ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS

COMPUTER SCIENCE AND ENGINEERING

FOR

B.TECH FOUR YEAR DEGREE PROGRAMME

(Applicable for the batches admitted from 2020 - 2021)

AR - 20

ADITYA INSTITUTE OF TECHNOLGY AND MANAGEMENT

(AUTONOMOUS)

Approved by AICTE,

Recognized Under 2(f) & 12(b) of UGC,

Permanently Affiliated to JNTU Kakinada.

K.Kotturu, Tekkali, Srikakulam – 532201. Andhra Pradesh.

Vision of the Institute

To evolve into a premier engineering institute in the country by continuously enhancing the range of our competencies, expanding the gamut of our activities and extending the frontiers of our operations.

Mission of the Institute

Synergizing knowledge, technology and human resource, we impart the best quality education in Technology and Management. In the process, we make education more objective so that the efficiency for employability increases on a continued basis.

Vision of the Department

To become a pioneer in providing high quality education and research in the area of computer science and engineering.

Mission of the Department

M1: Enrich society and advance computer science and engineering by preparing graduates with the knowledge, ability, and skill to become innovators and leaders who are able to contribute for the aspirations of the country and society.

M2: Benefit humanity through research, creativity, problem solving, and application development.

M3: Share knowledge and expertise to benefit the country, the region, and beyond while inspiring people to engage in computing fields.

The **Programme Educational Objectives (PEOs)** for our Computer Science and Engineering program are to produce graduates who will:

PEO1. Be employed as a practicing engineer in fields such as design, development, testing and research or undertake higher studies.

PEO2. Engage in lifelong self-directed learning, a capacity that is vital for success in today's global and rapidly changing engineering environment.

PEO3. Create new methods / processes to meet the society needs with their knowledge.

PEO4. Conduct themselves as ethical and responsible professionals with good communication skills and demonstrate leadership skills

PROGRAM OUTCOMES (POs):

Engineering Graduates will be able to:

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/Development Of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct Investigations Of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and Team Work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-Long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs):

By the completion of Computer Science program the student will be able to:

PSO1. Apply mathematical foundations, algorithmic principles, and theoretical computer science in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.

PSO2. Demonstrate understanding of the principles and working of the hardware and software aspects of computer systems.

PSO3. Use knowledge in various domains to identify research gaps and hence to provide solution to new ideas and innovations

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K. Kotturu, Tekkali, Srikakulam-532201, Andhra Pradesh, India

Academic Regulations 2020 (AR20) for B. Tech

(Effective for the students admitted into I year from the Academic Year 2020-21 onwards)

1. Award of B.Tech. Degree:

A student will be declared eligible for the award of the B. Tech. Degree if he/she fulfills the following academic regulations.

Registered for **160** credits and he/she must secure total **160** credits.

Students, who fail to complete their four-year course of study within **8** years or fail to acquire the **160** Credits for the award of the degree within **8** academic years from the year of their admission, shall forfeit their seat in B. Tech course and their admission shall stand cancelled.

2. Courses of study:

The following courses of study are offered at present with specialization in the B.Tech Course.

S. No.	Branch Code-Abbreviation	Branch
01	01-CE	Civil Engineering
02	02-EEE	Electrical and Electronics Engineering
03	03-ME	Mechanical Engineering
04	04-ECE	Electronics and Communication Engineering
05	05-CSE	Computer Science and Engineering
06	12-IT	Information Technology
07	42-CSE (AI&ML)	CSE (Artificial Intelligence and Machine Learning)

And any other course as approved by the authorities of the University from time to time.

3. Credits (Semester system from I year onwards):

S. No	Course	Credits
1	Mandatory Course	0
2	Theory Course	3
3	Laboratory Course	1.5
4	Integrated Course	4.5
5	Interdisciplinary/Open Elective Course	3
6	Skill-Oriented/Skill-Advanced/Soft Skills Course	2
7	Internship	1.5/03
8	Project work	12

4. Interdisciplinary/Open Electives:

There is one interdisciplinary elective in III year II semester and one open elective in IV year I semester. The student can choose any one interdisciplinary elective/open elective courses offered in the respective semester. The pattern of Midterm examinations and End examinations of these courses is similar to regular theory courses and the valuation is purely internal.

5. MOOCs:

Explore all possibilities to run at least one subject in every semester from II year I semester onwards as a MOOCs.

6. NCC/NSS activities:

All undergraduate students shall register for NCC/NSS activities. A student will be required to participate in an activity for two hours in a week during II year I semester or II year II semester. Grade shall be awarded as Satisfactory or Unsatisfactory in the mark sheet on the basis of participation, attendance, performance and behavior. If a student gets an unsatisfactory Grade, he/she shall repeat the above activity in the subsequent years, in order to complete the degree requirements.

7. Evaluation Methodology:

The performance of a student in each semester shall be evaluated with a maximum of **100** marks for theory course, laboratory and other courses. The project work shall be evaluated for **200** marks.

7.1 Mandatory Courses:

Mandatory course is one among the compulsory courses and does not carry any Credits. The list of mandatory courses is shown below:

- Induction Program
- Constitution of India
- Environmental Science
- Human Values

No marks or letter grade shall be allotted for all mandatory non-credit courses.

7.2 Theory course (100 marks):

For theory course, the distribution shall be **40** marks for internal midterm evaluation and **60** marks for the External End Examinations. Out of **40** internal midterm marks, **25** marks are allotted for descriptive exam, **10** marks for two assignments (**5** marks for each assignment) or one case study (group-wise), and **5** marks for objective test.

