	3	1	2	3		1	3	1	2
Average	3	1.8	1.25	1.5	1.8			3	1	1.5

3=strongly mapped, 2=moderately mapped, 1=slightly mapped

LEARNING OUTCOMES

1.0 Introduction to Transducers, Sensors and Actuators

1.1 Define the terms transducer, sensors and actuator

1.2 Distinguish between transducer and Sensors

1.3 State the need of sensors and actuators in IoT

1.4 State the functions of sensors and actuators in IoT

1.5 Explain an IoT system with a block diagram emphasising the role of sensors and actuators.

1.6 Classify sensors based on power requirement, output, measured property

1.7 List different passive and active sensors used in IoT

1.8 List different analog and digital sensors used in IoT

1.9 List different scalar and vector sensors used in IoT

1.10 Classify different actuators used in IoT

1.11 List different pneumatic actuators

1.12 List different Hydraulic actuators

1.13 List different mechanical actuators

1.14 List different electrical actuators

1.15 List different thermal/magnetic actuators

1.16 List different Shape memory polymers (SMP) actuators

1.17 Explain the characteristics of sensors

1.18 Explain different Sensorial Deviations (sensor errors)

1.19 List the major factors influencing the choice of sensors in IoT-based sensing applications

2.0 Principle of operation of Sensors in IoT

2.1 Classify sensors based on the domain quantity being measured

2.2 State the principle of operation of temperature Sensor

2.3 List the specifications and applications of typical analog temperature sensor (ex: LM35) and digital temperature sensor(ex:DS18B20)

2.4 State the principle of operation of i) Inductive Proximity Sensor ii)Optical Proximity Sensor iii)Capacitive Proximity Sensor iv)Magnetic Proximity Sensor v) Ultrasonic proximity Sensor.

2.5 List the specifications and applications of typical Proximity Sensor

2.6 State the principle of operation of Accelerometer sensor

2.7 List the specifications and applications of typical Accelerometer sensor module (MPU-6050 3-Axis Accelerometer and Gyro Sensor)

2.8 State the principle of operation of IR Sensor (Infrared Sensor)

2.9   List the specifications and applications of typical IR Sensor (ex: TSOP1838 IR distance sensor)

2.10   State the principle of operation of Pressure Sensor

2.11   List the specifications and applications of Pressure Sensor (ex: HX710B)

2.12   State the principle of operation of Ultrasonic Sensor

2.13   List the specifications and applications of Ultrasonic Sensor (ex: HC-SR04)

2.14   State the principle of operation of Smoke, Gas and Alcohol Sensor

2.15   List the specifications and applications of Smoke, Gas and Alcohol Sensor (ex: MQ3)

2.16   State the principle of operation of Humidity Sensor

2.17   List the specifications and applications of Humidity Sensor (ex:HR202, DHT11)

2.18   State the principle of operation of rotary type Position Sensor

2.19   List the specifications and applications of rotary type position Sensor (ex: M274)

2.20   State the principle of operation of Tilt Sensor

2.21   List the specifications and applications of Tilt Sensor (SW520D Mercury Tilt Switch Sensor Module)

2.22   State the principle of operation of conductivity based Level Sensor

2.23   List the specifications and applications of Flow and Level Sensor

2.24   State the principle of operation of PIR Sensor

2.25   List the specifications and applications of PIR Sensor (Ex: HC-SR501 PIR Motion Sensor)

3   **Principle of operation of Actuators**

3.1   Explain the characteristics of Actuators

3.2   State the principle of operation of pneumatic actuators

3.3   List the specifications and applications of pneumatic actuators

3.4   State the principle of operation of Hydraulic actuators

3.5   List the specifications and applications of Hydraulic actuators

3.6   State the principle of operation of mechanical actuators

3.7   List the specifications and applications of mechanical actuators

3.8   State the principle of operation of electrical actuators

3.9   List the specifications and applications of electrical actuators

3.10   State the principle of operation of thermal actuators

3.11   List the specifications and applications of thermal actuators

3.12   State the principle of operation of linear type motion actuators

3.13   List the specifications and applications of linear type motion actuators

3.14   State the principle of operation of rotary type motion actuators

3.15   List the specifications and applications of rotary type motion actuators

3.16   List the major factors influencing the choice of actuators in IoT-based applications

4 **Principles of signal acquisition, signal conditioning, measurement and calibration of sensors**

4.1   Define analog signal and digital signal

4.2   Differentiate between analog and digital signals

4.3   List the types signals acquired from IoT sensors

4.4   State the need for signal conditioning

4.5   Explain about analog signal conditioning with a block diagram

4.6   Explain about digital signal conditioning with a block diagram

4.7   State the need for calibration of sensor module

4.8   Explain about i) One point calibration ii) Two-point calibration iii) Multi-Point Curve Fitting
       calibration methods

4.9   Explain the calibration procedure of DS18B20 temperature sensor

4.10   Explain the calibration procedure of TSOP1838 IR distance sensor

4.11   State the importance of calibrating the sensors

5 Wired and Wireless communication protocols used in IoT based system

5.1   State the need of communication protocols in IoT based system

5.2   Classify different wired communication protocols used in IoT Sensors

5.3   List different external system protocols used wired communication between IoT sensor
       devices

5.4   Explain the features and applications of external wired protocols such as: i) USB Protocols ii)
       UART/USART Protocols iii) RS-232 Protocols iv) RS-485 Protocols v) Ethernet

5.5   List different internal system protocols used wired communication between IoT sensor
       devices

5.6   Explain the features and applications of internal wired protocols such as: i) I2C Protocols ii)
       SPI Protocol

5.7   List different wireless communication protocols used in IoT based system

5.8   Explain the features and applications of wireless communication protocols such as: i) WiFi ii)
       Bluetooth iii) Zigbee vi) NFC v) Z-Wave vi) LoRaWAN

COURSE CONTENT:

1. Introduction to Transducers, Sensors and Actuators

Define the terms transducer, sensors and actuator-Distinguish between transducer and Sensors-
State the need of sensors and actuators in IoT-State the functions of sensors and actuators in IoT-
Explain an IoT system with a block diagram emphasising the role of sensors and actuators.-Classify
sensors based on power requirement, output, measured property-List different passive and active
sensors used in IoT-List different analog and digital sensors used in IoT-List different scalar and
vector sensors used in IoT-Classify different actuators used in IoT-List different pneumatic
actuators-List different Hydraulic actuators-List different mechanical actuators-List different
electrical actuators-List different thermal/magnetic actuators-List different Shape memory
polymers (SMP) actuators-Explain the characteristics of sensors-Explain different Sensorial
Deviations (sensor errors) -List the major factors influencing the choice of sensors in IoT-based
sensing applications.

2. Principle of operation of Sensors in IoT

Classify sensors based on the domain quantity being measured-State the principle of operation of
temperature Sensor-List the specifications and applications of typical analog temperature sensor
(ex: LM35) and digital temperature sensor(ex:DS18B20)-State the principle of operation of i)
Inductive Proximity Sensor ii)Optical Proximity Sensor iii)Capacitive Proximity Sensor iv)Magnetic
Proximity Sensor v) Ultrasonic proximity Sensor.- List the specifications and applications of typical
Proximity Sensor -State the principle of operation of Accelerometer sensor-List the specifications
and applications of typical Accelerometer sensor module (MPU-6050 3-Axis Accelerometer and

Gyro Sensor)-State the principle of operation of IR Sensor (Infrared Sensor)-List the specifications and applications of typical IR Sensor (ex: TSOP1838 IR distance sensor)-State the principle of operation of Pressure Sensor-List the specifications and applications of Pressure Sensor (ex: HX710B)-State the principle of operation of Ultrasonic Sensor -List the specifications and applications of Ultrasonic Sensor (ex: HC-SR04)-State the principle of operation of Smoke, Gas and Alcohol Sensor-List the specifications and applications of Smoke, Gas and Alcohol Sensor (ex: MQ3)-State the principle of operation of Humidity Sensor-List the specifications and applications of Humidity Sensor (ex:HR202, DHT11)-State the principle of operation of rotary type Position Sensor-List the specifications and applications of rotary type position Sensor (ex: M274)-State the principle of operation of Tilt Sensor-List the specifications and applications of Tilt Sensor (SW520D Mercury Tilt Switch Sensor Module)-State the principle of operation of conductivity based Level Sensor-List the specifications and applications of Flow and Level Sensor-State the principle of operation of PIR Sensor-List the specifications and applications of PIR Sensor (Ex: HC-SR501 PIR Motion Sensor)

3. Principle of operation of Actuators in IoT

Explain the characteristics of Actuators-State the principle of operation of pneumatic actuators-List the specifications and applications of pneumatic actuators-State the principle of operation of Hydraulic actuators-List the specifications and applications of Hydraulic actuators-State the principle of operation of mechanical actuators-List the specifications and applications of mechanical actuators-State the principle of operation of electrical actuators-List the specifications and applications of electrical actuators-State the principle of operation of thermal actuators-List the specifications and applications of thermal actuators-State the principle of operation of linear type motion actuators-List the specifications and applications of linear type motion actuators-State the principle of operation of rotary type motion actuators-List the specifications and applications of rotary type motion actuators-List the major factors influencing the choice of actuators in IoT-based applications

4. Principles of signal acquisition, signal conditioning, measurement and calibration of sensors

Define analog signal and digital signal-Differentiate between analog and digital signals-List the types signals acquired from IoT sensors -State the need for signal conditioning -Explain about analog signal conditioning with a block diagram-Explain about digital signal conditioning with a block diagram-State the need for calibration of sensor module-Explain about i) One point calibration ii) Two-point calibration iii) Multi-Point Curve Fitting calibration methods-Explain the calibration procedure of DS18B20 temperature sensor -Explain the calibration procedure of TSOP1838 IR distance sensor-State the importance of calibrating the sensors

5. Wired and Wireless communication protocols used in IoT based system

State the need of communication protocols in IoT based system-Classify different wired communication protocols used in IoT Sensors -List different external system protocols used wired communication between IoT sensor devices-Explain the features and applications of external wired protocols such as: i) USB Protocols ii) UART/USART Protocols iii) RS-232 Protocols iv) RS-485

Protocols v) Ethernet-List different internal system protocols used wired communication between IoT sensor devices-Explain the features and applications of internal wired protocols such as: i) I2C Protocols ii) SPI Protocol-List different wireless communication protocols used in IoT based system-Explain the features and applications of wireless communication protocols such as: i) WiFi ii) Bluetooth iii) Zigbee vi) NFC v) Z-Wave vi) LoRaWAN

Reference Books:

14 Ambika Nagaraj , "Introduction to Sensors in IoT and Cloud Computing Applications",Bentham Science Publishers (2021), University Press

15 Ashwani Kumar Dubey (editor), Vijayan Sugumaran (editor), Peter Han Joo Chong (editor) – "Advanced IoT Sensors, Networks and Systems" Select Proceedings of SPIN 2022 (Lecture Notes in Electrical Engine)

16 Martí Boada, Antonio Lazaro, David Girbau, Ramón Villarino – "Battery-less NFC Sensors for the Internet of Things" (2022, Wiley-ISTE)

17 Francisco, Andre and Correa, "sensors-and-actuators", 2021

18   Moyer, Stan - IoT Sensors and Actuators, "IEEE Internet of Things Magazine 2019-sep vol. 2 issue.

19 John G. Webster, "The measurement, Instrumentation and Sensors hand book", CRC press

Table specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to be covered
Unit Test-I	From 1.1 to 3.7
Unit Test-II	From 3.8 to 5.8

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State Board of Technical Education and Training, A. P
Diploma in Internet of Things (DIoT)
IV Semester
Subject Name: SENSORS AND ACTUATORS IN IOT
Sub Code: IoT - 405

Time : 90 minutes	**Unit Test I**	**Max.Marks:40**

Part-A   **16Marks**

Instructions: (1) Answer **all** questions.

(2) First question carries **four** marks, each question of remaining carries **three** marks

1.a)Rod-Style actuator is an example of _____actuator.   (CO1)
  b) List any 2 characteristics of sensors.   (CO1)
c) DS18B20 is an example of _____Sensor.   (CO2)
  d)Give an application of Pneumatic Actuator.   (CO3)
2. Define the terms transducer, sensors and actuator.   (CO1)
3. List any 3 specifications of Tilt sensor.   (CO2)
4. What is Pressure sensor.List any 2 applications?   (CO2)
5. List any 6 applications of mechanical actuators.   (CO3)

Part-B   **3×8=24**

Instructions: (1) Answer **all** questions.
                      (2) Each question carries **eight** marks
                      (3) Answer should be comprehensive and the criterion for valuation
                      is the content but not the length of the answer.

6 .a) Explain an IoT system with a block diagram emphasising the role of sensors and actuators.
                                                                               (CO1)
                                  OR
  b) Explain different Sensorial Deviations (sensor errors).   (CO1)

7 .a) What is temperature sensor? State the principle of operation of temperature Sensor.(CO2)
                                  OR
  b) What is ultrasonic sensor?State the principle of operation of Ultrasonic Sensor.   (CO2)

8 .a) Explain the characteristics of Actuators.   (CO3)
                                  OR
  b) State the principle of operation of Hydraulic actuators and List any 4 specification of Hydraulic actuators.   (CO3)

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State Board of Technical Education and Training, A. P
Diploma in Internet of Things (DIoT)
IV Semester
Subject Name: SENSORS AND ACTUATORS IN IOT
Sub Code: IoT - 405

Time : 90 minutes   **Unit Test II**   **Max.Marks:40**

Part-A   **16Marks**

Instructions: (1) Answer **all** questions.

(2) First question carries **four** marks; each question of remaining carries **three** marks

1.a) Give an applications of linear type motion actuators.   (CO3)

b) TSOP1838 is an example of _____ Sensor.   (CO4)

c) Draw an analog signal.   (CO4)

d) Wifi is a _____ communication protocol.   (CO5)

2. List any 4 specifications of rotary type motion actuators.   (CO3)

3. Define analog signal and digital signal.   (CO4)

4. State the need for calibration of sensor module?   (CO4)

5. State the features of RS-232 protocol.   (CO5)

Part-B   **3×8=24**

Instructions: (1) Answer **all** questions.

(2) Each question carries **eight** marks

(3) Answer should be comprehensive and the criterion for valuation
is the content but not the length of the answer.

6.a) State the principle of operation of thermal Actuators and list its applications.   (CO3)

OR

b) List the major factors influencing the choice of actuators in IoT-based applications   (CO3)

7.a) Explain the calibration procedure of DS18B20 temperature Sensor.   (CO4)

OR

b) Explain about analog signal conditioning with a block diagram.   (CO4)

8.a) Explain the features and applications of I2C Protocols.   (CO5)

OR

b) Explain the features and applications of Zigbee.   (CO5)

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BOARD DIPLOMA EXAMINATIONS
C-23, IoT-405, SENSORS AND ACTUATORS IN IOT
IV SEMESTER
SEMESTER END EXAMINATION

TIME:3 HOURS   **MAX MARKS:80**

Part-A   **10×3=30**

Instructions: (1) Answer **all** questions.

(2) Each question carries **three** marks

(3) Answer should be brief and straight to the point and shall not exceed

five simple sentences.

1. Define the terms transducer, sensors and actuator.   (CO1)
2. State the need of actuators in IoT.   (CO1)
3. List any 3 specifications of IR sensor.   (CO2)
4. What is Pressure sensor. List any 2 applications?   (CO2)
5. List any 6 applications of mechanical actuators.   (CO3)
6. List any 4 specifications of rotary type motion actuators   (CO3)
7. Differentiate between analog and digital signals.   (CO4)
8. State the need for calibration of sensor module?   (CO4)
9. State the features of RS-485 protocol.   (CO5)
10.   List different wireless communication protocols used in IoT based system   (CO5)

Part-B   **5×10=50**

Instructions: (1) Answer **all** questions.

(2) Each question carries **TEN** marks

(3) Answer should be comprehensive and the criterion for valuation

is the content but not the length of the answer.

11. Explain an IoT system with a block diagram emphasising the role of sensors and actuators
(CO1)

12. What is Level sensor? State the principle of operation of conductivity based Level Sensor   (CO2)

13.   State the principle of operation of i) Inductive Proximity Sensor ii)Optical Proximity Sensor   (CO2)

14. Explain the characteristics of Actuators.   (CO3)

15. Explain the calibration procedure of DS18B20 temperature Sensor.   (CO4)

16. Explain about i) One point calibration ii) Two-point calibration iii) Multi-Point Curve Fitting calibration methods.   (CO4)

17. Explain the features and applications of SPI Protocol.   (CO5)

18. Explain the features and applications of Bluetooth   (CO5)

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WEB TECHNOLOGIES LAB

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
IOT-406	Web Technologies Lab	**3**	**45**	**40**	**60**

S.No.	Chapter/Unit Title	No. of Periods	CO's Mapped
1.	Exercise on HTML, CSS&XML	10	CO1
2.	Exercises on Java Script, JQuery	15	CO2, CO3
3.	Exercises on PHP web applications and Database Applications	20	CO3,CO4
	Total Periods	60	

Course Objectives	i)Understand the principles of creating an effective web page ii) To Know the working with HTML, CSS iii) To acquire knowledge and skills for creation of web site considering both client and server side iv) To familiarize the various Technologies like Java Script, JQuery, PHP. V)To understand Database connectivity Using PHP

Course Outcomes	CO1	IOT-406.1	Implement interactive web page(s) using HTML, CSS and JavaScript.
	CO2	IOT -406.2	To know the Usage of JQuery
	CO3	IOT -406.3	Build Dynamic web site using server side PHP Programming
	CO4	IOT -406.4	To know database connectivity using PHP.
	CO5	IOT -406.5	Develop real world application with different web designing tools.

