CURRICULUM - 2023

C -23

DIPLOMA IN COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE)

STATE BOARD OF TECHNICAL EDUCATION & TRAINING

ANDHRA PRADESH

DIPLOMA IN COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE)

CURRICULUM- 2023 (C-23)

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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-centered**, 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. **The Curriculum should be flexible, adaptable, and responsive to the changing needs of the industry and society.** As such, it has been the practice of SBTET, A.P., to keep the curriculum abreast with the advances in technology through systematic and scientific analysis of current curriculum and bring out an updated revised version at regular intervals.

The design of Curriculum C-23 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. Accordingly, a workshop was convened on 15th February 2023 by Smt. C. Naga Rani, I.A.S, Director of Technical Education & Chairperson, SBTET, AP to discuss on revamping of C-20 curriculum to meet the needs of industries and for improvement of placements.

The meeting was attended by Sri. Saurab Gaur, I.A.S, Principal Secretary, Skill Development & Training, Smt. Lavanya Veni, I.A.S, Director, Employment & Training. Thirteen Representatives from Industries and Fourteen 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, emphasized the necessity of industrial training and on-hand experience, that the students need to undergo to support the industries and the Gaps in the Curriculum need to be fixed 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 experts from Industries, Higher Level Institutions and Faculty of Polytechnics are informed to study the possibility of incorporating the following aspects while preparation of the curriculum so as to improve employability.

- **To bring out industry oriented Diploma Engineers.**
- **Internet of Things (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.**
- **Dynamic, Student centric to suit the needs of the industry.**

In continuation, series of workshops with subject experts followed in the subsequent weeks for thorough perusal for preparation of draft curriculum. Also, the suggestions received from representatives from various industries, academic experts from higher level institutions, subject experts from Polytechnics, have been recorded, validated for incorporation into the **Curriculum C-23.** Finally, the draft curriculum was sent to academicians of higher-level institutions, industrial experts for Vetting.

The design of new Curricula C-23 for 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 produce employable diploma holders in the country by correlating the growing needs of the industries with relevant academic input.

The outcome-based approach as given by NBA guidelines has been followed throughout the design of this curriculum and designed to meet the requirements of NBA Accreditation, too.

The Revised Curriculum i.e., Curriculum–2023 (C-23) is approved by 45th Academic Committee of SBTET, A.P for its implementation with effect from Academic Year 2023-24. Also, the SBTET, A.P under the aegis of the Department of Technical Education, Andhra Pradesh in it's 62nd Board Meeting held on 13-07-2023 (vide item no: 17) Approved to update the Polytechnic Curriculum C-23 with effect from the academic year 2023-2024 onwards after revamping the present C-20 curriculum, to meet the latest industrial technological developments including Industry 4.0 concepts.

2. HIGHLIGHTS OF CURRICULUM C-23

The following Courses/ Topics are incorporated in this curriculum C-23 as per the suggestions received from Industrial Experts, Faculty of Higher Level Institutions and Polytechnics to improve the Employability Skills of the Polytechnic Students.

1) The Weightage of Theory & Practical in 50:50.
2) A new subject Big Data & Cloud Computing incorporated to meet the requirements of Industry.
3) Industrial Training (CISCO) is replaced with training in Industry or two online certificate courses.

3. ACKNOWLEDGEMENTS

The Members of the working group are grateful to Smt C. Naga Rani I.A.S., Commissioner of Technical Education & Chairman of SBTET, for continuous guidance and valuable inputs during process of revising, modifying and updating the Curriculum C-20 to Curriculum C-23.

We are grateful to Sri. S. Suresh Kumar, I.A.S, Principal Secretary, Skills Development & Training for his valuable suggestions to bring the revamped curriculum C-23 in to a final form to meet latest Industry 4.0 concepts.

We are grateful to Sri. Saurab Gaur, I.A.S, former Principal Secretary, Skills Development & Training who actively participated in the Industry-Academia workshop conducted on 15th February, 2023 and offered valuable suggestions and insights into the learning needs and preferences so that the curriculum is engaging, inclusive, and effective.

It is pertinent to acknowledge the support of the following in the making of Curriculum C-23. A series of workshops in different phases were conducted by SBTET, AP, Guntur involving faculty from Polytechnics, Premier Engineering Colleges & representatives from various Industries and Dr. C. R. Nagendra Rao, Professor & Head, NITTTR-ECV to analyse the Previous C-20 Curriculum and in designing of C-23 Curriculum, is highly appreciated and gratefully acknowledged.

We also extend our sincere thanks to Sri. V. Padma Rao, Joint Director of Technical Education, Sri K.V. Ramana Babu, Secretary, SBTE&T, Andhra Pradesh, Sri K. Vijaya Bhaskar, Deputy Director (Academic) , Andhra Pradesh, 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 run at various institutions are of AICTE approved 3 years or 3½ years duration of academic instruction. All the Diploma courses are run on year wise pattern in the first year, and the remaining two or two & half years are run in the semester pattern. 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).
    a. 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.
    b. 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.
    c. 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). 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 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 3 hours 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.**

S. No.	Type of Assessment	Weightage Assigned
(i)	Testing of knowledge through mid-examination for year/sem as (Mid-1+Mid-2+Mid3) or (Mid-1 + Mid-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

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

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

The 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 be 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) HoD/Senior Lecture (Selection Grade-II) from the 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.

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.

III. In-Plant Industrial Training for 3-Year Diploma (C-23) Courses is scheduled as per the Academic Calendar of the SBTET every year.

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. 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) puts the required percentage of attendance, i.e., 90% in 6th semester Industrial Training and pays 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 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 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

<u>For IVC & ITI Lateral Entry students</u>:

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

iv. 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.

v. 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.

vi. 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.

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

A candidate is eligible to appear for 7th semester examination if he/she

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

<u>For IVC & ITI Lateral Entry students</u>:

a) Puts in the required percentage of attendance in the 7 th 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

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, i.e., 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 ie., 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 50 contains 8 essay type questions. Only 5 questions are to be answered and each carry 10 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, ie. 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 fulfil the following academic regulations.

i. He / She pursued a course of study for not less than 3 / 3 ½ academic years & not more than 6 / 7 academic years.
ii. He / she have 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 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 ie., 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 valued answer 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-traceable 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. 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.

VISION

To produce students with comprehensive understanding of the essentials in the area of Artificial Intelligence and make students to become leaders in the industry

MISSION

M1	To provide opportunity to Diploma students who are capable of playing pivotal role in wide aspects of modern Artificial Intelligence Engineering.
M2	To develop test and demonstrate how Artificial Intelligence can be used to tackle the problems in different domains that serves the nation and humanity.
M3	To train the student sensitive to the Environment, safety and economic context.
M4	To produce technically skilled students through intensive training in Artificial Intelligence Engineering tools and application and to prepare the students for professional career and further research.

PROGRAMME EDUCATIONAL OBJECTIVIES(PEOs)

ARTIFICIAL INTELLIGENCE Engineering programme is ever changing to transform to transform students to 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 ARTIFICIAL INTELLIGENCE Engineering 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 Computer 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, andthe 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 ARTIFICIAL INTELLIGENCE Engineering 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 System: Ability to understand the principles and working of computer systems and can assess the hardware and software aspects of computer systems.
PSO2	Foundations of Artificial Intelligence: Ability to understand the structure and development methodologies of Artificial Intelligence and Machine Learning. Possess professional skills and knowledge of usage of Python in Artificial Intelligence and Data Analysis. Familiarity and practical competence with a broad range of Python 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 and AI 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 ARTIFICIAL INTELLIGENCE Engineering 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 ARTIFICIAL**	✓	✓	✓	✓

INTELLIGENCE Engineering 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 ARTIFICIAL INTELLIGENCE Engineering** 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.	✓	✓	✓	✓

NOTE: In some of the courses PO5, PO6 and PO7 strength is between 1 and2,to strengthen them, the following remedial measures for all the courses are suggested.

Short fall in PO	Remedial measures
PO5	By conducting 1) Guest lectures on motivational aspects and ethics 2) Concerned teacher will educate the students to follow ethics and morals in developing solutions 3) providing access to Online courses like Swayam program 4) seminars by senior students to the junior students to assimilate the methods followed by them to the juniors 5) Head of section will frequently visit and observe the activities being followed by the students to correct their behavior and to inculcate morals and ethics
PO6	They can achieve this from **industrial training** module scheduled in 6th semester of this curriculum by observing, analyzing and applying the mathematical and scientific fundamentals in solving the real time problems that will arise in day-to-day activities in industry.
PO7	1. Providing access to Online courses like Swayam program 2. By utilizing Learning Management System (LMS)established by SBTET 3. By subscribing e-magazines/ print magazines to the institute library and made them accessible to the students. 4. By arranging Guest lecturers from the technical experts.

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERINGSCHEME OF INSTRUCTIONS AND EXAMINATION

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								
CAI-101	English	3	-	90	3	20	80	100
CAI-102	Engineering Mathematics - I	5	-	150	3	20	80	100
CAI-103	Engineering Physics	3	-	90	3	20	80	100
CAI-104	Engineering Chemistry and Environmental studies	3	-	90	3	20	80	100
CAI-105	Basics of Computers and AI	5	-	150	3	20	80	100
CAI-106	Programming in C	5	-	150	3	20	80	100
PRACTICAL SUBJECTS								
CAI -107	Engineering Drawing		3	90	3	40	60	100
CAI -108	Programming in C Lab		6	180	3	40	60	100
CAI -109	Physics Lab		1.5	90	1.5	20	30	50
CAI -110	Chemistry Lab		1.5		1.5	20	30	50
CAI -111	Computer Fundamentals Lab		3	90	3	40	60	100
	Activities		**3**	90				
	Total	**24**	**18**	**1260**	**-**	**-**	**-**	**1000**

CAI-101,102,103,104,107,109,110 common with all branches

CAI-106,108,111 common with CME

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING

SCHEME OF INSTRUCTIONS AND EXAMINATION

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								
CAI-301	Mathematics –II	4		60	3	20	80	100
CAI-302	OOPs through Java	4	-	60	3	20	80	100
CAI-303	Computer Networks & Cyber Security	5	-	75	3	20	80	100
CAI-304	Data Structures through C	5	-	75	3	20	80	100
CAI-305	DBMS	5	-	75	3	20	80	100
PRACTICAL SUBJECTS								
CAI-306	Java Programming Lab	-	4	60	3	40	60	100
CAI-307	Computer Networking & Cyber Security Lab	-	3	45	3	40	60	100
CAI-308	Data Structures Through C Lab	-	5	75	3	40	60	100
CAI-309	DBMS Lab		4	60	3	40	60	100
	ACTIVITIES		3	45				
	Total	**23**	**19**	**-**	**-**	**-**	**-**	**900**

CAI-301 common with all branches CAI-302 Common with CME-404, AIM-302 CAI-303 common with CME-405 CAI-304 Common with CME-304 CAI-305 Common with CME-305, AIM-305

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING

SCHEME OF INSTRUCTIONS AND EXAMINATION

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								
CAI-401	Web Technologies	5	-	75	3	20	80	100
CAI-402	Python Programming	5	-	75	3	20	80	100
CAI-403	Artificial Intelligence	5	-	75	3	20	80	100
CAI-404	Digital Electronics & Computer Organization	5	-	75	3	20	80	100
CAI-405	Operating Systems	4	-	60	3	20	80	100
PRACTICAL SUBJECTS								
CAI-406	Web Technologies Lab	-	5	75	3	40	60	100
CAI-407	Python Programming Lab	-	3	45	3	40	60	100
CAI-408	Communication Skills	-	3	45	3	40	60	100
CAI-409	Artificial Intelligence Lab using PROLOG	-	4	60	3	40	60	100
	Activities		3	45				
	Total	24	18	-	-	-	-	900

CAI-401 common with CME-402, AIM-401
CAI-402 common with CME-505, AIM-402
CAI-403 common with AIM-403
CAI-404 Common with AIM-304
CAI-405 Common with CAI-303, AIM-303

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING

SCHEME OF INSTRUCTIONS AND EXAMINATION

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								
CAI-501	Industrial Management and Entrepreneurship	5	-	75	3	20	80	100
CAI-502	Software Engineering	5	-	75	3	20	80	100
CAI-503	Data Science and Machine Learning	5	-	75	3	20	80	100
CAI-504	IOT & Cloud Computing	4	-	60	3	20	80	100
CAI-505	Natural Language Processing	5	-	75	3	20	80	100
PRACTICAL SUBJECTS								
CAI-506	Data Science and Machine Learning	-	3	45	3	40	60	100
CAI-507	IOT and Cloud Computing Lab	_	3	45	3	40	60	100
CAI-508	Life Skills	-	3	45	3	40	60	100
CAI-509	Project work	-	6	90	3	40	60	100
	Activities		**3**	45				
	Total	**24**	**18**	-	-	-	-	**900**

Note:CAI-501 common with CAI-501
CAI-502 common with CAI-401
CAI-508 common with all branches

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING

SCHEME OF INSTRUCTIONS AND EXAMINATION

VI Semester

CAI-601 Industrial Training

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 tosecure the minimum marks should complete it at his own expenses.

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

- Duration of the training: 6 months.
- Eligibility: The As per SBTET norms
- Training Area: Students can be trained in planning, executingAnimation andGraphics works.
- The Industrial Training shall carry 300 marks and pass marks is 50% in assessment at industry (first and second assessment put together) andalso 50% in final summative assessment at institution level.
- During Industrial training the candidate shall put in a minimum of 90%attendance at the TV Studios/Film Studios/Animation Theatres/or any related Multimedia and graphics industries.
- If the student fails to secure 90% attendance during industrial training, the student shall reappear for 6 months industrial training.
- Formative Assessment at Industry level shall be carried out by the representative of the industry where the student is undergoing training and thestaff member from the concerned section in the institution.
- If the student fails to secure 50% marks in industrial assessments put together, the student should reappear for 6 months industrial training at his own expenses.

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 members.

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								
CAI-101	English	3	-	90	3	20	80	100
CAI-102	Engineering Mathematics - I	5	-	150	3	20	80	100
CAI-103	Engineering Physics	3	-	90	3	20	80	100
CAI-104	Engineering Chemistry and Environmental studies	3	-	90	3	20	80	100
CAI-105	Basics of Computers and AI	5	-	150	3	20	80	100
CAI-106	Programming in C	5	-	150	3	20	80	100
PRACTICAL SUBJECTS								
CAI -107	Engineering Drawing		3	90	3	40	60	100
CAI -108	Programming in C Lab		6	180	3	40	60	100
CAI -109	Physics Lab		1.5	90	1.5	20	30	50
CAI -110	Chemistry Lab		1.5		1.5	20	30	50
CAI -111	Computer Fundamentals Lab		3	90	3	40	60	100
	Activities		**3**	90				
	Total	**24**	**18**	**1260**	**-**	**-**	**-**	**1000**

ENGLISH

CURRICULUM: C23-COMMON-101

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

S. No.	Unit Title	No of Periods	COs Mapped
1	English for Employability	8	CO1, CO2, CO3, CO4,CO5
2	Living in Harmony	8	CO1, CO2, CO3, CO4,CO5
3	Connect with Care	8	CO1, CO2, CO3, CO4, CO5
4	Humour for Happiness	8	CO1, CO2, CO3, CO4, CO5
5	Never Ever Give Up!	8	CO1, CO2, CO3, CO4, CO5
6	Preserve or Perish	9	CO1, CO2, CO3, CO4, CO5
7	The Rainbow of Diversity	8	CO1, CO2, CO3, CO4, CO5
8	New Challenges- Newer Ideas	8	CO1, CO2, CO3, CO4, CO5
9	The End Point First!	8	CO1, CO2, CO3, CO4, CO5
10	The Equal Halves	8	CO1, CO2, CO3, CO4, CO5
11	Dealing with Disaster	9	CO1, CO2, CO3, CO4, CO5
Total Periods		**90**	

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.

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 for 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. Acquire 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 goal 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 Text book 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 by N.D.V. Prasad Rao) : *English Grammar and Composition*, Blackie ELT Books, S. Chand and Co.
Sarah Freeman : *Strengthen Your Writing,* Macmillan

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)

Weightage Table : C23-COMMON-101: English

S. No.	Name of the Unit	Periods Allocated (Total 90 periods)	Weightage of Marks Allocated (Short + Long Answer question)	Weightage (Long answer questions) @10 Marks	Marks Wise Distribution of Weightage (Short answer questions) @3 Marks				CO's Mapped
					R	U	Ap	An	
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							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** (Integration of the cognitive skills of Understanding, Applying & Analysing)					
Total			**110**						

CAI-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
AIM-102	Engineering Mathematics-I	5	150	20	80

Chapter. No	Unit Title	No. of periods	COs mapped
1	Algebra	31	CO1
2	Trigonometry	44	CO2
3	Co-ordinate Geometry	23	CO3
4	Differential Calculus	34	CO4
5	Applications of Derivatives	18	CO5
Total Periods		**150**	

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

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

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 a 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 angle 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

$\sin^{-1}x + \cos^{-1}x = \frac{\pi}{2}$, etc.

2.16 Apply formulae like $\tan^{-1}x + \tan^{-1}y = \tan^{-1}\left(\frac{x+y}{1-xy}\right),\ where\ x \geq 0, y \geq 0, xy < 1$ 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 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

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

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

4.2 Evaluate the limits of the type $\lim_{x\to a}\frac{f(x)}{g(x)}$ and $\lim_{x\to\infty}\frac{f(x)}{g(x)}$

4.3 State the Standard limits $\lim_{x\to a}\frac{x^n-a^n}{x-a}$, $\lim_{x\to 0}\frac{\sin x}{x}$, $\lim_{x\to 0}\frac{\tan x}{x}$, $\lim_{x\to 0}\frac{a^x-1}{x}$, $\lim_{x\to 0}\frac{e^x-1}{x}$, $\lim_{x\to 0}(1+x)^{\frac{1}{x}}$, $\lim_{x\to\infty}\left(1+\frac{1}{x}\right)^x$ (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 $\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ 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, hyperbolic and inverse 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,	150	100%	3	>40% Level

	CO5	(31+44+23+34+18)			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.

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

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 - Determinant of a square matrix, minor and cofactor of an element, 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 - 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, hyperbolic and inverse 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, 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.

TIME SCHEDULE

Chapter. 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	

C-23 common-102
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

ENGINEERING PHYSICS

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

Chapter. No	Major topics	No. of Periods	Weightage of Marks	No. of Short Answer Questions	No. of Essay Type Questions	COs mapped
1.	Units and measurements	09	3	1		CO1
2.	Statics	11	13	1	1	
3.	Gravitation	12	20		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:	**90**	**110**	**10**	**8**	

MATRIX SHOWING MAPPING OF COURSE OUTCOMES WITH PROGRAMME

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.

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.

Matrix showing mapping of Course Outcomes with Program Outcomes

CO-PO Mapping Strength

	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

Course code Common - 103	Engineering Physics No of Course Objectives : 4				No of periods 90
Pos	Mapped with CO No	) periods addressing PO in Col 1 NO	%	vel 1,2,3	remarks
PO1	CO1,CO2,CO3,CO4	44	48.9 %	3	>40% level 3 (highly addressed) 25% to 40% level 2 (moderately addressed) 5% to 25% level 1 (Low addressed) < 5% (not addressed)
PO2	CO1,CO2, CO4	11	12.2%	1	
PO3	CO1, CO2,CO3, CO4	10	11.1%	1	
PO4	CO1, CO2,CO4	8	8.9%	1	
PO5	CO2,CO3, CO4	8	8.9%	1	
PO6					
PO7	CO1, CO2, CO3, CO4	9	10.0%	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 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

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

Engineering Chemistry and Environmental Studies (C-23)

CAI-104

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

Chapter. No	Unit Title/Chapter	No. of Periods	COs Mapped
1	Fundamentals of Chemistry	14	CO1
2	Solutions, Acids and Bases	16	CO1
3	Electrochemistry	12	CO2
4	Corrosion	8	CO2
5	Water Treatment	8	CO3
6	Polymers& Engineering Materials	12	CO4
7	Fuels	6	CO4
8	Environmental Studies	14	CO5
	Total	90	

Course Objectives

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

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.

CAI-104	Engineering. Chemistry and Environmental studies No of Course Outcomes:5				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	PSO1	PSO2	PSO3
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

Time Schedule:

Chapter. No	Unit Title/Chapter	No of Periods	Weightage of marks	Question wise distribution		Mapped with CO
				Essay	Short	
1	Fundamentals of Chemistry	14	21	1½*	2	CO1
2	Solutions, Acids and Bases	16	21	1½*	2	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	0	1	CO4
8	Environmental Studies	14	13	1	1	CO5
Total		90	110	8	10	

***One question of 10 marks should be given with 50% weightage from unit title 1and 2**

Upon completion of the course, the student shall be able to learn out

ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES

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.

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

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

CAI-105-Basics Of Computers and AI

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
CAI-105	**Basics Of Computers and AI**	5	150	20	80

S.No.	Chapter/Unit Title	No.of Periods	CO"s Mapped
1.	Fundamentals of Computers	30	CO1,CO3,CO4
2.	Programming Methodology	15	CO2
3.	Operating System basics	35	CO1,CO3
4.	Computer Hardware and Networking Basics	35	CO1,CO4,CO5
5.	Fundamentals of Artificial Intelligence	35	CO2,CO6
Total Periods		150	

Course Objectives	i) To know the fundamentals of Computers ii)To familiarize programming methodologies like algorithms and flowcharts iii)To understand Operating system basics iv)To familiarize Machine Learning and Artificial Intelligence

Course Outcomes	At the end of the course the student able to learn following:		
	CO1	CAI-105.1	Explain computer fundamentals
	CO2	CAI-105.2	Explain various flowchart, algorithm methods
	CO3	CAI-105.3	Explain the importance of Basic Computer operating systems
	CO4	CAI-105.4	Analyse functioning of various Hardware components
	CO5	CAI-105.4	Explain Networking process in computers
	CO6	CAI-105.5	Explain basics of Artificial Intelligence and Machine Learning

Learning Outcomes:

1.0 Fundamentals of Digital Computer

1.1. Define various terms related to computers – Computer, Hardware , Software, Firmware,High Level Language , Low Level Language
1.2. Draw and explain block diagram of a Computer in detail
1.3. Describe the current family of CPUs used in Computers.
1.4. State the use of storage devices used in a Computer.
1.5. List the two types of memory used in a Computer.
1.6. State the importance of cache memory.