7.2.1 Pattern for Internal Midterm Examinations (25 marks):

For theory courses of each semester, there shall be **2** Midterm exams. Each descriptive exam is to be held for **30** marks and will be scaled down to **25** marks, with the duration of **90** minutes.

For final calculation of internal marks, weightage of **70%** will be given to the student who performed well either in first Midterm or second Midterm and **30%** weightage will be given to other Midterm examination.

Midterm paper contains three descriptive type questions with internal choice. Each question carries **10** marks (3×10=30M). The first Midterm examination will be conducted usually after 8 weeks of instruction or after completion of 50% syllabus (i.e. first 3 Units), and the second Midterm examination will be conducted usually at the end of instruction after completion of remaining 50% syllabus (i.e. remaining 3 Units).

7.2.2 Objective test (5 marks):

For theory courses of each semester, there shall be **2** Objective tests to be conducted along with Midterm exam. Each Objective test is to be held for **10** marks with the duration of **10** minutes and will be scaled down to **5** marks.

For final calculation of objective test marks, weightage of **70%** will be given to the student who performed well either in first objective test or second objective test and **30%** weightage will be given to other objective test.

7.2.3 Pattern for External End Examinations (60 marks):

The question paper shall have descriptive type questions for **60** marks. There shall be one question from each unit with internal choice. Each question carries **10** marks. Each course shall consist of six units of syllabus. The student should answer total **6** questions. (6X10M=60M)

7.3 Laboratory Course (100 marks):

For laboratory course, there shall be continuous evaluation during the semester for **40** internal marks and **60** semester end examination marks. Out of the **40** marks for internal, **25** marks for day–to–day evaluation, **5** marks for record and **10** marks to be awarded for internal laboratory written test. The end examination shall be conducted by the teacher concerned and external examiner from outside the college.

For the course Engineering Graphics and Design, the distribution shall be **40** marks for internal evaluation (**20** marks for day–to–day evaluation, and **20** marks for internal tests) and **60** marks for end examination.

For the award of marks for internal tests, weightage of **70%** will be given to the student who performed well either in first test or second test and **30%** weightage will be given to other test.

7.4 Integrated Course (100 marks):

Integrated courses are exclusively designed to provide a unique learning experience of layered learning where students have a chance to practice while learning. These courses are designed by blending both theory and laboratory components one over the other.

Assessment for **100** marks as given below:

Category	Marks	Assessment
Internal	20	Internal assessment of Laboratory carried out for 40 marks will be scaled down to 20 marks.
	20	Internal assessment of Theory carried out for 40 marks will be scaled down to 20 marks.
End examination	40	End examination of Laboratory carried out for 60 marks will be scaled down to 40 marks.
	20	End examination of Theory carried out for 60 marks will be scaled down to 20 marks.

For Integrated courses, the evaluation of Theory and Laboratory are carried out separately as per evaluation method given in 7.2 and 7.3.

A candidate shall be declared to have passed in integrated course if he/she secures a minimum of **40%** aggregate marks i.e. **40** out of **100** (Internal & Semester-end examination marks put together), subject to a minimum of **35%** marks i.e. **21** marks out of **60** in semester-end examination; in addition to that he/she has to secure minimum of **14** marks (out of **40**) in Laboratory end examination and minimum of **7** marks (out of **20**) in Theory end examination.

7.5 Skill Oriented/Skill Advanced Course (100 marks):

Out of a total of **100** marks for the Skill-Oriented/Skill-Advanced Course, **40** marks shall be for the internal evaluation and **60** marks for semester-end examination.

The internal evaluation shall be made on the basis of seminar given by each student on the topic of his/her Skill-Oriented/Skill-Advanced Course, which was evaluated by internal committee constituted by HOD.

The semester-end examination (Viva-Voce) shall be conducted by the committee, consists of an External examiner, Head of the department and Internal supervisor of the Skill-Oriented/Skill-Advanced Course.

7.6 Soft Skills (100 marks):

Soft skills shall be evaluated for **100** marks: **40** marks for day-to-day evaluation and **60** marks on the basis of end examination and the valuation is purely internal.

7.7 Internship (100 marks):

All the students shall undergo internship for a period minimum of **6** weeks after II year II Semester and III year II Semester. Students have an option of choosing their own industry related to their respective branches.

Self study report for the internship of II year II Semester shall be submitted and evaluated during the III year I Semester and Self study report for the internship of III year II Semester shall be submitted and evaluated during the IV year I Semester.

The Self study report will be evaluated for a total of **100** marks consisting of **40** marks for internal assessment and **60** marks for semester-end examination.

Internal assessment for **40** marks shall be done by the internship supervisor in the industry.

The semester-end examination (Viva-Voce) shall be conducted by the committee, consisting of an External examiner, Head of the department and Internal supervisor of the Internship.

7.8 Project (200 marks):

Out of a total of 200 marks for the Project, **80** marks shall be for Project Internal Evaluation and **120** marks for the semester-end Examination.

The Internal Evaluation shall be made on the basis of two seminars given by each student on the topic of his project which was evaluated by an internal committee. Out of **80** internal marks: **20** marks allotted for literature survey, **30** marks for results and analysis, **15** marks for first seminar (usually after 8 weeks) and **15** marks for second seminar (at the end of the semester).

The semester-end examination (Viva – Voce) shall be conducted by the committee, consisting of an External examiner, Head of the Department and Supervisor of the Project. The evaluation of project shall be made at the end of IV year.

7.9 Honors/Minor Programme:

Students of a Department/Discipline are eligible to opt for Honors Programme offered by the same Department/Discipline.