CO-PO/PSO Matrix:

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT -406.1	2	2	3	2		2	1	2	3	2
IOT -406.2	1	3	3	3	1	3	1	3	3	3
IOT -406.3		2	3	2	1	3	1	2	3	3
IOT -406.4	1	1	3	2	2	3	2	2	3	3
IOT -406.5	3	3	3	3	2	3	2	3	3	3
Average	1.5	2.6	3	2.6	1.5	3	1.5	2	3	1.5

3=stronglymapped, 2=moderately mapped, 1=slightly mapped

LEARNING OUTCOMES

HTML, CSS and XML:

1. Exercise on basic HTML tags.
2. Design a HTML page using suitable table tags and attributes.
3. Design a HTML page with a form containing variouscontrols.
4. Design a HTML page on iframes.
5. Exercise on style.
6. Exercise on designing an XML document.

JavaScript, AJAX&JQuery:

7. Exercise on JavaScript functions.
8. Exercise on JavaScript arrays.
9. Write a program on mouse events using JQuery.
10. Design a webpage to apply the Effects of JQuery to HTML elements.
11. Exercise on changing background color using css() functioninJQuery.
12. Write a JavaScript program using ResponsiveSlidesJquery plugin (download from responsiveslides.com)

PHP:
13. Install the following on local machine:
    - Apache Web server
    - MySQL
    - PHP and configure it to work with Apache Web server and MySQL.
14. Exercise on PHP arrays.
15. Design a form and access the elements of form using PHP.
16. Write PHP program to perform various operations on a database table using functions.
17. Write a PHP program to set a cookie.

KEY COMPETENCIES

Exp. No.	Name of the experiment	Objectives	Key Competencies
1	Exercise on basic HTML tags	Create the HTML page with a title, heading, formatting and list tags in the body.	1) Identify the editor required for writing HTML 2) Add the tags with relevant content 3) Save the file 4) Open the file in browser 5) Test the results
2	Design a HTML page using suitable table tags and attributes	Create the HTML page with a table and that table should have a header, body and footer.	1) Identify the tags for creating the table 2) Add header, body and footer to the table. 3) Put some content in each section of table 4) Save the file 5) Open the file in browser 6) Test the results

Exp. No.	Name of the experiment	Objectives	Key Competencies
3	Design a HTML page with a form containing various controls	Create the HTML page with a form and add some controls like textbox, label to the form.	1) Identify the tags to add a form and controls 2) Add the form and put some controls in it. 3) Save the file 4) Open the file in browser 5) Test the results
4	Design a HTML page on frames	Create the HTML page with multiple iframes so that content in each frame will have different format and colors.	1) Identify the tags for creating multiple frames 2) Add some content to the frames and use different formats, colors for each frame. 3) Save the file 4) Open the file in a browser 5) Test the results
5	Design a style sheet to set the background color, position and dimensions of a HTML element	Create a style sheet which contains selectors to set the background color, position and dimensions of a HTML element.	6) Identify the editor required forcreatingCSS 7) Add selectors to set the background color, position and dimensions of an element. 8) Save the CSSfile 9) Link the CSS file to a valid HTMLpage. 10) Save the HTMLpage 11) Open the HTML page in abrowser 12) Test theresults
6	Exercise on designing an XML document	Create an XML Document on Student data	1) Identify the editor required for creating XML 2) Add required elements for student data 3) Save the XML file as .xml extension 4) Open the XML document in browser 5)Test the results
7	Exercise on JavaScript functions	Write a JavaScript program using function which performs sum of two numbers and function should call when button is clicked.	1) Create a HTML file 2) Write a JavaScript function which adds two numbers. 3) Add HTML button tag and assign a function to onclick attribute. 4) Save the HTML file. 5) Open the HTML page in a browser 6) Test the results Resolve the errors if any through debugging
8	Exercise on JavaScript arrays	Write JavaScript code to implement sorting like reading an array of ‗n‘ numbers and sorting them in ascending order.	1) Create a HTML file 2) Add elements to read array and to sort. 3) Write the logic for sorting using iterative and conditional statements. 4) Save the HTML file. 5) Open the HTML page in a browser 6) Test the results Resolve the errors if any through debugging

Exp. No.	Name of the experiment	Objectives	Key Competencies
9	Write a program on mouse events using JQuery	Write a JavaScript program using JQuery which displays different messages for mouse events like mouse enter, mouse leave, click, dblclick	1) Create a HTML file 2) Add a div tag with some content and border. 3) Write a JQuery functions which displays different messages when mouse enters in div tag, mouse leaves div tag and clicks on div tag. 4) Save the HTML file. 5) Open the HTML page in a browser 6) Test the results by moving mouse over the div tag. 7) Resolve the errors if any through debugging
10	Design a webpage to apply the Effects of JQuery	Write a JavaScript program using JQuery which performs effects like hide, show, slideup fade In, fadeout, slideDown, SlideUp	1) Create a HTML file 2) Add a div tag with some content and border. 3) Add some buttons 4) Write a JQuery functions which performs some effect when click on respective button. 5) Save the HTML file. 6) Open the HTML page in a browser 7) Test the results by click on the button. Resolve the errors if any through debugging
11	Exercise on changing background color using CSS properties in JQuery	Write a JavaScript program using JQuery which changes CSS properties like color, background-color, border etc.	1) Create a HTML file 2) Add a div tag with some content 3) Add some buttons 4) Write a JQuery functions which changes CSS properties like color, border when click on respective button. 5) Save the HTML file. 6) Open the HTML page in a browser 7) Test the results by click on the button. Resolve the errors if any through debugging
12	Write a JavaScript program using the results plugin (download from responsiveslides.com)	Write a JavaScript program using JQuery which displays date picker.	1) Create a HTMLfile 2) Add JQuery script tag. 3) Add slider plugin, which can be downloaded from http://responsiveslides.com 4) Add plugins file 5) Add images 6) Write JQuery code for display slideshow of images 7) Save the HTML file. 8) Open the HTML page in a browser 9) Test the results by click on the button. Resolve the errors if any through debugging

Exp. No.	Name of the experiment	Objectives	Key Competencies
13	Install the following on local machine: • Apache Web server • MySQL • PHP and configure it to work with Apache Web server and MySQL.	Install a web server which supports PHP	1) Identify version compatible to system 2) Download the software 3) Install the server software 4) Configure the server 5) Write simple PHP program 6) Test the result
14	Exercise on PHP arrays	Write PHP program to implement searching like reading an array of 'n' numbers and finding smallest among them.	1) Create a Philie. 2) Add elements to read array and to find the smallest number. 3) Write the logic for sorting using iterative and conditional statements. 4) Save and run the page. Test the result
15	Design a form and access the elements of form using PHP	Write a PHP program which displays sum of two numbers submitted by the form	1) Create a HTML file 2) Add form with two textboxes for enter two numbers 3) Write a PHP program, which adds two numbers submitted by form and display the sum. 4) Place the files in server 5) Open the HTML file in browser 6) Test the results
16	Write PHP code to perform various operations on a database table using functions.	Write PHP code to perform retrieval, insertion, modification and deletion of data in a database table using functions	1) Understand the process of connecting to database and execute commands. 2) Create a PHPfile. 3) Add required elements to the page. 4) Write the logic to retrieve, insert, update and delete data in the table using functions. 5) Save and run the page. 6) Test the result
17	Write a PHP program to set a cookie.	Write PHP code to create a cookie and put some information in it.	1) Understand the significance of cookies. 2) Create a PHP file. 3) Write the logic to create and set a cookie 4) Save and run the page. 5) Test the result.

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JAVA PROGRAMMING LAB

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
IOT-407	Java Programming Lab	3	45	40	60

S.No.	Chapter/Unit Title	No. of Periods	CO's Mapped
1.	Basics, overloading, inheritance, overriding	6	CO1,CO2
2.	Streams, Interfaces and Packages and Collections.	10	CO2,CO3
3.	Exceptions and Multi threaded programming.	12	CO3,CO4
4.	Applets and Event Handling	17	CO5
	Total Periods	60	

Course Objectives	i)Design object oriented programming paradigm ii)Able to develop multi tasking application with the knowledge of multi threading. iii) Familiarized to develop graphical user interface with event handling mechanism.

Course Outcomes	CO1	Perform object oriented programming model application design.
	CO2	Design optimized definition for an application with reusability features like inheritance and polymorphism.
	CO3	Analyze modular design for real time applications by using packages concept in projects. Able to design data structures used in applications.
	CO4	Apply multi threading concepts to implement multitasking and multi programming applications.
	CO5	Develop effective dynamic user interface for any front end applications using Applets and events.

CO-PO/PSO Matrix:

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT-407.1	2	1	3	2		2	1	2	3	3
IOT -407.2	1	3	3	3	1	3	2	2	3	3
IOT -407.3	1	2	3	2	2	3	1	2	3	3
IOT -407.4	1	1	3	2	2	3	2	2	3	3
IOT -407.5	3	3	3	3	2	3	2	2	3	3
Average	1.5	2.6	3	2.6	1.5	3	1.6	2	3	3

3=strongly mapped, 2=moderately mapped, 1=slightly mapped

Learning Outcomes
1. Exercise programs on conditional statements and loop statements
2. Exercise programs on Strings.
3. Exercise program to create class and objects and adding methods.
4. Exercise programs using constructors and construction over loading.

5. Exercise programs on command line arguments.
   i)   Input as command line arguments and perform operation on that data.
   ii) Input as command line arguments and update manipulated data in Files.
6. Exercise programs using concept of overloading methods.
7. Exercise programs on inheritance.
8. Write a program using the concept of method overriding.
9. Exercise on packages.
   i) Creation of packages
   ii) Design module to importing packages from other packages.
10. Exercise programs on interfaces.
11. Exercise programs on I/O Streams
    i) Reading data through Keyboard
    ii) Perform Reading and Writing operations on files using File Streams.
12. Exercise programs on Collections.
    i) Write a java program to search a student mark percentage based on pin number using Array list.
    ii) Write a java program to create linked list to perform delete, insert, and update data in linked list with any application.
13. Exercise on exception handling.
    i) Programs on try, catch and finally.
    ii) Programs on multiple catch statements
    iii) Programs on nested try statements.
14. Exercise on multithreading
    i) Programs on creation of single and multiple threads.
    ii) Programs on adding priorities to multiple threads.
15. Exercise on applets
    i) Programs on Graphics and colors.
    ii) Simple animations using threads and graphics.
16. Exercise on AWT controls
    i) Program to handle mouse events.
    ii) Program to handle keyboard events.
    iii) Programs to illustrate Text Fields and Button control.
    iv) Programs to illustrate Check Box and List control.
    v) Write an application program to illustrate multiple controls.

KEY COMPETENCIES

Exp. No.	Name of the experiment	Objectives	Key Competencies
1	Exercise programs on conditional statements and loop statements.	(a) Write program using if statement and switch (b) Write program using while, do and for constructs.	(a) Know the usage of IF and switch statements. (b) Compile the program and rectify the errors. (c) Observe the output.
2	Exercise programs on Strings.	(a) Write a programs to manipulate Strings (b) Write a programs to arrange array of strings in ascending order	(a) Create String objects (b)Use string class methods (c) Observe the output.

3	Exercise program to create class and objects and adding methods.	(a) Write a program to create a class and create objects. (b) Write a program to create class adding methods and access class members.	(a) Create class. (b) Declare methods. (c) Create objects. (d) Write main method. (e) Access class members.
4	Exercise programs using constructors and construction over loading.	(a) Write a program using default constructor. (b) Write a program using parameterized constructor.	(a) Declare and define constructor. (b) Call default constructor. (c) Call parameterized constructor. (d) observe constructor overloading.
5	Exercise programs on command line arguments.	(a) Write a program to illustrate usage of command line arguments. (b) Write a program to read data as command line arguments and update it into Files.	(a) Use command line arguments. (b) Run the program. (c) Understand usage of Files. (d) Observe the output.
6	Exercise programs using concept of overloading methods.	(a) Write a program to illustrate method overloading. (b) Write a program to illustrate method overloading using constructors.	(a) Observe method overloading. (b) Overload constructor methods.
7	Exercise on inheritance.	(a)Write a program to illustrate single inheritance. (b)Write a program to illustrate multiple inheritance.	(a) Create base class. (b) Write base class constructor. (c) Create derived class. (d) Use extends keyword. (e) Use super keyword. (f) Write derived class constructor.
8	Write a program using the concept of method overriding.	Write a program using the concept of method overriding.	(a) Use method overriding. (b) Use this keyword. (c) use super keyword
9	Exercise on importing packages.	Write a program to create and importing package.	(a) Create package. (b) Use of access specifiers. (c) Use package. (d) Use import keyword.
10	Exercise on interfaces.	Write a program to illustrate multiple inheritance using interfaces.	(a) Define interface. (b) Use extends keyword. (c) Use implements keyword. (d) Access interface variables.
11	Exercise programs on I/O Streams	(a) Write a program to give values to variables interactively through the keyboard. (b) Write program to read and write primitive data types. (c) Write programs to handle Files.	(a) Use different data types. (b) Use readLine() method. (c) Use println() method. (d)use File Streams (e)Observe the output.
12	Exercise programs on Collections.	(a) Write a java program to search a student mark	(a) Define collection classes (b) use ArrayList, LinkedList (c) apply List and Iterator Interface

		percentage based on pin number using Array list. (b)Write a java program to create linked list to perform delete, insert, and update data in linked list with any application.	
13	Exercise on exception handling	(a) Write a program to illustrate exception handling. (b) Write a program to illustrate exception handling using multiple catch statements. (c) Write a program to illustrate exception handling using nested try.	(a) Use try – catch. (b) Use multiple catch blocks. (c) Use finally statement. (d) use Nested try
14	Exercise on multithreading	(a) Write a program to create single a thread by extending the thread class. (b) Write a program to create a single thread by implementing the runnable interface. (c) Write a program to create multiple threads. (d) Write a program to illustrate thread priorities.	(a) Use extends, new. (b) Use run() and start() methods. (c) Observe thread execution. (d) Use implements runnable interface. (e) Use setPriority() and getPriority() methods. (f) use wait(),notify() methods
15	Exercise on applets.	Write a program to create simple applet to display different shapes with colors. Write an applet program to design simple animation.	(a) Use <applet>…</applet> tag. (b) Add applet to html file. (c) Run the applet. (d) use graphics methods (e) use threads and graphics.
16	Exercise on AWT controls	(a) Write an applet program to handle key events. (b) Write an applet program to handle mouse events. (c) Write an applet program to illustrate Text Field and button control. (d) Write an applet program to illustrate Check box and List control. (e)Write an applet program to illustrate multiple controls.	(a) Use keyboard event methods (b) Use mouse event methods (c) Use Text Field class methods (d) Use button class methods (e) Use Check box and List class methods

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IOT-408, COMMUNICATION SKILLS

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks for FA	Marks for SA
IOT-408	Communication Skills	3	45	40	60

Course Objectives	- to communicate effectively in diverse academic, professional and everyday situations
	- exhibit appropriate body language and etiquette at workplace
	- be employable through preparing appropriate job applications and attend interviews confidently with all necessary skills

CO No.	
CO1	Listen and comprehend the listening inputs related to different genres effectively
CO2	Communicate effectively in interpersonal interactions, interviews, group discussions and presentations
CO3	Acquire employability skills: job hunting, resume writing, attending interviews
CO4	Practise appropriate body language and professional etiquette

Course Delivery: Text book: **"English Communication Skills"**
by State Board of Technical Education and Training, AP

Sl No	Unit	Teaching Hours
1	Listening Skills	6
2	Workplace Etiquette	3
3	Introducing Oneself	3
4	Short presentation (JAM)	6
5	Group Discussion	6
6	Resume Writing and Cover Letter	3
7	Interview Skills	9
8	Presentation Skills	9
	Total	*45*

Course Content:

UNIT I: Listening Skills **6 periods**

Pre – While- Post-listening activities- Listening to audio content   (dialogues/ speech/ narrations) - answering the questions and fill in the blanks- vocabulary

UNIT 2: **Workplace Etiquette** **3 periods**

Basics of Etiquette- politeness/ courtesy, good manners- features of work place etiquette- adaptability, positive attitude, body language.

UNIT 3: Introducing Oneself **3 periods**

Speak about oneself - introduce oneself to a gathering/ formal & informal situations- Know about others- filling in the grid- introducing oneself in interviews

UNIT 4: Short Presentation **6 periods**

Dos and Don'ts in short presentation- speak for a minute without repetition, deviation & hesitation - the techniques to speak fluently – defining and describing objects, people, phenomena, events.- speaking on randomly chosen topics.

UNIT 5: Group Discussion **6 periods**

Fundamentals of Group Discussion- Dos and Don'ts- filling the Grid- possible list of topics- practice sessions- sample videos-Group activity

UNIT 6: Resume Writing and Cover Letter **3 periods**

Pre activity: answer the questions- jotting down biographical information- sample resumes- tips, Dos and Don'ts- model resumes- practice exercises on Resume writing

UNIT 7: Interview Skills **9 periods**

Pre –while-post activities: - things to do at three stages – respond to notifications- know the information about the organisation-practice FAQs - preparation of good/ suitable C V, Body language, tips for success in interviews, model / mock interviews.

UNIT 8: Presentation Skills **9 periods**

Preparatory work: observe pictures and answer questions- different kinds of presentations- PPTs, Flash cards, Posters, Charts. - tips to prepare aids, slide show, model PPTs, - checklist on pre, while and post presentations.