1.7. Explain the generations of computers.
1.8. Classification of computers - based on a) size, b) processor.
1.9. State the importance of binary number system for use in Digital Computers

2.0 Implement Programming Methodology.

2.1. State the different steps involved in problem solving.
2.2. Define algorithm.
2.3. List four characteristics of algorithm.
2.4. Define a program
2.5. Differentiate between program and algorithm.
2.6. State the steps involved in algorithm development.
2.7. Differentiate between algorithm and flowchart.
2.8. Develop algorithms for simple problems.
2.9. Draw the symbols used in flowcharts.
2.10. Draw flowcharts for simple problems.

3.0 Operating Systems basics

3.1. Describe the need for an operating system.
3.2. List the various operating systems used presently.
3.3. List and explain
  3.3.1. Types of dos commands
  3.3.2. Internal Commands
  3.3.3. External Commands
  3.3.4. Features of Windows desktop.
  3.3.5. Components of a Window.
3.4. State the function of each component of a Window.
3.5. Describe the Method of starting a program using start button
3.6. Explain usage of maximize, minimize, restore down and close buttons.
3.7. State the meaning of a file ,folder.
3.8. Describe the Method of viewing the contents of hard disk drive using Explorer
3.9. Describe the Method of finding a file using search option.
3.10. Use control panel for
  3.10.1. Installing and uninstalling software
  3.10.2. Installing and uninstalling hardware
  3.10.3. Changing the system date and time
  3.10.4. Installing a printer
3.11. Explain Drive space using system tool option of Accessories group
3.12. Explain Disk defragmentation using System tools
3.13. Explain the procedure for changing resolution, color, appearance, screensaver options ofthe display

4.0 Computer Hardware and Networking Basics

4.1 Hardware Basics
  4.1.1 Identify hardware used for I/P, O/P & inside computer case, system boardcomponents used for communication among devices
  4.1.2 Software - 3 types of Software: ROM BIOS, OS, application software
  4.1.3 Explain Functions of BIOS
  4.1.4 Explain boot process
  4.1.5 Explain POST and important beep codes

4.1.6 Describe about different connectors.

4.2 Networking Basics

4.1.1. Explain meaning of a computer network.
4.1.2. Describe the concept of a Local Area Network, Wide Area Network
4.1.3. Compare Internet and Intranet
4.1.4. Describe about internet service provider.
4.1.5. Explain the role of a modem in accessing the Internet.
4.1.6. Describe address format and IP address
4.1.7. What is browser and List various browsers
4.1.8. Explain the role of search engines with examples.
4.1.9. Explain Internet Security.

5.0 Fundamentals of Artificial Intelligence

5.1. Introduction to Artificial Intelligence

5.1.1. Introduction
5.1.2. Define AI
5.1.3. History of AI
5.1.4. Types of AI
5.1.5. Features of AI
5.1.6. Intelligent systems
5.1.7. Foundations of AI
5.1.8. Tic-tac-toe game playing
5.1.9. History of AI languages
5.1.10. Current Trends in AI
5.1.11. List searching algorithms
5.1.12. Applications of AI
5.1.13. Terminology of AI

5.2. Introduction to Machine Learning

5.2.1. Define Machine Learning, Compare Traditional Programming with MachineLearning
5.2.2. List the applications and key elements of Machine Learning
5.2.3. Define the terms in relation to approaches to Machine Learning (Decision tree learning, Association rule learning, Artificial neural networks,Deep Learning, Inductive Learning, Genetic algorithms, Clustering)
5.2.4. Explain Inductive Learning
5.2.5. Classify the Machine Learning

5.3. Introduction to Big data

5.3.1. Define and list sources of Big data
5.3.2. Evolution of data/big data
5.3.3. List and explain the characteristics of big data – the three V„s of big data
5.3.4. Describe Storing and selecting of Big Data
5.3.5. State the Need of Big Data
5.3.6. List types of tools used in Big Data
5.3.7. List applications of big data

COURSE CONTENT

1.0 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

2.0 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

3.0 Understand Operating Systems

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 - Fformatting a floppy disk using explore option - Installing and uninstalling new software using control panel - installing and un installing a new hardware using control panel - Drive space - disk defragmentation - Installing a printer - Changing resolution, colour, appearance and screensaver options of the display - Changing the system date and time.

4.0 Computer Hardware and Networking Basics

Hardware Basics- I/P, O/P - inside computer case- system board components - 3 types of Software - BIOS- boot process - POST - different connectors. Networking Basics - computer network - Local Area Network - Wide Area Network - Compare Internet and Intranet - internet service provider - role of a modem - address format and IP address - browser - search engines with examples -Describe Internet Security.

5.0 Fundamentals of Artificial Intelligence

Introduction – Definition - History of AI - Types of AI -Features of AI - intelligent systems-foundations of AI - Tic-tac-toe game playing - History of AI languages - Current Trends in AI- searching algorithms- Applications - Terminology of AI

Introduction to Machine Learning - Compare Traditional Programming with Machine Learning- applications -know the key elements- Define the terms - Decision tree learning, association rule learning, Artificial neural networks,DeepLearning,InductiveLearning,Geneticalgorithms,Clustering - Explain InductiveLearning- Classify the Machine Learning -List the applications

Introduction to Big data -Big data-Evolution -characteristics – the three V„s -Storing -Selecting - Need of Big Data -sources of big data -types of tools used - applications

REFERENCE BOOKS

1. Information Technology - Curtin.
2. Computer Science Theory & Application - E. Balaguruswamy, B. Sushila
3. Introduction to Computers (Special Indian Edition) - Peter Norton4.Big Data Basics part1 and 2 in www.mssqltips.com
5.Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-GrawHill6.Introduction to AI & Expert System: Dan W.Patterson, PHI. 7.Artificial Intelligence by Luger (Pearson Education)
8.Russel&Norvig, Artificial Intelligence: A Modern Approach, Pearson Education
9.Introduction to Machine learning, Nils J.Nilsson
10. Machine learning for dummies, IBM Limited ed,by Judith Hurwitz and Daniel Kirsch 11.Introduction to Machine Learning with Python A guide for data scientists, Andreas, C.Muller&Sarah Guido, O'Reill

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	R	U	
1.	Fundamentals of Digital Computers	30	16	6	10	2	1	CO1
2.	Programming Methodologies	15	13	3	10	1	1	CO2
3.	Operating system basics	35	26	6	20	2	2	CO3
4.	Computer Hardware and Networking Basics	35	29	9	20	3	2	CO4
5.	Fundamentals of Artificial Intelligence	35	26	6	20	2	2	CO5
	Total	150	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	From 1.1 to 3.3(inclusive)
Unit test-2	From 3.4 to 4.1(inclusive)
Unit test-3	From 4.2 to 5.3(inclusive)

CAI-106- Programming in C

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
CAI-106	Programming in C	5	150	20	80

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Introduction to C Language	20(10,10)	CO1,CO2
2.	Input and output statements, Operators and Expressions in C.	25(8,12, 5)	CO1,CO2,C3
3.	Decision making, iterative and other control statements	40(5,20,15)	CO1,CO2,CO3
4.	Arrays and strings, Structures and Unions	30(5,15,10)	CO1,CO2,CO3
5.	User defined functions, pointers, file management and pre-processor directives.	35(3,5,10,10,7)	CO1,CO2,CO3,CO4,CO5
	Total Periods	150	

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	CAI-106.1	Develop, compile and debug programs using C- fundamentals and different programming statements in C language.
CO2	CAI-106.2	Evaluate various operations using primary and derived data types in C.
CO3	CAI-106.3	Analyse programs using predefined functions, modules and recursive techniques
CO4	CAI-106.4	Write scientific and logical programs using pointers, file pointers
CO5	CAI-106.5	Develop programs using information passing

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. Input and output statements, Operators and Expressions in C

2.0 Explain the importance of Pre-processor Directive #include
2.1 Illustrate 1) Reading a character using getch(), getche() and getchar()
2) writing a character using putch(), putchar()
3) formatted input using scanf() & write sample programs using it.
4) formatted output usingprintf()& write sample programs using it.
2.2 Explain character functions
2.3 Define an operator, an expression
2.4 Explain 1) Various arithmetic operators and explain the evaluation of arithmetic expressions
with example.
2) Various relational operators and discuss evaluation of relational expressions
3) Various logical operators and discuss evaluation of logical expressions
2.5 Explain the difference between unary and binary operators
2.6 Describe various assignment operators, increment and decrement operators
2.7 Illustrate nested assignment
2.8 Explain conditional operators with an example
2.9 Explain 1) Bit-wise operators and explain each with an example
2) Special operators with examples
3) Precedence and Associativity of operators
2.10 Describe evaluation of compound expression
2.11 Illustrate type conversion techniques
2.12 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
1. Simple if and if-else statement with syntax and sample program
2. Nested if..else statements with syntax and sample program
3. if-else-if ladder with syntax and sample program
4. switch statement with syntax and sample program

3.3 State the importance of break statement with switch and illustrate
3.4 Compare
1. Conditional operator with if-else statement
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.
Define structured programming.

4.0 Arrays, strings, Structures and Unions

4.1 Define Array
4.2 Describe
1. Declaration and initialization of One Dimensional(1D) Array with syntax and sample programs.
2. Accessing the elements in 1D-Array with sample programs.
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 Define String
4.6 Describe
1. Declare and initialize of String variables.
2. gets() and puts()
3. Reading and displaying of strings from terminal with sample programs.
4. Explain about various String handling functions with sample programs.

4.7 Explain Character arithmetic.
4.8 Define a structure.
4.9 Explain
1. Initializing structure, Declaring structure, Declaring Structure Variables.
2. Accessing of the structure members
3. Structure assignment.
4. How to find size of a structure.
5. Nested structure concept.
6. Structures containing arrays
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
1. Function declaration in programs
2. Functions with no arguments and no return values with sample programs
3. Functions with arguments with no return values with sample programs
4. Functions with arguments with return values with sample programs
5. Functions with no arguments with return values with sample

programs

6. Functions that return multiple values with sample programs
7. Recursion with sample programs
8. Passing arrays to functions with sample programs
9. Structure as function arguments and structures as function values.
10. Structures containing pointers.
11. Self referential structures with examples.
12. Storage classes-auto, register, static, extern
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

1. Declaration and initialization of Pointers.
2. Accessing the address of a variable using &operator
3. Accessing the value of a variable through pointer
4. Pointer Arithmetic
5. Precedence of address and de-referencing operators.
6. Relationship between arrays and pointers.
7. Accessing array elements using pointers
8. Pointers as function arguments
9. Pointer arrays with examples.

5.8 Differentiate between address and de-referencing operators.

5.9 Explain

1. Dynamic memory management functions with examples.
2. Structures containing pointers.
3. Pointer to structure.
4. Self referential structures with examples.

5.10 Explain

1. Files and how to declare file pointer to a file
2. Illustrate the concept of file opening using various modes
3. Illustrate the concept of closing of a file
4. Illustrate the concept of Input / Output operations on a file
5. Illustrate the concept of random accessing files
6. Explain different file handling functions

5.11 Explain

1. Preprocessor directives
2. Need of preprocessor directives.

5.12 Write

1. Simple programs using preprocessor directives.
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-
6. 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 McGraw Hill
3	C The complete Reference	Schildt	Tata McGrawHill

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

ENGINEERING DRAWING

Course code	Course Title	No. of periods /week	Total No. of periods	Marks for FA	Marks for SA
EE-107	ENGINEERING DRAWING	3	90	40	60

S.No	Unit Title	No. of periods	CO's Mapped
1	Use of Drawing Instruments, Free Hand Lettering and Dimensioning Practice	10	**CO1**
2	Principles of Geometric Constructions	15	**CO2**
3	Projections of points, lines, planes and solids	20	**CO3**
4	Sectional Views	20	**CO4**
5	Orthographic projection	25	**CO5**
	Total	**90**	

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**	EE-107.1	Practice the use of engineering drawing instruments and Familiarise with the conventions to be followed in engineering drawing as per BIS
	CO2	EE-107.2	Construct the i) basic geometrical constructions ii) engineering curves
	CO3	EE-107.3	Visualise and draw the projections of i) Points ii) Lines iii) Regular Planes iv) Regular Solids
	CO4	EE-107.4	Visualise and draw the sectional views of components
	CO5	EE-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.

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

Table specifying syllabus to be covered for UNIT TEST I, II and III.

Programming in C Lab

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
CAI-108	**Programming in C Lab**	**06**	180	40	60

S No	Chapter/ Unit Title	No. of Periods	COs Mapped
1.	Fundamentals and Input /Output statements	15	CO1,CO2
2.	Control statements	45	CO1,CO2,CO4
3.	Arrays, structures and unions	60	CO1,CO2,,CO3,CO4
4.	User defined functions, storage classes, pointers, files and macros	60	CO1,CO2,CO3,CO4,CO5
	Total	180	

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	CAI-108.1	Perform Edit, compile and debug and execution of C-Programs (12)
CO 2	CAI-108.2	Develop programs using different predefined functions, keywords, user defined identifiers(18)
CO 3	CAI-108.3	Evaluate different expressions using available C-operators and valid data supported by C-language(24)
CO 4	CAI-108.4	Develop C-programs using control statements, array‟s, structures, unions, files (90)
CO 5	CAI-108.5	Develop C-programs using user defined functions and recursion (24)
CO 6	CAI-108.6	Develop C-programs to implement dynamic memory concept(12)

LEARNING OUTCOMES:

Fundamentals and Input /Output statements

1. Exercise on structure of C Program
2. Exercise on Keywords and identifiers
3. Exercise on constants and variables
4. Execution of simple C program
5. Exercise on operators and expressions
6. Exercise on special operators
7. Exercise on input and output of characters
8. Exercise on formatted input and output
9. Exercise on escape sequence characters

Control statements

(Note: Every statement must be repeated with at least 5 different applications)

10. Exercise on simple if statement
11. Exercise on if..else statement
12. Exercise on if..else..if ladder statement
13. Exercise on switch statement
14. Exercise on conditional operator comparing with if-else statement
15. Exercise on while statement

16. Exercise on for statement
17. Exercise on do. While statement

Arrays, structures and unions

18. Exercise on one dimensional arrays
19. Exercise on two dimensional arrays
20. Exercise on strings
21. Exercise on structure
22. Exercise on union
23. Exercise on array of structures
24. Exercise on user-defined function
25. Exercise on storage classes
26. Exercise on parameter passing techniques
27. Exercise on recursion
28. Exercise on pointers
29. Exercise on text files
30. Exercise on macros

User defined functions, storage classes, pointers, files ,and macros

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**	Write a C program using do statement	❖ Build the termination condition for looping ❖ Use do statement with

	statement		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 storage classes	Write a C program using different storage classes	❖ Know the use of different storage classes ❖ Use the different storage classes ❖ Check whether the scope of variables is correctly defined or not. ❖ Rectify the syntax errors ❖ Check the output for correctness
26	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
27	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
28	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
29	Exercise on text files	Write a C program to create a text file, write data into it and read data from it	❖ Define a file pointer ❖ Use the various modes of file opening ❖ Close the file ❖ Write text into file ❖ Read text from file ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check for the correctness of output for the given input

30	Exercise on macros	Write a C program using macros	❖ Know the need of macros ❖ Use the macros/preprocessor directives ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check for the correctness of output for the given input

ENGINEERING PHYSICS LAB
(C-23 curriculum common to all Branches)

SUBJECT	SUBJECT CODE	TOTAL PERIODS	NUMBER PERIODS PER WEEK
PHYSICS LAB	COMMON -109	45	03

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.	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
COURSE OUTCOMES		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 Kirchoff'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 to micro currents as potential engineering application.

TIME SCHEDULE

S.No	List of experiments	No. of Periods
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 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**

Objectives:

Upon completion of the course the student shall be able to

1.0 Practise with Vernier calipers to determine the volumes of a cylinder and sphere..

2.0 Practise with Screw gauge to determine thickness of a glass plate and cross sectionalarea of a wire.

3.0 Verify the Lami's theorem using concurrent forces.

4.0 Determine the value of acceleration due to gravity using Simple Pendulum. To verify theresult from l-T^2 graph.

5.0 Calculate the Focal length and focal power of convex lens using distant object method,U-V method , 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 offorce 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 degreecentigrade.

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.

S.No	List of experiments	No. of Periods	COs
1.	Vernier calipers	03	CO1
2.	Micrometer (Screw gauge)	03	
3.	Verification of Lami's theorem using concurrent forces	03	
4.	Determination of g using simple pendulum	03	CO2
5.	Focal length and power of convex lens	03	
6.	Refractive index of solid using travelling microscope	03	
7.	Verification of Boyle's law using Quill tube	03	CO3
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	
10	Meter bridge – Determination of resistance and specific resistance of a wire	03	CO4
11	Verification of Newton's law of cooling	03	
12	Photo electric cell – Study of its characteristics	03	

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
C0.1	3	2	2	2	2	1	2
C0.2	3		1	1	1	1	1
C0.3	3	2			1		
C0.4	3	2	2			1	2

Competencies and Key competencies to be achieved by the student

Name of the Experiment (No of Periods)	Competencies	Key competencies
1. Hands on practice on Vernier Calipers(03)	□ Find the Least count □ Fix the specimen in posit □ Read the scales □ Calculate the physical quantities of given object	• Read the scales • Calculate the requisite physical quantities of given objects
2. Hands on practice on Screw gauge(03)	□ Find the Least count □ Fix the specimen in posit □ Read the scales □ Calculate thickness of glass place and cross section of wire and other quantities	□ Read the scales □ Calculate thickness of given glass plate □ Calculate cross section of wire and other quantities
3. Verification of Parallelogram law of forces and Triangle law of forces(03)	• Fix suitable weights • Note the positions of threads on drawing sheet • Find the angle at equilibriumpoint • Construct parallelogram • Compare the measured diagonal • Construct triangle • Find the length of sides • Compare the ratios	• Find the angle at equilibriumpoint • Constructing parallelogram • Construct triangle • Compare the ratios of force and length
4. Simple pendulum(03)	• Fix the simple pendulum to thestand • Adjust the length of pendulum • Find the time for number ofoscillations • Find the time period • Calculate the acceleration due to gravity • Draw l-T and l-T^2 graph	• Find the time for number ofoscillations • Find the time period • Calculate the acceleration due to gravity • Draw l-T and l-T^2 graph

Name of the Experiment(Periods)	Competencies	Key competencies
5. Focal length and Focal power of convex lens (Separate & Combination) (03)	• Fix the object distance • Find the Image distance • Calculate the focal length and power of convex lens and combination of convex lenses • Draw u-v and 1/u - 1/v graphs	• Calculate the focal length and power of convex lens • Draw 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 scale • Calculate the refractive index of glass slab	• Read the scale • 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 value P x l	• Find the length of air column • Find the pressure of enclosed air • Find the value P x l
Name of the Experiment	**Competencies**	**Key competencies**
8. Mapping of magnet lines offorce(03)	• Draw magnetic meridian • Placed the bar magnet in NN and NS directions • Draw magnetic lines of force • Locate the neutral points along equatorial and axial lines	• Draw magnetic lines offorce • Locate the neutral pointsalong equatorial and axial lines
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 resonating lengths • Calculate velocity of sound	• Adjust the reservoir level • Find the first and secondresonating lengths • Calculate velocity of sound at room temperature Calculate velocity of sound 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	• Find the balancing length • Calculate unknown resistance Calculate the specific resistance

Scheme of Valuation for END Practical Examination :

A. Writing Aim, Apparatus, Formula, Graph, Precautions carries Marks	**10 (Ten)**
B. For Drawing the table, taking Readings, Calculation work, Drawing the graph, finding result carries Marks	**15 (Fifteen)**
C. Viva Voice 05 (Five) Marks	
Total Marks	**30 (Thirty)**

CHEMISTRY LAB

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
CAI-110 (common to all branches)	**Chemistry Laboratory**	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

TIMESCHEDULE

S.No	Name of the Experiment	No.ofPeriods	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_3 and making solutions of	03	CO1
3.	EstimationofHClsolutionusingStd.Na_2CO_3solution	03	CO2
4.	Estimation of NaOHusing Std. HCl solution	03	CO2
5.	Estimation of H_2SO_4usingStd.NaOH solution	03	CO2
6.	Estimation of Mohr‟s Salt usingStd.$KMnO_4$	03	CO3
7.	Determination of acidity of water sample	03	CO2
8.	Determination of alkalinity of water sample	03	CO2
9.	Determination of total hardness of water using Std.	03	CO4
10.	Estimation of Chlorides present in water sample	03	CO4
11.	Estimation of Dissolved Oxygen(D.O)in water	03	CO5
12.	Determination of PH using PHmeter	03	CO5

13.	Determination of conductivity of water and adjusting	03	CO5
14.	Determination of turbidity of water	03	CO5
15.	Estimation of total solids present in water sample	03	CO5
	Total:	**45**	

Objectives:

Upon completion of the course the student shall be able to

1.0 Practice volumetric measurements (using pipettes, measuring jars, volumetric flask, burettes) and gravimetric measurements (using different types of balances), making dilutions, etc To identify the chemical compounds and solutions by senses.

2.0 Practice making standard solutions with pre weighed salts and to make solutions of desireddilutions using appropriate techniques.