Students who are desirous of pursing their special interest areas other than the chosen discipline of Engineering may opt for additional courses in Minor specialization groups offered by a department other than their parent department. Student can also opt for Industry-relevant tracks of any branch to obtain the Minor.

A Student shall be permitted to register for Honors/Minor program at the beginning of II year II semester provided that the student must have acquired a minimum of 8.0 CGPA upto the end of II year I semester without any backlogs. In case of the declaration of the semester results after the commencement of the II year II semester and if a student fails to score the required minimum of 8.0 CGPA, his/her registration for Honors/Minor program stands cancelled and he/she shall continue with the regular programme.

A CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog in order to keep the Honors/Minors registration active.

In addition to fulfilling all the requisites of a regular B.Tech Programme, a student shall earn 20 additional credits to be eligible for the award for B.Tech (Honors/Minor) program.

20 additional credits acquired are excluded from CGPA requirement for the award of B.Tech degree and CGPA requirement for the degree with Honors/Minor.

Of the 20 additional credits to be acquired, 16 credits shall be earned by undergoing specified courses listed as pool, with four courses, and each carrying 4 credits. The remaining 4 credits must be acquired through two MOOC courses, which shall be domain specific, each with a minimum duration of 8 weeks as recommended by the Board of Studies. If no grade is given to any MOOCS course by the evaluator, then grade will be decided by the Department committee and ratified by Board of Studies and Academic Council.

The Committee constituted by the Principal will decide on the minimum enrolments for offering Honors/Minor program. If the minimum enrolment criterion is not met, then the students will be permitted to register for the equivalent MOOC courses as approved by the concerned Board of Studies.

A student shall be permitted to choose only courses as a part of Honors/Minor degree program that he/she has not studied in any form during the regular B.Tech program.

If a student drops or is terminated from the Honors/Minor program, the additional credits so far earned cannot be converted into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate.).

In case a student fails to meet the CGPA requirement for Degree with Honors/Minor at any point of registration, he/she will be dropped from the list of students eligible for Degree with Honors/Minor and they will receive regular B.Tech degree only. However, such students will receive a separate grade sheet with a mention of the additional courses completed by them.

Honors/Minor must be completed simultaneously with a major degree program. A student cannot earn Honors/Minor after he/she has already earned bachelor's degree.

8. Attendance Requirements:

A student shall be eligible to appear for the semester-end examinations, if he/she acquires a minimum of **75%** of attendance in aggregate of all the subjects.

Condonation of shortage of attendance in aggregate up to **10%** (**65%** and above and below **75%**) in each semester with genuine reasons shall be approved by a committee duly appointed by the college. The condonation approved otherwise can be reviewed by the College Academic Committee.

A Student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester. He/she may seek re-admission for that semester when offered next.

Shortage of Attendance below **65%** in aggregate shall in NO case be condoned. Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled. A fee stipulated by the college shall be payable towards condonation of shortage of attendance.

9. Minimum Academic Requirements:

9.1 Conditions for pass and award of credits for a course:

A candidate shall be declared to have passed in individual course if he/she secures a minimum of **40%** aggregate marks i.e. **40** out of **100** (internal & semester-end examination marks put together), subject to a minimum of **35%** marks i.e. **21** marks out of **60** in semester-end examination.

On passing a course of a programme, the student shall earn assigned credits in that Course.

9.2 Method of Awarding Letter Grades and Grade Points for a Course:

A letter grade and grade points will be awarded to a student in each course based on his/her performance as per the grading system given below.

Table: Grading System for B.Tech. Programme

Percentage	Level	Letter Grade	Grade Points
>= 90%	Outstanding	A+	10
80 – 89%	Excellent	A	9
70 – 79%	Very Good	B	8
60 – 69%	Good	C	7
50 – 59%	Fair	D	6
40 – 49%	Satisfactory	E	5
< 40%	Fail	F	0
-	Absent	Ab	0

9.3 Calculation of Semester Grade Points Average (SGPA) for semester:

The performance of each student at the end of the each semester is indicated in terms of SGPA.

The SGPA is calculated as below:

$$\text{SGPA} = \frac{\Sigma(\text{CR} \times \text{GP})}{\Sigma\text{CR}} \quad \text{(for all courses passed in a semester)}$$

Where CR = Credits of a Course
GP = Grade points awarded for a course

9.4 Calculation of Cumulative Grade Points Average (CGPA) and Award of Division for entire programme:

The CGPA is calculated as below:

$$\text{CGPA} = \frac{\Sigma(\text{CR} \times \text{GP})}{\Sigma\text{CR}} \quad \text{(for the entire programme)}$$

Where CR = Credits of a course
GP = Grade points awarded for a course

- Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.
- As per the AICTE regulations, conversion of CGPA into equivalent percentage as follows:
  Equivalent Percentage = (CGPA – 0.50) x 10

9.5 Award of Divisions:

Class Awarded	CGPA Secured
First Class with distinction	≥ 7.5
First Class	≥ 6.5 and < 7.5
Second Class	≥ 5.5 and <6.5
Pass Class	≥ 5.0 and <5.5

9.6 Supplementary Examinations:

Supplementary examinations will be conducted in every semester.

9.7 Conditions for Promotion:

(i) A student will be promoted to second year if he/she satisfies the minimum attendance requirement.

(ii) A student shall be promoted from II to III year only if he fulfills the academic requirement of total **50%** credits (if the number of credits is in fraction, it will be rounded off to a lower digit) from regular and supplementary examinations of I year and II year examinations, irrespective of whether the candidate takes the examination or not.