Mapping Course Outcomes with Programme Outcomes:

PO	1	2	3	4	5	6	7
CO	POs 1 to 5 are applications of Engineering Principles, can't be directly mapped to English Communication Skills					1,2,3,4	1,2,3,4

Unit wise Mapping of CO –PO

CO	Course Outcome	COs / Unit Mapped	POs mapping	Cognitive levels as per Bloom's Taxonomy R/U/A/An (Remembering / Understanding / Applying/ Analyising)
CO 1	Listen and comprehend listening inputs related to different genres effectively	Unit 1	6,7	R/U/A
CO2	Communicate effectively in interpersonal interactions, interviews, group discussions and presentations	Units 3,4,5,7,8	6,7	R/U/A/An
CO3	Acquire employability skills: job hunting, resume writing, attending interviews	Units 6,7	6,7	R/U/A/An
CO4	Practise appropriate body language and professional etiquette	Units 2, 3, 4,5,7,8	6,7	R/U/A

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IOT-409, MICROCONTROLLERS AND INTERFACING LAB

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
IOT-409	Microcontrollers and Interfacing Lab	03	45	40	60

S.No	Unit Title	No. of Periods	COs Mapped
1	Familiarization with Keil software and Microcontroller Kit	03	CO1
2	Basic programming using Microcontroller kit/Keil	15	CO2
3	Interfacing I/O devices with 8051 using Embedded C	18	CO3
4	Application development using Proteus/equivalent software	06	CO4
5	Dumping/Burning into Microcontroller chip	03	CO4
	Total	45	

Course Objectives	1. To familiarize with 8051 Microcontroller kit and Keil compiler
	2. To understand the programming and interfacing concepts of 8051 Microcontroller
	3. To learn the practical importance and applications of programming and interfacing of 8051 Microcontroller chip

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CO No		COURSE OUTCOMES
CO1	IOT-409.1	Describe the usage of 8051 Microcontroller kit and Keil Compiler
CO2	IOT-409.2	Apply Instruction set of 8051 Microcontroller in AL programming
CO3	IOT-409.3	Apply Instruction set of 8051 Microcontroller for interfacing of I/O devices
CO4	IOT-409.4	Simulate Interfacing circuits using Proteus and learn the burning of firmware into Microcontroller chip

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT-409.1	3	3	3	3			3	3	3	
IOT-409.2	3	3	3	3	3			3	3	3
IOT-409.3	3	3	3	3	3	1	3	3	3	3
IOT-409.4	3	3	3	3	3	1	3	3	3	3
Average	3	3	3	3	3	1	3	3	3	3

3=strongly mapped 2=moderately mapped 1=slightly mapped

LEARNING OUTCOMES:

I. **Familiarization with Microcontroller Kit & Simulators**
   3. Familiarize with   8051 Microcontroller Kit
   4. Familiarize with   8051 simulator KEIL (or equivalent software)

II. **Basic programming using Microcontroller kit/Keil**
   5. Write an ALP to perform Block move - 10bytes of data from 0X30-0X39 to 0X40-0X49
   6. Write an ALP to perform Block exchange – 10bytes of data between 0X30-0X39 to 0X40-0X49
   7. Write an ALP to perform: Addition,subtraction,division and multiplication of two8-bit numbers
   8. Write an ALP to perform addition of two16-bit numbers
   9. Write an ALP to perform subtraction of two16-bit numbers
   10. Write an ALP to the find Smallest/Largest number in 10bytes of data stored from 0X30 to 0X39 and store the result in the next location i.e., 0X3A
   11. Write an ALP to find the 2's complement of given 8-bit number

III. **To practice Interfacing Techniques using Embedded C**
   12. Write a program to make an LED connected to port pin P1.5, light up for specific time on pressing a switch connected to port pin P2.3
   13. Write a Program to make an LED connected to pinP1.7 to   blink at a specific rate
   14. Interface a 7segment LED display with 8051 microcontroller and write a program to display a given decimal digit
   15. Interface a small DC motor with 8051 and write a program to rotate the motor in clockwise/anti clockwise direction

IV. **Application development using proteus/equivalent software**
   16. Familiarization of firmware-based application with proteus/equivalent software
   17. Perform experiments given in 10 and 11 above using proteus

V. **Dumping/Burning into Microcontroller**
   18. Perform burning/loading of .HEX file of experiments given in 10and 11 above into flash memory for 89C51 and test it in development kit.

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IOT-410, ADVANCED IOT LAB

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
IoT-410	Advanced IoT Lab	03	45	40	60

S.No	Unit Title	No. of Periods	COs Mapped
1	Familiarization with Arduino Nano/Mega Board	06	CO1
2	Interfacing sensors and actuators	30	CO2
3	Study of simple IoT projects using Arduino	9	CO3
	Total	45	

Course Objectives	1. To Familiarization with Arduino Nano/Mega Board
	2. To interface sensors and actuators using Arduino Nano/Mega Board
	3. To Study simple IoT projects using Arduino

CO No		COURSE OUTCOMES
CO1	IoT-410.1	1. Familiarise with Arduino Nano/Mega Board
CO2	IoT-410.2	2. Interface sensors and actuators using Arduino Nano/Mega Board
CO3	IoT-410.3	3. Explore simple IoT projects using Arduino

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IoT-410.1	3	1					3	3	3	
IoT-410.2	3	1			3			3	3	3
IoT-410.3	3	1			3	2	3	3	3	3
Average	3	1			3	2	3	3	3	3

3=strongly mapped 2=moderately mapped 1=slightly mapped

LEARNING OUTCOMES:
I. Familiarization with Arduino Board

1. Familiarize with Arduino Nano, Mega Boards

II. Interfacing with sensors and actuators
2. Interface MQ2 gas/smoke/alcohol sensor with Arduino and glow the Red, Green Blue LEDs depending on the gas/smoke/alcohol concentration
3. Interface DC motor to Arduino and control its speed using potentiometer
4. Interface a sound sensor and LED with Arduino and turn ON the LED when there is sound otherwise turn OFF the LED.

5. Interface photo sensor and LED with Arduino and turn ON LED when there is no light and turn OFF LED when there is light

6. Interface IR Sensor Module and buzzer with Arduino. Switch ON buzzer to detect the presence of obstacles.

7. Interface **Ultrasonic sensor** with Arduino to measure the distance from the target and display it on LCD display.

8. Interface **soil moisture sensor** with Arduino to measure the percentage of soil moisture and display it on LCD display

9. Control a **servo motor** using Arduino with an input given through a pushbutton (ex. When the push button is pressed the servo motor has to rotate by 15 degrees)

10. Rotate **a stepper motor** either clock-wise or anti clock wise at 'n' number of steps using Arduino.

11. Interface **proximity sensor** with Arduino and indicate the object movement

12. Interface water level sensor with Arduino and display the different water levels with Red, green and Blue LEDs

13. Design a Digital DC Voltmeter to measure the voltage using Arduino and display the values in LCD display

14. Interface a **heat sensor** to the Arduino board and display its reading on an LCD

15. Interface heartbeat sensor with Arduino and display the status on LCD display

III. Study of simple IOT based projects

16 Build and Study a simple IOT based home automation system

17 Build and Study a simple IOT based home security system

18 Build and Study a simple IOT based smart irrigation system

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V SEMESTER

DIPLOMA IN INTERNET OF THINGS
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
V SEMESTER

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Semester	Scheme Of Examinations			
		Theory	Pract--icals		Duration (hrs)	Sessio-nal Marks	End Exam Marks	Total Marks
THEORY SUBJECTS								
IOT-501	Industrial Management and Entrepreneurship	5	-	75	3	20	80	100
IOT-502	Big Data & Cloud Computing	5	-	75	3	20	80	100
IOT-503	Hardware Platforms for IoT	5	-	75	3	20	80	100
IOT-504	Industrial IoT & its Security	5	-	75	3	20	80	100
IOT-505	Python Programming	5	-	75	3	20	80	100
PRACTICAL SUBJECTS								
IOT-506	Embedded Systems for IoT Lab	-	4	60	3	40	60	100
IOT-507	Python Programming Lab	–	4	60	3	40	60	100
IOT-508	Life Skills	-	3	45	3	40	60	100
IOT-509	Project work	-	3	45	3	40	60	100
	ACTIVITIES	**-**	**3**	**45**				
	Total	**25**	**17**	**630**	**-**	**300**	**700**	**900**

501,508 common to all branches
502,505 common with DCME

INDUSTRIAL MANAGEMENT & ENTREPRENEURSHIP

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
IOT-501	Industrial Management & Entrepreneurship	5	75	20	80

TIME SCHEDULE

S.No.	Chapter/Unit title	No.of periods	Weightage Allocated	Short type	Essay type	CO's Mapped
1	Principles of Management.	08	16	2	1	CO1
2	Organization Structure & Organizational Behaviour.	15	26	2	2	CO2
3	Production Management.	14	26	2	2	CO3
4	Engineering Ethics & Safety and Labour Codes.	15	26	2	2	CO4
5	Entrepreneurship & Start-ups.	08	16	2	1	CO5
	TOTAL	75	110	30	80	

Course Objectives and Course Outcomes

			Upon completion of the course the student shall be able to
COURSEOBJECTIVES			(i) Familiarize the concepts of management, and organization structures.
			(ii) Exposure to organizational behavioural concepts, basics of production management in industries.
			(iii) Exposure to Engineering Ethics, Industrial Safety, Labour codes and entrepreneurial start-ups programmes.
COURSE OUTCOMES	CO1	IOT-501.1	Understand the principles of management as applied to industry.
	C02	IOT-501.2	Explain types of the industrial organization structures and the behaviour of an individual in an organization, motivational and leadership styles.
	C03	IOT-501.3	Explain the different aspects of production management.
	CO4	IOT-501.4	Explain Engineering Ethics, Industrial Safety and industrial Labour Codes.
	CO5	IOT-501.5	Explain Entrepreneurial development programmes and Start-ups.

CO and PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	1							1		
CO2		1								2
CO3	3								2	2
CO4						3		1	2	
CO5							2	1	2	

3: High, 2: Moderate, 1: Low Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions
(vi) Quiz   (vii) Industry Visits   (viii) Tech-Fest   (ix) Mini Projects (x) Library Visits.

MODEL BLUE PRINT OF THE QUESTION PAPER

Sl. No	Chapter Name	Periods Allocated	Weightage Allocated	Question Wise Distribution of Weightage			Marks Wise Distribution of Weightage		
				R	U	Ap	R	U	Ap
1	Principles of Management.	08	16	1	1	1	3	3	10
2	Organization Structure & Organizational Behaviour.	15	26	1	1	2	3	3	20
3	Production Management.	14	26	1	1	2	3	3	20
4	Engineering Ethics & Safety and Labour Codes.	15	26	1	1	2	3	3	20
5	Entrepreneurship & Start-ups.	08	16	1	1	1	3	3	10
	TOTAL	**60**	**110**	**5**	**5**	**08**	**15**	**15**	**80**

Note: R-Remembering;   U-Understanding;   Ap-Applying;

Learning Outcomes

Understand the principles of management as applied to industry.

   1.0 **Principles of Management**
       1.1   Define industry, commerce (Trade) and business.
       1.2   Know the need for management.
       1.3   Understand functions of Management.
       1.4   List the principle of scientific management by F.W.Taylor
       1.5   List the principle of modern management by Henry Foyal.
       1.6   Differentiate management, administration and organization

1.7   Differentiate Lower, Middle and Top level management

1.8   Explain the importance of Managerial skills (Technical, Human, Conceptual)

1.9   Know the objectives of Management Information Systems.

1.10 Know the Characteristics of Management Information Systems.

2.0   **Organization Structure & Organizational Behaviour**

2.1   Define organization structure.

2.2   Explain line, staff and line & staff organization structures with advantages, disadvantages and applications.

2.3   List various Motivation theories.

2.4   Explain Maslow's Hierarchy of needs.

2.5   Explain Different leadership styles.

2.6   Explain Trait theory of leadership

2.7   Explain Behavioral theory of Leadership.

2.8   Explain the Responsibility of human resource management.

2.9   Understand the process of recruitment, selection and training

2.10 State the Objectives of Job Analysis.

3.0 Production Management

3.1   Define Production, Planning and Control.

3.2   Explain Briefly Mass production, Batch production and Job order production.

3.3   Define the terms Routing, Scheduling and Dispatching.

3.4   List applications of network diagrams in production planning and control.

3.5   Draw PERT and CPM Network Diagrams – Simple Problems.

3.6   Know the functions of Materials Management.

3.7   Explain ABC analysis of Inventory.

3.8   Explain concept of Economic ordering quantity.

3.9   Explain meaning of Supply chain management.

3.10   Write processes of Supply Chain Management

3.11   List the Functions of Purchase Department.

3.12   Write functions of Stores Department.

4.0 Engineering Ethics & Safety and Labour Codes

4.1   Definition of Engineering Ethics.

4.2   Understand Core qualities of Professional Engineers.

4.3   Explain Different types of Ethics in Engineering.

4.4   State the meaning of Intellectual Property Rights

4.5   List common types of Intellectual Property Rights.

4.6   List Activities of Corporate Social Responsibility (CSR).

4.7   State the need of Human values in engineering fields.

4.8   Comprehend the importance of safety at Workplace.

4.9   List Different hazards in the industry.

4.10   State the causes of accidents costs of accidents and their prevention.

4.11   List Salient features of Code on Wages, 2019.

4.12   List Salient features of Industrial Relations Code, 2020,

    4.13   List Salient features of Code on Social Security, 2020

    4.14   List Salient features of Occupational Safety, Health and Working Conditions Code, 2020.

5.   Entrepreneurship & Start-ups

5.1   Define the word Entrepreneur and Entrepreneurship.

5.2   Explain various self - employment schemes

5.3   List the Financial assistance programmes provided by the Governments.

5.4   Explain the concept of TQM and ISO 9000 series and BIS 14000 Series.

5.5   List the Advantages and Drawbacks of ISO 9000 series of standards.

5.6   Explain the Concept of Incubation center's.

5.7   Explain Startup and its stages.

5.8   Explain Break Even Analysis to make or buy the products.

5.9   State the Importance of Branding.

5.10 State the significance of Business name, logo and tag line.

5.11 Explain the Concepts of Digital Marketing.

5.12 Know the Role of E-commerce and Social Media.

Course Content

1.0 Principles of Management

Introduction: Industry, Commerce and Trade; Definition of management; Functions of management; Principles of Scientific Management: F.W. Taylor - Principles of Modern Management: Henry Fayol; Administration organization and management; Levels of management - Managerial skills - Management Information Systems: Objectives and Characteristics.

2.0 Organization Structure & Organizational Behaviour

Organization Types: Line, Staff and Line & Staff Organizations – Maslow's motivational theory; Leadership Styles – Trait theory of leadership – Behavioural theory of Leadership.

Job Analysis - Responsibility of human resource management - Selection procedure – Training of Workers: Apprentice Training – On job training.

3.0 Production Management.

Production, Planning and Control – Types of Production - Routing, Scheduling and Dispatching - PERT and CPM Network Diagrams – Applications - –Calculate Project Duration and identify the critical path of the Project – Simple Problems; Functions of Materials Management - ABC analysis of Inventory. - Economic ordering quantity- Meaning of Supply Chain Management – Processes of Supply Chain Management - Functions of Purchase Department - Purchasing Procedure -Functions of Stores Department – Bin Card.

4.0 Engineering Ethics &Safety and Labour Codes

Engineering Ethics: Definition – Classification of Engineering Ethics - Personal and Business ethics – Value based ethics - Environmental ethics – Meaning of Intellectual Property Rights – Common types of Intellectual Property Rights - Activities of Corporate Social Responsibility (CSR).

Human values : Morals – Values –Character- Caring –Courage - Cooperation – Commitments – Empathy – Honesty- Integrity - Respect for others – Sharing–Service learning.

Industrial Safety: The importance of safety at Workplace -Hazard and accident - Different hazards in the industry -The causes of accidents and prevention of accidents - Direct and indirect cost of accidents.

Industrial Labour Codes: Meaning of Employer and Employee - Objectives of Industrial Labour Codes – Salient features of Code on Wages, 2019 - Salient features of Industrial Relations Code, 2020 - Salient features of Code on Social Security, 2020 - Salient features of Occupational Safety, Health and Working Conditions Code, 2020.

5.0 Entrepreneurship & Start-ups

Entrepreneur - Entrepreneurship - Role of Entrepreneur - Qualities of an entrepreneur- Requirements of an entrepreneur - Expectations of Entrepreneurship - Self-employment schemes - Institutional support - Concept of TQM –Pillars of TQM- Importance of ISO 9000 certification - Concepts of ISO 9000 Series and BIS 14000 Series- Advantages and Drawbacks of ISO 9000 series of standards - List the beneficiaries of ISO 9000.

Financial assistance programmes - Concept of Incubation center's – Start-up and its stages –– Make or Buy Decision – Break Even Analysis - Branding – Business name, logo and tag line – Concepts of Digital Marketing - Role of E-commerce and Social Media.

REFERENCEBOOKS
1. Industrial Engineering and Management   -by O.PKhanna
2. Production Management-by Buffa.
3. Engineering Economics and Management Science-by Banga& Sharma.
4. Personnel Management by Flippo.
5. Production and Operations Management–S.N.Chary
6. Converging Technologies for Smart Environments and Integrated
   Ecosystems IERC Book Open Access 2013 pages-54-76.

Table specifying the scope of syllabus to be covered for Unit Test-I & Unit Test-II

IOT-501 :: Industrial Management & Entrepreneurship

Unit Test	Learning Outcomes to be covered
Unit Test – I	From 1.1 to 3.12
Unit Test – II	From 4.1 to 5.12

Unit Test - 1

Q.No	Question from the Chapter	Bloom's category	Marks allocated	CO addressed
	Part - A (16 marks)			
1	Principles of Management, Organization Structure & Organizational Behaviour and Production Management	R,U	4	CO1,CO2, CO3
2	Principles of Management	U	3	CO1
3	Organization Structure & Organizational Behaviour	U	3	CO2
4,5	Production Management	U	6	CO3
	Part - B (24 marks)			
6	Principles of Management	U	8	CO1
7	Organization Structure & Organizational Behaviour	U	8	CO2
8	Production Management	U	8	CO3

Unit Test - 2

Q.No	Question from the topic	Bloom's category	Marks allocated	CO addressed
	Part - A (16 marks)			
1	Engineering Ethics and Human Values and Entrepreneurship & Start-ups	R,U	4	CO4, CO5
2	Engineering Ethics and Human Values	U	1	CO4
3	Entrepreneurship & Start-ups	U	3	CO5
	Part - B (24 marks)			
6	Engineering Ethics and Human Values	U	8	CO4
7	Entrepreneurship & Start-ups	U	8	CO5
8	Engineering Ethics and Human Values and Entrepreneurship & Start-ups	U	8	CO4, CO5

R-Remembering;   U-Understanding;   Ap-Applying;   An- Analylising

BOARD DIPLOMA EXAMINATION,
Unit Test - 1
IOT-501 Industrial Management and Entrepreneurship Start-ups

Time : 90 Minutes   Total Marks: **40**

PART – A

Instructions: *1ˢᵗ Question having 4 one-mark questions, and remaining 4Questions carry 3 marks each*

1. (a) The highest skill required for top level management is ------------------------

    (b) Who stated the Needs of hierarchy theory?