3.0 Conduct titrations adopting standard procedures and using Std. Na_2CO_3solution

4.0 Conduct titrations adopting standard procedures and using Std.HClsolution for estimation ofNaOH

5.0 Conduct titrations adopting standard procedures and using Std. NaOH solution for estimation of H_2SO_4

6.0 Conduct titrations adopting standard procedures and using Std.$KMnO_4$solution for estimation of Mohr‟s Salt

7.0 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)

8.0 Conduct titrations adopting standard procedures to determine the alkalinity of given samples of water (One ground water and one surface / tap water)

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

10.0 Conduct titrations adopting standard procedures to determine the chlorides present in the given samples of water and wastewater (One ground water and one surface / tap water)

11.0 Conduct the test using titrometric / electrometric method to determine Dissolved Oxygen (D.O) in given water samples (One sample from closed container and one from open container / tap water)

12.0 Conduct the test on given samples of water / solutions (like soft drinks, sewage, etc.) to determine their pH using standard pH meter

13.0 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

14.0 Conduct the test on given samples of solutions (coloured and non coloured) to determinetheir turbidity in NTU

15.0 To determine the total solids present in given samples of water (One ground water and onesurface / tap water)

Competencies and Key competencies to be achieved by the student

Name of the Experiment (No of Periods)	**Competencies**	**Key competencies**
Familiarization of methods for Volumetric analysis. Recognition of chemical substances And solutions (03)	-	--
Preparation of Std Na_2CO_3 and making solutions of different dilution(03)	▪ Weighing the saltto the accuracy of .01 mg ▪ Measuring the water with volumetric flask, measuring jar, volumetric pipetteand graduated pipette ▪ Making appropriat edilutions	▪ 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
Estimation of HCl solution using Std. Na_2CO_3solution (03)	▪ Cleaning the glassware andrinsing with appropriate solutions ▪ Making standard	▪ Making standard solutions ▪ Measuring accurately the standard solutions and titrants ▪ Effectively Controlling the
Estimation of NaOH using Std. HCl solution (03)		
Estimation of H_2SO_4usingStd. NaOH solution (03)		

Estimation of Mohr‟s Salt usingStd.$KMnO_4$ (03) Determination of acidity of water sample (03)	solutions ▪ Measuring accurately the standard solutionsand titrants ▪ Filling the burettewith titrant	flow of the titrant ▪ Identifying the end point ▪ Making accurate observations
Determination of alkalinity of water sample (03) Determination of total hardness of water using Std. EDTA solution (03) Estimation of Dissolved Oxygen(D.O)in water sample (By titration method) (03)	▪ Fixing the burette to the stand ▪ Effectively Controlling the flow of the titrant ▪ Identifying the end point ▪ Making accurate observations ▪ Calculating the results	
Estimation of Dissolved Oxygen(D.O)in water sample (By electrometric method) (03) Determination of pH using pH meter (03) Determination of conductivity of water and adjusting ionic strength to required level (03) Determination of turbidity of water (03)	▪ Familiarize with instrument ▪ Choose appropriate „Mode‟ / „Unit‟ ▪ Prepare standard solutions / buffers, etc. ▪ Standardize the instrument with ▪ appropriate standard solutions ▪ Plot the standard curve ▪ Make measurements accurately ▪ Follow Safety precautions	▪ Prepare standard solutions / buffers, etc. ▪ Standardize the instrument with appropriate standard solutions ▪ Plot the standard curve ▪ Make measurements accurately

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 ▪ Drying the crucible in an oven	▪ Measuring the accurate volume and weight of sample ▪ Filtering and air drying without losing any filtrate ▪ Accurately weighing the filter paper, crucible and filtrate

SCHEME OF VALUATION

A) Writing Chemicals, apparatus ,principle and procedure 5M

B) Demonstrated competencies 20MMaking standard solutions

Measuring accurately the standard solutions and titrantsEffectively

Controlling the flow of the titrant

Identifying the end point

Making accurate observations

C) Viva-voce 5M

Total 30M

Computer Fundamentals Lab

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
CAI-111 (common to all branches)	**Computer Fundamentals Lab**	3	90	40	60

Time schedule:

S.No.	Chapter/Unit Title	No. of sessions each of 4 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.

	At the end of the course students will be able to		
Course Outcomes	CO1	CAI-110.1	Identify hardware and software components
	CO2	CAI-110.2	Prepare documents with given specifications using word processing software
	CO3	CAI-110.3	Use Spread sheet software to make calculation and to draw various graphs / charts.
	CO4	CAI-110.4	Use Power point software to develop effective presentation for a given theme or topic.
	CO5	CAI-110.5	Edit digital or scanned images using Photoshop

Learning Outcomes:

I. Computer Hardware Basics

1. a).To Familiarize with Computer system and hardware connectionsb).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 withstandard 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	a. Access device manager and find the details b. Type /Navigate the correct path and Select icon related to the
		like mouse and key board d. Use My Computer to check the details of Hard drives and partitions e. Use the Taskbar	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 Calculator using 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. – Home – Insert- page layout- References-Review-View	a. Create/Open a document b. Use Save and Save as features c. Work on two Word documents simultaneously d. Choose correct Paper size and Printing options	a. Create a Document and name 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	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.
		h.	d.
		Spellings and Grammar	
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 c. Practice examples like preparing an Examination schedule notice with a hyperlink to Exam schedule table.	a. Insert hyperlinks &Bookmarks b. Create organization charts/flow charts
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 spread sheet 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 c. Use Automatic updating function of Excel Formulae d. Use Mathematical Operators in Formulae e. Use Excel Error Message and Help	Enter formula for automatic calculations
18.	To Create Excel Functions, Filling Cells	a. Use Reference Operators b. Work with sum, Sum if , Count and Count If Functions	a. Create Excel sheets involving cross references and equations b. Use the

		c. Fill Cells Automatically	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	eate 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	a. Create simple PowerPoint presentation with photographs/Clip Art and text boxes b. Use bullets

		e. Add a Textbox to a PowerPoint slide	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 f. 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 g. Create 2D Bar Charts in PowerPoint h. Format the 2D Chart e. Format a Chart Background	Create charts and Bar graphs, Pie Charts and format.

30.	To Insert audio & video, Hyperlinks in a slide Add narration to the	a. Insert sounds in the slide and hide the audio symbol b. Adjust the volume in the settings	a. Insert Sounds and Video in appropriate format.

	slide	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	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 withstandard 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	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	e 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	o create a border or frame around an image to add visual interest to a photo
		d. Create a border color e. Send the border color to the back f. Experiment with different colors	
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.	o swap background elements using the Select and Mask tool and layers.
37	To change colors of Photograph	a. Change colors using: olour Replacement tool **ue/Saturation adjustment layer tool**	Able to control color saturation
38	To prepare a cover page for the book in subject area	a. open 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. open a file b. Go to image→ adjustments→ Brightness/Contrast. f. adjust the brightness and contrast g. 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,	Able to apply shadow emboss effects
		bevel and emboss→ contour→ satin→ gradient overlay d. Save the image.	

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

III SEMESTER

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING

SCHEME OF INSTRUCTIONS AND EXAMINATION

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								
CAI-301	Mathematics –II	4		60	3	20	80	100
CAI-302	Java programming	4	-	60	3	20	80	100
CAI-303	Computer Networks & Cyber Security	5	-	75	3	20	80	100
CAI-304	Data Structures through C	5	-	75	3	20	80	100
CAI-305	DBMS	5	-	75	3	20	80	100
PRACTICAL SUBJECTS								
CAI-306	Java Programming Lab	-	4	60	3	40	60	100
CAI-307	Computer Networking & Cyber Security Lab	-	3	45	3	40	60	100
CAI-308	Data Structures Through C Lab	-	5	75	3	40	60	100
CAI-309	DBMS Lab		4	60	3	40	60	100
	ACTIVITIES		3	45				
	Total	**23**	**19**	**-**	**-**	**-**	**-**	**900**

CAI-301 common with all branches
CAI-302 Common with CAI-302
CAI-304 Common with CM-304
CAI-305 Common with CM-305,AIM-305

CAI-301
ENGINEERING MATHEMATICS-II
(Common to CM/AIML/AMG/AMT/AIM/CCB/CCN/WD)

Course Code	Course Title	No. of Periods/week	Total No. of periods	Marks for FA	Marks for SA
CAI - 301	Engineering Mathematics-II	4	60	20	80

Chapter. No	Unit Title	No. of periods	COs mapped
1	Integral Calculus	22	CO1
2	Differential Equations	8	CO2
3	Graph Theory and Probability	17	CO3
4	Statistics	13	CO4
	Total Periods	60	

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 involving standard functions using these properties.

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) $\int (f(x))^n\, f'(x)\,dx,\ n \neq -1$

iii) $\int \frac{f'(x)}{f(x)}\,dx$

iv) $\int [f(g(x))]\,g'(x)\,dx$

1.5. Find the integrals of *tan x, cot x, sec x* and *cosec x* w.r.t. x.

1.6. Evaluate the Standard integrals of the functions of the type

$i)\frac{1}{a^2+x^2},\frac{1}{a^2-x^2},\frac{1}{x^2-a^2}$

$ii)\frac{1}{\sqrt{a^2+x^2}},\frac{1}{\sqrt{a^2-x^2}},\frac{1}{\sqrt{x^2-a^2}}$

$iii)\sqrt{a^2+x^2},\sqrt{a^2-x^2},\sqrt{x^2-a^2}$

1.7. Evaluate integrals using decomposition method.

1.8. Solve problems using integration by parts.

1.9. Use Bernoulli's rule for evaluating the integrals of the form $\int u.vdx$.

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.

1.14. State various properties of definite integrals.

1.15. Evaluate simple problems on definite integrals using these properties.

Unit -II
Differential Equations

C.O. 2 Obtain 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.

2.4 Solve the first order and first degree differential equations by variables separable method.

2.5 Solve linear differential equation of the form $\frac{dy}{dx}+Py=Q$, where P and Q are functions of x only or constants.

Syllabus for Unit test-I completed

Unit-III
Graph Theory and 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.

3.10 Define permutations and combinations with examples.

3.11 State addition theorem of probability for two mutually exclusive and exhaustive events.

3.12 Solve 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 Bayes' 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 these measures of dispersion

4.5 Explain bivariate data.

4.6 Explain the concept of covariance and correlation between two variables.

4.7 Calculate Pearson's correlation coefficient between two variables.

4.8 Find Spearman's rank correlation coefficient.

4.9 Explain 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	3	2	2	2				3	2	2
CO2	3	2	2	2				3	2	2
CO3	3	3	3	3				3	3	3
CO4	3	3	3	3				3	3	3
Avg.	3	2.5	2.5	2.5				3	2.5	2.5

3 =Strongly mapped (High), **2 =** Moderately mapped (Medium), **1 =** Slightly mapped (Low)

Note: The gaps in CO/PO mapping will 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 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 (22+8+17+13)	100%	3	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately addressed
2	CO1, CO2, CO3,CO4	38 (8+3+17+10)	63%	3	
3	CO1, CO2, CO3,CO4	38 (8+3+17+10)	63%	3	
4	CO1, CO2, CO3,CO4	38 (8+3+17+10)	63%	3	
5					
6					

7					5% to 25% Level 1 Low addressed <5% Not addressed
PSO 1	CO1, CO2, CO3,CO4	60 (22+8+17+13)	100%	3	
PSO 2	CO1, CO2, CO3,CO4	38 (8+3+17+10)	63%	3	
PSO 3	CO1, CO2, CO3,CO4	38 (8+3+17+10)	63%	3	

COURSE CONTENTS

Unit-I

Indefinite Integration:

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:

   $i)\frac{1}{a^2+x^2},\frac{1}{a^2-x^2},\frac{1}{x^2-a^2}$

   $ii)\frac{1}{\sqrt{a^2+x^2}},\frac{1}{\sqrt{a^2-x^2}},\frac{1}{\sqrt{x^2-a^2}}$

   $iii)\sqrt{a^2+x^2},\sqrt{a^2-x^2},\sqrt{x^2-a^2}$

   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 variables separable method and linear differential equation of the type $\frac{dy}{dx}+\mathrm{P}y=\mathrm{Q}.$

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, conditional probability, dependent and independent events with multiplication theorem - Priori and posteriori probability, Baye's theorem.

Unit IV

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.

Textbook:

Engineering Mathematics-II, a textbook for second year third semester diploma courses,

prepared & prescribed by SBTET, AP.

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.

TIME SCHEDULE

Chapter. No	Chapter/Unit title	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	2	1	CO1
Unit – II: Differential Equations						
3	Introduction to 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						
5	Graph theory	5	6	2	0	CO3
6	Probability	12	26	2	2	CO3
Unit – IV : Statistics						
6	Measures of Central Tendency	1	0	0	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	

Unit Test Syllabus

Unit Test	Syllabus
Unit Test-I	From L.O 1.1 to L.O 2.5
Unit Test-II	From L.O 3.1 to L.O 4.10

CAI-302 OOPS THROUGH JAVA

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
CAI-302	OOPS THROUGH JAVA	4	60	20	80

Time Schedule

Chapter No.	Chapter/Unit Title	No. of Periods	Marks	No. of Short Answer Questions	No. of Essay Type Questions	CO's Mapped
1.	Object oriented programming concepts and Basics of java, Overloading	10	13	1	1	CO1,CO2
2.	Concepts of inheritance, overriding, Interfaces and Packages	12	26	2	2	CO2
3.	I/O Streams and Collections.	12	21	2	1.5	CO3
4.	Exception handling and Multi threaded programming.	12	21	2	1.5	CO4
5.	Applets, AWT and Event Handling	14	29	3	2	CO4,CO5
	Total	**60**	110	10	8	

Course Objectives	i) To know applying object oriented programming paradigm in problem solving on the platform of Sun Micro Systems. ii) Able to design multi tasking application with the knowledge of multi threading. iii) Familiarized to develop graphical user interface with event handling mechanism.

Course Outcomes	At the end of the course the student able to learn following:		
	CO1	CAI-302.1	Know the object oriented programming concepts in problem solving. Use syntaxes and semantics of object oriented paradigm.
	CO2	CAI-302.2	Design optimized definition for an application with reusability features and packages in project development.
	CO3	CAI-302.3	Knows the usage of utilities in real time data structures.
	CO4	CAI-302.4	Demonstrate multithreading concepts to implement multitasking and multi programming applications.
	CO5	CAI-302.5	Demonstrate to design effective dynamic user interface for any front end applications using Applets and events.

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 Array List
3.7.2 LinkedList
3.7.3 HashSet

3.8 Iterator
3.8.1 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
- Try
- Catch
- Finally
- Throw
- 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
Update(), Paint(), 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.
5.14Explain how to use AWT controls in applet programming.
a. Labels.
b. Buttons.
c. TextFields
d. Checkboxes.
e. Lists.
f. Choice
g. Scrollbars.

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-Text Fields-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-1	From 1.1 to 3.6
Unit test-2	From 3.7 to 5.14

CAI-303 Computer Networks & Cyber Security

Course code	Course Title	No. of Periods/ Weeks	Total No. of periods	Marks for FA	Marks for SA
CAI-303	Computer Networks& Cyber Security	5	75	20	80

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Introduction to Networks	15	CO1,CO2
2.	Network Addressing and Management	15	CO2
3.	Introduction to Cyber security	15	CO3
4.	Encryption Techniques	20	CO4
5.	System security	10	CO5
	Total Periods	75	

Course Objectives	i. To know the different types of networks ii. To know the Network components, devices and topologies. iii. To understand managing Network using IP addresses and protocols iv. To design and able to build network v. To familiarise network administration vi. To know about Network & system security vii. To understand Encryption techniques

Course Outcomes	At the end of the course, the student shall able to		
	CO1	CAI-303.1	Explain types of networks, cables and connectors
	CO2	CAI-303.2	Compare ISO&TCP/IP model, Network components, tools and topologies, protocols
	CO3	CAI-303.3	Explain Network security
	CO4	CAI-303.4	Explain encryption techniques
	CO5	CAI-303.5	Explain System Security

Learning Outcomes:

1.0 Introduction to Networks.

1.1 State the Need and importance of Networking.
1.2 Classification of Networks–LAN, MAN, WAN
1.3 List Various Network Communication Standards.
1.4 Explain the OSI Reference Model with its architecture and layer functions.

1.5 Explain the functions of each layer of TCP/IP Reference Model
1.6 Compare TCP/IP and OSI reference models.
1.7 Transmission media Cables
- 1.7.1 Coaxial Cables
- 1.7.2 Twisted-Pair Cables(Shielded, Unshielded)
- 1.7.3 Optical Fiber Cables

1.8 LAN Devices
- 1.8.1 Repeaters
- 1.8.2 Hubs
- 1.8.3 Switches
- 1.8.4 Network Interface Cards(NICs)
- 1.8.5 Routers
- 1.8.6 Modem
- 1.8.7 Gateways**.**

1.9 Network Topologies
- 1.9.1 Bus
- 1.9.2 Ring
- 1.9.3 Star
- 1.9.4 Mesh
- 1.9.5 Hybrid

2.0 Network Addressing and Management

2.1 Introduction to Network Addressing.
2.2 Explain TCP/IP Addressing Scheme.
2.3 Types of IP Address Classes.
2.4 State the need of subnet and its importance
2.5 List the advantages and disadvantages of subnetting
2.6 Describe need of protocols in computer networks
2.7 Explain the protocols
- 2.7.1 **Hyper Text Transfer Protocol(HTTP)**
- 2.7.2 File Transfer Protocol(FTP)
- 2.7.3 Simple Mail Transfer Protocol(SMTP)
- 2.7.4 Address Resolution Protocol(ARP)
- 2.7.5 Reverse Address Resolution Protocol(RARP)
- 2.7.6 Telnet
- 2.7.7 **State the importance of Simple Network Management Protocol(SNMP)**

2.8 Internet Protocol Addressing formats
- 2.8.1 IPv4
- 2.8.2 IPv6

2.9 IPV4 VS IPV6

3.0 Introduction to Network security

3.1 Define security and network security.

3.2 Describe OSI security architecture.

3.3 Discuss about different security goals.

3.4 Define cryptography.

3.5 Discuss about crypto system.

3.6 Discuss about authentication, Confidentiality, integrity w.r.t data.

3.7 Differentiate passive and active security threats.

3.8 List and explain categories of passive and active security attacks.

3.9 List and explain categories of security services.

3.10 List and explain categories of security mechanisms.

3.11 Explain the Model for network security and with block diagram.

4.0 Encryption Techniques

4.1.1 Define the term encryption
4.1.2 Define the term Decryption
4.1.3 List the essential ingredients of a symmetric cipher.
4.1.4 Describe two basic functions used in encryption algorithms.
4.1.5 List keys required for two people to communicate via a cipher.
4.1.6 Describe the general approaches to attack a cipher.
4.1.7 Describe the Caesar cipher.
4.1.8 Discuss the mono-alphabetic cipher.
4.1.9 Describe Playfair cipher. and Hill ciphers.
4.1.10 Discuss One-Time-Pad.
4.1.11 Differentiate mono and poly-alphabetic ciphers.
4.1.12 Discuss the problems with the one-time pad.
4.1.13 Explain a transposition cipher.
4.1.14 Explain RSA algorithm
4.1.15 Explain steganography.
4.1.16 Illustrate the ciphers with examples.

5.0 System security

5.1 Discuss about Intruders
5.2 Explain intrusion detection
5.3 Explain password management
5.4 Discuss the following threats
5.5 Describe malicious softwares
5.6 Describe Backdoor
5.7 Describe Logic Bomb
5.8 Explain Trojan Horses
5.9 Define Mobile Code
5.10 Describe Multiple-Threat Malware
5.11 Define terms virus and warm.
5.12 Discuss about Virus Nature and its Classification
5.13 Define Macro Viruses and Virus Kits,
5.14 Define the term E-Mail Viruses
5.15 Discuss about Virus Counter measures:
5.16 Define Antivirus Approaches
5.17 Describe Advanced Antivirus Techniques
5.18 Discuss about Morries worm
5.19 Define worm attacks

5.20 Explain worm technologies

5.21 Define and explain mobile phone worms

5.22 Describe how a worm propagates.

5.23 Discuss about worm countermeasures.

COURSE CONTENTS

1. **Introduction to Networks:** Need for network - Network classification- network standards - - Network Components - ISO reference model - TCP/IP model - Transmission media Cables- LAN Devices -Network Topologies
2. **Network Addressing and Management:** Introduction to Network Addressing - TCP/IP Addressing Scheme - IP Address Classes - Need of subnet and its importance -Advantages and Disadvantages of subnetting - **Need of protocols in computer networks – All protocols- Simple Network Management Protocol(SNMP) -** Internet Protocol Addressing formats
3. **Introduction to Network security:** Define terms security and network security – OSI security architecture – security goals – cryptography- crypto system- Authentication, Confidentiality, integrity w.r.t data. – passive and active security threats – Categories of passive and active security attacks – categories of security services – categories of security mechanisms - Model for network security and with block diagram**.**
4. Encryption Technics: Definition of Encryption, Decryption - List the essential ingredients of a symmetric cipher - Two basic functions used in encryption algorithms - Keys required for two people to communicate via a cipher - General approaches to attack a cipher - Caesar cipher - mono-alphabetic cipher - Playfair cipher. and Hill cipher - One-Time-Pad - problems with the one-time pad - transposition cipher - RSA algorithm – steganography - Illustrate ciphers with examples.

5. **SYSTEM SECURITY**: Intruder - intrusion detection - password management - malicious softwares-Backdoor - Logic BoMB - Trojan Horses - Mobile Code - Multiple-Threat Malware – Definitions of terms virus and warm - Virus Nature and its Classification -Define Macro Viruses and Virus Kits and E-Mail Viruses - Virus Counter measures - Antivirus Approaches - Advanced Antivirus Techniques - Morries worm - worm attacks - worm technologies - mobile phone worms - worm propagates.

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 5.23

Data Structures Through C

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
CAI-304	Data Structures Through C	**5**	**75**	**20**	**80**

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Introduction to Data structures Sequential Storage Representation	23	CO1
2.	Linked Storage Representation-Linked Lists	15	CO2
3.	Linear Data Structures-Stacks	12	CO3
4.	Linear Data Structures-Queues	10	CO4
5.	Non Linear Data Structures-Trees	15	CO5
	Total Periods	75	

Course Objectives	At the end of the course students will be able to
	i)To know the various types of Data Structures ii)To familiarize with the representation of Data Structures iii)To use various Data structures in organizing data iv)To reinforce theoretical concepts by writing relevant programs

Course Out comes	CO1	CAI-304.1	Illustrate various techniques of sorting and searching
	CO2	CAI-304.2	Explain the operations on Various Linked Lists
	CO3	CAI-304.3	Apply the operations of Stack.
	CO4	CAI-304.4	Explain the operations of different types of Queue.
	CO5	CAI-304.5	Apply Binary tree traversal techniques.