(iii) A student shall be promoted from III year to IV year only if he fulfills the academic requirements of total **50%** credits (if number of credits is in fraction, it will be rounded off to lower digit) from regular and supplementary examinations of I Year, II Year and III Year examinations, irrespective of whether the candidate takes the examinations or not.

10. Course pattern:

(i) The entire course of study is of four academic years and each year will have TWO Semesters (Total EIGHT Semesters).

(ii) A student is eligible to appear for the end examination in a subject, but when absent for it or failed in the end examinations he/she may appear for that subject's supplementary examinations, when offered.

(iii) When a student is detained due to lack of credits / shortage of attendance, he may be re-admitted when the semester is offered after fulfillment of academic regulations. Whereas the academic regulations hold well with the regulations he/she first admitted.

11. Minimum Instruction Days:

The minimum instruction days for each semester shall be **90**.

12. **There shall be no branch transfer after the completion of admission process**.

13. **General:**

(i) Wherever the words "he," "him," "his," occur in the regulations, they include "she," "her," "hers" as well.

(ii) The academic regulation should be read as a whole for the purpose of any interpretation.

(iii) In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the principal is final.

(iv) The college may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.

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Academic Regulations 2020 (AR20) for B. Tech (Lateral Entry Scheme)
(Effective for the students admitted into II year from the Academic Year 2021-22 onwards)

1. Award of B. Tech. Degree:

A student will be declared eligible for the award of the B. Tech. Degree if he/she fulfills the following academic regulations.

Registered for **121** credits and he/she must secure total **121** credits.

Students, who fail to complete their three-year course of study within **6** years or fail to acquire **121** Credits for the award of the degree within **6** academic years from the year of their admission shall forfeit their seat in B. Tech course and their admission shall stand cancelled.

2. Promotion Rule:

A lateral entry student will be promoted from II year to III year if he satisfies the minimum required attendance in II year.

A student shall be promoted from III year to IV year only if he fulfills the academic requirements of total **50%** of credits (if the number of credits is in fraction, it will be rounded off to lower digit) from the II Year and III Year examinations, irrespective of whether the candidate takes the examinations or not.

3. All other regulations as applicable for B. Tech. four- year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme)

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DISCIPLINARY ACTION FOR MALPRACTICES / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	Punishment
1	If the student possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the student which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
	If the student gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phone with any student or students in or outside the exam hall with respect to any matter	Expulsion from the examination hall and cancellation of the performance in that subject only. In case of an outsider, he will be handed over to the police and a case is registered against him.
2	If the student has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the student is appearing	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year.
3	If the student impersonates any other student in connection with the examination	The student who has impersonated shall be expelled from examination hall. The student is also debarred and forfeits the seat. The performance of the original student, who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all semester-end examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of the seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4	If the student smuggles the answer book or additional sheet or takes out or arranges to send out the question paper or answer book or additional sheet during or after the examination	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all semester-end examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of the seat.
5	If the student uses objectionable, abusive or offensive language in the answer script or in letters to the examiners or writes to the examiner requesting him to award pass marks	Cancellation of the performance in that subject.
6	If the student refuses to obey the orders of the Chief Superintendent/Assistant -Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walkout or instigates others to walk out or threatens the officer-in charge or any person on duty in or outside the examination hall or causes any injury to any of his relatives either by words spoken or written or by signs or by visible representation, assaults the officer-in-charge or any person on duty in or outside the examination hall or any of his relatives, or indulges in any other act of misconduct or mischief which results in damage or destruction of property in the examination hall or any part of the	In case of students of the college, they shall be expelled from examination hall and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

	college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination	
7	If the student leaves the exam hall taking away answer script or intentionally tears off the script or any part thereof inside or outside the examination hall	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of the seat.
8	If the student possesses any lethal weapon or firearm in the examination hall	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat.
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clauses 6, 7, 8	In case of student of the college, expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to police and. a police case will be registered against them.
10	If the student comes in a drunken condition to the examination hall	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny	Cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work of that semester/year examinations.

ADITYA INSTITUTE OF TECHNOLOGY & MANAGEMENT, TEKKALI – 532201
(An Autonomous Institution)
B.Tech COURSE STRUCTURE (AR – 20)
Department of CSE

I YEAR I SEMESTER						
Category	**Code**	**Theory/Lab**	**L**	**T**	**P**	**C**
MC	20MCT101	Induction Program	3 weeks			0
HSSC	20HST101	English	3	0	0	3
BSC	20BST101	Linear Algebra and Calculus	2	1	0	3
BSC	20BST107	Chemistry	3	0	0	3
ESC	**20ESI102**	Programming for problem solving	3	0	3	4.5
ESC	20ESL103	Engineering Graphics & Design	1	0	4	3
HSSC	20HSL101	Language Proficiency Lab	0	0	3	1.5
BSC	20BSL102	Chemistry Lab	0	0	3	1.5
Total			**12**	**1**	**13**	**19.5**

I YEAR II SEMESTER						
Category	**Code**	**Theory/Lab**	**L**	**T**	**P**	**C**
MC	20MCT103	Constitution of India	2	0	0	0
BSC	20BST102	Differential Equations	2	1	0	3
BSC	20BST105	Applied Physics	3	0	0	3
PC	20CST101	Data Structures and Algorithms	3	0	0	3
ESC	20EST101	Basic Electrical Engineering	3	0	0	3
ESC	20ESL104	IT Workshop	1	0	4	3
BSC	20BSL101	Physics Lab	0	0	3	1.5
ESC	20ESL101	Basic Electrical Engineering Lab	0	0	3	1.5
PC	20CSL101	Data Structures and Algorithms Lab	0	0	3	1.5
Total			**14**	**1**	**13**	**19.5**