    (c) PERT is event oriented approach   (Yes/No)

    (d) Choose the correct answer

       Bin card are used in (planning department/stores/marketing department/finance department)

2. Differentiate Management and Administration.

3. Explain Trait theory of leadership

4. Define Routing, Scheduling and Production control.

5. State the purpose of bin card

PART – B

Instructions: *Part B consists of **3** Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.*

6. (a) Explain Staff organisation with the aid of sketch and state advantages and disadvantages.

(OR)

  *(b)*Explain Maslow's Hierarchy of needs

*7. (a)*Explain ABC Analysis of inventory.

(OR)

(b)For the following data of a project, draw the network. Find out critical path and project duration

Activity.	1--2	1--3	1--4	2--5	3--5	3--6	4--6	5--7	6--7
Days.	5	4	7	6	10	7	8	5	6

8(a) Explain the principles of management.

(OR)

 (b) Explain functions of   Management.

BOARD DIPLOMA EXAMINATION
Unit Test - 2
IOT-501 Industrial Management and Entrepreneurship Start-ups

Time : 90 Minutes   Total Marks: **40**

PART – A

Instructions: *1ˢᵗ Question having 4 one-mark questions, and remaining 4Questions carry 3 marks each*

1. (a) Write the full form of TQM

   (b) Write the full form of MSME

   (c) Choose the correct answer

 ISO means Indian organisation for standardisation (Yes/No)

 (d) EDP means ---------------------

2. List out causes for accidents in the industry

3. What are the expectations of entrepreneur?

4. What are the pillars of TQM?

5. Lit out Beneficiaries of ISO9000 certification

PART – B

Instructions: *Part B consists of **3**Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.*

6. (a) Explain various industrial hazards .

(OR)

 *(b)*Explain Industrial Relations Code, 2020

7. (a) Explain any four self-employment schemes

(OR)

 (b) Explain the Entrepreneurial Development schemes existing in our country

8 (a) what are the advantages and disadvantages of ISO 9000series of standards

(OR)

 (b)   Explain Occupational Safety, Health and Working Conditions Code, 2020

BOARD DIPLOMA EXAMINATION,
D.I.O.T. – V SEMESTER EXAMINATION
INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP START-UPS

Time : 3 Hours   Total Marks: **80**

PART – A

Answer all questions   10 x 3=30

1. With line diagram, show the managerial skills needed at various levels of management
2. Differentiate administration, organisation and management
3. List out various types selection tests
4. Explain Trait theory of leadership
5. What is meant by inventory control
6. List out various types of productions and explain any one of them
7. Write the classification of Engineering ethics
8. List out causes of industrial accidents
9. What are the pillars of TQM
10. Lit out Beneficiaries of ISO9000 certification

PART B

Answer all questions   5 x 8=40

11. Explain principles of management stated by Henry Foyal

12   Explain Maslow's needs of hierarchy motivation theory

13   Explain Line and Staff organisation structure

14   Explain different types of productions

15   For the following data of a project, Draw the network, Find out critical path and project

Duration.

Activity.	1--2	1--6	2--3	2-4	3--5	4--5	6--7	5--8	7-8
Optimistic time days	2	2	5	1	5	2	3	2	7
Most likely time days	5	5	11	4	11	5	9	2	13
Pessimistic time days	14	8	29	7	17	14	27	8	31

16   Explain causes of industrial accidents and cost of industrial accidents

17   Explain the salient features of Industrial Relations Code, 2020

18   Explain break even analysis with a line diagram.

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BIG DATA & CLOUD COMPUTING

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
IOT-502	Big data & Cloud Computing	5	75	20	80

S.No.	Chapter/Unit title	No.of periods	Weightage Allocated	Short type	Essay type	CO's Mapped
1	Over View of Data Mining	20	29	3	2	CO1
2	Over view of data ware housing	10	13	1	1	CO2
3	Introduction to Big Data	10	16	2	1	CO3
4	Big Data Analytics	20	26	2	2	CO4
5	Cloud computing	15	26	2	2	CO5
	TOTAL	75	110	30	80	

Course Objectives	i)To know the fundamentals of Data Mining ii)To know the fundamentals of Data WareHousing iii)To familiarize with Big Data and Big Data Analytics iv)To Know Big data Technologies

Course Outcomes	At the end of the course the student able to learn following:		
	CO1	IOT-502.1	Describe Data Mining
	CO2	IOT-502.2	Explain DATA WARE HOUSING
	CO3	IOT-502.3	Describe Big Data
	CO4	IOT-502.4	Analyse functioning of various Big data Analytical techniques
	CO5	IOT-502.5	Explain Cloud computing

CO-PO/PSO Matrix:

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT-502.1	1	1	1	1	0	0	2	0	1	1
IOT-502.2	1	0	1	2	1	0	2	2	2	0
IOT-502.3	3	0	0	1	0	0	2	2	1	0
IOT-502.4	2	2	1	1	0	0	1	2	1	3
IOT-502.5	2	0	1	1	1	0	2	2	3	0
Average	1.8	0.6	0.8	1.2	0.5	0	1.8	1.6	1.6	0.8

3=Strongly mapped , 2=moderately mapped, 1=slightly mapped

Learning Outcomes:

1. **Over View Data Mining**
   1.1. Define Data Mining
   1.2. List type of Data Mining
   1.3. List Advantages of Data Mining
   1.4. List Disadvantages of Data Mining
   1.5. List Applications of Data Mining
   1.6. List Challenges of Implementation in Data mining
   1.7. Evolution of Data Mining
   1.8. List and explain Data Mining Techniques
   1.9. Explain Data Mining Implementation Process
   1.10. Explaining Data Mining Architecture
   1.11. Explain KDD- Knowledge Discovery in Databases of Data Mining
   1.12. List and explain Data Mining tools
   1.13. List Major Difference between Data mining and Machine learning
   1.14. State the importance of Data Analytics
   1.15. List and explain phases of Data Analytics
   1.16. Differentiate between Data Mining and Data Analytics
   1.17. List and explain types of Datamining techniques
   1.18. Explain Text data mining
   1.19. Differentiate between classification and clustering in data mining

2. **Over View Of Data Ware Housing**
   2.1. Define data ware housing
   2.2. State the importance of Data Ware Housing
   2.3. Differences between Database and Data Warehouse
   2.4. Explain Data Warehouse Architecture
   2.5. Explain Three-Tier Data Warehouse Architecture
   2.6. State the importance of Operational Data Stores
   2.7. Define ETL and ELT
   2.8. List Types of Data Warehouses
   2.9. Explain Data Ware Housing Model
   2.10. Explain Data Warehouse Design approaches
   2.11. Define terms Meta Data, Data Mart
   2.12. Define OLAP
   2.13. List characteristics of OLAP
   2.14. Differentiate between OLTP and OLAP
   2.15. List Types of OLAP
   2.16. Differentiate between Data Mining and Data Warehousing

3. **Introduction to Big Data**
   3.1. Define bigdata
   3.2. Evolution of Bigdata
   3.3. List Challenges of Traditional system
   3.4. Describe three V's of bigdata
   3.5. Describe Storing Big Data
   3.6. How do you Select Big Data
   3.7. Explain Processing of Big Data
   3.8. Classify the structures of Big Data
   3.9. State the Need of Big Data
   3.10. List the sources of big data

3.11.   Define Big Data Analytics
3.12.   List the types of tools used in Big Data
3.13.   List and explain the applications of big data
3.14.   List various risks of Big Data
3.15.   Describe Intelligent data analysis
3.16.   Differentiate between Traditional and Bigdata approach

4.   Big Data Analytics

4.1. State the importance of big data analytics
4.2. Explain Big Data Life Cycle
4.3. State the Methodology in Big data Analytics
4.4. List Core Deliverables
4.5. List Key Stakeholders
4.6. List the responsibilities of Data Analyst
4.7. List the basic skills necessary for data analyst
4.8. State the importance of Data Scientist
4.9. Dealing with Big Data Analytic Project

      4.9.1.   How to managea Bigdata Analytics Project
      4.9.2.   State Problem Definition
      4.9.3.   Data collection
      4.9.4.   Cleansing data
      4.9.5.   Summarizing
      4.9.6.   Data exploration
      4.9.7.   Data Visualization

4.10. Big data Analytic methods

      4.10.1. Importance of SQL in Data Analytics
      4.10.2. Importance of Charts & Graphs
      4.10.3. Importance of   Data Analysis Tools: R Programming, Python for data
                           analysis, Julia,SPSS, MATLAB, Octave

4.11. ADVANCED METHODS

      4.11.1.   Role of Machine Learning for Data Analysis
      4.11.2.   List association rules
      4.11.3.   State importance of Decision trees
      4.11.4.   State importance of Text Analytics

4.12. BIG DATA TECHNOLOGIES

      4.12.1. State the importance of NOSQL
      4.12.2. List advantages of NOSQL
      4.12.3. Sate the importance of NEWSQL
      4.12.4. List advantages of NEWSQL
      4.12.5. HADOOP

            4.12.5.1. List advantages
            4.12.5.2 List Features
            4.12.5.3 List versions
            4.12.5.4. Explain Hadoop components
            4.12.5.5.Explain HADOOP Architecture

5.   Cloud Computing

5.1. What is cloud computing
5.2. List Advantages of cloud computing
5.3. List disadvantages of cloud computing

5.4. Evolution of cloud computing

5.5. Draw and explain NIST Visual Model of Cloud Computing

5.6. List features of Cloud computing

5.7. List and explain components of cloud computing

5.8. List and explain Cloud computing technologies

5.9. List and explain different service models in cloud computing

5.10. Compare different service models

5.11. List and explain different deployment models or types of clouds

5.12. Differentiate between private cloud and public cloud

5.13. Compare traditional data center and Cloud storage

5.14. Describe how data is managed in cloud (DBaaS)

5.15. Explain security concepts in cloud

5.16. List different types of cloud simulator

5.17. State the importance of cloud simulator

COURSE CONTENT

1. DATA MINING: Data Mining - definition – Types- Advantages - Disadvantages - Applications - challenges - Evolution – Techniques - Implementation Process – Architecture - KDD- Knowledge Discovery - tools - Difference between Data mining and Machine learning – phases Data Analytics - Text data Mining - classification and clustering in data mini

2. DATA WARE HOUSING: What is data ware housing - importance of Data Ware Housing – differences between Datase and Data Warehouse - Data Warehouse Architecture - Three-Tier Data Warehouse Architecture - Operational Data Stores? - Define ETL and ELT - Types of Data Warehouses - Data Ware Housing Model - Data Warehouse Design approaches - terms Meta Data, Data Mar - OLAP - Data Mining Vs Data Warehousing

3. Introduction to Big Data: Define bigdata& analytics - Evolution of data/bigdata - Challenges of Traditional system - The three V's of big - Storing Big Dat - Selecting Big Data - Processing of Big Data- structures of Big Data - Need Big Data- tools used in Big Data - applications of big data - risks of Big Data - importance of Intelligent data analysis - Traditional vs. Big Data approach

4. BIG DATA ANALYTICS: Importance of big data analytics - Big Data Life Cycle - Methodology in Big data Analytics - Core Deliverables - Key Stakeholder - responsibilities of Data Analysis - basic skills necessary for data analyst - importance of Data Scientist- Big Data Analytic Project- Big data Analytic methods - ADVANCED METHODS- BIG DATA TECHNOLOGIES -NOSQL -NEWSQL - HADOOP

5. CLOUD COMPUTING: cloud computing - Advantages and disadvantages - Evolution of cloud computing - Draw and explain NIST Visual Model of Cloud Computing - features of Cloud computing- components of cloud computing- Cloud computing technologies - different service models in cloud computing - Compare different service models- different deployment models or types of clouds- Differentiate between private cloud and public cloud - Compare traditional data centre and Cloud storage - how data is managed in cloud(DBaaS)- security concepts in cloud- cloud simulator and List different types

TEXT BOOKS

1. H.Dunham,"Datamining:Introductory and Advanced Topics" Pearson Education.
2. Sam Anahory, Dennis Murray, "Data Warehousing in the Real World : A Practical Guide for Building Decision Support Systems, Pearson Education.

REFERENCE BOOKS

1. Jiawei Han, Micheline Kamber, "Data Mining Concepts & Techniques" Elsevier.
2. Mallach,"Data Warehousing System",McGraw –Hill.

Reference Websites:

https://www.javatpoint.com/aggregation-in-data-mining
https://www.javatpoint.com/data-warehouse
https://www.javatpoint.com/cloud-computing-technologies

Model Blue Print:

S. No.	Chapter Name	Periods allocated	Weightage allotted	Mark wise Distribution of Weightage				Question wise Distribution of Weightage				Cos Mapped
				R	U	Ap	An	R	U	Ap	An	
1.	Over View of Data Mining	20	29	6	20			3	2			CO1
2.	Over view of data ware housing	10	13	3	10			1	1			CO2
3.	Introduction to Big Data	10	16	6	10			2	1			CO3
4.	Big Data Analytics	20	26	6	20			2	2			CO3,CO4
5.	Cloud computing	15	26	6	20			2	2			CO3,CO5
	Total	75	110	30	80			10	8			

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	1.1 to 3.8
Unit test-2	3.9 to 5.17

DIPLOMA IN INTERNET OF THINGS
MODEL PAPER
Big Data & Cloud Computing
UNIT TEST-1

SCHEME: C-23   SUBJ CODE:IOT-502
MAX MARKS:40   TIME: 90Minutes

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PART-A   **16 Marks**

Instructions:1) Answer all questions

           2) First question carries 4marks, and each question of remaining
             carries 3marks

1. a) Data mining is the process of sorting through large data sets to identify patterns and
relationships (True/False)   (CO1)

b) -------------------- is type of data mining   (CO1)

c) Data ware housing means ---------------------   (CO2)

d) OLAP means []   (CO3)

I) Online analytical processing II) Online additional processing III) Online asset processing IV) NONE

2)List any three Advantages of Data Mining   (CO1)
3) List any three Difference between Database and Data Warehouse   (CO2)
4) What are the three V 's of bigdata   (CO3)
5) What is the necessity of big data.   (CO3)

PART-B   3 X 8=24Marks

Instructions: 1) Answer all questions

          2)Each question carries 8 Marks

          3)Answer should be comprehensive and the criterion for valuation is the
          content but not the length of the answer

6. a) Explain Text data mining in detail.   (CO1)
                           Or
 b) Explaining Data Mining Architecture in detail.   (CO1)
7. a) Explain Three-Tier Data Warehouse Architecture   (CO2)
                           Or
 b) Explain Data Warehouse Design approaches in detail   (CO2)
8. a) Explain Processing Big Data in detail.   (CO3)
                           Or
b) Explain the procedure for Storing Big Data   (CO3)

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BOARD DIPLOMA EXAMINATIONS

DIPLOMA IN INTERNET OF THINGS
MODEL PAPER – YEAR END EXAMINATION
Big Data & Cloud Computing

SCHEME: C-23   SUBJ CODE: IOT-502
MAX MARKS:80   TIME: 3HOURS

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PART-A

10X3=30Marks

Note: Answer all questions

1. Define Data Mining.   (CO1)
2. State the importance of Data Analytics   (CO1)
3. List any three Data Mining tools   (CO1)
4. State the importance of Data Ware Housing   (CO2)
5. Define bigdata   (CO3)
6. List any three tools used in big data   (CO3)
7. List any three Key Stakeholders in Big data   (CO4)
8. Sate the importance of NEWSQL   (CO4)
9. What is cloud computing   (CO5)
10. List any three Differences between private cloud and public cloud (CO5)

PART-B

5X10=50Marks

Note: Answer any five questions

11. Explain Data Mining Implementation Process.   (CO1)

12. Explain any two Datamining techniques   (CO1)

13. Explain Three-Tier Data Warehouse Architecture   (CO2)

14. Explain Processing of Big Data   (CO3)

15. Explain Big Data Life Cycle   (CO4)

16.Explain components of HADOOP   (CO4)

 17.Draw and explain NIST Visual Model of Cloud Computing   (CO5)

18. Explain security concepts in cloud   (CO5)

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HARDWARE PLATFORMS FOR IOT

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
IOT-503	**Hardware Platforms for IoT**	05	75	20	80

S No	Unit Title	No. of Periods	Weightage of Marks	No. of Short Answer Questions	No. of Essay Questions	COs Mapped
1	Introduction to Hardware Platforms for IoT	12	16	2	1	CO1
2	Building IoT with Arduino	17	26	2	2	CO2
3	Building IoT with ESP8266 Node Microcontroller Unit (Node MCU)	13	26	2	2	CO3
4	Building IoT with Raspburry Pi	18	26	2	2	CO4
5	Arduino Programming fundamentals	15	16	2	1	CO5
	Total	75	110	30	80	

Course Objectives	To Introduce Hardware Platforms for IoT
	To understand about building IoT with Arduino
	To know aboutBuilding IoT with ESP8266 Node Microcontroller Unit (Node MCU)
	To explore building IoT with Raspberry Pi
	To get acquaint with Arduino Programming fundamentals

CO No		COURSE OUTCOMES
CO1	IOT-503.1	Introduce Hardware Platforms for IoT
CO2	IOT-503.2	understand about building IoT with Arduino
CO3	IOT-503.3	Know about building IoT with ESP8266 Node MCU
CO4	IOT-503.4	Build IoT with Raspberry Pi
CO5	IOT-503.5	Acquaint with Arduino Programming fundamentals

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT-503.1	3				1			3		1
IOT-503.2	3	2	1		2			3	1	
IOT-503.3	3	1	1		1			3		1
IOT-503.4	3	3	2	1	2			3		2
IOT-503.5	3	3	1	2	3		1	3	1	2
Average	3	1.8	1.25	1.5	1.8			3	1	1.5

3=strongly mapped, 2=moderately mapped, 1=slightly mapped

3.0 Introduction to Hardware Platforms for IoT

1.1 State the need of hardware platform in IoT

1.2 List any six different common hardware platforms used in IoT

1.3 Explain the features of hardware platform such as i) power supply ii) Input/output ii) Memory iii) communication iv) clock frequency

1.4 Draw the block diagram of an IoT based smart home automation system and explain the role of Hardware platform in that system.