Learning Outcomes:

1. Introduction to Data Structures

1.1 Understand various types of Data Structures

1.1.1. Define Data Structure and classify them
1.1.2. Explain Linear Data Structures
1.1.3. Describe Non-Linear Data Structures
1.1.4. Explain Data Types and Abstract Data Types
1.1.5. Explain about Space and Time Complexities

1.2 **Sequential Storage Representation**

1.2.1 Various Sorting Techniques

1.2.1.1 Define Sorting
1.2.1.2 State the need of Sorting
1.2.1.3 List the methods of Sorting
1.2.1.4 Explain the following for Bubble Sort, Selection Sort,

Insertion Sort, Quick Sort, Merge Sort

a) Sorting technique,
b) Algorithm and complexity
c) Program

1.2.2 **Various Searching Techniques**

1.2.2.1 Define searching
1.2.2.2 State the need of searching
1.2.2.3 List two types of searching
1.2.2.4 Explain the following for Linear Search, Binary Search with Recursion and with-out Recursion..

a) Searching technique.
b) Algorithm and complexity
c) Program

2 Linked Storage Representation –Linked Lists

2.1 List the advantages & disadvantages of Linked Lists over Arrays
2.2 State the purpose of Dummy Header
2.3 Explain the following for Singly Linked List, Doubly Linked List

a) Structure
b) Creation
c) How to represent a node using 'C' Structure
d) Perform insertion, deletion, traverse and sort operations
e) Perform search and replace an element
f) C Program with all operations.

2.4 Define Singly circular list
2.4.1 Structure of Singly circular list
2.5 List the advantages of a Singly Circular Linked List over a Singly Linked List
2.6 Describe the changes require in a singly linked list program to make it the Singly Circular List.
2.7 Define Doubly circular list
2.7.1 Structurer of Doubly circular list
2.8 List the advantages of a Doubly Circular Linked List over a Doubly Linked List
2.9 Describe the changes require in a Doubly Linked List program to make it the Doubly Circular List.

1. Linear Data Structures-Stacks

3.1 Define Stack
3.2 Explain the push, pop and display operations of a Stack
3.3 Explain array implementation of a Stack with various operations.
3.4 Explain the program for Array implementation of a Stack with various operations.
3.5 Explain Linked List implementation of a Stack with various operations.
3.6 Explain the program for Linked List implementation of a Stack with various operations.
3.7 List the applications of Stacks
3.8 Convert Infix expression to Postfix expression
3.9 Explain the program for Conversion of Infix expression to Postfix expression
3.10 Evaluate Postfix expression
3.11 Explain the program for Evaluating Postfix expression

1.0 Linear Data Structures-Queues

4.1 Define Queue
4.2 Explain the insertion, deletion and display operations on Queues
4.3 Explain array implementation of a Queue with various operations.
4.4 Explain the program for Array implementation of a Queue with various operations.
4.5 Explain Linked List implementation of a Queue with various operations.
4.6 Explain the program for Linked List implementation of a Queue with various operations.
4.7 Know about Circular Queues
4.8 Explain array implementation of a Circular Queue with various operations
4.9 Explain the program for Array implementation of a Circular Queue with various operations
4.10 Explain Linked List implementation of a Circular Queue with various operations.
4.11 Explain the program for Linked List implementation of a Circular Queue with various operations.
4.12 List the application of Queues
4.13 Know about Priority Queues

2. Non Linear Data Structures-Trees

5.1 Define a Tree
5.2 Explain the terminology related to Tree
5.2.1 Root, Edge, Parent, Child, Siblings, Leaf, Internal nodes, Degree, Level, Height, Depth, Path, Sub tree, Forest.
5.3 Define Binary Tree
5.4 Differences between General Tree and Binary Tree.
5.5 Conversion of General Trees to Binary Trees
5.6 Explain the linear representation and linked list representation of a Binary Tree
5.7 Define Binary Search Tree
5.8 Differences between Binary Search Tree and Binary Tree
5.9 Perform various traversals on Binary Search Trees
5.10 Construct a Binary Tree using In-order and Preorder Traversals
5.11 Construct a Binary Tree using In-order and Post-order Traversals
5.12 Know the importance of Binary Search Trees over General Trees
5.13 Perform insertion, deletion, search and various traversal operations on a Binary Search Tree.
5.14 Explain the program of Binary Search Tree with all operations.
5.15 List the Applications of trees

COURSE CONTENT

1. Introduction to Data Structures
Data structures – Linear & non linear, data types and abstract data types, algorithm analysis for time and space requirements.
Sequential Storage Representation – **Sorting -** Introduction to different sorting techniques – Bubble, Selection, Insertion, Quick & Merge. **Searching –** Introduction to different searching techniques – Linear and Binary.

2. Linear data structures-Linked Lists
Linked Lists – Types - Singly Linked Lists – Create, insert, delete, sort, search and replace an element in a linked list – - Doubly Linked Lists – Create, insert, delete, sort, search and replace an element in a linked list – Define terms Singly circular and doubly circular linked lists

3. Linear data structures-Stacks

Stacks- Implementation of stacks, application of stacks, converting infix to postfix expression and postfix expression evaluation.

4. Linear data structures-Queues

Queues–Implementation of queues- Application of queues- know about Circular queues, and Priority queue.

5. Non Linear data structures-Trees

Trees- Trees- Trees Terminology–Binary trees –Representation – Linear and Linked list representation-Binary Search Tree-various operations-Tree traversals-Tree Conversions& Applications

REFERENCE BOOKS

1. Data Structures: A Pseudocode Approach with C - Gilberg / Forouzan
2. Data Structures using 'C' - Tanenbaum langsam and Augonstein (PHI).
3. Data structures through C - Yashwanth Kanetkar
4. An Introduction to data structures with applications - Tremblay & Sorenson

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 2.7
Unit test-2	From 3.1 to 5.15

DATABASE MANAGEMENT SYSTEMS

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
CAI-305	**DBMS**	5	75	20	80

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Concepts of DBMS & RDBMS	18	CO1
2.	Concepts of SQL	22	CO2
3.	Basics of PL/ SQL	15	CO3
4.	Advance PL/SQL	10	CO4
5.	Concepts of NoSQL & MongoDB.	10	CO5
	Total Periods	75	

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 Out comes	CO1	CAI-305.1	Describe fundamentals, types and Overall structure of DBMS
	CO2	CAI-305.2	Apply SQL commands to create, retrieve, update, delete data from the Relational data bases.
	CO3	CAI-305.3	Describe PL/SQL programming constructs, control statements and sub programs.
	CO4	CAI-305.4	Apply cursors, triggers and Exception handling concepts
	CO5	CAI-305.5	Use NOSQL database concepts and MongoDB data base concepts in designing database Schema.

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 user defined 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.
3.11 Explain handling procedures and functions with example programs.
3.12 Explain the parameter modes in PL/SQL with examples (in , out and in out)

4.0 Advanced PL/SQL

4.1 Define cursor.
4.2 Classify cursors
4.3 Explain implicit cursor with example
4.4 Explain explicit cursors with example
4.5 Define trigger
4.6 List Advantages of triggers
4.7 Explain database triggers.

5.0 Concepts of NoSQL & MongoDB.

5.1 No SQL
- 5.1.1 List features of NOSQL
- 5.1.2 Compare RDBMS and NoSQL
- 5.1.3 List the Advantages and Disadvantages of NoSQL
- 5.1.4 Know about the ACID and BASE system.
- 5.1.5 Compare ACID and BASE properties

5.1.6 NoSQL

5.1.6.1 Key-value stores,
5.1.6.2 Column-oriented,
5.1.6.3 Graph oriented Databases
5.1.6.4 Document oriented Databases.

5.2 MongoDB

5.2.1 What is mongo DB.
5.2.2 List the advantages of MongoDB
5.2.3 Explain the Creation, Dropping, Creation of Collection
5.2.4 Dropping of Collection of Database in MongoDB
5.2.5 Explain the Data types of MongoDB.
5.2.6 Explain Inserting Document, Query Document, Update Document, Deleting Document & Sorting Document.

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

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

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
CAI-306	OOPS THRU JAVA	4	60	40	60

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Basics, overloading, inheritance, overriding	16	CO1,CO2
2.	Streams, Interfaces and Packages and Collections.	10	CO2,CO3
3.	Exceptions and Multi threaded programming.	14	CO3,CO4
4.	Applets and Event Handling	20	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 Analyze modular design for real time applications by using packages concept in projects.
	CO3	Apply IO on data and use collections
	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.

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 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. (c) 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	Write a program using the concept of method	(a) Use method overriding. (b) Use this keyword.

	method overriding.	overriding.	(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. (b) Use package. (c) 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 Observe the output.
12	Exercise programs on Collections.	(a) Write a java program to search a student mark 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.	(a) Define collection classes (b) use ArrayList, LinkedList (c) apply List and Iterator Interface
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

Computer Networking & Cyber Security Lab

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
CAI-307	**Computer Networking & Cyber Security Lab**	03	45	40	60

S No	Chapter/ Unit Title	No. of Periods	COs Mapped
1.	**Computer Hardware**	10	CO1,CO2,CO3
2.	Computer Networking	15	CO3.CO4.CO5
3.	CYBER SECURITY	20	CO4,CO5,CO6
	Total	45	

COURSE OBJECTIVES	1. Identify all the components of mother board. 2. Modify AIMOS settings as required 3. Install drives, NIC card, modem 4. Install network devices, design and develop network. 5. Understand ip address classes and sub netting 6. Prepare cross and straight Ethernet cables 7. Install and configure proxy server 8. To learn Different Cipher Techniques 9. To Implement the Symmetric key Algorithms 10. To Implement the Asymmetric key Algorithms 11. To use the network security tools and vulnerability assessment tools

Course Outcomes	CO1	CAI-307.1	Assemble the PC with suitable components.
	CO2	CAI-307.2	Install network devices, design and develop network Install any network device and configure
	CO3	CAI-307.3	Develop the cipher techniques for encryption
	CO4	CAI-307.4	Implement symmetric key Algorithms
	CO5	CAI-307.5	Demonstrate Asymmetric key Algorithm

Learning Outcomes:

Computer Hardware

1. Identification of various Hardware components on Motherboard
2. Using various options of CAIOS setup
3. Print the summary of your system Hardware and verify for correctness
4. Hard drive, optical drive installation.
5. How to recover lost data on hard drive.

Computer Networking

6. Preparing the Ethernet cable for cross and direct connections using crimping tool and test using LAN tester.
7. Installation of a switch and connecting systems to a network switch.
8. Installation of a modem (internal, external or USB) and connecting to internet.
9. Using FTP for uploading and downloading files.
10. Installation and configuring the proxy server for internet access.
11. Setting of IP address to an existing terminal

CYBERSECURITY CONCEPTS:

SYMMETRIC KEY ENCRYPTION TECHNIQUES

12. perform encryption and decryption by using Caesar Cipher technique
13. Exercise encryption and decryption by using Play fair Cipher technique
14. Exercise encryption and decryption by using Hill Cipher technique
15. perform encryption and decryption by using Veneer Cipher

ASYMMETRIC KEY ENCRYPTION TECHNIQUES

16. Perform encryption and decryption using RSA public and private key.
17. To perform the validation of the digital document using Digital signature standard encryption and decryption
18. To perform the procedure of installation process of antivirus to detect threats.
19. Learn the procedure to ensure security basic firewalls can be enabled in the system.

The competencies and key competencies to be achieved by the student

S. No.	Name of the experiment	Objectives	Key Competencies
1	Exercise on Identification and familiarization of various components of computer system.	Identification and familiarization of various components of computer system.	❖ Identify and note down mother board , Components and Chips. ❖ Identify various Internal and External slots in the mother board and clean them with blower/ Brush. ❖ Practice Inserting and Removing RAM with care. ❖ Measure the Output voltages of SMPS.
2	Exercise on various operations and modifications required for CAIOSsetup.	Perform various operations and modifications required for CAIOS setup.	❖ Identify location of CAIOS battery on mother board. ❖ Know how to replace CAIOS battery. ❖ Identify keyboard key for entering BIOS setup. ❖ Setup CAIOS settings ❖ Check the status of CAIOS settings after replacement.
3	Exercise on Print the summary of your system Hardware and verify for correctness	Print the summary of your system Hardware and verify for correctness	❖ Know how to open system summary window ❖ Check whether all the hardware peripherals are working properly or not. ❖ Know how to install device drivers ❖ Know how to enable and disable hardware peripherals. ❖ Print the hardware summary page.
4	Exercise on Hard drive, optical drive installation.	Hard drive, optical drive installation.	Hard drive: ❖ Identify the Hard drive slot. ❖ Know how to remove power supply and SATA cables from Hard drive. ❖ Unscrew Hard drive from computer case ❖ Replace new Hard drive and fix it in computer case ❖ Know how to connect power supply cable and SATA cables to Hard drive ❖ Check for the working condition of new Hard Drive. Optical drive: ❖ Identify the Optical drive slot. ❖ Know how to remove power supply and SATA cables from Optical drive. ❖ Unscrew Optical drive from computer case ❖ Replace new Optical drive and fix it in computer case ❖ Know how to connect power supply

			cable and SATA cables to Optical drive ❖ Check for the working condition of Optical drive. SSD DRIVES: ❖ Identify SSD slots ❖ How to install SSD drives
5	Exercise on recovery of lost data on hard drive.	How to recover lost data on hard drive.	❖ Verify the available recovery tools of Operating system. ❖ Know how to recover lost data on Hard drive using Restore point. ❖ Know how to recover lost data on Hard drive using Recovery Image.
6	Exercise on Preparing the Ethernet cable for cross and direct connections using crimping tool and test using LAN tester.	Preparing the Ethernet cable for cross and direct connections using crimping tool and test using cable tester.	❖ Know the color pattern of Ethernet cable for direct connection. ❖ Prepare UTP cable for direct connection using crimping tool. ❖ Check the working condition of cable using LAN tester. ❖ Know the color pattern of Ethernet cable for cross connection. ❖ Prepare UTP cable for cross connection using crimping tool. ❖ Check the working condition of cable using LAN tester.
7	Switch	Installation of switch and connect systems	❖ Install switch ❖ Connect the systems ❖ Check the validity of sharing of data in between the systems
8	Exercise on Installation of a modem (internal, external or USB) and connecting to internet.	Installation of a modem (internal, external or USB) and connecting to internet.	Internal modem ❖ Identify PCI slot for placing Internal modem ❖ Connect internal modem ❖ Install required modem driver ❖ Check for the working condition External modem ❖ Connect External modem ❖ Install required modem driver ❖ Check for the working condition USB modem ❖ Connect USB modem ❖ Install required modem driver Check for the working condition
9	Exercise on Using FTP for uploading and downloading files.	Using FTP for uploading and downloading files.	❖ Know about FTP protocol ❖ Know how to upload file using FTP ❖ Know how to download file using FTP
10	Exercise on Installation and	Installation and configuring the proxy	❖ Know about proxy server. ❖ Know how to install proxy server.

	configuring the proxy server for internet access	server for internet access	❖ Know how to configure proxy server.
11	Exercise on Setting of particular IP address to an existing terminal system	Setting of particular IP address to an existing terminal system	❖ Know about IP addresses ❖ Know how to set IP addresses to the computer systems in a LAN
12	To implement Transportation and Substitution using Caesar Cipher Technique	Learn to implement the Caesar Cipher Transportation Technique on information	❖ Compile program ❖ Input key value ❖ Input text to be encrypted ❖ Rectify the syntax errors ❖ We will get Encrypted text as output Check the output for correctness
13	To implement Transportation and Substitution using Playfair Cipher Technique	Learn to implement the Playfair Cipher Transportation Technique on information	❖ Compile program ❖ Input key value ❖ Input text to be encrypted ❖ Rectify the syntax errors ❖ We will get Encrypted text as output ❖ Check the output for correctness
14	To implement Transportation and Substitution using Hill Cipher Technique	Learn to implement the Hill Cipher Transportation Technique on information	❖ Input the plain text and key from the user. ❖ Split the plain text into groups of length three. ❖ Arrange the keyword in a 3*3 matrix. ❖ the two matrices to obtain the cipher text of lengththree. ❖ Combine all these groups to get the complete cipher text.
15	To implement Vigenere Cipher Technique	Learn to implement the Vigenere Cipher Technique on information	❖ Arrange the alphabets in row and column of a 26*26 matrix. ❖ Circulate the alphabets in each row to position left such that the first letter is attached to last. ❖ Repeat this process for all 26 rows and construct the final key matrix. ❖ The keyword and the plain text is read from the user. ❖ The characters in the keyword are repeated sequentially so as to match with that of the plaintext. Pick the first letter of the plain text and that of the keyword as the row indices and column indicesrespectively. ❖ The junction character where these two meet forms the cipher character. ❖ Repeat the above steps to generate the

			entire cipher text.
16	To implement Encryption and Decryptions using RSA algorithm	Learn to implement the RSA Public Key Encryption Algorithm	❖ By using RSA Public Key & Private key for Encryption and Decryption of the message ❖ By using Public key message will be ciphered ❖ By using Private key message will be deciphered ❖ Both the keys are Asymmetric
17	Implementation of Digital Signature Standard	Learn the Digital signature Implementation and its usage	❖ Read the 256-bit key values. ❖ Divide into five equal-sized blocks named A, B, C, D and E. ❖ The blocks B, C and D are passed to the function F. ❖ The resultant value is permuted with block E. ❖ The block A is shifted right by 's' times and permuted with the result of step-4. ❖ Then it is permuted with a weight value and then with some other key pair and taken as the firstblock. ❖ Block A is taken as the second block and the block B is shifted by 's' times and taken as the thirdblock. ❖ blocks C and D are taken as the block D and E for the final output.
18	Study of any Antivirus Installation & Configurations Study/Demo Study of Standard Vulnerabilities.	Learn to install the Antivirus Software in Computer System and know the configuration Setting	❖ Choose the Appropriate Antivirus Software to install in the Computer System ❖ Do the Appropriate settings to configure the Antivirus software in the System. ❖ Observing System Performance While using the Antivirus software ❖ Observe the Viruses/Threats when attacked to Computer System
19	Setting firewall with Windows OS, its importance and Problems.	Study the implementation of firewall Settings in Computer system and learn how it manage the System	❖ Choose The Appropriate System settings to implement Firewall ❖ Observe the System performance while having firewall

Software requirements	❖ Linux /Windows Operating system ❖ C compiler ❖ Java Compiler

Data Structures Through C Lab

Course Code	Course Title	No. of periods/week	Total No. of periods	Marks for FA	Marks for SA
CAI-308	**Data Structures Through C Lab**	5	75	40	60

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Introduction to Data structures Sequential Storage Representation	20	CO1
2.	Linked Storage Representation-Linked Lists	15	CO2
3.	Linear Data Structures-Stacks	15	CO3
4.	Linear Data Structures-Queues	15	CO4
5.	Non Linear Data Structures-Trees	10	CO5
	Total Periods	75	

Course Objectives	At the end of the course students will be able to
	i)To know the various types of Data Structures ii)To familiarize with the representation of Data Structures iii)To use various Data structures in organizing data iv)To reinforce theoretical concepts by writing relevant programs

Course Outcomes	CO1	CAI-308.1	Execute C programs on sorting and searching techniques
	CO2	CAI-308.2	Develop C programs on the various Linked Lists operations.
	CO3	CAI-308.3	Design C programs on the operations of Stack data structure
	CO4	CAI-308.4	Execute C programs on the operations of Queue data structure
	CO5	CAI-308.5	Write C programs on the operations of Binary Trees

Learning Outcomes

Write C Program to Implement

1. BUBBLE SORTING using Functions.
2. SELECTION SORTING using Functions.
3. INSERTION SORTING using Functions.
4. MERGE SORTING on two sorted list using Functions.
5. QUICK SORTING using Functions.
6. LINEAR SEARCHING using Functions.
7. BINARY SEARCHING with-out RECURSION.

8. BINARY SEARCHING with RECURSION.
9. SINGLY LINKED LIST with insert, delete, display, sort, find and replace operations.
10. DOUBLY LINKED LIST with insert, delete, display, sort, find and replace operations.
11. STACK with insertion, deletion and display operations using arrays.
12. STACK with insertion, deletion and display operations using linked lists.
13. Conversion of arithmetic expression to post-fix expression using STACKS.
14. Evaluation of post-fix expression using STACKS.
15. QUEUES with insertion, deletion and display operations using arrays.
16. QUEUES with insertion, deletion and display operations using linked lists.
17. CIRCULAR QUEUE with insertion, deletion and display operations using arrays.
18. CIRCULAR QUEUE with insertion, deletion and display operations using Linked List.
19. BINARY SEARCH TREE with insertion, deletion, various traversals and search operations.