Category	**Subjects (T/L)**	**Credits**
Mandatory Courses	2/0	0
Humanities and Social Science Courses	1/1	4.5
Basic Science Courses	4/2	15
Engineering Science Courses	2/4	15
Professional Core Course	1/1	4.5
Total	**10/8**	**39**

II YEAR I SEMESTER						
Category	**Code**	**Theory/Lab**	**L**	**T**	**P**	**C**
MC	20MCT202	Environmental Science	2	0	0	0
ESC	**20ESI204**	Python Programming	3	0	3	4.5
ESC	20EST205	Digital Logic Design	3	0	0	3
PC	20CST202	Discrete Mathematics	2	1	0	3
PC	20CST203	Computer Organization & Architecture	3	0	0	3
PC	20CST204	Object Oriented Programming	3	0	0	3
ESC	20ESL205	Digital Logic Design Lab	0	0	3	1.5
PC	20CSL202	Object Oriented Programming through Java Lab	0	0	3	1.5
SC	20CSS201	Skill Oriented Course – I	1	0	2	2
Total			**17**	**1**	**11**	**21.5**

II YEAR II SEMESTER						
Category	**Code**	**Theory/Lab**	**L**	**T**	**P**	**C**
MC	20MCS204	NCC/NSS	2	0	0	0
MC	20MCT205	Human Values	2	0	0	0
BSC	20BST204	Probability & Statistics with R	3	0	0	3
PC	20CST205	Design and Analysis of Algorithms	2	1	0	3
PC	20CST206	Database Management Systems	3	0	0	3
PC	20CST207	Operating Systems	3	0	0	3
OE	20IET21X	Interdisciplinary Elective – I	3	0	0	3
BSC	20BSL203	Probability & Statistics with R Programming Lab	0	0	3	1.5
PC	20CSL203	Database Management Systems Lab	0	0	3	1.5
PC	20CSL204	Operating Systems Lab	0	0	3	1.5
SC	20CSS202	Skill Oriented Course – II	1	0	2	2
Total			**19**	**1**	**11**	**21.5**
Honors/Minor Courses: Artificial Intelligence & Machine Learning						
HM	20AIT201	Computational Statistics and Data Analysis	4	0	0	4
Internship (6 weeks) (Mandatory) during summer vacation						

Subject Code	Offered by Dept.	Interdisciplinary Elective – I	Offered for Dept.
20IET211	BS&H	Transform Theory	MECH/CIVIL
20IET212	BS&H	Numerical Methods	ECE/EEE
20IET213	BS&H	Introduction to Number Theory	CSE/IT
20IET214	CIVIL	Elements of building planning	MECH
20IET215	CIVIL	Remote Sensing	ECE/EEE/CSE/IT
20IET216	EEE	Mathematical Simulation and Modeling	ECE/MECH/CIVIL/CSE/IT
20IET217	MECH	Fundamentals of Material Science	ECE/EEE/CIVIL/CSE/IT
20IET218	ECE	Introduction to Electronic Measurements	EEE/MECH/CIVIL/CSE/IT
20IET219	**CSE**	UNIX Utilities	ECE/EEE/MECH/CIVIL
20IET21A	IT	Fundamentals Data Structures	ECE/EEE/MECH/CIVIL
20IET21B	TPC	Advanced Coding – I	CSE/IT
20IET21C	TPC	Competitive Programming – I	ECE/EEE/MECH/CIVIL

English
(Common to all Branches)

Subject Code: 20HST101

L	T	P	C
3	0	0	3

Course Objectives

- To enable students build vocabulary appropriate to their levels and to make students understand printed texts of different genres
- To enhance basic writing skills of the students in different forms of written communication
- To assist students implicitly synthesize the rules of grammar for the production of accurate sentences
- To help students learn rules of using punctuation marks and prepositions appropriately in writing
- To aid students acquire appropriate and adequate letter writing skills
- To get students develop reading skills and enhance their essay writing skills

Course Outcomes

1. Students will be able to comprehend printed texts of different genres more easily and they will be able to make appropriate word choice.
2. Students will be able to write short texts masterly.
3. Students will be able to construct grammatically correct sentences.
4. Students will be able to use punctuation marks and prepositions correctly in speech and writing.
5. Students will be able to communicate through letters and emails effectively.
6. Students will be able to comprehend unfamiliar passages, and will be able to write *essays.*

Unit – I *Father's Help* by R K Narayan
Synonyms and Antonyms — One-word substitutes

Unit – II *My Early Days* by A P J Abdul Kalam
Tense— Voice — *If* clauses

Unit – III *The Road Not Taken* by Robert Frost
Reported Speech—Degrees of Comparison — Simple, Compound, Complex Sentences

Unit – IV *Politics and the English Language* by George Orwell
Punctuation —Prepositions

Unit–V *Mother's Day* by J. B. Priestly
Letter Writing — E-mail Writing

Unit – VI *Chipko Movement*
Reading Comprehension—Essay Writing

Text Books

1. *On Writing Well.* William Zinsser. Harper Resource Book. 2001
2. *Practical English Usage*. Michael Swan. Oxford University Press. 1995.
3. *Study Writing.* Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
4. *Hugging the Trees: The Story of the Chipko Movement*. Thomas Weber. Viking Publishers, New Delhi, 1988.