1.5 List the advantages of hardware platforms in building IoT

1.6 List the applications of hardware platforms in IoT

1.7 List the factors to be considered for selection of an IoT hardware platform

4.0 Building IoT with Arduino

2.1 State the purpose Arduino development boards in building IoT projects

2.2 List different entry level Arduino boards

2.3 Draw the layout diagram of Arduiono Uno and identify different functional blocks

2.4 List the features of Arduino Uno

2.5 Explain about the analog, digital and PWM I/O pins of Arduino Uno

2.6 List the communication protocols supported by Arduino Uno

2.7 State the memory modules associated with Arduino Uno

2.8 State the power supply features of Arduino Uno

2.9 Compare the specifications and features of entry level Arduino boards such as: Uno R3, Nano, Mini, Micro and Mega boards.

2.10 List different Enhanced Featured Arduino boards

2.11 Compare the specifications and features of Enhanced Featured Arduino boards such as: Nano BLE, MKR Zero, and Zero boards.

2.12 List different IoT Arduino boards

2.13 Compare the specifications and features of IoT featured Arduino boards such as: Nano 33 IoT, MKR FOX 1200, MKR WAN 1300/1310, MKR GSM 1400, MKR WiFi and MKR NB 1500 boards.

2.14 Explain the step by step procedure of interfacing and building a project by taking DHT11 temperature sensor and LCD display interface with Arduino Uno as an example

2.15 Explain the step by step procedure for programming the Arduino board with Arduino IDE

3. Building IoT with ESP8266 Node Microcontroller Unit (Node MCU)

3.1 State the purpose of ESP 8266 Node MCU development board

3.2 State the features and specifications of ESP 8266 Node MCU

3.3 Draw the pin configuration of ESP8266 NodeMCU and state the purpose of each pin

3.4 Differentiate between Arduino uno and NodeMCU ESP8266

3.5 Differentiate between ESP32 and ESP 8266

3.6 List the applications of ESP8266 Node MCU

3.7 Explain about the significance of Wifi module in ESP8266

3.8 List the different protocols supported by ESP8266 in each layer of TCP/IP stack

3.9   Explain the step by step procedure of interfacing and building a project by taking SPI camera interface with ESP8266 WiFi module to display the video on mobile phone as an example

3.10   Explain the step by step procedure for programming the ESP8266 with Arduino IDE

4   Building IoT with Raspburry Pi

4.1   State the purpose of Raspburry Pi board

4.2   Classify Raspburry Pi generations and models

4.3   List the important specifications and features of Raspburry Pi

4.4   Compare different Raspburry Pi generations and models (Gen 4 Model B, Gen 3 model B+, Gen 3 model B and Gen 3 model A+) on the basis of: i) General Purpose Input/Output (GPIO), ii) clock frequency of CPU, iii) no. of cores and iv) RAM size

4.5   Compare different Raspburry Pi generations and models (Gen 4 Model B, Gen 3 model B+, Gen 3 model B and Gen 3 model A+) on the basis of: i) USB ports ii) power supply requirements iii) HDMI ports

4.6   Compare different Raspburry Pi generations and models (Gen 4 Model B, Gen 3 model B+, Gen 3 model B and Gen 3 model A+) on the basis of: i) video out quality ii) video in iii) Ethernet iv) bluetooth v)Wi-Fi and vi) external storage

4.7   State the significant usage of Raspburry Pi Zero

4.8   Compare Raspburry Pi and Arduino development boards

4.9   List the factors influencing the choice of selection of Raspburry Pi and Arduino

4.10   Explain the step by step procedure of interfacing and building a project by taking Fire sensor interface with Raspburry Pi to send notifications on mobile phone in case of fire as an example

4.11   Explain the step by step procedure for installation of Raspburry Pi OS (ex:Raspbian OS)

4.12   Explain the step by step procedure of programming the Raspburry Pi

5   Arduino Programming fundamentals

5.1   State the purpose of Arduino programming language

5.2   State the structure of Arduino sketch.

5.3   State the syntax and purpose of setup() and loop() functions

5.4   State the data types, variables, and operators of Arduino programming language

5.5   State the syntax of following Arduino constant declaration : HIGH, LOW,INPUT, OUTPUT, INPUT_PULLUP,LED_BUILTIN, true, false

5.6   Explain about the control statements such as: i) if statement ii) if…else statement iii)if…else if..else statement iv) switch statement and v) control operator of Arduino programming language

5.7   Explain about the loop statements such as : i) while loop ii) do…while loop iii) for loop of Arduino programming language

5.8   Explain the syntax and usage of Arduino I/O functions such as: i) pinMode() ii)digitalRead() iii)digitalWrite() iv)analogRead() v) analogWrite() vi) analogReference() Functions

5.9   Explain about the syntax and usage of times functions such as: i) delay() ii)delayMicroseconds() iii)millis() iv)micros()

5.10   State the need for Arduino library functions

5.11   State the process of adding library to the Arduino sketch

5.12   State the use of Tinkercad simulator

5.13   Explain the step by step procedure of building and simulating an Arduino based circuit (ex. LED blinking) using Tinkercad.

COURSE CONTENT:

1. Introduction to Hardware Platforms for IoT

State the need of hardware platform in IoT-List any six different common hardware platforms used in IoT -Explain the features of hardware platform such as i) power supply ii) Input/output ii) Memory iii) communication iv) clock frequency-Draw the block diagram of an IoT based smart home automation system and explain the role of Hardware platform in that system. -List the advantages of hardware platforms in building IoT -List the applications of hardware platforms in IoT-List the factors to be considered for selection of an IoT hardware platform

5.0 Building IoT with Arduino

State the purpose Arduino development boards in building IoT projects-List different entry level Arduino boards -Draw the layout diagram of Arduiono Uno and identify different functional blocks-List the features of Arduino Uno--Explain about the analog, digital and PWM I/O pins of Arduino Uno-List the communication protocols supported by Arduino Uno-State the memory modules associated with Arduino Uno-State the power supply features of Arduino Uno-Compare the specifications and features of entry level Arduino boards such as: Uno R3, Nano, Mini, Micro and Mega boards.-List different Enhanced Featured Arduino boards -Compare the specifications and features of Enhanced Featured Arduino boards such as: Nano BLE, MKR Zero, and Zero boards.-List different IoT Arduino boards -Compare the specifications and features of IoT featured Arduino boards such as: Nano 33 IoT, MKR FOX 1200, MKR WAN 1300/1310, MKR GSM 1400, MKR WiFi and MKR NB 1500 boards.-Explain the step by step procedure of interfacing and building a project by taking DHT11 temperature sensor and LCD display interface with Arduino Uno as an example -Explain the step by step procedure for programming the Arduino board with Arduino IDE

5   Building IoT with ESP8266 Node Microcontroller Unit (Node MCU)

State the purpose of ESP 8266 Node MCU development board-State the features and specifications of ESP 8266 Node MCU-Draw the pin configuration of ESP8266 NodeMCU and state the purpose of each pin-Differentiate between Arduino uno and NodeMCU ESP8266-Differentiate between ESP32 and ESP 8266-List the applications of ESP8266 Node MCU - Explain about the significance of Wifi module in ESP8266 - List the different protocols supported by ESP8266 in each layer of TCP/IP stack-Explain the step by step procedure of interfacing and building a project by taking SPI camera interface with ESP8266 WiFi module to display the video on mobile phone as an example-Explain the step by step procedure for programming the ESP8266 with Arduino IDE

6   Building IoT with Raspburry Pi

State the purpose of Raspburry Pi board-Classify Raspburry Pi generations and models-List the important specifications and features of Raspburry Pi-Compare different Raspburry Pi generations and models (Gen 4 Model B, Gen 3 model B+, Gen 3 model B and Gen 3 model A+) on the basis of: i) General Purpose Input/Output (GPIO), ii) clock frequency of CPU, iii) no. of cores and iv) RAM size -Compare different Raspburry Pi generations and models (Gen 4 Model B, Gen 3 model B+, Gen 3 model B and Gen 3 model A+) on the basis of: i) USB ports ii) power supply requirements iii) HDMI ports-Compare different Raspburry Pi generations and models (Gen 4 Model B, Gen 3 model B+, Gen 3 model B and Gen 3 model A+) on the basis of: i) video out quality ii) video in iii) Ethernet iv) bluetooth v)Wi-Fi and vi) external storage-State the

significant usage of Raspburry Pi Zero-Compare Raspburry Pi and Arduino development boards-List the factors influencing the choice of selection of Raspburry Pi and Arduino -Explain the step by step procedure of interfacing and building a project by taking Fire sensor interface with Raspburry Pi to send notifications on mobile phone in case of fire as an example -Explain the step by step procedure for installation of Raspburry Pi OS (ex:Raspbian OS)-Explain the step by step procedure of programming the Raspburry Pi

5 Arduino Programming fundamentals

State the purpose of Arduino programming language-State the structure of Arduino sketch.-State the syntax and purpose of setup() and loop() functions-State the data types, variables, and operators of Arduino programming language-State the syntax of following Arduino constant declaration : HIGH, LOW,INPUT, OUTPUT, INPUT_PULLUP,LED_BUILTIN, true, false-Explain about the control statements such as: i) if statement ii) if…else statement iii)if…else if..else statement iv) switch statement and v) control operator of Arduino programming language-Explain about the loop statements such as : i) while loop ii) do…while loop iii) for loop of Arduino programming language-Explain the syntax and usage of Arduino I/O functions such as: i) pinMode() ii)digitalRead() iii)digitalWrite() iv)analogRead() v) analogWrite() vi) analogReference() Functions-Explain about the syntax and usage of times functions such as: i) delay() ii)delayMicroseconds() iii)millis() iv)micros()-State the need for Arduino library functions-State the process of adding library to the Arduino sketch-State the use of Tinkercad simulator -Explain the step by step procedure of building and simulating an Arduino based circuit (ex. LED blinking) using Tinkercad.

Reference Books:

1   Rao, M., "Internet of Things with Raspberry Pi 3: Leverage the power of Raspberry Pi 3 and JavaScript to build exciting IoT projects", Packt Publishing Ltd,2018
2   Baichtal, J., "Arduino for beginners: essential skills every maker needs" Pearson Education, 2013
3   Schwartz, M. ," Internet of Things with ESP8266. Packt Publishing Ltd, 2016
4   Richardson, M., & Wallace, S., "Getting started with raspberry PI. " O'Reilly Publisher Media, Inc., 2012
5   John C. Shovic , "Raspberry Pi IoT Project: Prototyping Experiments for Makers", Apress publishers,2016
6   Erik Savasgard, "Arduino For Beginners", ebook, 2014
7   Dr. Rajesh Singh Dr. Anita Gehlot Dr. Lovi Raj Gupta Navjot Rathour Mahendra Swain Bhupendra Singh, "Iot Based Projects: Realization with Raspberry Pi, NodeMCU and Arduino", BPB Publications, India, 2020
8   Jonathan Oxer Hugh Blemings, Practical Arduino Cool Projects for Open Source Hardware, Apress publishers,2009
9   Michael Margolis, "Arduino Cookbook", O.Reilly Publishers, 2012

Table specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to be covered
Unit Test-I	From 1.1 to 3.4
Unit Test-II	From 3.5 to 5.13

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State Board of Technical Education and Training, A. P

Diploma in Internet of Things (DIoT)

V Semester

Subject Name: Hardware Platforms for IoT

Sub Code: IoT - 503

<u>Time : 90 minutes</u>   Unit Test I   Max.Marks:40

Part-A   **16Marks**

Instructions: (1) Answer **all** questions.

(2) First question carries **four** marks, each question of remaining carries **three** marks

1. a) Need of hardware platform _____   **(CO1)**
    b) Example for entry level Arduino board_____   **(CO2)**
    c) Powersuply requirement of Arduino board _____   (CO2)
    d) 1GB of memory means it can store 10^9 bits **(TRUE/FALSE)**   **(CO1)**

2. List the applications of hardware platforms in IoT   **(CO1)**

3. State the memory modules associated with Arduino Uno   **(CO2)**

4. State the features and specifications of ESP 8266 Node MCU.   **(CO3)**

5. List different IoT Arduino boards   **(CO2)**

Part-B   **3×8=24**

Instructions: (1) Answer **all** questions.

(2) Each question carries **eight** marks

(3) Answer should be comprehensive and the criterion for valuation

is the content but not the length of the answer.

6. (a) Draw the block diagram of an IoT based smart home automation system and explain the role of Hardware platform in that system.   **(CO1)**

or

(b) Explain the features of hardware platform such as i) power supply ii) Input/output ii) Memory iii) communication iv) clock frequency.   **(CO1)**

7.   (a) Explain about the analog, digital and PWM I/O pins of Arduino Uno.   **(CO2)**

or

(b) Draw the layout diagram of Arduiono Uno and identify different functional blocks   **(CO2)**

8. (a) Draw the pin configuration of ESP8266 NodeMCU and state the purpose of each pin

(CO3)

or

(b) Differentiate between Arduino uno and NodeMCU ESP8266   **(CO3)**

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State Board of Technical Education and Training, A. P
Diploma in Internet of Things (DIoT)
V Semester
Subject Name: Hardware Platforms for IoT
Sub Code: IoT - 503

Time : 90 minutes	Unit Test II	Max.Marks:40

Part-A   **16Marks**

Instructions: (1) Answer **all** questions.

(2) First question carries **four** marks; each question of remaining carries **three** marks

1. a) What is the full form of TCP/IP   **(CO3)**

   b) What is the full form of WiFi   **(CO3)**

   c) Write the syntax of PIN MODE   **(CO5)**

   d) Write the syntax of HIGH   **(CO5)**

2. Classify Raspburry Pi generations and models   **(CO4)**
3. State the significant usage of Raspburry Pi Zero   **(CO4)**
4. State the structure of Arduino sketch   **(CO5)**
5. State the need for Arduino library functions.   **(CO5)**

Part-B   **3×8=24**

Instructions: (1) Answer **all** questions.

(2) Each question carries **eight** marks

(3) Answer should be comprehensive and the criterion for valuation

is the content but not the length of the answer.

6. (a) Explain about the significance of Wifi module in ESP8266   **(CO3)**

or

(b Explain the step by step procedure for programming the ESP8266 with Arduino IDE
                                    (CO3)

7. (a) Explain the step by step procedure for installation of Raspburry Pi OS (ex:Raspbian OS)
                                    (CO4)

or

(b) Explain the step by step procedure of programming the Raspburry Pi   **(CO4)**

8. (a) Explain about the loop statements such as : i) while loop ii) do…while loop iii) for loop of Arduino programming language.   **(CO5)**

or

(b). Explain the step by step procedure of building and simulating an Arduino based circuit (ex. LED blinking) using Tinkercad.   **(CO5)**

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BOARD DIPLOMA EXAMINATIONS
C-23, IoT-503, Hardware Platforms for IoT
V SEMESTER
SEMESTER END EXAMINATION

TIME:3 HOURS   **MAX MARKS:80**

Part-A   **10×3=30**

Instructions: (1) Answer **all** questions.

(2) Each question carries **three** marks

(3) Answer should be brief and straight to the point and shall not exceed

five simple sentences.

1. State the need of hardware platform in IoT   (CO1)
2. List the advantages of hardware platforms in building IoT   (CO1)
3. List the features of Arduino Uno   (CO2)
4. State the power supply features of Arduino Uno   (CO2)
5. Differentiate between ESP32 and ESP 8266.   (CO3)
6. State the purpose of ESP 8266 Node MCU development board   (CO3)
7. State the purpose of Raspburry Pi board   (CO4)
8. Classify Raspburry Pi generations and models   (CO4)
9. State the need for Arduino library functions   (CO5)
10. State the structure of Arduino sketch.   (CO5)

Part-B   **5×10=50**

Instructions: (1) Answer **all** questions.

(2) Each question carries **TEN** marks

(3) Answer should be comprehensive and the criterion for valuation

is the content but not the length of the answer.