Time Schedule:

Sno	Experiment Name	Allotted Periods
1	BUBBLE SORTING using Functions.	3
2	SELECTION SORTING using Functions.	3
3	INSERTION SORTING using Functions.	3
4	MERGE SORTING on two sorted list using Functions.	3
5	QUICK SORTING using Functions.	3
6	LINEAR SEARCHING using Functions.	3
7	BINARY SEARCHING with-out RECURSION.	3
8	BINARY SEARCHING with RECURSION.	3
9	SINGLY LINKED LIST with insert, delete, display, sort, find and replace operations.	6
10	DOUBLY LINKED LIST with insert, delete, display, sort, find and replace operations.	6
11	STACK with insertion, deletion and display operations using arrays.	3
12	STACK with insertion, deletion and display operations using linked lists.	6
13	Conversion of arithmetic expression to post-fix expression using STACKS.	6
14	Evaluation of post-fix expression using STACKS.	3
15	QUEUES with insertion, deletion and display operations using arrays.	3
16	QUEUES with insertion, deletion and display operations using linked lists.	6
17	CIRCULAR QUEUE with insertion, deletion and display operations using	6

	arrays.	
18	CIRCULAR QUEUE with insertion, deletion and display operations using Linked List.	6
19	BINARY SEARCH TREE with insertion, deletion, various traversals and search operations.	9

DATA STRUCTURES LAB OBJECTIVES AND KEY COMPETENCIES			
Sl.No	Name of the Experiment	Objectives	Key Competencies
1	Exercise on bubble sort	Write a C program for i. Implementing Bubble sort ii. Printing the list after every pass iii. Printing the list after Bubble sort is performed	❖ Correct syntactical errors ❖ Debug logical errors ❖ Observe whether Bubble sort algorithm is properly implemented ❖ Check whether the sorted list is generated after the Bubble sort is performed for the given unordered list ❖ Check the efficiency of the program if the given list is almost sorted
2	Exercise on Selection sort	Write a C program for i. Implementing selection sort ii. Printing the list after every pass iii. Printing the list after selection sort is performed	❖ Correct syntactical errors ❖ Debug logical errors ❖ Observe whether selection sort algorithm is properly implemented ❖ Check whether the sorted list is generated after the selection sort is performed for the given unordered list
3	Exercise on insertion sort	Write a C program for i. Implementing insertion sort ii. Printing the list after every pass iii. Printing the list after insertion sort is performed	❖ Correct syntactical errors ❖ Debug logical errors ❖ Observe whether insertion sort algorithm is properly implemented ❖ Check whether the sorted list is generated after the insertion sort is performed for the given unordered list
4	Implement a program for merge sort on two sorted lists of elements	Write a C program for i. Implementing merge sort ii. Printing the list after every pass iii. Printing the list after merge sort is performed	❖ Correct syntactical errors ❖ Debug logical errors ❖ Check whether two separate sorted lists are properly stored in separate arrays ❖ Observe whether Merge sort algorithm is properly implemented ❖ Check whether the sorted list is generated after the Merge sort is performed for the given two

DATA STRUCTURES LAB OBJECTIVES AND KEY COMPETENCIES			
Sl.No	Name of the Experiment	Objectives	Key Competencies
			separate lists
5	Exercise on Quick sort	Write a C program for i. Implementing Quick sort ii. Printing the list after every pass iii. Printing the list after Quick sort is performed	❖ Correct syntactical errors ❖ Debug logical errors ❖ Observe whether Quick sort algorithm is properly implemented ❖ Check whether the sorted list is generated after the Quick sort is performed for the given unordered list ❖ Check the efficiency of the program if the given list is almost sorted
6	Exercises on linear search	Write a C program for i. Implementing Linear Search ii. Print the proper result for successful and unsuccessful search	❖ Correct syntactical errors ❖ Debug logical errors ❖ Check whether Linear Search algorithm is properly implemented ❖ Observe the result for the search element is present in the list ❖ Observe the result for the search element is not present in the list
7	Exercise on binary search with-out Recursion	Write a C program for i. Implementing Binary Search ii. Print the proper result for successful and unsuccessful Binary search	❖ Correct syntactical errors ❖ Debug logical errors ❖ Check whether Binary Search algorithm is properly implemented ❖ Observe the result for the search element is present in the list ❖ Observe the result for the search element is not present in the list
8	Exercise on binary search with Recursion	Write a C program for I. Implementing Binary Search II. Print the proper result for successful and unsuccessful Binary search	❖ Correct syntactical errors ❖ Debug logical errors ❖ Check whether Binary Search algorithm is properly implemented ❖ Observe the Base Condition ❖ Observe the intermediate results in stack ❖ Observe the result for the search element is present in the list ❖ Observe the result for the search element is not present in the list
9	Exercises on creation, insertion, deletion, display, sorting, find and replace of elements in a singly linked lists	Write a C program for i. Creation of linked list ii. Inserting an element in Linked list iii. Check for deletion of a node if no element is present and print error message iv. Delete an element from the	❖ Rectify syntactical errors ❖ Debug logical errors ❖ Study node structure ❖ Validate whether the memory allocation is done for the node ❖ Confirm whether the addition of node is done at the end

DATA STRUCTURES LAB OBJECTIVES AND KEY COMPETENCIES			
Sl.No	Name of the Experiment	Objectives	Key Competencies
		Linked list v. Display all the elements from the linked list vi. Sorting of elements vii. Find and Replace of element	❖ Correct if deletion of an element in an empty list ❖ Confirm whether deletion of required node is done ❖ Observe whether all the elements of the linked list are displayed in proper order ❖ Observe whether all the elements of the linked list are sorted in proper order ❖ Observe whether find and replace of element in the linked list
10	Exercises on creation, insertion, deletion, display, sorting, find and replace of elements in a Double linked lists	Write a C program for iii. Creation of linked list ix. Inserting an element in Linked list x. Check for deletion of a node if no element is present and print error message xi. Delete an element from the Linked list xii. Display all the elements from the linked list iii. Sorting of elements iv. Find and Replace of element	❖ Rectify syntactical errors ❖ Debug logical errors ❖ Study node structure ❖ Validate whether the memory allocation is done for the node ❖ Confirm whether the addition of node is done at the end ❖ Correct if deletion of an element in an empty list ❖ Confirm whether deletion of required node is done ❖ Observe whether all the elements of the linked list are displayed in proper order ❖ Observe whether all the elements of the linked list are sorted in proper order ❖ Observe whether find and replace of element in the linked list
11	Write a program to Implement a stack using Arrays	Write a C program for i. Creation of Stack consisting of elements using arrays ii. Insertion of new element is done by push() function call iii. Deletion of last element is done by pop() function call iv. Print error message for 'empty stack' if no elements are present for pop() function call v. Print error message for 'stack full' if number of elements exceed size of Stack array	❖ Correct syntactical errors ❖ Debug logical errors ❖ Observe declaration of stack using arrays ❖ Validate whether a new element is inserted at the top by push() function call ❖ Check whether only the top element is deleted by pop() function call ❖ Verify for empty stack condition in pop() ❖ Verify for stack full condition in push()
12	Write a program to Implement a stack using Linked List	Write a C program for i. Creation of Stack consisting of elements using Linked List ii. Insertion of new element is done	❖ Correct syntactical errors ❖ Debug logical errors ❖ Study node structure ❖ Validate whether the memory

DATA STRUCTURES LAB OBJECTIVES AND KEY COMPETENCIES			
Sl.No	Name of the Experiment	Objectives	Key Competencies
		by push() function call iii. Deletion of last element is done by pop() function call iv. Print error message for 'empty stack' if no elements are present for pop() function call	allocation is done for the node ❖ Observe declaration of stack using Linked List ❖ Validate whether a new element is inserted at the top by push() function call ❖ Check whether only the top element is deleted by pop() function call ❖ Verify for empty stack condition in pop()
13	Write a program for conversion of given infix arithmetic expression into postfix expression	Write a C program for I. Conversion of infix expression into postfix expression using stacks concept II. Printing the postfix expression	❖ Correct syntactical errors ❖ Debug logical errors ❖ Observe declaration of stack using arrays ❖ Check whether the final expression is postfix expression or not.
14	Write a program for Evaluation of post-fix expression using STACKS.	Write a C program for i. Evaluation of post-fix expression using STACKS ii. Printing the evaluated result	❖ Correct syntactical errors ❖ Debug logical errors ❖ Observe declaration of stack using arrays ❖ Check whether the result is correctly evaluated or not.
15	Write a program to implement a queue using arrays	Write a C program for i. Creation of Queue consisting of elements using arrays ii. Insertion of new element is done by add_Queue() iii. Print error message for 'empty queue' if no elements are present for deletion of an empty queue. iv. Print error message for 'queue full' if number of elements exceed size of Queue array upon insertion of new element. v. Deletion of first element is done by delete_Queue()	❖ Correct syntactical errors ❖ Debug logical errors ❖ Observe declaration of Queue using arrays ❖ Validate whether a new element is inserted at the end of the array by add_Queue() ❖ Verify for empty Queue condition for deletion of an element ❖ Verify for Queue full condition upon insertion of a new element ❖ Check whether only the first element is deleted by delete_Queue()
16	Write a program to implement a queue using linkedlist	Write a C program for i. Creation of Queue consisting of elements using Linked List ii. Insertion of new element is done by add_Queue() iii. Print error message for 'empty queue' if no elements are present for deletion of an empty queue. iv. Deletion of first element is done by delete_Queue()	❖ Correct syntactical errors ❖ Debug logical errors ❖ Study node structure ❖ Validate whether the memory allocation is done for the node ❖ Validate whether a new element is inserted at the end of the Linked List by add_Queue() ❖ Verify for empty Queue condition for deletion of an element ❖ Check whether only the first element is deleted by

DATA STRUCTURES LAB OBJECTIVES AND KEY COMPETENCIES			
Sl.No	Name of the Experiment	Objectives	Key Competencies
			delete_Queue()
17	Write a program to implement a circular queue using arrays	Write a C program for vi. Creation of circular Queue consisting of elements using arrays vii. Insertion of new element is done by add_Queue() iii. Print error message for 'empty queue' if no elements are present for deletion of an empty queue. ix. Print error message for 'queue full' if number of elements exceed size of Queue array upon insertion of new element. x. Deletion of first element is done by delete_Queue() at the front end	❖ Correct syntactical errors ❖ Debug logical errors ❖ Observe declaration of circular Queue using arrays ❖ Validate whether a new element is inserted at the rear end of the array by add_Queue() ❖ Verify for empty Queue condition for deletion of an element ❖ Verify for Queue full condition upon insertion of a new element ❖ Check whether only the first element is deleted by delete_Queue() at the front end
18	Write a program to implement a circular queue using LInkedLists	Write a C program for xi. Creation of circular Queue consisting of elements using Linked List xii. Insertion of new element is done by add_Queue() iii. Print error message for 'empty queue' if no elements are present for deletion of an empty queue. iv. Deletion of first element is done by delete_Queue() at the front end	❖ Correct syntactical errors ❖ Debug logical errors ❖ Study node structure ❖ Validate whether the memory allocation is done for the node ❖ Observe declaration of circular Queue using Linked List ❖ Validate whether a new element is inserted at the rear end of the Linked List by add_Queue() ❖ Verify for empty Queue condition for deletion of an element ❖ Check whether only the first element is deleted by delete_Queue() at the front end

DATA STRUCTURES LAB OBJECTIVES AND KEY COMPETENCIES			
Sl.No	Name of the Experiment	Objectives	Key Competencies
19	Write a C program to BINARY SEARCH TREE with insertion, deletion, various traversals and search operations.	Write a C program for i. Creation of Binary Trees ii. Insertion of a node iii. Deletion of a node iv. Perform In-order Traversal of the binary tree v. Perform Pre-order Traversal of the binary tree vi. Perform Post-order Traversal of the binary tree	❖ Correct syntactical errors ❖ Debug logical errors ❖ Observe proper definition of elements in a Binary Search Tree ❖ Check whether the node is properly inserted in the Binary Tree ❖ Check whether the node is properly deleted in the Binary Tree ❖ Observe the root node after deleting root node element ❖ Validate whether the Tree in-order traversal is properly done ❖ Validate whether the Tree pre-order traversal is properly done ❖ Validate whether the Tree post-order traversal is properly done

DBMS Lab

Course Code	Course Title	No. of periods/week	Total No. of periods	Marks for FA	Marks for SA
CAI-309	DBMS Lab	4	60	40	60

Sno	UNIT TITLE	NO. OF PERIODS	COS
1	Concepts of DBMS & RDBMS	8	CO1
2	Concepts of SQL	16	CO2
3	Basics of PL/ SQL	12	CO3
4	Advance PL/SQL	16	CO4
5	Concepts of NoSQL & MongoDB.	8	CO5
		60	

COURSE OBJECTIVES	**Upon completion of the course the student shall able to learn** 1. Insert, update, delete and select data into/from Relation Database 2. Develop PL/SQL programs 3. Insert, update, delete and select data from MongoDB

Course Outcomes	CO1	CAI-309.1	Develop SQL Queries to Create, modify and drop tables and Queries to Insert, update, delete data from tables.
	CO2	CAI-309.2	Execute SQL Queries to display data on different conditions from different tables
	CO3	CAI-309.3	Execute PL/SQL Programs
	CO4	CAI-309.4	Demonstrate the usage of cursors and triggers
	CO5	CAI-309.5	Execute commands to Insert, update, delete and select data in NOSQL and Mongo DB databases

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 form at 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	18
8	Exercise on GROUP BY, HAVING	2
9	Exercise on Number functions, character functions, conversion functions and date functions, group functions	3
10	Exercise on SET operators	2
11	Exercise on sub queries	3
12	Exercise on Joins	3
13	Exercise on various date and number format models	1
14	Exercise on creating tables with integrity constraints	2
15	Write programs using PL/SQL control statements	6
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

Sl.No	Name of the Experiment	Periods
	Total	60

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
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

Sl.No	Name of the Experiment	Objectives	Key Competencies
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
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

Sl.No	Name of the Experiment	Objectives	Key Competencies
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.

IV SEMESTER

DIPLOMA IN COMPUTER SCIENCE ENGINEERING(ARTIFICIAL INTELLIGENCE)

SCHEME OF INSTRUCTIONS AND EXAMINATION

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								
CAI-401	Web Technologies	5	-	75	3	20	80	100
CAI-402	Python Programming	5	-	75	3	20	80	100
CAI-403	Artificial Intelligence	5	-	75	3	20	80	100
CAI-404	Digital Electronics & Computer Organization	5	-	90	3	20	80	100
CAI-405	Operating Systems	4	-	60	3	20	80	100
PRACTICAL SUBJECTS								
CAI-406	Web Technologies Lab	-	5	60	3	40	60	100
CAI-407	Python Programming Lab	-	3	45	3	40	60	100
CAI-408	Communication Skills	-	3	45	3	40	60	100
CAI-409	Artificial Intelligence Lab using PROLOG	-	4	60	3	40	60	100
	Activities		3	45				
	Total	24	18	-	-	-	-	900

CAI-401 common with CME-402, AIM-401
CAI-402 common with CME-505, AIM-402
CAI-403 common with AIM-403

WEB TECHNOLOGIES

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
CAI-402	**Web Technologies**	**5**	**75**	**20**	**80**

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Principles of Web Designing and HTML Introduction.	11	CO1
2.	Understand various HTML tags and usage of style sheets.	14	CO1,CO2
3.	Understand XML and Client side scripting using Java Script.	18	CO2
4.	JQuery	10	CO3
5.	Web servers and Server side scripting using PHP	22	CO4
	Total Periods	75	

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>, , <cite>, <<ins>, <del>,
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.
2.2.1 Explain 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

3.2.1 Differentiate between Client-side and Server-side scripting.
3.2.2 List Client side and server side scripting languages.
3.2.3 Describe the features of Java Script.
3.2.4 Placing 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.

3.2.6 Form Handling in Java Script

3.2.7 Illustrate Arrays

3.2.7.1 Understand single and multi dimensional arrays.

3.2.7.2 Design small programs using arrays.

understand about various Objects provided by JavaScript

3.2.7.3 **Math** object

3.2.7.4 **String** object

3.2.7.5 **Date** object

3.2.7.6 **Boolean** and **Number** object

3.2.8 Describe events in java script.

4. J Query

4.1 Define JQuery

4.2 List the features of JQuery

4.3 List jQuery plugins

4.4 Explain the steps for to includeJQueryin Web Pages

4.5 Explain jQuery Syntax with example program

4.6 Describe the jQuery Selectors-Accessing HTML elements by using

4.7 Element Selectors

4.8 ID, Class Selectors

4.9 Explain the jQuery Document Ready Event

4.10 Describe the jQuery Event handling methods(Mouse Events, Keyboard Events, Form Events, Docent/Window events)

4.11 Explain effects of jQuery(like hide, show, fade In, fadeout, fadeToggle,fadeTo, slideDown, SlideUp, SlideToggle)

4.12 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 the 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 Understand theFundamentals of PHP

5.2.1 Explain how to combine HTML and PHP.

5.2.2 Explain how to access HTML, PHP documents from web servers.

5.3 Listvarious Data types and explain them with examples.

5.3.1 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.

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, IFrame

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**

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-1	From 1.1 to 3.2
Unit test-2	From 4.1 to 5.29

python Programming

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
CAI-402	**Python Programming**	**5**	**75**	**20**	**80**

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Introduction	10	CO1
2.	Control Flow and Loops	15	CO2
3.	Functions and Arrays	15	CO3
4.	Data Structures	15	CO4
5.	Object Oriented Programming in Python and File Handling and Exception Handling	20	CO5
	Total Periods	75	

Course Objectives	i)To know the fundamentalsPython programming ii)To understand fundamental syntactic information about 'Python' iii) To develop various python programs

Course Outcomes	CO1	CAI-402.1	Explain Basic constructs like operators, expressions and components of python programming as well as Editing and Debugging
	CO2	CAI-402.2	Write Python programs using Control statements, Loops
	CO3	CAI-402.3	Write python programs using Functions and arrays
	CO4	CAI-402.4	Develop Python programs using Data structures
	CO5	CAI-402.5	Develop Python application programs using OOP Concept, FILES, Exceptions

Learning Outcomes:

1.0 Introduction

1.1. History of Python.
1.2. List Python features
1.3. Explain Applications of Python
1.4. Describe Python Integrated Development and Learning Environment (IDLE)
1.5. Give the process of Running Python Scripts.
1.6. Explain Identifiers, Keywords, Indentation, Variables
1.7. Explain various datatypes (Int, float, Boolean, string, and list)
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. 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.(Built-in, User defined)
1.18. Explain Built-in Functions.
1.19. Give the Steps in Develop a simple python program and execution.

2.0 Control Flow and Loops

2.1. Explain various Control Flow constructs.
  2.1.1. If
  2.1.2. If-Else
  2.1.3. if-elif-else
2.2. 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. Scope of variables: Local Variables and Global Variables
3.6. Explain creation of modules.
3.7. Explain importing of modules.
3.8. Python Variable: Namespace and scoping
3.9. Python Packages
3.10. Explain Strings: String slices, immutability
3.11. 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

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

ARTIFICIAL INTELLIGENCE

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
CAI-403	**ARTIFICIAL INTELLIGENCE**	5	75	20	80

S. No.	Chapter/Unit Title	No. of Periods	CO's Mapped
1.	Introduction to PROLOG	15	CO1
2.	Problems and Search Methods in AI	20	CO1, CO2
3.	Knowledge Representation	20	C01, CO3
4.	Game Theory	10	CO4
5.	Fuzzy Logic	10	CO5
Total Periods		75	

Course Objectives	i) To understand PROLOG ii) To know the Searching techniques of AI iii) To knowledge representation using predicate logic iv) To familiarize Game playing strategies and Fuzzy logic

Course Outcomes	At the end of the course the student able to learn following:		
	CO1	CAI-403.1	Describe concepts of PROLOG language
	CO2	CAI-403.2	Analyze various searching techniques
	CO3	CAI-403.3	Illustrate various knowledge representation techniques
	CO4	CAI-403.4	Explain various game paying techniques
	CO5	CAI-403.5	Explain fuzzy logic concepts

Learning Outcomes:

1.0 Introduction to PROLOG

1.1 State the need of PROLOG.
1.2 List the Key features of prolog
1.3 List the facts and rules of PROLOG
1.4 Describe how to install Prolog in Linux
1.5 List Advantages and Disadvantages of Prolog
1.6 State the Goals and terminology.
1.7 Explain Variables.
1.8 ExplainControl Structures
1.9 Illustrate the usage of Arithmetic operators
1.10 State the importance of Matching in PROLOG
1.11 Explain Backtracking
1.12 List and explain the types offcuts
1.13 Explain Recursion
1.14 Define List
1.15 Explain Lists with examples
1.16 Describe Dynamic databases
1.17 List and explain various Input/output operations

1.18 List and explain various Input and Output Streams

2.0 Problems and Search Methods in AI

2.1 Define Artificial Intelligence
2.2 List the AI Problems.
2.3 Explain Underlying Assumption.
2.4 List AI Techniques
2.5 Explain the level of model.
2.6 State the Criteria for success.
2.7 Define the problem as a state space search.
2.8 List the Problem Characteristics.
2.9 Define the production system.
2.10 Explain the Production systems.
2.11 List the Features of Production system.
2.12 Explain about Searching problems, solutions
2.13 Define Un-informed Searching strategy.
2.14 Define Informed Searching strategy
2.15 Explain Un-informed searching methods
- 2.15.1 BFS
- 2.15.2 DFS
- 2.15.3 greedy search
- 2.15.4 brute force search

2.16 Explain Informed searching methods
- 2.16.1 DFS
- 2.16.2 branch and bound
- 2.16.3 Hill climbing
- 2.16.4 constraint satisfaction searching
- 2.16.5 A*

3.0 Knowledge Representation

3.1 Define Knowledge representation
3.2 List and explain the types of Knowledge
3.3 Knowledge representation issues:
- 3.3.1 List and Explain issues in knowledge representation
- 3.3.2 Explain representation on mappings
- 3.3.3 List the approaches to knowledge representation

3.4 Predicate logic:
- 3.4.1 Define predicate logic
- 3.4.2 Illustrate simple facts in logic
- 3.4.3 Illustrate instance and ISA relationships
- 3.4.4 Describe Computable functions and predicates
- 3.4.5 Quote Resolutions

3.5 Representing knowledge as rules
- 3.5.1 Define procedural knowledge
- 3.5.2 Define Declarative knowledge
- 3.5.3 Distinguish Procedural vs Declarative knowledge
- 3.5.4 Define Logic Programming
- 3.5.5 Explain Logic programming
- 3.5.6 Explain forward reasoning

3.5.7 Explain Backward reasoning
3.5.8 DistinguishForward vs.Backward reasoning

4.0 GAME THEORY

4.1 Describe Games as Search Problems
4.2 Explain components of Search problem
4.3 Describe **Minimax** search procedures
4.4 Explain Additional refinements
4.5 Define pruning the search tree
4.6 Describe Alpha-Beta Pruning.
4.7 State the purpose of Chance Node
4.8 State the importance of Expected Value
4.9 Illustrate Games that Include an Element of Chance

5.0 FUZZY LOGIC

5.1 Define Fuzzy logic
5.2 Explain basics of fuzzy logic
5.3 State the importance of sets
5.4 Explain Fuzzy sets
5.5 State importance of crisp sets
5.6 Explain Crisp sets
5.7 State importance of fuzzy logic control
5.8 Explain Fuzzy logic control
5.9 State importance of fuzzy inference
5.10 Explain Fuzzy inference
5.11 State fuzzy hedges
5.12 Explain Fuzzy hedges
5.13 State the importance of Alpha cut threshold
5.14 Explain Alpha cut threshold
5.15 State the importance of Neuro fuzzy systems
5.16 Explain Neuro fuzzy systems
5.17 State the importance of fuzzy Bayesian networks
5.18 Explain Fuzzy Bayesian networks

COURSE CONTENTS:

UNIT1:

Introduction to PROLOG
Introduction PROLOG--facts–rules–goals–variables–control–tructures–operatorsmatching–backtracking–cuts–recursion–lists–dynamic database–simple input/output streams

UNIT2:
PROBLEMS AND SEARCH METHODS in AI

Introduction to artificial intelligence–Problems–Problem Spaces–Search Strategies–Uninformed–Informed Search Methods.