Linear Algebra and Calculus
(Common to all Branches)

Subject Code : 20BST101

L	T	P	C
2	1	0	3

Course Objectives:

- Understand the process of calculation of rank, solution of System of Linear Homogeneous and Non Homogeneous equations by Gauss Elimination method.
- Learn the process of calculating the Eigen values, Eigenvectors and Quadratic Forms.
- Understand the concepts of multiple integrals and their usage.
- Learn the properties of Gamma and Beta Functions, their relation and evaluation of improper integrals.
- Understand the concepts of gradient, divergence, curl of scalar and vector point functions.
- Understand and calculate Line Integral, Surface Integral, Volume Integral, concepts of Green's, Stokes and Gauss Divergence theorems in converting one integral form to another

Course Outcomes:

The student will be able to:

1. Calculate the rank and solve linear homogeneous and non homogeneous equations by Gauss Elimination method.
2. Calculate eigen values, eigen vectors and estimate the nature of the matrix..
3. Evaluate multiple integral in both Cartesian and polar coordinates.
4. Apply Beta and Gamma functions to solve improper integrals.
5. Calculate gradient, divergence, curl of a scalar and vector point functions and derive vector identities.
6. Solve a Line Integral, Surface Integral, Volume Integral, apply Green's, Stokes and Gauss Divergence theorems in converting one integral form to another.

Unit – I

Linear System of Equations: *Matrices – Rank- echelon form – Normal form – System of Linear Homogeneous and Non Homogeneous equations – Gauss Elimination method- Applications- Matrix representation for a Graph- Current in an electrical circuit.* (8 hrs)

Unit – II

Eigen Values, Eigen Vectors, Quadratic Forms: *Eigen values – Eigenvectors – Properties (an over view)- Diagonalization- Quadratic Forms- Reduction of Quadratic Forms to Canonical Form- Rank-Nature-Index-Signature.* (8 hrs)

Unit – III

Multiple Integrals: *Double integral (Cartesian and polar form) -Change of order of integration - Change of variables (Cartesian to polar)- Triple integrals – Change of variables (Cartesian to spherical/cylindrical).* (8 hrs)

Unit – IV

Special functions: *Gamma and Beta Functions – Properties - Relation between Beta and Gamma functions-Evaluation of improper integrals.* (8 hrs)

Unit – V

Vector Differential Calculus: Scalar and Vector point functions- Vector differentiation - Directional derivatives – Gradient, Curl and Divergence- Vector identities. (8 hrs)

Unit – VI

Vector Integral Calculus: Vector Integration –Line Integral, Surface Integral, Volume Integral – Green Theorem, Stokes Theorem and Gauss Divergence theorem (without proofs with simple illustrations only). (8 hrs)

Text Books

1. B.V. Ramana, Higher Engineering Mathematics, 44th Edition, Tata McGraw Hill New Delhi, 2014.
2. Dr.B.S.Grewal, Higher Engineering Mathematics, 43nd Edition, Khanna Publishers, 2015.

Reference Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. **G.B. Thomas and R.L. Finney**, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. **Veerarajan T**., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. **D. Poole**, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
5. **N.P. Bali and Manish Goyal**, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

Chemistry
(Common to all Branches)

Subject Code : 20BST107

L	T	P	C
3	0	0	3

Course Objectives:

The students will become familiar and understand about:

- Rationalise the importance of water for society and industrial needs.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
- To become familiar in moulding methods of preparation of different types of plastic materials
- Rationalise organic reactions such as addition, substitution, elimination, rearrangement reactions.
- Rationalise reference electrodes and science of corrosion.
- Distinguish Renewable & Non-Renewable energy resources and rationalise about green chemistry, batteries.

Course Outcomes:

The course will enable the student to:

1. Rationalise the importance of water for society and industrial needs.
2. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
3. Differentiate different moulding techniques of plastic materials
4. Rationalise organic reactions such as addition, substitution, elimination, rearrangement reactions.
5. Rationalise the science of corrosion.
6. Distinguish Renewable & Non-Renewable energy resources and rationalise about green chemistry, batteries.

Unit – I

Water Technology Hardness of Water – Temporary and Permanent Hardness - Units of Hardness - Estimation of Hardness by EDTA Method - Problems on Temporary and Permanent Hardness - Disadvantages of Hard Water – Softening Methods of Hard Water- Zeolite or Permutit Process - Ion Exchange Process - Methods of Treatment of Water for Domestic Purposes – Sedimentation, Coagulation, Filtration, Disinfection - Sterilization, Chlorination, Break Point chlorination, Ozonisation. ***(9 lectures)***

Unit – II

Spectroscopy Spectroscopy - Electronic Spectroscopy - Types of Electronic Transitions - Definition of Chromophore – Definition of Auxochrome – Absorption and Intensity Shifts - Introduction to I.R. Spectroscopy – Fingerprint Region – Introduction to NMR – Principle - Equivalent and Non-Equivalent Protons - Chemical Shift- Splitting – Coupling Constant. ***(8 lectures)***

Unit – III

Polymers and Plastics Definitions of Polymer, Polymerization – Functionality – Degree of polymerization - Types of Polymerization (Addition and Condensation Polymerizations) - Plastics – Definition, Thermoplastics, Thermosetting Plastics – Compounding of Plastics – Moulding of

Plastics into Articles (Compression, Injection, Transfer and Extrusion Moulding Methods) - Preparation, Properties and Engineering Uses of PVC and Bakelite. ***(7 lectures)***

Unit – IV

Organic Reactions Types of Organic reactions: Addition - Electrophilic, Nucleophilic and Free radical - Substitution - Electrophilic, Nucleophilic (SN^1 and SN^2) and Free radical – Elimination (E_1 and E_2) – Rearrangement Reactions (Claisen, Pinacol Pinacolone Rearrangement). ***(7 lectures)***