11. Draw the block diagram of an IoT based smart home automation system and explain the role of Hardware platform in that system.(CO1)

12. Draw the layout diagram of Arduiono Uno and identify different functional blocks (CO2)

13. Explain the step by step procedure for programming the Arduino board with Arduino IDE(CO2)

14. Differentiate between Arduino uno and NodeMCU ESP8266(CO3)

15. Explain about the significance of Wifi module in ESP8266 (CO3)

16. Explain the step by step procedure of interfacing and building a project by taking Fire sensor interface with Raspburry Pi to send notifications on mobile phone in case of fire as an example (CO4)

17. Compare Raspberry Pi and Arduino development boards(CO4)

18. Explain about the loop statements such as : i) while loop ii) do…while loop iii) for loop of Arduino programming language(CO5)

INDUSTRIAL IOT AND ITS SECURITY

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
IOT-504	Industrial IOT and Its Security	05	75	20	80

S No	Unit Title	No. of Periods	Weightage of Marks	No. of Short Answer Questions	No. of Essay Questions	COs Mapped
1	Introduction to Industrial Internet of Things (IIOT)	15	16	2	1	CO1
2	Reference Architecture of IIoT and Key Technologies of IIoT	17	26	2	2	CO2
3	Data Transmission technologies in IIoT	18	26	2	2	CO3
4	Industrial Data Acquision and Control in IIoT & IIoT Analytics	15	26	2	2	CO4
5	Industrial IoT Security	10	16	2	1	CO5
	Total	75	110	30	80	

Course Objectives	To introduce Industrial Internet of Things (IIOT)
	To explore reference Architecture of IIoT and Key Technologies of IIoT
	To understand the Data Transmission technologies in IIoT
	To familiarise with Industrial Data Acquision and Control in IIoT & IIoT Analytics
	To know about Industrial IoT Security

CO No		COURSE OUTCOMES
CO1	IOT-504.1	Introduction about Industrial Internet of Things (IIOT)
CO2	IOT-504.2	Exploration of reference Architecture of IIoT and Key Technologies of IIoT
CO3	IOT-504.3	Understanding the Data Transmission technologies in IIoT
CO4	IOT-504.4	Familiarisation with Industrial Data Acquision and Control in IIoT & IIoT Analytics
CO5	IOT-504.5	Understanding the basics of Industrial IoT Security

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT-504.1	3				1			3		1
IOT-504.2	3	2	1		2			3	1	
IOT-504.3	3	1	1		1			3		1
IOT-504.4	3	3	2	1	2			3		2
IOT-504.5	3	3	1	2	3		1	3	1	2
Average	3	1.8	1.25	1.5	1.8			3	1	1.5

3=strongly mapped, 2=moderately mapped, 1=slightly mapped

LEARNING OUTCOMES

1. Introduction to Industrial Internet of Things (IIoT)

  1.1 Explain the concept of Industrial Internet of Things (IIoT)

  1.2 Distinguish between IoT and Industrial IoT

  1.3 List the applications of Industrial IoT

  1.4 List the benefits of Industrial IoT in manufacturing

  1.5 List any six IIoT vendors

  1.6 Explain the impact of 5G mobile communication technology on Industrial IOT

  1.7 Explain the role of IIoT in Industry 4.0

  1.8 Explain about the important requirements of IIoT

  1.9 Explain the concept of Cyber Physical System (CPS)

  1.10 State any six important features of CPS

  1.11 State the characteristics of CPS

  1.12 List the applications of CPS

  1.13 Explain about mobile Cyber Physical System

  1.14 State the similarities and differences between CPS and IoT

  1.15 Draw a Venn diagram depicting the relationship between IoT, CPS, IIoT, and Industry 4.0 and explain.

2. Reference Architecture of IIoT and Key Technologies of IIoT

  2.1 Define Business model of IoT

  2.2 List the primary principles of a reference architecture for Industrial IoT

  2.3 List different viewpoint framework of Industrial Internet reference architecture (IIRA).

  2.4 Explain the Business viewpoint framework of IIRA

  2.5 Explain the usage viewpoint framework of IIRA

  2.6 Explain the functional viewpoint framework of IIRA

  2.7 Explain the implementation viewpoint framework of IIRA

  2.8 State the key technologies of IIoT

  2.9 Define Artificial Intelligence (AI).

  2.10 List the advantages of AI-powered IIoT

  2.11 Define Cloud Computing.

  2.12   Explain the role of Cloud computing in IoT

  2.13   List the advantages and disadvantages of cloud computing in IoT

  2.14 Define edge Computing.

  2.15   List the key benefits of edge computing in IoT based manufacturing.

  2.16 Define Data Mining

  2.17 Explain about the role of Data mining in IIoT

3. Data Transmission technologies in IIoT

  3.1 List different data transmission technologies used in IIoT

  3.2 State the salient features of Foundation Fieldbus (FF)

  3.3 State the salient features of Profibus

  3.4 State the salient features of Interbus

3.5   Differentiate between the Profibus and the Interbus.

3.6   State the salient features of Highway Addressable Remote Transducer (HART)

3.7   State the salient features of Bitbus

3.8   State the salient features of CC-Link

3.9   State the salient features of Modbus

3.10   State the salient features of Batibus

3.11   Explain about Controller Area Network (CAN)

3.12   State the salient features of CAN

3.13   State the salient features of DeviceNet

3.14   State the salient features of LonWorks

3.15   State the important features of ISA100.11a

3.16   State the important features of Wireless HART

3.17   Differentiate between HART and Wireless HART

3.18   State the important features of Narrow Band-IoT (NB-IoT)

4 Industrial Data Acquision and Control in IIoT & IIoT Analytics

4.1   State the necessity of Industrial Control

4.2   List the important systems used for Industrial control in IIoT

4.3   Explain the architecture and components of Distributed control System (DCS) with a block diagram

4.4   Explain Architecture and components of Programmable Logic Control (PLC) with a block diagram

4.5   Explain Architecture and components of Supervisory Control And Data Acquisition (SCADA) with a block diagram

4.6   Differentiate between PLC and SCADA

4.7   State the necessity of analytics

4.8   List the four major types of IIoT analytics

4.9   State the concepts of descriptive analytics, diagnostic analytics, prescriptive analytics, and predictive analytics.

4.10   List the challenges of analytics in Industries.

5 Industrial IoT Security

5.1 Define IIoT Security

5.2   List different security goals.

5.3   Explain the terms referred to IIoT Security: i) Confidentiality i) Integrity iii) Availability iv) Authenticity v)Non-repudiation vi) Access Control vi) Authorization

5.4   Define the terms passive and active security threats

5.5   Differentiate between passive and active security threats.

5.6   List and explain categories of security services.

5.7   List and explain categories of security mechanisms.

5.8   Explain the model for network security and with block diagram.

5.9   Explain why security is required for IIoT

5.10   State the common security problems in Perception layer

5.11   State the common security problems in Network layer

5.12   State the common security problems in Application layer

5.13   Explain the ways to protect IIoT from common security attacks

COURSE CONTENT:

1. Introduction to Industrial Internet of Things (IIoT)

Explain the concept of Industrial Internet of Things (IIoT)-Distinguish between IoT and Industrial IoT-List the applications of Industrial IoT-List the benefits of Industrial IoT in manufacturing-List any six IIoT vendors-Explain the impact of 5G mobile communication technology on Industrial IOT-Explain the role of IIoT in Industry 4.0-Explain about the important requirements of IIoT-Explain the concept of Cyber Physical System (CPS)-State any six important features of CPS-State the characteristics of CPS-List the applications of CPS- Explain about mobile Cyber Physical System-State the similarities and differences between CPS and IoT-Draw a Venn diagram depicting the relationship between IoT, CPS, IIoT, and Industry 4.0 and explain.

2.Reference Architecture of IIoT and Key Technologies of IIoT

Define Business model of IoT-ist the primary principles of a reference architecture for Industrial IoT-List different viewpoint framework of Industrial Internet reference architecture (IIRA).-Explain the Business viewpoint framework of IIRA-Explain the usage viewpoint framework of IIRA-Explain the functional viewpoint framework of IIRA-Explain the implementation viewpoint framework of IIRA-State the key technologies of IIoT-Define Artificial Intelligence (AI).-List the advantages of AI-powered IIoT-Define Cloud Computing.-Explain the role of Cloud computing in IoT-List the advantages and disadvantages of cloud computing in IoT-Define edge Computing.-List the key benefits of edge computing in IoT based manufacturing.-Define Data Mining-Explain about the role of Data mining in IIoT

3. Data Transmission technologies in IIoT

List different data transmission technologies used in IIoT-State the salient features of Foundation Fieldbus (FF)-State the salient features of Profibus-State the salient features of Interbus-Differentiate between the Profibus and the Interbus.-State the salient features of Highway Addressable Remote Transducer (HART)-State the salient features of Bitbus-State the salient features of CC-Link-State the salient features of Modbus-State the salient features of Batibus-Explain about Controller Area Network (CAN)-State the salient features of CAN-State the salient features of DeviceNet-State the salient features of LonWorks-State the important features of ISA100.11a-State the important features of Wireless HART-Differentiate between HART and Wireless HART-State the important features of Narrow Band-IoT (NB-IoT)

4   Industrial Data Acquision and Control in IIoT & IIoT Analytics

State the necessity of Industrial Control-List the important systems used for Industrial control in IIoT-Explain the architecture and components of Distributed control System (DCS) with a block diagram-Explain Architecture and components of Programmable Logic Control (PLC) with a block diagram-Explain Architecture and components of Supervisory Control And Data - cquisition (SCADA) with a block diagram-Differentiate between PLC and SCADA-State the necessity of analytics-List the four major types of IIoT analytics-State the concepts of descriptive analytics, diagnostic analytics, prescriptive analytics, and predictive analytics.-List the challenges of analytics in Industries.

5 Industrial IoT Security

Define IIoT Security-List different security goals.-Explain the terms referred to IIoT Security: i) Confidentiality i) Integrity iii) Availability iv) Authenticity v)Non-repudiation vi) Access Control vi) Authorization-Define the terms passive and active security threats-Differentiate between passive and active security threats.-List and explain categories of security services.-List and explain categories of security mechanisms.-Explain the model for network security and with block diagram.-Explain why security is required for IIoT -State the common security problems in Perception layer -State the common security problems in Network layer -State the common security problems in Application layer -Explain the ways to protect IIoT from common security attacks-

Reference Books:

1   Alasdair Gilchrist, "Industry 4.0: The Industrial Internet of Things",Apress
2   Audrey O'Shea, "A Geek Girl's Guide to Electronics and the Internet of Things", 2020, Wiley Publishing house
3   smail Butun, "Industrial-iot-challenges-design-principles-applications-and-security", 2020, Springer publishers
4   Sravani Bhattacharjee, "Practical Industrial Internet of Things Security",Packt Publishing, 2018
5   Anandarup Mukherjee, Chandana Roy, Sudip Misra, "Introduction to Industrial Internet of Things and Industry 4. 0", CRC Press, 2020
6   Uthayan Elangovan, "Product Lifecycle Management (PLM)_ A Digital Journey Using Industrial Internet of Things (IIoT)",CRC Press, 2020

Table specifying the scope of syllabus to be covered for Unit Tests

Unit Test	Learning outcomes to be covered
Unit Test-I	From 1.1 to 3.7
Unit Test-II	From 3.8 to 5.13

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(Model Paper)   C –23, IoT -504

State Board of Technical Education and Training, A. P
Diploma in Internet of Things (DIoT)
V Semester
Subject Name: Industrial IOT and Its Security
Sub Code: IoT - 504

Time : 90 minutes   Unit Test I   Max.Marks:40

Part-A   **16Marks**

Instructions: (1) Answer **all** questions.

(2) First question carries **four** marks, each question of remaining carries **three** marks

1 a) Full form of IIRA _____   **(CO2)**
   b) Full form of HART_____   **(CO3)**
   c) Full form of AI_____   **(CO2)**
   d) A cyber-physical system is a collection of computing devices communicating with one another and interacting with the physical world via sensors and actuators in a feedback loop.
   (TRUE/FALSE)   **(CO2)**

2. List any six IIoT vendors   **(CO1)**
3. Distinguish between IoT and Industrial IoT   **(CO1)**
4. Define edge Computing   **(CO2)**

5. State the salient features of Bitbus   **(CO3)**

Part-B   3×8=24

Instructions: (1) Answer **all** questions.

(2) Each question carries **eight** marks

(3) Answer should be comprehensive and the criterion for valuation
is the content but not the length of the answer.

6. (a) Explain about mobile Cyber Physical System   **(CO1)**

or

(b) Explain the impact of 5G mobile communication technology on Industrial IOT

(CO1)

7. (a) Explain about the role of Data mining in IIoT   **(CO2)**

or

(b) Explain the role of Cloud computing in IoT   **(CO2)**

8. (a) Explain the implementation viewpoint framework of IIRA   **(CO2)**

or

(b) Differentiate between the Profibus and the Interbus.   **(CO3)**

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State Board of Technical Education and Training, A. P
Diploma in Internet of Things (DIoT)
V Semester
Subject Name: Industrial IOT and Its Security
Sub Code: IoT - 504

Time : 90 minutes   Unit Test II   Max.Marks:40

Part-A   **16Marks**

Instructions: (1) Answer **all** questions.

(2) First question carries **four** marks; each question of remaining carries **three** marks

1. a) What is the full form of NB-IoT   **(CO3)**

   b) What is the full form of DCS   **(CO4)**

   c) What is the full form of PLC   **(CO4)**

   d) What is the full form of SCADA   **(CO4)**

2. State the salient features of LonWorks   **(CO3)**
3. List the four major types of IIoT analytics   **(CO4)**
4. Define IIoT Security   .   **(CO5)**
5. State the common security problems in Application layer   **(CO5)**

Part-B   **3×8=24**

Instructions: (1) Answer **all** questions.

(2) Each question carries **eight** marks

(3) Answer should be comprehensive and the criterion for valuation

is the content but not the length of the answer.

6. (a) Explain about Controller Area Network (CAN)   **(CO3)**

or

   (b Differentiate between HART and Wireless HART   **(CO3)**

7. (a) Differentiate between PLC and SCADA   **(CO4)**

or

   (b) Explain Architecture and components of Programmable Logic Control with a block diagram
.

(CO4)

8. (a) Explain why security is required for IIoT   **(CO5)**

or

   (b) Explain the model for network security and with block diagram   **(CO5)**

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MODEL PAPER
BOARD DIPLOMA EXAMINATIONS
C-23, IoT-504, Industrial IOT and Its Security
V SEMESTER
SEMESTER END EXAMINATION

TIME:3 HOURS   **MAX MARKS:80**

Part-A   **10×3=30**

Instructions: (1) Answer **all** questions.

(2) Each question carries **three** marks

(3) Answer should be brief and straight to the point and shall not exceed

five simple sentences.

1. List the applications of Industrial IoT   (CO1)
2. State the characteristics of CPS   (CO1)
3. Define Business model of IoT   (CO2)
4. List the advantages of AI-powered IIoT   (CO2)
5. Differentiate between the Profibus and the Interbus   (CO3)
6. State the salient features of CC-Link   (CO3)
7. List the challenges of analytics in Industries   (CO4)
8. State the necessity of analytics   (CO4)
9. List different security goals   (CO5)
10. State the common security problems in Perception layer   (CO5)

Part-B   **5×10=50**

Instructions: (1) Answer **all** questions.

(2) Each question carries **TEN** marks

(3) Answer should be comprehensive and the criterion for valuation

is the content but not the length of the answer.

11. Explain the impact of 5G mobile communication technology on Industrial IOT   (CO1)

12. Explain the usage viewpoint framework of IIRA   (CO2)

13. Explain about the role of Data mining in IIoT   (CO2)

14. Explain about Controller Area Network (CAN   (CO3)

15. Differentiate between HART and Wireless HART   (CO3)

16. Explain Architecture and components of Programmable Logic Control (PLC)
    with a block diagram   (CO4)

17. Explain the architecture and components of Distributed control System (DCS)
    with a block diagram   (CO4)

18. Explain the ways to protect IIoT from common security attacks   (CO5)

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Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
IOT-505	Python Programming	5	75	20	80

S.No.	Chapter/Unit title	No.of periods	Weightage Allocated	Short type	Essay type	CO's Mapped
1	Python Programming Introduction	10	26	2	2	CO1
2	Standard Data Types and Control Flow	15	13	1	1	CO2
3	Data Structures	15	26	2	2	CO3
4	Functions	15	26	2	2	CO4
5	Object Oriented Programming in Python and File Handling and Exception Handling	20	19	3	1	CO5
	TOTAL	75	110	30	80	

Course Objectives	i)To know the fundamentals of Python programming ii)To understand fundamental syntactic information about 'Python' iii) To develop various python programs

	CO1	IOT-505.1	Explain Basic constructs like operators, expressions and components of python programming as well as Editing and Debugging
Course Outcomes	CO2	IOT-505.2	Write Python programs using Control statements, Loops
	CO3	IOT-505.3	Write python programs using Functions and arrays
	CO4	IOT-505.4	Develop Python programs using Data structures
	CO5	IOT-505.5	Develop Python application programs using OOP Concept, FILES,Exceptions

CO-PO/PSO Matrix:

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT-505.1	3	1	2	1	1	1		2	1	
IOT-505.2	3	2	2	1	1	1	1	2	2	2
IOT-505.3	3	2	2	1	1	1		2	2	2
IOT-505.4	3	1	2	1	1	1	1	2	2	2
IOT-505.5	3	1	2	1	2	3	2	2	2	2
Average	3	1.75	2	1	1.2	1.8	1.3	2	1.8	1.8

3=strongly mapped, 2=moderately mapped, 1=slightly mapped

Learning Outcomes:

1.0   Introduction
1.1.   History of Python.
1.2.   List Python features
1.3.   List and Explain Applications of Python
1.4.   Explain Python Integrated Development and Learning Environment (IDLE)
1.5.   Explain process of Running Python Scripts.
1.6.   Explain Identifiers, Keywords, Indentation, Variables
1.7.   List and Explain various datatypes
1.8.   Explain declaration, initialization of variables.
1.9.   Explain Input and Output statements.
1.10.   Explain formatted input output.
1.11.   State the usage of comments
1.12.   List and Explain various Operators.
1.13.   Explain Boolean values.
1.14.   Explain Operator precedence rules.
1.15.   State the purpose of modules.
1.16.   Define functions.
1.17.   List types of functions
1.18.   List and Explain Built-in Functions.
1.19.   Explain the Steps in Developing a simple python program and execution.