UNIT3:
KNOWLEDGE REPRESENTATION
Knowledge representation issues–predicate logic–representing knowledge using rules

UNIT4:

GAME THEORY

Minimax algorithm–alpha-beta pruning–additional refinements–State-of-the-Art Game Programs

UNIT5:

FUZZY LOGIC

Introduction–fuzzy sets–crisp sets–fuzzy logic control–fuzzy inference–fuzzy hedges–alpha cut threshold–neuro fuzzy systems–fuzzy Bayesian networks.

Text/References:

1. Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-Graw Hill.
2. Introduction to AI & Expert System: Dan Watterson, PHI.
3. Artificial Intelligence by Luger (Pearson Education)
4. Russel & Norvig, Artificial Intelligence: A Modern Approach, Pearson Education
5. http://www.nptel.iitm.ac.in/video.php?subjectId=106105077
6. Website for search strategy implementation in python http://code.google.com/p/aima-python/
7. http://www.journals.elsevier.com/artificial-intelligence/
8. https://www.technologyreview.com/s/534871/our-fear-of-artificial-intelligence/
9. http://www.sanfoundry.com/artificial-intelligence-mcqs-inductive-logicunification-lifting-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 3.1
Unit test-2	From 3.2 to 5.9

Digital Electronics & Computer Organization

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
CAI-404	Digital Electronics & Computer Organization	5	75	20	80

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Number systems, Logic Gates ,Boolean Algebra and basic Combinational circuits	15	CO1,CO3
2.	Flip-Flops & Counters	15	CO1,CO2
3.	Information representation & CPU Organization	15	CO1,CO2,CO3
4.	Memory Organization	15	CO2,CO4
5.	I/O Organization	15	CO3,CO4,CO5
Total Periods		75	

Course Objectives	i) To acquire the basic knowledge of Number systems, 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 electronics circuits iii)To know about Processor organization, information Representation iv)To understand how memory and i/o is organized in an effective way

	At the end of the course the student able to learn following:		
Course Outcomes	CO1	CAI-404.1	Describe fundamental Numbering concepts and techniques used in digital electronics, the switching algebra theorems and logic gates
	CO2	CAI-404.2	Analyse the operation of flip flops and counting circuits
	CO3	CAI-404.3	Explain the Basic computer organization techniques and information representation
	CO4	CAI-404.4	Explain Memory organization
	CO5	CAI-404.5	Describe Handling of I/O organization

Learning Outcomes:

1.0 Circuits

1.1 Number systems

1.1.1 List the various number systems used in digital Computer.

1.1.2 Explain Decimal , Binary, octal, Hexa Decimal number systems

1.1.3 Convert decimal number to other base conversion.

1.1.3.1 Decimal to Binary

1.1.3.2 Decimal to Octal
1.1.3.3 Decimal to Hexadecimal

1.1.4 Convert binary number to other base conversion.
1.1.4.1 Binary to Decimal
1.1.4.2 Binary to octal
1.1.4.3 Binary to Hexadecimal

1.1.5 Convert octal number to other base conversion.
1.1.5.1 Octal to Decimal
1.1.5.2 Octal to Binary
1.1.5.3 Octal to Hexadecimal

1.1.6 Convert hexadecimal other base conversion.
1.1.6.1 Hexadecimal to Decimal
1.1.6.2 Hexadecimal to Binary
1.1.6.3 Hexadecimal to Octal

1.1.7 Binary numbers representation.
1.1.7.1 Define Binary numbers representation.
1.1.7.2 List the types of Binary numbers representation.
1.1.7.3 Explain Unsigned binary number representation.
1.1.7.4 Explain Signed binary number representation.

1.1.8 Binary coded decimal (BCD) coding scheme.
1.1.8.1 Define Binary coded decimal (BCD) coding scheme.
1.1.8.2 List the types of Binary coded decimal (BCD)
1.1.8.3 Draw and explain 8421 code.
1.1.8.4 Draw and explain 2421 code.
1.1.8.5 Draw and explain 8 4-2-1 code.

1.2 Boolean algebra

1.2.1 Explain AND, OR, NOT operations with truth tables.
1.2.2 Explain the working of EX-OR and EX-NOR operations with truth tables.
1.2.3 List the different postulates in Boolean algebra.
1.2.4 State De-Morgan‘s theorems.
1.2.5 Prove De-Morgan‘s theorems using truth tables.
1.2.6 Apply De-Morgan‘s theorems and other postulates of Boolean algebra to simplify the given Boolean expression.
1.2.7 Write Boolean expression for given truth table.
1.2.7.1 Using Sum-Of-Products(SOP) method
1.2.7.2 Using Product-Of-Sums(POS)method
1.2.8 Use K – map to simplify Boolean expression (up to 4 variables).
1.2.8.1 Using Two variable K-Map
1.2.8.2 Using Three variable K-Map
1.2.8.3 Using Four variable K-Map

1.3 Logic Gates

1.3.1 Define Logic gate
1.3.2 List basic gates
1.3.3 Define OR gate
1.3.4 Explain OR gate with logic symbol and truth table.
1.3.5 Define AND gate
1.3.6 Explain AND gate with logic symbol and truth table.
1.3.7 Define NOT gate
1.3.8 Explain NOT gate with logic symbol and truth table.
1.3.9 What is universal gate? List universal gates
1.3.10 Define NOR gate
1.3.11 Explain NOR gate with logic symbol and truth table.

1.3.12 Define NAND gate
1.3.13 Explain NAND gate with logic symbol and truth table.
1.3.14 Define EX-OR and EX-NOR gates
1.3.15 Explain the working of EX-OR and EX-NOR gates with truth tables.
1.3.16 Implement AND, OR, NOT, EX-OR gates using NAND gates only
1.3.17 Implement AND, OR, NOT, EX-OR gates using NOR gate only.

1.4 Basic Combinational Circuits

1.4.1 Define the Half Adder. Explain the function of Half Adder.
1.4.2 Draw Half-Adder circuit using an exclusive OR and an AND gate.
1.4.3 Draw a Half–Adder using only NAND gates or only NOR gates.
1.4.4 Define the Full Adder. Explain the function of Full Adder.
1.4.5 Construct Full Adder using two Half-Adder and an OR gate

2.0 Flip-Flops, Counters

2.1 **FLIP-FLOPS**

2.1.1 List the details of different logic families**.**
2.1.2 Define positive and negative logic levels.
2.1.3 Define Flip flop
2.1.4 Draw and explain the basic principle of operation of aFlip-flop.
2.1.5 Define Latch.
2.1.6 Explain the working of a NAND latch circuit with truth table and Timing diagram
2.1.7 Explain the working of a NOR latch circuit with truth table and Timing diagram
2.1.8 Differentiate between Latch and Flip-flop.
2.1.9 Explain with block diagram, waveforms and truth tables the working of RS Flip-flop.
2.1.10 Explain with block diagram, waveforms and truth tables the working of RS ,TFlip-flop.
2.1.11 Explain with block diagram, waveforms and truth tables the working of D Flip-flop.
2.1.12 Explain with block diagram, waveforms and truth tables the working of JK Flip-flop.
2.1.13 Explain with block diagram, waveforms and truth tables the working of T Flip-flop.
2.1.14 Draw and explain the need for a Master-Slave flip-flop.
2.1.15 Explain the working of a Master-Slave flip-flop using suitable circuit diagram and truth table.

2.2 Counters

2.2.1 Define Counter
2.2.2 List the types of counters.
2.2.3 Define Synchronous counter
2.2.4 Define Asynchronous counter
2.2.5 Distinguish between asynchronous and synchronous counters.
2.2.6 Draw and explain module-10 (decade) Asynchronous counter circuit diagram with waveforms and truth tables
2.2.7 Draw and explain module-8 synchronous counter circuit diagram with waveforms and truth tables
2.2.8 Draw and explain module-16 synchronous counter circuit diagram with waveforms and truth tables
2.2.9 List the advantages of synchronous counters
2.2.10 Programmable counter
2.2.10.1Draw and explain the need for a Programmable counter
2.2.10.2Explain how to design Programmable counter circuit diagram
2.2.11 List the applications of counter.

3.0 **CPU Organization & Information representation and Arithmetic Operation**

3.1 CPU Organization

3.1.1 Draw the functional block diagram of Digital computer and explain the function of each unit.
3.1.2 Define Register
3.1.3 State the purpose of
3.1.3.1 Accumulator
3.1.3.2 Program counter
3.1.3.3 Instruction Register
3.1.3.4 Memory Buffer Register
3.1.3.5 Memory Address Register
3.1.4 Draw the block diagram of simple accumulator based CPU.
3.1.5 Explain the function of each unit
3.1.6 Define the terms micro operation, macro operation,
3.1.7 Define instruction cycle, fetch cycle and execution cycle.
3.1.8 What is stored program concept
3.1.9 Describe the sequential execution of a program stored in memory by the CPU

3.2 **Information representation and Arithmetic Operation**
3.2.1 Explain the basic types of information representation in a computer.
3.2.2 Define floating point representation and fixed point representation of numbers.
3.2.3 Illustrate the floating point and fixed point representations with example.
3.2.4 Distinguish between Fixed point and Floating point representations.
3.2.5 What is Instruction format
3.2.6 Define Opcode , Operand and address.
3.2.7 Explain different types of instructions with examples
3.2.7.1 Zero address instructions
3.2.7.2 One address instructions
3.2.7.3 Two address instructions
3.2.7.4 Three address instructions
3.3 List and explain various addressing modes.

4.0 Memory Organization
4.1 Distinguish between main and auxiliary memory.
4.2 State the need for memory hierarchy in a computer.
4.3 Explain memory hierarchy in a computer in detail
4.4 State the significance of various memory device characteristics: access time, access rate, alterability, permanence of storage, cycle time.
4.5 Discuss Associative Memory
4.6 Explain the principle of virtual memory organization in a computer system
4.7 Explain virtual address and physical address organization.
4.8 State the principle of locality of reference
4.9 Explain Cache memory organization.
4.10 Analyze the importance of the principle of memory interleaving in a computer.

5.0 I/O Organization
5.1 List the any five peripheral devices that can be connected to a computer.
5.2 Define Interface.
5.3 Explain the need for an interface.
5.4 List modes of date transfer.
5.5 Explain synchronous and asynchronous data transfer.
5.6 Compare synchronous and asynchronous data transfer.
5.7 Explain hand shaking procedure of data transfer.
5.8 Explain programmed I/O method of data transfer.

5.9 Explain interrupted initiated I/O.
5.10 Explain DMA controlled transfer.
5.11 Explain priority interrupt, polling, and daisy chaining priority.
5.12 Write about bus system
5.13 List the four bus systems.
5.14 Differentiate between i/o bus and memory bus

COURSE CONTENTS

1.Number systems, Boolean algebra and Logical Gates : List the various number systems used in digital Computer, Explain Decimal , Binary, octal, Hexa Decimal number systems, Convert decimal number to other base conversion, Convert binary number to other base conversion, Convert octal number to other base conversion, Convert hexadecimal other base conversion, Binary numbers representation, Signed binary arithmetic, Binary coded decimal (BCD) coding scheme, Character representation, 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.

2.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. **Counters:** Basic Asynchronous, Synchronous.

3. Processor Organization - functional block diagram of Digital computer -Simple accumulator based CPU and function of each unit.-Stored program concept
Information representation and Arithmetic Operation- Basic types of information representation - floating point representation and fixed point representation of numbers, Operand, Opcode and address - zero address, one address, two address and three address instructions - different addressing modes.
4.Organization of Computer Memory system - Main and auxiliary memory -Need for memory hierarchy in a computer -Significance of various memory devices characteristics: access time, access rate, alterability, permanence of storage, cycle time - Associative Memory-Virtual memory organization in a computer system - Virtual address and physical address organization. -Principle and advantage of cache memory organization-Principle of memory interleaving in a computer
5.Input and output organization - Peripheral devices -Need for an Interface-Three modes of date transfer - Synchronous and asynchronous data transfer -Hand shaking procedure of data transfer -Programmed I/O method of data Transfer-Interrupted initiated I/O-DMA controlled transfer-Priority interrupt, polling, and daisy chaining priority-Bus systems

REFERENCE BOOKS

1. Digital principles and applications -- Malvino and leach
2. Digital Electronics -- Bignell - Thomson
3. Modern Digital Electronics -- R.P. Jain
4. Computer System Architecture -- Morris Mano.

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 2.2
Unit test-2	From 2.3 to 5.14

Operating Systems

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
CAI-405	**Operating Systems**	4	60	20	80

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Introduction to Operating system	12	CO1
2.	Process management	12	CO2
3.	nchronization & Deadlocks	12	CO3
4.	Memory management	12	CO4
5.	sk scheduling and File management	12	CO5
	Total Periods	60	

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

Course Out comes	CO1	CAI-405.1	Explain basic concepts of Operating System
	CO2	CAI-405.2	Explain process scheduling algorithm
	CO3	CAI-405.3	Describe Semaphores, synchronization and Deadlock handling techniques
	CO4	CAI-405.4	Use memory management techniques and page replacement algorithms
	CO5	CAI-405.5	Use Disk scheduling algorithms and File allocation methods with respect to different operating systems

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

4.10 Define virtual memory techniques

4.11 Describe demand paging

4.12 Describe page replacement

4.13 Discuss on page replacement algorithms

4.13.1 FIFO

4.13.2 LRU

4.13.3 Optimal

4.14 Explain the concept of thrashing

4.15 Explain working set model and page fault frequency

5.0 Disk scheduling and File management

5.1 List out various disk performance parameters

5.2 Disk scheduling policies

5.2.1 FIFO

5.2.2 SSTF

5.2.3 SCAN

5.3 Define file management

5.4 List and explain various file operations

5.5 List and explain various access methods

5.6 List and explain various allocation methods

5.6 List and explain directory structure

5.7 Explain disk organization and structure

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 -- Silberschatz and Galvin
2. Operating Systems -- William Stallings, PHI
3. Operating Systems -- Dietel and Dietel
4. Operating Systems -- Dhamdhere (TMH)
5. Advanced Operating Systems -- Tanenbaum

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

Web Technologies Lab

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
CAI-406	Web Technologies Lab	5	75	40	60

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Excercise on HTML, CSS&XML	20	CO1
2.	Excercise on Java Script, JQuery	25	CO2,CO3
3.	Excercise on PHP web applications and Database Applications	30	CO3,CO4
	Total Periods	75	

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	CAI-406.1	Implement interactive web page(s) using HTML, CSS and JavaScript.
	CO2	CAI-406.2	To know the Usage of JQuery
	CO3	CAI-406.3	Build Dynamic web site using server side PHP Programming
	CO4	CAI-406.4	To know database connectivity using PHP.
	CO5	CAI-406.5	Develop real world application with different web designing tools.

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 a 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() function in JQuery.

12. Write a Java Script program using Responsive Slides Jquery 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 a 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 a browser 6) Test the results
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 a browser 5) Test the results

Exp. No.	**Name of the experiment**	**Objectives**	**Key Competencies**
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 for creating CSS 7) Add selectors to set the background color, position and dimensions of an element. 8) Save the CSS file 9) Link the CSS file to a valid HTML page. 10) Save the HTMLpage 11) Open the HTML page in a browser 12) Test the results
6	Exercise on designing a XML document	Create a 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, dBl click	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 moues 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, slide up fadeIn ,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 theresults 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 Responsive Slides jQuery plugin(download from responsiveslides.com)	Write a JavaScript program using jQuery which displays date picker.	1) Create a HTML file 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 PHP file. 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 PHP file. 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 seta cookie 4) Save and Run the page. 5) Test the result.

Python Programming Lab

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
CAI-407	**Python Programming Lab**	**3**	**45**	**40**	**60**

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Exercise 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	
	Total Periods	45	

COURSE OBJECTIVES	Upon completion of the course the student shall able to learn 12. Basics of Python programming 13. Decision Making and Functions in Python 14. Object Oriented Programming using Python.	
CO No.	COURSE OUTCOMES	
CO 1	CAI-407.1	Execute Simple python programs
CO 2	CAI-407.2	Execute Python programs using expressions, operators
CO 3	CAI-407.3	Execute python programming using Functions, Packages
CO 4	CAI-407.4	Demonstrate Python programs using Lists
CO 5	CAI-407.5	Develop Python programs using OOP Concepts and Exceptions
CO 6	CAI-407.6	Demonstrate Debugging of Python Programs

LEARNING OUTCOMES

1. Write and execute simple python Program.

2. Write /execute simple 'Python' program: Develop minimum 2 programs using different data types (numbers, string, tuple, list, and dictionary).

3. Write /execute simple 'Python' program: Develop minimum 2 programs using Arithmetic

Operators, 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 up to 10 for numbers 1 to 5.

8. Write a program to: i) Find factorial of a given number. ii) Generate multiplication table up to 10 for numbers 1 to 5 using functions.

9. Write a program to: i) Find factorial of a given number using recursion. ii) Generate Fibonacci sequence 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 the dictionary.

13. Write a program to: To calculate average, mean, median, and standard deviation of numbers in 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

Sl.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 thesquare, 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 programs 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 programs 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 programs 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 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 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

Communication Skills

Course Title : Communication Skills	**Course code: C23-Common- 408 { Common to all Branches}**
Year/ Semester : IV Semester	**Number of Periods : 45 (3 hrs per week)**
Type of Course : Practical	**Max Marks : 100 { Internal 40 + External 60 }**

Course Objectives: The students shall

- 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

Course Outcomes: The students shall

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: **"Communication Skills"**
by State Board of Technical Education and Training, AP

Sl No	Unit	Teaching Hours
1	Listening Skills	6
2	Work place Etiquette	3
3	Introduce 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: **Work place 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.

ASSESSMENT

C23-Common-408: English Communication Skills Lab

- The assessment for C23-Common 408 : 'English Communication Skills' is on par with all other practical subjects comprising 40 marks for Internal assessment and 60 marks for External examination attaining the final total of 100 Marks.
- The Internal Assessment can be conducted in the form of Assignments in all the 8 Units. One or Two assignments can be conducted in each Unit, awarding 10 marks for each assignment and the total marks can be averaged to 40 marks as suggested below.
- These assignments should focus mostly on LISTENING and SPEAKING skills rather than writing. However, for the practice sake, students can write down their assignments in a separate note book to enable them speak/present in the end exam fluently. The students should submit these assignment note books to the teacher.
- Questioning styles vary from Unit to Unit as different skills are assessed in each Unit with specific parameters as given in the workbook.

- Listening skills can be tested by playing different Audio/ Video clips (appropriate in content and language, preferably without subtitles) and test their skill of listening comprehension . Follow pre-while-post stages of listening activity and students should answer general, specific, inferential, vocabulary questions.
- Personal profile, describing a place/a thing/ a person/ an event / a picture, JAM, presentations, Direct interaction with the teacher/ examiner are the topics for individual speaking skills.
- Role plays, GD and Interview skills should be made as group activities and the teacher assesses various skills of the students as given in the workbook.
- Teacher should maintain a record of the following Assessment sheet (one for each student) to award Internal marks.