Unit – V

Corrosion and Its Control Definition of Corrosion – Theories of Corrosion (Chemical & Electrochemical) – Mechanism of Electrochemical Corrosion (Oxygen Absorption Type and Hydrogen Evolution Type) - Galvanic Series - Factors Influencing Corrosion – Corrosion Control Methods - Proper Designing, Modifying the Environment, Cathodic Protections – Sacrificial Anodic Protection and Impressed Current Cathodic Protection. Metallic (Anodic and Cathodic) Coatings – Methods of application on metals (Galvanizing and Tinning). ***(9 lectures)***

Unit – VI

Green Chemistry & Energy Introduction to green chemistry – Definition and 12 principles of green chemistry. Types of energy sources – Renewable & Non-Renewable - Introduction to solar energy – harnessing of solar energy – photo voltaic cells – Concentrated Solar power plants.
Introduction of Energy storage devices: Principle& mechanism of Batteries & Supercapacitors, Types of Batteries (Alkaline & Lead-Acid) - Difference between Batteries and Supercapacitors. ***(8 lectures)***

Text Books

1. University chemistry, by B. H. Mahan
2. Elementary organic spectroscopy: principles and applications, by Y. R. Sharma
3. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
4. "Engineering Chemistry", P. C. Jain and Monica Jain, Dhanpat Rai Publications, Co., New Delhi, 2004, 16th Edition

Reference books:

1. Fundamentals of Molecular Spectroscopy, by C. N. Banwell
2. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
3. Physical Chemistry, by P. W. Atkins
4. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition.
5. Concise Inorganic Chemistry: Fifth Edition by J.D. Lee

Programming for Problem Solving
(Common to all Branches)

Subject Code : 20ESI102

L	T	P	C
3	0	3	4.5

Course Objective

The course is designed to provide complete knowledge of C language. Students will be able to develop logics which will help them to create programs, applications in C. Also by learning the basic programming constructs they can easily switch over to any other language in future.

Course Outcomes

1. Understand the fundamentals of C programming
2. Choose the loops and decision making statements to solve the problem
3. Make use of pointers to access arrays, strings and implements different operations on arrays, and work with textual information, characters and strings.
4. Apply programming to write modular programs, user defined functions to solve real time problems and allocate memory using dynamic memory management functions.
5. Create user defined data types including structures and unions to solve problems.
6. Implement files operations in C programming for a given application and able to handle errors during program execution.

Unit – I

Introduction to Programming: Introduction to components of Computer system, Algorithm, Flow chart, Program development steps, C Tokens, Operator precedence, Structure of C program, Basic I/O statements.

Exercise Questions: 1

Ex 1: Write the C programs to calculate the following

a) Area of triangle when sides are given.
b) Program for Type Casting.
c) Interchanging values of two variables.

Ex 2: Write the C programs to perform the following

a) Read lower case character and convert into upper case.
b) Find maximum of 3 values using conditional operator.
c) Calculate area and perimeter of circle.

Unit – II

Control Structures: Decision statements: if, if-else, nested if and switch, **Iterative statements:** for, while, do while and nested loops **Branching:** Break, continue, goto.

Exercise Questions: 2

Ex 3: Write C programs for the following using decision making statements

a) Program to find roots of quadratic equation.
b) Find the Largest among 3 values.
c) Calculate the grades of a student.

Ex 4: Write C programs for the following using Iterative Statements

a) Arithmetical operations using switch-case.

b) Read a number and display in reverse.
c) Check for Armstrong number property

Ex 5:

a) Generate Fibonacci series.
b) Generate Prime numbers between two numbers.
c) Write a program in C to display the pattern like right angle triangle using an asterisk

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Unit – III

Arrays: Definition, Types: 1D, Multi Dimensional arrays, declaration, initialization, accessing elements, Matrix operations and String Handling.
Pointers: Definition, Declaration, Initialization, Pointer arithmetic, Pointer to pointer, arrays and pointers, Dynamic memory allocation

Exercise Questions: 3

Ex 6: Implement the following using arrays

a) Largest and smallest from a list of elements.
b) Program for Linear Search.
c) Program for Bubble Sort.

Ex 7: Implement the following using arrays

a) Matrix addition.
b) Matrix Multiplication.
c) Program using string handling functions

Ex 8: Implement the following using DMA Functions

a) Find the sum and average of list of elements using DMA Functions
b) Implementation of call by reference and call by valve.

Ex 9:

a) Implement C Program using any numerical methods

Unit – IV

Functions: Definitions, Declaration, Types of Functions, Parameter passing, Passing Arrays to functions, Recursion, library functions, functions and pointers, and Storage classes,

Exercise Questions: 4

Ex 10:

a) Factorial using recursion and non recursion.
b) GCD using recursion and non recursion.
c) To count the digits of a given number using recursion

Unit – V

Structures: Definition, Declaration, Accessing the structure elements, Array of structures, Arrays with in structures, pointer to structure, passing structure to function, nested structures, and unions.

Exercise Questions: 5

Ex: 11

a) Implementation of array of structure
b) Demonstration of Union

Unit – VI

Files: Definition, Types of files, Opening modes, File IO Functions, Random access functions, Preprocessor directives.

Exercise Questions: 6

Ex 12:

a) Copy the contents of one file into another.
b) Count the number of characters, words and lines in a file.

Text Books

1. B. W Kernighan, Dennis M. Ritchie. The C – Programming Language. 2nd Edition, PHI.
2. Behrouz A. Forouzan, "A Structured Approach Using C" Richard F. Gilberg 3rd Edition
3.G.S.N Murty, S Vishnu Murty, "Problem solving Through 'C'- User Friendly Approach", First Edition, MANTECH Publication Pvt.Ltd., 2021

References

1. Yashwant Kantikar. 2012. Let Us C, 8th Ed. PBP Publications.
2. E. Balagurusamy. 2011. C Programming. Tata Mc Graw Hills, New Delhi, India.