2.0   Control Flow and Loops
2.1.   List and Explain various Control Flow constructs.
    2.1.1.   If
    2.1.2.   If-Else
    2.1.3.   if-elif-else
2.2.   List and Explain various Loop Statements.
    2.2.1.   for Loop
    2.2.2.   while loop
    2.2.3.   break
    2.2.4.   continue
    2.2.5.   pass

3.0   Functions and Arrays
3.1.   Introduction
3.2.   Function Arguments: Default arguments, Variable Length arguments
3.3.   Anonymous Functions
3.4.   Return Statement
3.5.   List and explain Scope of variables
3.6.   Explain creation of modules.
3.7.   Explain importing of modules.
3.8.   Python Variable: Namespace and scoping
3.9.   Explain Python Packages
3.10.   List and Explain Strings: String slices, immutability
3.11.   List and Explain String functions and methods.
3.12.   Explain about String module.
3.13.   Explain about Python Arrays.
3.14.   Explain accessing of elements in an Array.
3.15.   Explain Array methods.

4.0 **Data Structures**
4.1. Explain Python Lists.
4.2. Describe Basic List Operations.
4.3. Explain List Slices.
4.4. Explain List methods.
4.5. Explain List loop
4.6. Explain mutability.
4.7. Explain aliasing.
4.8. Explain Cloning lists.
4.9. Explain List parameters.
4.10. Explain List comprehension.
4.11. Tuples.
    4.11.1. Explain Tuple assignment.
    4.11.2. Explain Tuple as return value.
    4.11.3. Explain Tuple Comprehension
4.12. Dictionaries
    4.12.1. Explain creation of dictionary/assignment.
    4.12.2. Explain Operations and methods.
    4.12.3. Explain Dictionary Comprehension.
4.13. Explain Sets.

5.0 **Object Oriented Programming in Python and File Handling and Exception Handling**
5.1. Creating Classes
5.2. Creating Objects
5.3. Method Overloading and Overriding
5.4. Data Hiding
5.5. Data Abstraction
5.6. Opening files in different modes
5.7. Processing files
5.8. Closing a file
5.9. Exception Handling

COURSE CONTENT

UNIT – I:

Introduction: Introduction to Python and installation, data types: Int, float, Boolean, string, and list; variables, Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Boolean values, expressions, statements, precedence of operators, comments; modules, functions--- function and its use, flow of execution, parameters and arguments.

UNIT – II:

Control Flow and Loops: Control Flow- if, if-elif-else, for, while, break, continue, pass

UNIT – III:

Functions and Arrays - Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful

Functions(Function Returning Values), Scope of the Variables in a Function - Global and Local Variables, Modules: Creating modules, import statement, from Import statement, name spacing, Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages - Strings: string slices, immutability, string functions and methods, string module;Python arrays, Access the Elements of an Array, array methods.

UNIT – IV:

Data Structures : Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters, list comprehension; Tuples: tuple assignment, tuple as return value, tuple comprehension; Dictionaries: operations and methods, comprehension-sets.

UNIT – V:

Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding, File Handling: Open Files, File Processing and Closing a File Error and Exceptions: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions

REFERENCE BOOKS

1. Python Programing by K. Nageswara Rao, Shaikh Akbar - Scitech Publications (India) Pvt. Ltd.
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
3. Learning Python, Mark Lutz, Orielly
4. Think Python, Allen Downey, Green Tea Press
5. Core Python Programming, W.Chun, Pearson.
6. Introduction to Python, Kenneth A. Lambert, Cengage

Model Blue Print:

S.No.	Chapter/Unit title	No.of periods	Weightage Allocated	Marks Wise Distribution of Weightage				Question wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Python Programming Introduction	10	26	6	20			2	2			CO1
2	Standard Data Types and Control Flow	15	13	3		10		1		1		CO2
3	Data Structures	15	26	6		20		2		2		CO3
4	Functions	15	26	6		20		2		2		CO4
5	Object Oriented Programming in Python and File Handling and Exception Handling	20	19	9		10		**3**		1		CO5
	Total	75	110	30	20	60		10	2	6		

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1.1 to 3.7
Unit test-2	From 3.8 to 5.9

DIPLOMA IN INTERNET OF THINGS
MODEL PAPER
Python Programming
UNIT TEST-1

SCHEME: C-23   SUBJ CODE:IOT-505
MAX MARKS:40   TIME: 90Minutes

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PART-A   **16Marks**

Instructions:1) Answer all questions
                2) First question carries 4marks, and each question of remaining carries 3marks

1. a) Mathematical operations can be performed on a string. (True/False)   (CO1)
   b) _____ has the highest precedence in the expression.   (CO1)
   c)~4 evaluate to _____   (CO1,CO2)
   d) What is the output when we execute list("hello")?

   i) ['h', 'e', 'l', 'l', 'o']

   ii) ['hello']

   iii) ['llo']

   iv) ['olleh']   (CO3)

2. List features of Python.   (CO1)
3. Write the rules for choosing names of variables.   (CO1)
4) What are the different operations that can be performed on a list? (CO3)
5)write about if statement with an example.   (CO2)

PART-B

3X8=24Marks

Instructions:1) Answer all questions
            2)Each question carries 8 Marks
            3)Answer should be comprehensive and the criterion for valuation is the
            content but not the length of the answer

6. a) Explain about the need for learning python programming and its importance.   (CO1)
                            Or
   b) Explain the basics for executing a python program using REPL(Shell) with an
      example.   (CO1)
7. a) What are the different loop control statements available in python? Explain with
        suitable examples.   (CO2)
                            Or
   b) Write in brief about Tuple in python. Write operations with suitable examples. (CO3)
8. a)Write a python program that prints the intersection of two lists. (without using list
comprehensions/sets).   (CO3)
                            Or
   b) List and explain different arithmetic operators supported by Python. Discuss about their
precedence and associativity.   (CO1)
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DIPLOMA IN INTERNET OF THINGS
MODEL PAPER – END EXAMINATION
Python Programming

SCHEME: C-23   SUBJ CODE:IOT-505
MAX MARKS:80   TIME: 3HOURS

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PART-A   10X3=30Marks

Note: Answer all questions

1. Write in brief about the applications of Python.   CO1
2. List data types used in Python.   CO1
3. Demonstrate the use of continue in loop statement.   CO2
4. List different methods used in Python lists.   CO3
5. Write in brief about sets in Python.   CO3
6. List different types of arguments in Python.   CO4
7. Can a Python function return multiple values? If yes, how it works? CO4
8. List Object oriented features supported by Python.   CO5
9. List different modes in File opening.   CO5
10. Define Exception.   CO5

PART-B   5x10=50Marks

Note: Answer any five questions each carries ten marks

11. Explain about Python IDLE.   CO1
12. Explain about running Python scripts.   CO1
13. Explain different conditional control flow statements in Python with examples.   CO2

14. Explain in detail about dictionaries in Python.   CO3
15. Write in brief about Sequence operations with suitable examples in python.
    CO3
16. Explain how to create a user defined exception.   CO4
17. What are the two ways of importing a module? Which one is more beneficial? Explain. CO4
18. Explain how to implement inheritance in Python.   CO5

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IOT-506, EMBEDDED SYSTEMS FOR IOT LAB

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
IoT-506	Embedded Systems for IOT Lab	03	45	40	60

S.No	Unit Title	No. of Periods	COs Mapped
1	Familiarization with ESP8266 Node MCU and Raspburry Pi development Boards	06	CO1
2	Basic I/O interfacing with ESP8266 Node MCU and Raspburry Pi development Boards	24	CO2
3	Interfacing with sensors and actuators with ESP8266 Node MCU and Raspburry Pi development Boards	18	CO3
4	Interfacing Wifi, Bluetooth, GSM modules	9	
	Total	45	

Course Objectives	1. To Familiarization with ESP8266 Node MCU and Raspburry Pi development Boards
	2. To interface Basic I/O devices with ESP8266 Node MCU and Raspburry Pi development Boards
	3. To interface sensors and actuators with ESP8266 Node MCU and Raspburry Pi development Boards
	4. To interface Wifi, Bluetooth modules

CO No		COURSE OUTCOMES
CO1	IoT-506.1	1. Familiarise with ESP8266 Node MCU and Raspburry Pi development Boards
CO2	IoT-506.2	2. Interface Basic I/O devices with ESP8266 Node MCU and Raspburry Pi development Boards
CO3	IoT-506.3	3. Interface sensors and actuators with ESP8266 Node MCU and Raspburry Pi development Boards
CO4	IoT-506.4	4. Interface Wifi, Bluetooth modules

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IoT-506.1	3	1					3	3	3	
IoT-506.2	3	1						3	3	3
IoT-506.3	3	1				2	3	3	3	3
IoT-506.4	3	1								
Average	3	1	0	0	0	2	3	3	3	3

3=strongly mapped 2=moderately mapped 1=slightly mapped

LEARNING OUTCOMES:

III. Familiarization with ESP8266 Node MCU and Raspburry Pi development Boards

1. Familiarize with **ESP8266 Node MCU** Board
2. Familiarize with **Raspburry Pi development Board**
3. Install and Familiarize with Raspbian IDE (or equivalent software). Execute a program using **Raspburry Pi** to ON an LED when push button is pressed.

IV. Basic I/O interfacing with ESP8266 Node MCU and Raspburry Pi development Boards

4. Interface Seven segment display with ESP8266/Raspburry Pi and demonstrate the display of numbers from 0 to 9 with delay
5. Interface 4x3 Keypad with ESP8266/Raspburry Pi and Display the status of the keys on LCD display
6. Interface four seven segment display units and 4x3 keypad with ESP8266/Raspburry Pi to display a four digit number typed on keypad.
7. Interface LED bar graph with ESP8266 and turns on a series of LEDs based on the value of analog sensor
8. Display moving(scrolling) text on 16×2 LCD with ESP8266

III. Interfacing with basic sensors and actuators with ESP8266 Node MCU and Raspburry Pi development Boards

9. Interface **temperature sensor** with **ESP8266/ Raspburry Pi** and turn on LED when temperature exceeds the threshold level
10. Interface a **LDR** to the **ESP8266/ Raspburry Pi** and write a program to turn ON the LED when it is dark and turn OFF the LED when there is light on the sensor.
11. Design and write the program of an **ESP8266/ Raspburry Pi** board based **DC motor speed control** using a potentiometer
12. Interface **Ultrasonic sensor** with **ESP8266/ Raspburry Pi** board to measure the distance from the target and display it on LCD display.
13. Rotate **a stepper motor** either clock wise or anti clock wise at 'n' number of steps using **ESP8266/ Raspburry Pi**
14. Interface proximity sensor with **ESP8266/ Raspburry Pi** and indicate the object movement

IV. Interfacing WiFi and Bluetooth with ESP8266 Node MCU and Raspburry Pi development Boards

15. Interface Raspburry Pi with a camera and display it on mobile phone
16. Interface a relay with bulb and switch ON/OFF the bulb using mobile phone with Bluetooth interface using Raspburry Pi
17. Display a text message on LCD by interfacing Raspburry Pi with Mobile phone

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Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
IOT-507	Python Programming Lab	3	45	40	60

S.No.	Chapter/Unit Title	No. of Periods	CO's Mapped
1.	Exercises on basics, expressions and operators.	9	CO1
2.	Exercises on Functions, packages	12	CO2, CO3
3.	Exercises on Lists, sets	18	CO3, CO4
4.	Exercise on Exceptions and debugging	6	CO5,CO6
	Total Periods	45	

COURSE OBJECTIVES	1	Basics of Python programming
	2	Decision Making and Functions in Python
	3	Object Oriented Programming using Python.

CO		COURSE OUTCOMES
CO 1	IOT-507.1	Execute Simple python programs
CO 2	IOT-507.2	Execute Python programs using expressions, operators
CO 3	IOT-507.3	Execute python programming using Functions, Packages
CO 4	IOT-507.4	Demonstrate Python programs using Lists
CO 5	IOT-507.5	Develop Python programs using OOP Concepts and Exceptions
CO 6	IOT-507.6	Demonstrate Debugging of Python Programs

CO-PO/PSO MATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT-507.1	2	2	2	1	2			3		2
IOT-507.2	2	3	2					2		2
IOT-507.3	3	3	2	3		2	2	2		
IOT-507.4	2	2	2		2	3	1	2	3	
IOT-507.5	3	3	2		2	2	2	2	2	
IOT-507.6	2	1		3			3	1		
Average	2.3	2.3	2	2.3	2	2.3	2	2	2.5	2

3=strongly mapped, 2=moderately mapped, 1=slightly mapped

LEARNING OUTCOMES

1. Write and execute simple python Program.

2. Write /execute simple 'Python' program: Develop minimum 2 programs using different datatypes (numbers, string, tuple, list, and dictionary).

3. Write /execute simple 'Python' program: Develop minimum 2 programs using ArithmeticOperators, exhibiting data type conversion.

4. (i)Write simple programs to convert U.S. dollars to Indian rupees.

(ii) Write simple programs to convert bits to Megabytes, Gigabytes and Terabytes.

5. Write simple programs to calculate the area and perimeter of the square, and the volume &perimeter of the cone.

6. Write program to: (i) determine whether a given number is odd or even. (ii) Find the greatest of the three numbers using conditional operators.

7. Write a program to: i) Find factorial of a given number. ii) Generate multiplication table upto 10 for numbers 1 to 5.

8. Write a program to: i) Find factorial of a given number. ii) Generate multiplication table upto 10 for numbers 1 to 5 using functions.

9. Write a program to: i) Find factorial of a given number using recursion. ii) Generate Fibonaccisequence up to 100 using recursion.

10. Write a program to: Create a list, add element to list, delete element from the lists.

11. Write a program to: Sort the list, reverse the list and counting elements in a list.

12. Write a program to: Create dictionary, add element to dictionary, delete element from thedictionary.

13. Write a program to: To calculate average, mean, median, and standard deviation of numbersin a list.

14. Write a program to: To print Factors of a given Number.

15. File Input/output: Write a program to: i) To create simple file and write "Hello World" in it. ii) To open a file in write mode and append Hello world at the end of a file.

16. Write a program to: i) To open a file in read mode and write its contents to another file but replace every occurrence of character 'h' ii) To open a file in read mode and print the number of occurrences of a character 'a'.

17. Write a Program to: Add two complex number using classes and objects.

18. Write a Program to: Subtract two complex number using classes and objects.

19. Write a Program to: Create a package and accessing a package.

Key Competencies:

S.No	Name of the Experiment	Objectives	Key Competencies
1.	Write and execute simple python Program.	Write a simple python program to print Hello World! and debug and execute	1. Know the usage of Python IDLE 2. Edit and save the program 3. Check for the syntax errors and clear the errors 4. Run the program and check for the output.
2.	Write /execute simple 'Python' program: Develop minimum 2 programs using different data types (numbers, string, tuple, list, dictionary).	Write a Python program to identify different data types.	1. Identify different data types 2. Write basic python program using datatypes 3. Evaluate arithmetic expression 4. Run the program 5. Rectify the syntactical errors 6. Execute the program 7. Check the output for its correctness
3.	Write /execute simple 'Python' program: Develop minimum 2 programs using Arithmetic Operators, exhibiting data type conversion.	Write a Python program to identify arithmetic operators and data type conversion	1. Identify different arithmetic operators 2. Build arithmetic expressions 3. Identify the priorities of operators 4. Evaluate arithmetic expression 5. Run the program 6. Rectify the syntactical errors 7. Execute the program Check the output for its correctness
4.	(i)Write simple programs to convert U.S. dollars to Indian rupees. (ii) Write simple programs to convert bits to Megabytes, Gigabytes and Terabytes.	Write a Python program to identify arithmetic operators and data type conversion	1. Identify different arithmetic operators 2. Build arithmetic expressions 3. Identify the priorities of operators 4. Evaluate arithmetic expression 5. Run the program 6. Rectify the syntactical errors 7. Execute the program Check the output for its correctness
5.	Write simple programs to calculate the area and perimeter of the square, and the volume & perimeter of the cone.	Write a Python program to identify arithmetic operators and data type conversion	1. Identify different arithmetic operators 2. Build arithmetic expressions 3. Identify the priorities of operators 4. Evaluate arithmetic expression 5. Run the program 6. Rectify the syntactical errors 7. Execute the program Check the output for its correctness
6.	Write program to: (i) Determine whether a given number is odd or even. (ii) Find the greatest of the three numbers using conditional operators.	Write a Python program to identify conditional statements in Python.	1. Build a relational expression 2. Use the if statement for decision making 3. Rectify the syntax errors 4. Check the output for correctness
7.	Write a program to: i) Find factorial of a given number. ii) Generate multiplication table up to 10 for numbers 1 to 5.	Write a Python program to identify loops statements in Python.	1. Build the termination condition for looping 2. Use while statement with correct syntax 3. Check whether correct number of iterations are performed by the while loop 4. Rectify the syntax errors 5. Debug logical errors

8.	Write a program to: To print Factors of a given Number.	Write a Python program to make use of function.	1. Build the termination condition for looping 2. Use while statement with correct syntax 3. Check whether correct number of iterations are performed by the while loop 4. Rectify the syntax errors Debug logical errors
9.	Write a program to: i) Find factorial of a given number using recursion. ii) Generate Fibonacci sequence up to 100 using recursion.	Write a Python program to make use of recursion.	1. Build the application using recursion. 2. Build the terminating condition for recursion. 3. Rectify the syntax errors 4. Debug logical errors
10.	Write a program to: To print Factors of a given Number.	Write a Python program to identify loops statements in Python.	1. Build the termination condition for looping 5. Use while statement with correct syntax 6. Check whether correct number of iterations are performed by the while loop 7. Rectify the syntax errors 1. Debug logical errors
11.	Write a program to: Create a list, add element to list, delete element from the lists.	Write a Python program to identify various lists and list manipulation methods in Python.	1. Create a one list with correct syntax 2. Create a list 3. Read elements from list 4. Add elements to list 5. Delete elements 6. Rectify the syntax errors 7. Debug logical errors 8. Check for the correctness of output for the given input
12.	Write a program to: Sort the list, reverse the list and counting elements in a list.	Write a Python program to identify various lists and list manipulation methods in Python.	1. Create a one list with correct syntax 2. Create a list 3. Read elements from list 4. Add elements to list 5. Delete elements 6. Rectify the syntax errors 7. Debug logical errors 8. Check for the correctness of output for the given input
13.	Write a program to: Create dictionary, add element to dictionary, delete element from the dictionary.	Write a Python program to identify various dictionary and dictionary manipulation methods in Python.	1. Create a one dictionary with correct syntax 2. Create a dictionary 3. Read elements from list 4. Add elements to dictionary 5. Delete elements from dictionary 6. Rectify the syntax errors 7. Debug logical errors 8. Check for the correctness of output for the given input