Calculating Internal marks through Assignments :				
Name of the Student:		**PIN:**	**Branch:**	**Academic Year:**
S. No.	**Title of the Unit**	**Assignment 1: 10 Marks**	**Assignment 2: 10 Marks**	**Total Marks in each Unit (Average for 10 Marks)**
1	Listening Skills			
2	Workplace etiquette			
3	Introducing Oneself			
4	Short Presentations (JAM)			
5	Group Discussion			
6	Resume & Cover Letter			
7	Interview Skills			
8	Presentation Skills			
	Marks Scored			Ex: 65
	Total No. of Units			8
	Internal Assessment : Average for 40 Marks	(65/8) X4 = 32.5		33 (for 40 Marks)

Aspects to be evaluated to test speaking skills			
S.No	**Language Aspects**	**Organising Aspects**	**Body Language aspects**
1	Content: Quality, clarity and relevance of ideas	Coherence, cohesion of relevant ideas	Postures
2	Fluency	Proper beginning, topic sentence, expansion/details, conclusion	Gestures,
3	Vocabulary	Using proper Linkers	Eye contact
4	Pronunciation	Avoid repetitions, clichés, fillers	Audibility, pitch, Permissible pauses
5	Grammar (Syntax, semantics)		Other Permissible body movements

Artificial Intelligence Lab using prolog

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
CAI-409	**Artificial Intelligence Lab using prolog**	**04**	60	40	60

S No	Chapter/ Unit Title	No. of Periods	COs Mapped
1.	Installation and study of Prolog environment	10	CO1, CO2, CO3
2.	Study and write programs on Input/CO2, CO types, rules	20	CO1, CO2, CO3
3.	Study and write Programs on Goal finding, backtracking, objects, strings, set operations	15	CO1, CO4
4.	Programs on various applications	15	CO1, CO5
	Total	60	

COURSE OBJECTIVES	**Upon completion of the course the student shall be able to** 1. Installation &Study of prolog. 2. Use Edit, compile and execution of prolog programs 3. Usage of prolog environment 4. To Write AI program using various prolog constructs like facts, objects, predicates and variables, Goal finding, backtracking, objects, strings, set operations 5. Write AI programs on various applications using prolog

CO No		COURSE OUTCOMES
CO1	CAI-409.1	Demonstrate Installation of prolog and edit, compile and execution of simple prolog programs using statements, keywords, user defined identifiers
CO2	CAI-409.2	Practice programs using facts, objects, predicates, variables andarithmetic operators
CO3	CAI-409.3	Execute prolog program on recursion, Lists, dynamic database
CO4	CAI-409.4	Prepare Programs on Goal finding, backtracking, objects, strings, set operations
CO5	CAI-409.5	Use prolog programs on various applications

Learning outcomes:

1. Installation of GNU-Prolog, Study of Prolog (GNU-Prolog)
2. Write a prolog program of facts, objects, predicates and variables in PROLOG.
3. Write a prolog program of Rules and Unification in PROLOG.
4. Write a prolog program of “cut” and “fail” predicate in PROLOG.
5. Write a prolog program of arithmetic operators, simple input/output and compound goals inPROLOG.
6. Write a prolog program of recursion in PROLOG.
7. Write a prolog program of Lists in PROLOG.
8. Exercise on dynamic database in PROLOG.
9. Implement string operations like substring, string position, palindrome etc.
10. Write a prolog program to implement all set operations (Union, intersection, complementetc.)
11. Write a prolog program to maintain family tree.
12. Write a prolog program to solve “Water Jug Problem”.
13. Write program to solve 4-queens problem.
14. Write a program for Tic-Tac-Toe problem.

KEY COMPETENCIES

Exp. No.	Name of the experiment	Objectives	Key Competencies
1	Installation of gnu-prolog	(a) Study of Prolog (gnu-prolog) (b) Installation of prolog	a) identify the errors during the installation b) observe the installation completion
2	Exercise on facts, objects, predicates and variables in PROLOG.	(a) Write a program for facts using prolog (b) Write a program objects using prolog (c) Write a program for predicates using prolog (d) Write a program for variables using prolog	(a) Compile the program and rectify the errors. (b) Execute the program (c) Observe the output.
3	Exercise on Rules and Unification in PROLOG.	(a) Write a program on Rules in prolog (b) Write program on Unification in prolog	(a) Provide the terms as input. (b) use parent method for matching terms (c) Observe the output.
4	Exercise on “cut” and “fail” predicate in PROLOG	(a) Write a program on cut in prolog (b) Write a program on fail in prolog	(a) use different methods for cut and fails predicates (b) observe the errors (c) observe the output

5	Exercise on arithmetic operators, simple input/output and compound goals in PROLOG.	Write a program on (a) arithmetic operators (b) input /output (c) goals in prolog	(a) use different terms as input (b) call the different methods (c) observe the errors (d) observe the output
6	Exercise on recursion in PROLOG	(a) Write a program using recursion in prolog	(a) Use the structures and objects (b) Understand the matching (c) Observe the errors (d) Observe the result
7	Exercise on Lists in PROLOG.	(a) Write a program on lists	(a) Use different operations like membership, length, concatenation, append, insertion (b) Check the errors (c) Observe the output
8	Exercise on dynamic database in PROLOG	(a) Write a program on database in prolog	(a) Create database (b) Use different manipulations (c) Check the errors (d) Observe the result
9	Exercise on string operations in prolog	Write a program on (a) String comparison (b) String copy (c) String reverse (d) Substring (e) Position of the string	(a) Use different string operations (b) Check the errors (c) Observe the output
10	Exercise on all set operations (Union, intersection, complement, difference) in prolog	(a) Write a program on set operations in prolog	(a) Use different operations like union Intersection, difference (b) Observe the errors (c) Observe the output
11	Exercise on maintain family tree in prolog	(a) Write a program on creation of family tree in prolog	(a) Create the family tree (b) Check the errors (c) Observe the output
12	Exercise on “Water Jug Problem” in prolog	(a) Write a program to implement water-Jug problem.	(a) use water jug concept (b) observe the errors (c) check the output
13	Exercise on 4-queens problem in prolog	(a) Write a program to implement the 4-queens problem in prolog	(a) Use 4-queens instead of N (b) Observe the errors (c) Observe the output
14	Exercise on Tic-Tac-Toe	(a) Write a program on Tic-Tac-Toe	(a) Create the Tic-Tac-Toe (b) Check the errors (c) Observe the output

V SEMESTER

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING

SCHEME OF INSTRUCTIONS AND EXAMINATION

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								
CAI-501	Industrial Management and Entrepreneurship	5	-	75	3	20	80	100
CAI-502	Software Engineering	5	-	75	3	20	80	100
CAI-503	Natural Language Processing	5	-	75	3	20	80	100
CAI-504	Data Science and Machine Learning	5	-	75	3	20	80	100
CAI-505	IOT & Cloud Computing	4	-	60	3	20	80	100
PRACTICAL SUBJECTS								
CAI-506	Data Science and Machine Learning	-	3	45	3	40	60	100
CAI-507	IOT and Cloud Computing Lab	_	3	45	3	40	60	100
CAI-508	Life Skills	-	3	45	3	40	60	100
CAI-509	Project work	-	6	90	3	40	60	100
	Activities		**3**	45				
	Total	**24**	**18**	-	-	-	-	**900**

Note:CAI-501 common with CAI-501, AIM-501
CAI-502 common with CAI-401
CAI-503 Common with AIM-503
CAI-508 common with all branches

Industrial Management and Entrepreneurship

Course code	Course Title	No. of Periods/ Weeks	Total No. of periods	Marks for FA	Marks for SA
AIM-501	Industrial Management and Entrepreneurship	5	75	20	80

Time Schedule

Chapter No.	Chapter/Unit Title	No. of Periods	Marks	No. of Short Answer Questions	No. of Essay Type Questions	CO's Mapped
1.	Principles of Management.	10	16	2	1	CO1
2	Organization Structure & Organizational Behaviour.	18	26	2	2	CO2
3.	Production Management.	18	26	2	2	CO3
4.	Engineering Ethics & Safety and Labour Codes.	19	26	2	2	CO4
5.	Entrepreneurship & Start-ups.	10	16	2	1	CO5
	Total	**75**	110	10	8	

Course Objectives and Course Outcomes

COURSEOBJECTIVES		Upon completion of the course the student shall be able to (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	CAI-501.1	Understand the principles of management as applied to industry.
	C02	CAI-501.2	Explain types of the industrial organization structures and the behaviour of an individual in an organization, motivational and leadership styles.
	C03	CAI-501.3	Explain the different aspects of production management.
	CO4	CAI-501.4	Explain Engineering Ethics, Industrial Safety and industrial Labour Codes.
	CO5	CAI-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.

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. 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. 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. 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

CAI-501 :: Industrial Management & Entrepreneurship start-ups

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

Software Engineering

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
CAI-502	Software Engineering	5	75	20	80

S.No.	Chapter/Unit Title	No. of Periods	CO"s Mapped
1.	Basics of Software Engineering Designs & Life Cycle Models	10	C01
2.	Software Project Management	18	CO2
3.	Requirement Analysis & Specifications	10	C03
4.	Software Design, Coding	22	CO4
5.	Software testing, Debugging, Reliability, Quality Management & Maintenance	15	CO5
	Total Periods	75	

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	CAI-502.1	Explain Software life cycle models and basics of software engineering.
	CO2	CAI-502.2	Describe Software Project Management
	CO3	CAI-502.3	Prepare SRS document
	CO4	CAI-502.4	Apply Design, coding techniques.
	CO5	CAI-502.5	Apply Testing Techniqes ,Quality and reliability metrics

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 requirements Traceability

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 Define and Classify Cohesion and Coupling

- 4.2.1 Classification of Cohesiveness
- 4.2.2 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 Modeling Language

- 4.5.1 List the goals of UML
- 4.5.2 Role of UML in Object oriented Design
- 4.5.3 List and explain Building blocks of UML
- 4.5.4 List different symbols used in UML notation
- 4.5.5 Classify and list standard UML diagrams
- 4.5.6 Know the purpose of Class diagram and draw simple class diagrams
- 4.5.7 Use case diagram
  - 4.5.7.1 Define the term Use case
  - 4.5.7.2 Know the purposes of Use case diagram
  - 4.5.7.3 Learn to draw the Use case diagram
- 4.5.8 Interaction diagram
  - 4.5.8.1 State the purpose of Interaction diagram
  - 4.5.8.2 Interaction diagrams
  - 4.5.8.3 List interaction diagrams(sequence & collaboration)
  - 4.5.8.4 learn to draw the Interaction diagrams

4.6 Understand the concept of Software Coding

- 4.6.1 Coding Standards and Guidelines - Code Review- Code Walk- Throughs - Code Inspection
- 4.6.2 Clean Room Testing - Software Documentation- Software Testing

5.0 **Testing, Debugging, Reliability, Quality Management & Maintenance**

- 5.1 Understand Testing
  - 5.1.1 What is Testing?
  - 5.1.2 Differentiate Verification and Validation
  - 5.1.3 List 3Designs of Test Cases
  - 5.1.4 Compare Testing in the Large vs Testing in the Small
  - 5.1.5 Explain Unit Testing
  - 5.1.6 Explain Black box Testing and White Box Testing.
  - 5.1.7 Explain Open source software testing tools : Selenium,Bugzilla
- 5.2 Debugging
  - 5.2.1 Explain Debugging Approaches.
  - 5.2.2 List the Debugging Guidelines.
- 5.3 Explain Program Analysis Tools (Static Analysis Tools& Dynamic Analysis)
- 5.4 List and Explain Integration Testing
- 5.5 Explain System Testing
- 5.6 Explain Performance Testing.
- 5.7 Understand the concept of Software Reliability
  - 5.7.1 Differentiate Hardware Reliability and Software Reliability
  - 5.7.2 List the different Reliability Metrics
  - 5.7.3 Understand the Reliability Growth Modeling
- 5.8 State the importance of Statistical Testing
- 5.9 Explain Software Quality Management systems
- 5.10 Define 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, Debugging software 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
4. http://www.tutorialspoint.com/uml/

6.The Unified Modelling Language User guide…Grady Booch

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 3.6
Unit test-2	From 4.1 to 5.7

Natural Language Processing

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
CAI-503	Natural Language Processing	5	75	20	80

S.No	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Introduction to Natural Language Processing	15	CO1
2.	Word Level Analysis	14	CO2
3.	Syntactic analysis	14	CO3
4.	semantics and pragmatics	19	CO4
5.	discourse analysis and lexical resources	13	CO5
	Total Periods	75	

Course Objectives	i. Acquire the fundamentals of natural language processing ii. To familiarize word level analysis iii. Analyze CFG and PCFG in NLP iv. Apply the semantics of sentences and pragmatics v. Apply the NLP techniques

Course Outcomes	At the end of the course the student able to learn following:		
	CO1	CAI-503.1	Describe a given text with basic Language features
	CO2	CAI-503.2	Explain an innovative application using NLP components
	CO3	CAI-503.3	Apply a rule based system to tackle morphology/syntax of a language.
	CO4	CAI-503.4	Explain a tag set to be used for statistical processing for real-time applications.
	CO5	CAI-503.5	Compare and contrast the use of different statistical approaches for different types of NLP applications

LEARNING OUTCOMES:

1.0 INTRODUCTION TO NATURAL LANGUAGE PROCESSING.

1.1 Describe the Origins and challenges of NLP

1.2 Classification of Language Modeling

1.2.1 Explain Grammar-based LM

1.2.2 Explain Statistical LM

1.3 Describe the role of Regular Expressions

1.4 Define Finite-State Automata

1.5 State the importance of English Morphology

1.6 Explain Transducers for lexicon and rules

1.7 State the importance of Tokenization

1.8 Explain Detecting and Correcting Spelling Errors

1.9 Describe Minimum Edit Distance

2.0WORD LEVEL ANALYSIS

2.1 Explain the usage of Unsmoothed and Smoothed N-grams

2.2 Analyze N-grams

2.3 Describe Interpolation and Backoff- Word Classes

2.4 Explain Part-of-Speech Tagging

2.5 Differentiate Rule-basedStochastic and Transformation-based tagging

2.6 Identify the Issues in PoS tagging

2.7 Compare Hidden Markov and Maximum Entropy models.

3.0SYNTACTIC ANALYSIS

3.1 Define Context-Free Grammar

3.2 Define Grammar rules for English

3.3 Classify Treebanks

3.4 ExplainNormal Forms for grammar

3.5 State the importance of Dependency Grammar

3.6 Describe the process of Syntactic Parsing

3.7 Explain the problem of Ambiguity

3.8 Explain Dynamic Programming parsing

3.8.1 Shallow parsing

3.8.2 Probabilistic CFG

3.9 Explain Probabilistic CYK algorithm

3.10 Describe Probabilistic Lexicalized CFGs

3.11 Describe the Unification of feature structures.

4.0 SEMANTICS AND PRAGMATICS

4.1 Identify the Requirements for representation

4.2 Explain the First-Order Logic

4.3 Classify Description Logics

4.4 Describe Syntax-Driven Semantic analysis approach

4.5 State the need of Semantic attachments

4.6 Define Word Senses

4.7 Explain the Relations between Words and Senses

4.8 Describe Thematic Roles

4.9 Define Selectional restrictions

4.10 Explain the process of Word Sense Disambiguation using Supervised

4.11 Identify the importance of Dictionary & Thesaurus

5.0 DISCOURSE ANALYSIS AND LEXICAL RESOURCES

5.1 Describe the procedure of Discourse segmentation

5.2 Define Coherence

5.3 Explain Anaphora Resolution using Hobbs and Centering Algorithm

5.4 State the importance of Coreference Resolution

5.5 Explain Porter Stemmer algorithm

5.6 Describe Lemmatizer

5.7 Explain the corpus

- 5.7.1 WordNet
- 5.7.2 PropBank
- 5.7.3 FrameNet
- 5.7.4 Brown Corpus
- 5.7.5 British National Corpus (BNC).

COURSE CONTENTS

UNIT I:INTRODUCTION

Origins and challenges of NLP – Language Modelling: Grammar-based LM, Statistical LM - Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance

UNIT II:WORD LEVEL ANALYSIS

Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.

UNIT III:SYNTACTIC ANALYSIS

Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs - Feature structures, Unification of feature structures.

UNIT IV: SEMANTICS AND PRAGMATICS

Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, Selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus

UNIT V: DISCOURSE ANALYSIS AND LEXICAL RESOURCES

Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC).

TEXT BOOKS:

1. Daniel Jurafsky, James H. Martin―Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.
2. Steven Bird, Ewan Klein and Edward Loper, ―Natural Language Processing with Python‖, First Edition, O_Reilly Media, 2009.

REFERENCE BOOKS:

1. Breck Baldwin, ―Language Processing with Java and LingPipe Cookbook, Atlantic Publisher, 2015. 2. Richard M Reese, ―Natural Language Processing with Java‖, O_Reilly Media, 2015.
2. Nitin Indurkhya and Fred J. Damerau, ―Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010.
3. Tanveer Siddiqui, U.S. Tiwary, ―Natural Language Processing and Information Retrieval‖, Oxford University Press, 2008.

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 3.6
Unit test-2	From 3.7 to 5.7

CAI-504 Data Science and Machine Learning

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
CAI-504	**Data Science and Machine Learning**	5	75	20	80

S. No.	Chapter/Unit Title	No. of Periods	CO"s Mapped
1.	Introduction to Data Science	10	C01
2.	Introduction to Programming Tools for Data Science	14	CO2
3.	Mathematical Foundations	14	CO3
4.	Machine Learning	16	CO4
5.	Classification and Regression algorithms	21	CO5
	Total Periods	75	

Course Objectives	i. To know Data Science related to Machine Learning ii. To know various Programming tools for implementation of Data science Concepts iii. To understand the mathematical foundations needed for data science and Machine Learning iv. To explain Machine learning techniques v.To Implement Classification and Regression algorithms

Course Outcomes	At the end of the course the student able to learn following:		
	CO1	CAI-504.1	Understand the concepts of Data Science related to Machine Learning
	CO2	CAI-504.2	Implementing data science concepts by using the programming tools.
	CO3	CAI-504.3	understanding of the mathematical foundations needed for data science
	CO4	CAI-504.4	Explain Machine learning techniques
	CO5	CAI-504.5	Implement Classification and Regression algorithms

Learning Outcomes:

1. Introduction to Data Science
   1.1. Define Data Science
   1.2. Applications of Data science.

1.3. Define Big data
1.4. Explain Characteristics of Big data
1.5. Explain Data Preprocessing
1.6. Need of data Preprocessing in machine learning
1.7. Explain dimensionality reduction and feature extraction and manifold learning.
1.8. Define Web scraping

2. Introduction to Programming Tools for Data Science

2.1. State the purpose of following Toolkits using Python:
- 2.1.1. Matplotlib,
- 2.1.2. NumPy,
- 2.1.3. Scikit-learn

2.2. Define Visualizing Data
2.3. List different types of charts
2.4. Explain creating charts or plots in python.
- 2.4.1. Bar Charts
- 2.4.2. Line Charts
- 2.4.3. Scatterplots

2.5. Working with data in python
- 2.5.1. Explain Reading data Files with examples
- 2.5.2. Explain Scraping the Web in python
- 2.5.3. Using APIs (Example: Usingthe Twitter APIs),
- 2.5.4. Cleaning and Munging,
- 2.5.5. Manipulating Data,
- 2.5.6. Rescaling,
- 2.5.7. Dimensionality Reduction

3. Mathematical Foundations

3.1. Linear Algebra:
- 3.1.1. Define Vectors,
- 3.1.2. Operation on Vectors
- 3.1.3. Implementation of Vectors in python
- 3.1.4. Define Matrices.
- 3.1.5. Operation on Matrices
- 3.1.6. Implementation of Matrices in python

3.2. Statistics:
- 3.2.1. Describe a Single Set of Data,
- 3.2.2. Define Correlation, covariance, variance
- 3.2.3. Explain Simpson's Paradox,
- 3.2.4. Correlation and Causation

3.3. Probability:
- 3.3.1. Define Dependence and Independence,
- 3.3.2. Explain Conditional Probability,
- 3.3.3. Explain Bayes's Theorem,
- 3.3.4. Define Random Variables,
- 3.3.5. Define Continuous Distributions

3.3.6. Explain Normal Distribution,
3.3.7. Explain Central Limit Theorem

3.4. Hypothesis and Inference:
3.4.1. Explain Statistical Hypothesis Testing,
3.4.2. Describe Confidence Intervals,
3.4.3. Define P-hacking
3.4.4. Explain Bayesian Inference

4. Machine Learning

4.1. Overview of Machine learning concepts

4.2. Types of Machine learning
4.2.1. Supervised,
4.2.2. Unsupervised,
4.2.3. Reinforced learning,

4.3. Analyse the examples of supervised and unsupervised learning.

4.4. List the types 0f supervised learning Algorithms.

4.5. Explain the classification Algorithms
4.5.1. K Nearest Neighbors
4.5.2. Decision trees and Random forest
4.5.3. Logistic regression
4.5.4. Naïve Bayes algorithm

4.6. Explain Regression Algorithms
1.6.1 Linear Regression
1.6.2 Ordinary least squares method.

5. Unsupervised Learning Algorithms

5.1. List types of unsupervised learning algorithms

5.2. Describe the tasks of unsupervised learning
5.2.1 Dimensionality reduction
5.2.2 Anamoly detection
5.2.3 clustering

5.3. Explain unsupervised learning algorithms
5.2.4 K means clustering algorithm
5.2.5 Hierarchical clustering algorithm
5.2.6 DB Scan algorithm

5.4. Advanced Machine Learning
5.4.1. Define Neural Networks
5.4.2. Explain the need of neural networks in machine learning
5.4.3. Applications of neural networks.
5.4.4. Define Perceptron
5.4.5. List Types of neural networks
5.4.6. Define Feed-Forward Neural Networks
5.4.7. Explain Backpropagation

Course Content

1. Introduction to Data Science
   Data Science, Big data, Characteristics of Big data, Data Preprocessing, Need of data preprocessing in machine learning, dimensionality reduction, feature extraction, manifold learning, Web scraping

2. Introduction to Programming Tools for Data Science
   Toolkits using Python: Matplotlib, NumPy, Scikit-learn, NLTK,
   Visualizing Data: Bar Charts, Line Charts, Scatterplots, Working with data: Reading Files, Scraping the Web, Using APIs (Example: Using the Twitter APIs), Cleaning and Munging, Manipulating Data, Rescaling, Dimensionality Reduction

3. Mathematical Foundations
   Linear Algebra: Vectors, Matrices,
   Statistics: Describing a Single Set of Data, Correlation,covariance, variance, Simpson's Paradox, Correlation and Causation,
   Probability: Dependence and Independence, Conditional Probability, Bayes's Theorem, Random Variables, Continuous Distributions, The Normal Distribution, Hypothesis and Inference: Statistical Hypothesis Testing,

4. Machine Learning-Supervised learning
   Overview of Machine learning concepts –Types of Machine learning – Supervised, Unsupervised, Reinforced learning, types of supervised learning algorithms, classification algorithms, regression algorithms.

5. Unsupervised learning
   Types of unsupervised learning algorithms, tasks of unsupervised learning, clustering algorithms – Clustering, hierarchical clustering, DB Scan.
   More in to machine learning: Neural Network, need of neural networks in machine learning,Applications of neural networks, Perception, Types of Neural Networks, feed forward networks, Back propagation.

LIST OF SUGGESTED BOOKS

1. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media
2. Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow:Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition, O'Reilly Media
3. Jain V.K., “Data Sciences”, Khanna Publishing House, Delhi.
4. Jain V.K., “Big Data and Hadoop”, Khanna Publishing House, Delhi.
5. Jeeva Jose, “Machine Learning”, Khanna Publishing House, Delhi.
6. Chopra Rajiv, “Machine Learning”, Khanna Publishing House, Delhi.
7. Ian Goodfellow, Yoshua Bengio and Aaron Courville, "Deep Learning", MIT Press http://www.deeplearningbook.org
8. Jiawei Han and Jian Pei, "Data Mining Concepts and Techniques", Third Edition, MorganKaufmann Publishers

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 5.47

INTERNET OF THINGS & CLOUD COMPUTING

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
CAI-505	**Internet of Things and Cloud Computing**	4	60	20	80

S.No.	Chapter/Unit Title	No. of Periods	CO"s Mapped
1.	Introduction of IOT	10	CO1
2.	Data Protocols	10	CO1, CO2
3.	Communication Technologies	13	CO1, CO3
4.	Wireless Sensor Networks	17	CO4
5.	Cloud Computing	10	CO1, CO5
	Total Periods	60	

Course Objectives	i) To assess the vision of IoT. ii) To classify Real World IoT applications in various Domains. iii) To understand design methodology for IoT platforms.

Course Outcomes	At the end of course student able to learn the following:		
	CAI-505.1	CO1	Explain the basic concepts like usage of sensors, components and frequently used technologies of IoT from a global context
	CAI-505.2	CO2	Apply Data protocols of IoT
	CAI-505.3	CO3	Describe various communication technologies of IOT
	CAI-505.4	CO4	Illustrate the use of sensor networks in applications ofvarious domains
	CAI-505.5	CO5	Explain Integrating IOT with cloud computing

Learning Outcomes:

1: Introduction of IOT

1.1. INTRODUCTION:

1.1.1. Define IOT and list its Features

1.1.2. List the components of IoT: hardware, software, technology and protocols

1.1.3. List Applications, various Technologies of IOT

1.1.4. List advantages and disadvantages of IoT

1.1.5. Describe various connecting technologies

1.1.6. Sensors

1.1.6.1. Need of sensor

1.1.6.2. Features of Sensors

1.1.6.3. Classify Sensors based on output, on data types

1.1.7. Define actuator and list its types

1.1.8. List and explain functional Components of IOT
1.1.9. Explain service-oriented architecture of IOT
1.1.10. List IOT challenges

1.2. . Various Connectivity Technologies in IOT:

1.2.1 6LoWPANs Technologies

1.2.1.1 Features
1.2.1.2 Addressing
1.2.1.3 List and explain different packet formats
1.2.1.4 Explain 6LoWPAN protocol stack architecture

1.2.2 List and Explain Routing protocols (Loading, RPL)

1.2.3 RFID Technologies

1.2.3.1 What is RFID
1.2.3.2 List the features
1.2.3.3 Explain Working principle
1.2.3.4 Applications

2. DATA PROTOCOLS

2.1. Message Queue Telemetry Transport (MQTT)

2.1.1. Define and explain MQTT
2.1.2. List components, Methods, Applications
2.1.3. Define and explain Secure MQTT

2.2. Constrained Application Protocol (CoAP)

2.2.1. Define and explain CoAP
2.2.2. List and explain CoAP message types

2.3. Extensible Messaging and Presence Protocol (XMPP)

2.3.1. List Features of XMPP
2.3.2. Explain XMPP
2.3.3. Describe core XMPP Technologies
2.3.4. List applications of XMPP

2.4. Advanced Message Queuing Protocol (AMQP)

2.4.1. List Features of AMQP
2.4.2. Explain AMQP in detail
2.4.3. List applications of XMPP

3. Communication Technologies

3.1. IEEE 802.15.4

3.1.1. List features of IEEE 802.15.4
3.1.2. Explain IEEE 802.15.4
3.1.3. List IEEE 802.15.4 Variants
3.1.4. List and explained 802.15.4 Types

3.2. ZIGBEE

3.2.1. What is ZIGBEE
3.2.2. List features, components, different topologies, types, applications ZIGBEE
3.2.3. Explain different topologies of ZIGBEE
3.2.4. Explain ZIGBEE types
3.3. Near field communication (NFC)
3.3.1. What is NFC
3.3.2. List types and applications of NFC
3.3.3. Explain working principle of NFC
3.3.4. Describe modes of operation of NFC
3.4. Bluetooth
3.4.1. What is the purpose of Bluetooth?
3.4.2. List features, functions, applications of Bluetooth
3.4.3. Explain Bluetooth technology in detail
3.4.4. Describe Pico Net

4. Wireless Sensor Networks

4.1. What is Wireless Sensor Network and list its application
4.2. List and types of Sensor networks: Single Source Single Object Detection, Single Source Multiple Object Detection, Multiple Source Single Object Detection, Multiple Source MultipleObject Detection
4.3. What are the Challenges in Wireless Sensor Networks?
4.4. Explain node Behaviour in WSNs
4.5. Explain Information theoretic self-management in WSN
4.6. Applications of WSN
4.7. Explain Wireless Multimedia Sensor Networks (WMSN)
4.8. Explain Stationary Wireless Sensor Networks
4.9. Explain Mobile Wireless Sensor Networks
4.10. What is Machine to Machine Communications (M 2 M)
4.11. Lists applications, features of M2M
4.12. List and explain M2M sensor nodes
4.13. Explain Role of IOT in automation of the following applications
4.13.1. Health care applications
4.13.2. Smart Home,
4.13.3. Smart Cities,
4.13.4. Smart class rooms
4.13.5. Smart Energy
4.13.6. Smart Transportation and Mobility
4.13.7. Smart Factory

5. Cloud Computing

5.1. What is cloud computing, state its importance and Recent Trends in Computing
5.2. Evolution of cloud computing
5.3. Draw and explain NIST Visual Model of Cloud Computing
5.4. List features of Cloud computing
5.5. List and explain components of cloud computing
5.6. List and explain different service models in cloud computing
5.7. Compare different service models
5.8. List and explain different deployment models or types of clouds

5.9. Differentiate between private cloud and public cloud
5.10. Compare traditional data centre and Cloud storage
5.11. Describe how data is managed in cloud (DBaaS)
5.12. Explain security concepts in cloud
5.13. What is cloud simulator and List different types?

COURSE CONTENT

UNIT1: Introduction of IOT
INTRODUCTION to IOT – Definition – Applications – Technologies – Sensor features –Types –Actuator list – Components – Challenges Connectivity technologies - 6LoWPAN –Features – Addressing –RoutingRFID – features – working principle – Applications

UNIT2: DATA PROTOCOLS
MQTT – Definition – features – components – applications – MQTT – SMQTTCoAP-Definition – message types XMPP – features – core technologies – applications AMQP- Features-applications

UNIT3: Communication Technologies
IEEE 802.15.4 – features – variants – types ZIGBEE –features – components – technologies – types – applicationsNFC – types –modes – applications Bluetooth - purpose –features - Technologies- applications

UNIT4: Wireless Sensor Networks

Wireless Sensor Networks- Applications -Types-Challenges-node behaviour-Information theoreticself-management-Applications-WMSN-. Stationary Wireless Sensor Networks-Mobile Wireless Sensor Networks-M 2 M-applications - features-sensor nodes- Role of IOT in automation of applications - Health care -Smart Home-SmartCities

UNIT5: Cloud Computing

Cloud Computing-Evolution-NIST Visual Model-features -components - service models-Compare different service models-deployment models - Differentiate between private cloud - Compare traditional data centre and Cloud storage-DBaaS -security concepts - cloud simulators- applications

REFERENCE BOOKS

1) https://onlinecourses-archive.nptel.ac.in/
2) Vijay Madisetti, ArshdeepBahga, “Internet of Things: A Hands-On Approach”, OrientBlackswanPvt., Ltd., New Delhi, 2015.
3) WaltenegusDargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theoryand Practice", A John Wiley and Sons, Ltd., Publication, 2010.
4) Jeeva Jose, “Internet of Things”, (ISBN: 978-93-86173-591) KBP House,1st edition,2018.
5) Interconnecting Smart Objects with IP: The Next Internet, Jean-

Philippe Vasseur, AdamDunkels, Morgan Kuffmann

6) Designing the Internet of Things , Adrian McEwen (Author), Hakim Cassimally

7) Internet of Things: Converging Technologies for Smart Environments and IntegratedEcosystems, Dr.OvidiuVermesan, Dr. Peter Friess, River Publishers

8) Internet of Things (A Hands-on-Approach) , Vijay Madisetti , ArshdeepBahga

9) 6LoWPAN: The Wireless Embedded Internet, Zach Shelby, Carsten Bormann, Wiley

10) Building the internet of things with ipv6 and mipv6, The Evolving World of M2MCommunications, Daniel Minoli John Wiley & Sons

11) Recent research/white papers

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 5.13

Data Science and Machine Learning Lab

Course Code	Course title	No of periods /week	Total no of periods	Marks for FA	Marks for SA
CAI-506	**Data Science and Machine Learning Lab**	**03**	45	40	60

S No	Chapter/ Unit Title	No. of Periods	COs Mapped
1.	Recalling of Python /Java programming environment	6	CO1
2.	Implementation of various Supervisory Learning programs using Python/java	15	CO1, CO2, CO5
3.	Implementation of various Un-Supervisory Learning programs using Python/java	15	CO1, CO3, CO5
4	Implementation of Instance based Learning programs using Python/java	9	CO1, CO4, CO5
	Total	45	

COURSE OBJECTIVES	**Upon On completion of the course the student shall be able to** The objective of this course is to impart necessary knowledge of the mathematical foundations needed for data science and develop programming skills required to build data science applications.

CO No		COURSE OUTCOMES
CO 1	CAI-506.1	Demonstrate understanding of the mathematical foundations needed for data science. Collect, explore, clean, munge and manipulate data
CO 2	CAI-506.2	Demonstrate Python/Java programs for the Supervisory machine learning algorithms.
CO 3	CAI-506.3	Demonstrate Python/Java programs for the Un-Supervisory machine Learning algorithms.
CO 4	CAI-506.4	Apply appropriate data sets to the Machine Learning algorithms.

Learning Outcomes:

Exp. No.	name of the experiment	Objectives	Key Competencies

LIST OF PRACTICALS

1. Installation of Python packages for data science and machine learning.
2. Write a program in Python to predict the class of the flower based on available attributes.
3. Write a program in Python to predict if a loan will get approved or not.
4. Write a program in Python to predict the traffic on a new mode of transport.
5. Write a program in Python to predict the class of user.
6. Write a program in Python to identify the tweets which are hate tweets and which arenot.
7. Write a program to implement a ID3 algorithm.

1	Installation of python packages	a)Study of packages cessary b)Installation of packages ing pip	c) identify the errors during the installation d) observe the installation completion
2	Exercise on classification of flower based on available attributes.	(e) Write a program for classification using KNN .	(d) Compile the program and rectify the errors. (e) Execute the program (f) Observe the output.
3	Exercise on finding whether a loan will get approved or not	(c) Write a program in python to impement prediction using logistic regression.	(d) Compile the program and rectify the errors. (e) Observe the output.
4	Exercise on prediction of traffic	(c) Write a program in python for predicting the traffic using KNN	(d) observe the errors (e) observe the output
			(e)
5	Exercise on predicting the class of user	Write a program in python To predict the class of user using decision trees	(f) observe the errors (g) observe the output
6	Exercise on classifying the tweets	(a) Write a program in python for classifying the tweets using naïve bayes algorithm	(e) Observe the errors (h) Observe the result

7	Exercise implementation ID3 algorithm	(a) Write a program in python for implementing ID3 algorithm	(d) Check the errors (f) Observe the output

IOT and Cloud Computing Lab

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
CAI-507	IOT and Cloud Computing Lab	03	45	40	60

S No	Chapter/ Unit Title	No. of Periods	COs Mapped
1.	Program to work with sensors.	20	CO1
2.	Design Android applications for IOT	15	CO1, CO2
3.	Working with cloud	10	CO1, CO3
	Total	45	

COURSE OBJECTIVES	Program to work with sensors. Design Android applications for IOT Working with cloud

Course Outcomes	CO1	CAI-507.1	Program to work with sensors.
	CO2	CAI-507.2	Design Android applications for IOT
	CO3	CAI-507.3	Working with cloud

Learning Outcomes:

1. Familiarization with Arduino/Raspberry Pi and perform necessary software installation.
2. To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.
3. To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
4. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.
5. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is

pressed.

6. To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.
7. Develop an android app to build an interface to send data to an Arduino board.
8. Develop an android app to receive temperature from Arduino board and alert the user when temperature reaches threshold value.
9. To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.
10. To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from smartphone using Bluetooth.
11. Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to thing speak cloud.
12. Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thing speak cloud.

Exp. No.	Name of the experiment	Objectives	Key Competencies
1	Installation of Arduino/Raspberry pi softwares	(c) Installation and interfacing of Arduino Boards.	a) identify the errors during theinstallation b) observe the installation completion
2	Exercise on interfacing LED buzzer to Arduino board	(f) Write a program in python to interface LED buzzer to Arduino board	a) Compile the program and rectifythe errors. b) Execute the program c) Observe whether LED is working according to input.
3	Exercise to interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi	write a program to turn ON LED when push button is pressed	a) Compile the program and rectifythe errors. b) Execute the program c) Observe whether LED is working according to input. d) Observe the output.
4	Exercise To interface DHT11 sensor with Arduino/Raspberry Pi	Write a program in python to print humidity temperature	a) Compile the program and rectifythe errors. b) Execute the program c) Observe whether temperature and humidity are

			correctly printed or not. d) Observe the output.
5	Exercise to interface motor using relay with Arduino/Raspberry Pi	Write a program in python to turn on motor using push button	(a) Compile the program and rectifythe errors. (b) Execute the program (c) Observe whether motor is working according to input. (d) Observe the output
6.	Exercise to interface OLED with Arduino/Raspberry Pi	Write a program to print temperature and humidity on OLED	a) Compile the program and rectifythe errors. b) Execute the program c) Observe whether OLED is displaying the temperature and humidity. d) Observe the output
7	Exercise to communicate android application with Arduino board	Write a program to develop android app using android studio to communicate data to Arduino board.	(a) Install the android app (b) Compile the program and rectifythe errors. (c) Execute the program (d) Observe the output
8	Exercise on communicating data from Arduino board to android app.	Write a program to develop android app using android studio to receive data from Arduino board.	(a) Install the android app (b) Compile the program and rectifythe errors. (c) Execute the program (d) Observe the output
9	Exercise on interfacing Bluetooth to Arduino board	Write a program to send sensor data to smart phone	(a) Compile the program and rectifythe errors. (b) Execute the program (c) Observe the output
10	Exercise on interfacing Bluetooth to Arduino board	write a program to turn LED ON/OFF when '1'/'0' is received from smartphone using Bluetooth.	a) Compile the program and rectifythe errors. b) Execute the program c) Observe the output
11	Exercise to upload data to thingspeak cloud	Write a program on raspberry pi to upload data to cloud.	(a) Compile the program and rectifythe errors. (b) Execute the program (c) Observe the output
12	Exercise on to retrieve temperature and humidity data from thing speak cloud	Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thing speak cloud	(a) Compile the program and rectifythe errors. (b) Execute the program (c) Observe the output

C23- CAI-508: Life Skills

Course Title : Life Skills	**Course code : C23- Common-508 (Common to all Branches)**
Year/ Semester : V/ VI Semester	**Total periods : 45**
Type of Course : Lab Practice	**Max Marks : 100 (Sessional 40 + External 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

Chapter. 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

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
CAI-509	**PROJECT WORK**	3	45	40	60

Course Objectives	i)To inculcate team spirit among students ii)To apply software life cycle models iii)To design, develop, test and deploy project

Course Outcomes	At the end of course student able to		
	CO1	CAI509.1	Identify the hardware, software problems and their feasibility
	CO2	CAI509.2	Prepare SRS document based on gathered and analysed requirements
	CO3	CAI509.3	Design the plan document based on SRS
	CO4	CAI509.4	Code and test the software based on the design document
	CO5	CAI509.5	Practice software maintenance skills and maintaining quality and reliability
	CO6	CAI509.6	Calculate software metrics like cost, loc, scheduling, manpower and other resources.

LEARNING OUTCOMES

1. Identify different works to be carried out in the Project
2. Collect data relevant to the project work
3. Carryout need survey and identify the problem(project)
4. Select the most efficient software life cycle from the available choices based on preliminary investigation
5. Estimate the cost of project, technological need, computer skills, materials and other equipment
6. 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
7. Prepare SRS document
8. Design the required elements of the project work as per standard models such as UML
9. Develop the working software modules required for the project work
10. Prepare critical activities at various stages of the project work
11. Test ,Debug, verify and validate the project
12. Record the results
13. Preparation of project report (and user manual if necessary) to enable the client to maintain the project

Key competencies (Guide lines)
THE PROJECT CAN BE CHOSEN FROM THE FOLLOWING DOMAINS:

1. SOFTWARE PROJECTS
    a. Web site designing
    b. Banking
    c. Income tax calculation package
    d. Examinations cell.
    e. Student database management
    f. Library management
    g. Stores Management
    h. Staff data management
    i. Payrolls
    j. Inventory Control

k. Hostel management
l. Tourism package
m. Institution management software
n. Anti-Virus software development.
o. Folder-locking.
p. Terminate stay resident systems.

2. ARTIFICIAL INTELLIGENCE PROJECTS
   a. E-commerce
   b. Chat bots
   c. Robotics
   d. Speech recognition
   e. Machine vision
   f. Gaming
   g. Healthcare
   h. Fitness Applications
   i. Home Automation or any relevant

3. MACHINE LEARNING PROJECTS

   a. Traffic Alerts
   b. Social Media
   c. Transportation
   d. Products Recommendations
   e. Dynamic Pricing
   f. Google Translate
   g. Online Video Streaming
   h. Fraud Detection
   i. Loan Prediction or any relevant

4. To develop above projects and deploy in cloud platform

5. To develop IOT based applications

6. To maintain the software products based on the ever changing needs of and quality measures required by the clients

Evaluation Scheme for the Project Work

S. No.	Tasks	Max. Marks Allotted for each task INTERNAL /EXTERNAL (40+60=100)
1.	Feasibility study of the problem	4/6
2.	Requirement Analysis of the problem, SRS document preparation	4/8
3.	Designing the problem	6/10
4.	Implementation	8/10
5.	Testing and verification	10 /16
6.	Project report preparation and presentation	8/10
	Total:	**40/60 (100)**

VI SEMESTER

DIPLOMA IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
SCHEME OF INSTRUCTIONS AND EXAMINATION
CURRICULUM-2023
(VI Semester)
CAI-601 Industrial Training

Course Code	Course title	No of periods/week	Duration	Marks for FA	Marks for SA
CAI-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 exhibiting the strength, teamwork spirit and self-confidence
5. Prepare product documents like user manual and installation guide and operational manuals.
6. Perform the activities of deploying product at customer site and training the end user.
7. 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.

Course Outcomes	At the end of course student able to:		
	CO1	**CAI601.1**	Apply knowledge and skill already learnt in the institution.
	CO2	**CAI601.2**	Acquire the required skills of analysis, design and development, testing, verification and validation, deployment and distribution of the product.
	CO3	**CAI601.3**	Involve in product design, development, quality testing and maintenance production by exhibiting the strength, teamwork spirit and self-confidence
	CO4	**CAI601.4**	Prepare product document, gain the skills in deploying product at customer site, training the end user, maintaining the system.

LEARNING OUTCOMES – SCHEME 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 at Nptel/ Swayam/ Moocs/course era/lectera/caltech/oxford/hackerrank/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 at Nptel/Swayam/Moocs/course era/lectera/caltech/oxford/hackerrank/ udemy… etc.,	i)Learning ii)Mini Application development iii)Report preparation iv)2 nd 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 at either of Nptel/ Swayam/ Moocs/course era / lectera / caltech / oxford / hackerrank / udemy for First Certificate Course

2. Next 3 Months/12 Weeks- Registration at either of Nptel/ Swayam/ Moocs/course era / lectera / caltech / oxford / hackerrank / udemy for Second Certificate Course.

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	Assessment of learning	120

			the Industry (After 20 weeks))	outcomes by both the faculty and training mentor of the industry	
			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 75%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 ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING 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 Cource.*

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.

DEPARTMENT OF TECHNICAL EDUCATION
NAME OF THE INSTITUTION
INDUSTRIAL TRAINING FIRST ASSESSMENT

PIN:

NAME OF THE STUDENT:

Name of the Industry:

Skill Set Sl.No	***SKILL SET***	***Max Marks Allotted For each parameter***	***Marks obtained***
1	Apply knowledge and skill already learnt in the institution.	50	
2	Acquire the required skills of analysis, design and development , testing, verification and validation.	40	
3	Acquire the required skills of deployment and distribution of the product.	30	
	Total	*120*	

(Marks in words:)

Signature of the Training In-charge (Mentor)
Name:
Designation:

Signature of the visiting staff (Guide)
Name:
Designation:

DEPARTMENT OF TECHNICAL EDUCATION
NAME OF THE INSTITUTION
INDUSTRIAL TRAINING SECOND ASSESSMENT

PIN:
NAME OF THE STUDENT:
Name of the Industry:

Skill Set Sl.No	***SKILL SET***	***Max Marks Allotted For each parameter***	***Marks obtained***
1	Apply knowledge and skill already learnt in the institution.	10	
2	Acquire the required skills of analysis, design and development, testing, verification and validation.	20	
3	Acquire the required skills of deployment and distribution of the product.	10	
4	Involve in product design, development, quality testing and maintenance production by exhibiting the strength, teamwork spirit and self-confidence	25	
5	Prepare product documents like user manual and installation guide and operational manuals.	15	
6	Perform the activities of deploying product at customer site and training the end user.	25	
7	Maintaining the system at user site (Post product services)	15	
		120	

(Marks in words:)
Signature of the Training In-charge (Mentor)
Name:
Designation:

Signature of the visiting staff (Guide)
Name:
Designation:

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