14	Write a program to: To calculate average, mean, median, and standard deviation of numbers in a list.	Write a Python program to identify various statistical functions.	1.Create a list 2. add elements to list 3. perform statistical functions on that list
15.	File Input/output: Write a program to: i) To create simple file and write "Hello World" in it. ii) To open a file in write mode and append Hello world at the end of a file.	Write a Python program to identify the steps to create a file and append to file.	1. Create a Python file 2. Add contents to file
16	Write a program to: i) To open a file in read mode and write its contents to another file but replace every occurrence of character 'h' ii) To open a file in read mode and print the number of occurrences of a character 'a'.	Write a Python program to identify the steps to open a file in read/write mode.	1. Open a Python file in write mode 2. Add contents to the file 3. Open a Python file in Read mode 4. Print the file
17.	Write a Program to: Add two complex number using classes and objects.	Write a Python program to identify the steps to create class and create an object in Python.	1. Create a class using Python 2. Create an object in Python 3. Debug the python program 4. Check the correctness
18	Write a Program to: Subtract two complexes number using classes and objects	Write a Python program to identify the steps to create class and create an object in Python.	1. Create a class using Python 2. Create an object in Python 3. Debug the python program Check the correctness
19	Write a Program to: Create a package and accessing a package.	Write a Python program to practice in creating packages and accessing packages	1. Create a package using Python 2. Access the package in Python 3. Debug the python program Check the correctness

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IOT-508, LIFE SKILLS

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks for FA	Marks for SA
IOT-508	Life Skills	3	45	40	60

Course Objectives	Understand the relevance of life skills in both personal and professional lives
	Practise life skills complementarily in life-management to lead a happy and successful life

	Course Outcomes:
CO1	exhibit right attitude and be adaptable in adverse and diverse situations
CO2	set appropriate goals and achieve them through proper planning, time management and self-motivation
CO3	solve diverse real-life and professional problems with critical thinking and creativity for a stress-free life
CO4	be an ideal team player and manifest as a leader

Course Delivery:

Text book: **"Life Skills"** – by State Board of Technical Education and Training, AP

Sl no	Unit	Teaching Hours
1	Attitude	4
2	Adaptability	4
3	Goal Setting	4
4	Motivation	4
5	Time Management	4
6	Critical Thinking	4
7	Creativity	4
8	Problem Solving	5
9	Team work	4
10	Leadership	4
11	Stress Management	4
	Total	45

Course Content:
UNIT I: Attitude *matters!*
Preparatory activity-Role play; Generating word bank; Types of attitude. Read the passage and answer the related questions, read the story and discuss issues raised; Express opinions on the given topic and fill the grid with relevant words.

UNIT 2: **Adaptability…**   *makes life easy!*
Pair work-Study the given pictures and understand adaptability -read the anecdote and discuss, read the story and answer the questions, role play

UNIT 3: Goal Setting…   *life without a goal is a rudderless boat!*
Short term goals and long term goals-SMART features, observe the pictures and answer questions-matching- read the passage and answer questions-filling the grid.

UNIT 4:   Motivation…   *triggers success!*
Types of motivation-difference between motivation and inspiration- matching different personalities with traits - dialogue followed by questions - writing a paragraph based on the passage.

UNIT 5: Time Management *… the need of the hour!*

Effective Time Management- Time quadrant - Group task on management of time- Time wasters-fill in the grid, read the story and answer the questions- prioritising tasks.

UNIT 6: Critical Thinking…   *Logic is the key!*

Preparatory activity-read the passage and answer the questions- differentiate between facts and assumptions- components of critical thinking- complete the sets of analogies- choose the odd one out- true or false statements- decide which of the conclusions are logical.

UNIT 7: Creativity….   The essential YOU!!

Definition- Pre-activity-read the anecdote and answer the questions- matching celebrities with their fields of specialisation- think of creative uses of objects- think creatively in the given situations.

UNIT 8: Problem Solving… *there is always a way out!*

Preparatory activity-read the story and answer the questions- discuss the given problem and come out with three alternative solutions- group activity to select the best solution among available alternatives- discuss the problem and plan to analyse it.

UNIT 9: Team Work…   *Together we are better!*

Advantages of team work- Characteristics of a team player- Activity-Observe the pictures and classify them into two groups- team game - read the story and answer the questions- fill in the grid.

UNIT 10 : Leadership… the *making of a leader!*
Characteristics of effective leadership- styles of leadership- Activity-read the dialogue and answer the questions- identify the people in the picture and describe them- discuss leadership qualities of the given leaders- filling the grid- read the quotes and write the name of the leader.

UNIT 11: Stress Management … *live life to the full !!*

Types of stress- Strategies for Stress Management- Activity-read the passage and answer the questions, read the situation and write a paragraph about how to manage stress.

Mapping COs with POs

POs	1	2	3	4	5	6	7
COs	POs 1 to 5 are applications of Engineering Principles, can't directly be mapped with Life Skills					1,2,3,4	1,2,3,4

Unit wise Mapping of COs- POs

CO	Course Outcome	CO Unit Mapped	PO mapped	Cognitive levels as per Bloom's Taxonomy R/U/Ap/An/Ev/Cr (Remembering / Understanding/ Applying/Analysing/ Evaluating/ Creating)
CO 1	To exhibit right attitude and be adaptable to adverse and diverse situations	All Units (1 to 11)	6,7	U/Ap/ An
CO2	To set appropriate goals and achieve them through proper planning, time management and self-motivation	Units 3,4,5	6,7	U/Ap/An
CO3	To solve diverse real-life and professional problems with critical thinking and creativity for a stress-free life	Units 6,7,8,11	6,7	U/Ap/An/ Ev/ Cr.
CO4	To be an ideal team player and manifest as a leader	Units 9,10	6,7	U/Ap/An/ Ev

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IOT-509, PROJECT WORK

Course Code	Course Title	No. of periods / Week	Total No. of Periods	Marks for FA	Marks for SA
IOT-509	Project Work	3	45	40	60

Course Objectives	• Enhance the knowledge by innovative learning and get the skills through the teamwork • Provide with the opportunity to synthesize knowledge from various areas of learning • Critically and creatively apply it to real life situations

COURSE OUT COMES	CO1	Organising teamwork.
	CO2	Innovative learning.
	CO3	Apply theoretical knowledge to practical work situations.
	CO4	Practice technical project reports preparation and presentation.

PO-CO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2		2	2		1	3	2	2
CO2						3		3		2
CO3			3			3		3		2
CO4						3		3		2
Average	2	2	3	2	2	3	1	3	2	2

3=strongly mapped,2=moderately mapped ,1=slightly mapped

Note:

The gaps in CO and PO mapping will be met by one or more appropriate activities from the following: (i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quiz (vii) Industry Visits (viii) Tech Fest (ix) Mini Projects (x) Library Visits.

Learning Outcomes

Upon completion of the course the student shall be able to exhibit the following skill sets:

1.   Problem solving and Critical Thinking

1.1   Identify different works to be carried out in the Project

1.2   Collect data relevant to the project work

1.3   Carryout need survey

1.4   Select the most efficient method from the available choices based on preliminary investigation

1.5   Design the required elements of the project work as per standard practices

1.6   Prepare the working modules / equipment required for the project work

1.7   Estimate the cost of project, technological need, computer skills, materials and other equipment

1.8   Prepare the plan and schedule of starting time and sequence of operations to be carried out at various stages of the project work in detail

1.9   Prepare critical activities at various stages of the project work

1.10   Test various conditions with different electrical input parameter if required

1.11   Implement project work and record the results.

1.12   Draw Appropriate Conclusions

1.13   Preparation of project report.

2.   Communication

2.1   Communicate effectively.

2.2   Present Ideas Clearly.

2.3   Present Ideas Coherently.

2.4   Report writing.

3.   Collaboration

1.1   Discuss the ideas.

1.2   Coordinate with team members

1.3   Team work in accomplishing the task.

4.   Independent Learning

4.1   Involves in the group task.

4.2   Analyse the appropriate actions.

4.3   Compares merits and demerits

4.4   Analyse the activities for sustainability

4.5   Analyse the activities to ensure ethics

5.   Ethics

5.1   Give respect and value to all classmates, educators, colleagues, and others

5.2   Understand the health, safety, and environmental impacts of their work

5.3   Recognize the constraints of limited resources

5.4   Develop sustainable products and processes that protect the health, safety, and prosperity of future generations

5.5   Maintain integrity in all conduct and publications and give due credit to the contributions of others

COURSE CONTENT

1.0 Programming/Design/Assembling/Analysis/Case Study Projects in the areas of Internet of Things/Computer Engineering

Weightage of marks for Assessment of Learning Outcomes of Project work

S. No	Item	Marks
1	**Internal Marks** Completion of Assigned task in the group/individual to complete the project	**40**
	End Exam Marks: i) Demonstration of skill relevant to the project (30) ii) Project Report (20) iii) Viva Voce (10)	**60**
	Total marks	**100**

➢ End Examination assessment shall be done by HIOTS/HCMES, external examiners and faculty members who guided the students during project work.

➢ The external examiner shall be from an industry/organisation/Head of HIOTS/HCMES of other polytechnic/Senior faculty of another polytechnic.

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VI SEMESTER

DIPLOMA IN INTERNET OF THINGS ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATION

CURRICULUM-2023
(VI Semester)
IOT-601 Industrial Training

Course Code	Course title	No of periods/week	Duration	Marks for FA	Marks for SA
IOT-601	INDUSTRIAL TRAINING (Online Certificate courses / Industry)	42	6 months	240	60

LEARNING OUTCOMES (In Industry): The student shall be able to display the following skill sets

1 Apply knowledge and skill already learnt in the institution.
2 Acquire the required skills of analysis, design and development, testing, verification and validation.
3 Acquire skills of deployment and distribution of the product.
4 Involve in product design, development, quality testing and maintenance production by
5 exhibiting the strength, teamwork spirit and self-confidence
6 Prepare product documents like user manual and installation guide and operational manuals.
7 Perform the activities of deploying product at customer site and training the end user.
8 Maintaining the system at user site (Post product services)

S No	Unit Title	Duration	COs Mapped
1	Application of Knowledge acquired.	1 month	CO1
2	Skill Acquirement.	2 months	CO2
3	Participate in product development.	2 months	CO3
4	Perform onsite service.	1 month	CO4
	Total	6 months	

Course Objectives	1.Expose to real time working environment 2. Enhance knowledge and skill already learnt in the institution 3. Acquire the required skills in SDLC phases . 4. Instil the good qualities of integrity, responsibility and self confidence.

	At the end of course student able to:		
Course Outcomes	CO1	IOT-601.1	Apply knowledge and skill already learnt in the institution.
	CO2	IOT-601.2	Acquire the required skills of analysis, design and development, testing, verification and validation, deployment and distribution of the product.
	CO3	IOT-601.3	Involve in product design, development, quality testing and maintenance production by exhibiting the strength, teamwork spirit and self-confidence
	CO4	IOT-601.4	Prepare product document, gain the skills in deploying product at customer site , training the end user, maintaining the system.

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
IOT-601.1	3					3		3	3	
IOT-601.2	3			2	3	3	3	3	3	
IOT-601.3	3	3	3	3	3	3	3	3	3	3
IOT-601.4	3	3	3	3	3	3	3	3	3	3
Average	3	3	3	2.7	3	3	3	3	3	3

3=strongly mapped 2=moderately mapped 1=slightly mapped

LEARNING OUTCOMES – SCHEM OF EVALUATION (Two Online Certificate courses):

TRAINING MODULE NO.	TOPIC	LEARNING OUTCOMES (In-house training)	MARKS
First 3 Months/12 weeks- First certificate	1) Registration and training at Nptel/ Swayam/ Moocs/course era/lectera/caltech/oxford/hckerrank/ udemy… etc.,	i)Learning ii)Mini Application development iii)Report -1 preparation for First certificate iv)1st Assessment	120
Next 3 Months/12 Weeks-Second Certificate	1) Registration and training at Nptel/Swayam/Moocs/course era/lectera/caltech/oxford/hckerrank/ udemy… etc.,	i)Learning ii)Mini Application development iii)Report preparation iv)2nd Assessment	120
External Evaluation	**Seminar on two reports**/viva	Evaluation by GUIDE/Co - Examiner,HOD and External Examiner	60
		TOTAL	300

Online Certificate courses –

1. First 3 Months/12 weeks-Registration and training at either of Nptel/ Swayam/ Moocs/course era/lectera/ caltech /oxford/hckerrank/udemy for First Certificate Course

2. Next 3 Months/12 Weeks-Registration and training at either of Nptel/ Swayam/ Moocs/course era/lectera/ caltech /oxford/hckerrank/udemy for Second Certificate Cource.

Scheme of evaluation(Training at Industry)

Sl.No.	Subject	Duration	Scheme of evaluation		
			Item	**Nature**	**Max. Marks**
1	**Industrial Training**	**6 months**	**1.First Assessment at Industry (After 12 Weeks)**	Assessment of learning outcomes by both the faculty and training mentor of the industry	**120**
			2.Second Assessment at the Industry (After 20 weeks))	Assessment of learning outcomes by both the faculty and training mentor of the industry	**120**
			Final Summative assessment at institution level	**Training Report**	**20**
				Demonstration of any one of the skills listed in learning outcomes	**30**
				Viva Voce	**10**
TOTAL MARKS					**300**

The industrial training shall carry **300** marks and pass marks are **50**%.A candidate failing to secure the minimum marks should complete it at his own expenses.

During Industrial training the candidate shall put in a minimum of 90**%**attendance.

Weightage of marks for Assessment of Learning Outcomes during first and second assessment (at industry)

Sl.No	Learning Outcome	Max Marks Allotted For first assessment	Max Marks Allotted For second assessment
1	Apply knowledge and skill already learnt in the institution.	50	10
2	Acquire the required skills of analysis, design and development, testing, verification and validation, deployment and distribution of the product.	70	30
3	Involve in product design, development, quality testing and maintenance production by exhibiting the strength, teamwork spirit and self-confidence	-	40
4	Prepare product document, gain the skills in deploying product at customer site, training the end user, maintaining the system.	-	40
	Total	120	120

During assessment the performance of the students shall be assessed in those skills in which the student has been trained and be awarded the marks as per the weightage assigned as above. In case the student has undergone training in a few skill sets then the total marks obtained shall be raised to

120 marks for the given assessment i.e., either assessment 1 or 2. However the performance of the student shall be assessed at the most skill sets listed above but not less than three skill sets.

Illustration for First assessment.

If the student has undergone training in only in 2 skill sets (namely 1 for 50 marks, and 2 for 40 marks) out of 3 (namely 1 for 50 marks, 2 for 40 marks and 3 for 30 marks) in First assessment and marks awarded during assessment is 60 out of 90 marks, then the marks of 60 shall be enhanced to 120 proportionately as (60/90) *120=80.

Illustration for second assessment.

If the student has undergone training in only in 5 skill sets (namely 1 for 10 marks, 2 for 20 marks, 3 - for 10 marks, 4 for 25 marks, 5 For 15 marks) out of 7 (namely 1 for 10 marks, 2 for 20 marks, 3 For 10 marks, 4 for 25 marks, 5 For 15 marks, 6 for 25 marks and 7 for 15 marks) in Second assessment and marks awarded during assessment is 65 out of 80 marks, then the marks of 65 shall be enhanced to 120 proportionately as (65/80) *120=97.5 = rounded to 98.

GUIDELINES FOR INDUSTRIAL TRAINING OF DIPLOMA IN COMPUTER ENGINEERING PROGRAMME
1. Duration of the training: 6 months.
2. Eligibility: The As per SBTET norms
3. Training Area: Students can be trained in either in In-house/Industry/ ***TWO Online Certificate***

courses

  i. *First 3 Months/12 weeks- Registration and training at either of Nptel/ Swayam/ Moocs/course era / lectera / caltech / oxford / hckerrank / udemy for First Certificate Cource*
  ii. *Next 3 Months/12 Weeks- Registration and training at either of Nptel/ Swayam/ Moocs/course era / lectera / caltech / oxford / hckerrank / udemy for Second Certificate Course.*

 in the areas of
4. Application Software Development / system software Development / firmware development / Mobile application development/ Database applications / Web development/ IoT application development / smart technologies / Hardware interfacing/ Networking .

5. The candidate shall put a minimum of 90% attendance during Industrial Training.

6. If the student fails to secure 90% attendance during industrial training, the student shall reappear for 6 months industrial training.

7. Formative assessment at industry level shall be carried out by the Mentor from of the industry, where the student is undergoing training and the faculty in charge (Guide) from the concerned section in the institution.

8. The Industrial training shall carry 300 marks and pass marks is 50% in assessments at industry (first and second assessment) and final summative assessment at institution level put together i.e. 150 marks out of 300 marks.

9. If the student fails to secure 50% marks in final summative assessment at institution level, the student should reappear for final summative assessment in the subsequent board examination.

10. Final summative assessment at institution level is done by a committee including1. Head of the section (of concerned discipline ONLY), 2.External examiner from an industry and 3. Faculty member who assessed the student during Industrial Training as members.

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