Web Links:

1. https://www.tutorialspoint.com › Cprogramming › C – Home
2. https://www.programiz.com/c-programming

Engineering Graphics & Design
(Common to all Branches)

L	T	P	C
1	0	4	3

Subject Code : 20ESL103

Course Objectives:

- Able to develop drawing skills.
- To draw orthographic views from the given isometric view and vice verse
- To understand the fundamentals of computer aided design and drafting

Course Outcomes:

1. Draw projection of points and straight lines in first angle projection.
2. Project plane surfaces and simple solids inclined to one reference plane.
3. Convert orthographic views into isometric projections and vice-versa.
4. Draw basic lines and profiles with commonly used operations in drafting software.
5. Generate 2D drawings along with dimensioning in drafting software.

List Of Exercises

PART-A: Conventional Engineering drawing

1 Projections of points
2 Projections of straight lines inclined to one reference plane only.
3 Projections of planes inclined to one reference plane only.
4 Projections of simple solids inclined to one reference plane only.
5 Conversion of isometric views into orthographic views
6 Conversion of orthographic views into isometric views.

PART-B: Basic Computer aided engineering drawing (2-D drawings)

1. Commands – Axes, Coordinate points, Creation of lines, Polylines, Square, Rectangle, Polygons, Spines, Circles, Ellipse, Text.
2. Move, Copy, Offset, Mirror, Rotate, Trim, Extend, Break, Chamfer, Fillet, Curves.

Note: Six Exercises are to be completed by using AutoCAD software

Text Books:

1. Engineering Drawing, N. D. Bhatt, V. M. Panchal, Charotar Pub.
2. Engineering Drawing, K. L .Narayana, P.Kanniah, Scitech Pub.

Reference Books:

1. Engineering Drawing and Graphics, 2nd ed., K. Venugopal, New Age International Pub.
2. Fundamentals of Engineering Drawing, 11th ed., Luzadder, J. Warren, D.M. Jon, Prentice Hall India Pub.

Language Proficiency Lab
(Common to all Branches)

Subject Code : 20HSL101

L	T	P	C
0	0	3	1.5

Course Objectives

- To enable students develop neutralized accent
- To assist students utter words intelligibly
- To enhance the ability of students to speak spontaneously
- To help students converse aptly as the context demands
- To get students acquire perceptive abilities in professional conversations
- To aid students grasp and interpret information provided in graphs and tables

Course Outcomes

1. Students will be able to recognize differences among various accents and speak with neutralized accent.
2. Students will be able to pronounce words accurately with the knowledge of speech sounds and use appropriate rhythm and intonation patterns in speech.
3. Students will be able to speak extemporaneously about anything in general.
4. Students will be able to generate dialogues for various situations.
5. Students will be able to present posters perceptively and concisely.
6. Students will be able to comprehend and interpret data provided in graphs and tables.

Course Syllabus

Unit – I

Listening Comprehension of Audio and Video clips of different accents

Unit – II

Pronunciation—Intonation—Stress—Rhythm

Unit – III

JAM — Narration of an Event

Unit – IV

Situational Dialogues

Unit – V

Poster Presentation

Unit – VI

Interpretation of Data in Graphs and Tables

Text Books

1. *Communication Skills*. Sanjay Kumar and Pushpa Lata. OUP. 2011.
2. *Practical English Usage.* Michael Swan. OUP. 1995.
3. *Speak Well*. K. Nirupa Rani. Orient Blackswan, Hyderabad. 2012.
4. *Strengthen Your Communication Skills*. M. Hari Prasad. Maruthi Publications, Hyd. 2014.
5. *Strengthen Your Steps*. M. Hari Prasad. Maruthi Publications, Hyderabad. 2012.
6. *Technical Communication*. Meenakshi and Sangeetha. OUP. New Delhi. 2013.

Chemistry Lab
(Common to all Branches)

Subject Code : 20BSL102

L	T	P	C
0	0	3	1.5

Course Objectives

The students will become familiar and understand about:

- Measure molecular/system properties such as kinematic viscosity, acid number of lubricating oil, etc
- Measure molecular/system properties such as surface tension and viscosity.
- Measure molecular/system properties such as pH, conductance of solutions, redox potentials, etc
- Measure molecular/system properties such as chloride content, hardness of water, dissolved oxygen, etc.
- Synthesize a small polymer molecule and analyze a salt sample.
- Estimate iron (by colurimeter), partition coefficient, and adsorption of acetic acid by Charcoal etc.

Course Outcomes:

The students will learn to:

1. Measure molecular/system properties such as kinematic viscosity, acid number of lubricating oil, etc.
2. Measure molecular/system properties such as surface tension and viscosity.
3. Measure molecular/system properties such as pH, conductance of solutions, redox potentials, etc
4. Measure molecular/system properties such as chloride content, hardness of water, dissolved oxygen, etc.
5. Synthesize a small polymer molecule and analyze a salt sample.
6. Estimate iron (by colurimeter), partition coefficient, and adsorption of acetic acid by charcoal, etc.

List of Experiments
(Choice of 10-12 experiments from the following)

1. Determination of surface tension and viscosity
2. Determination of Hardness of water sample by EDTA Method.
3. Conductometric estimation of Acid by Base.
4. Conductometric estimation of mixture of acids by base.
5. Potentiometric Titrations.
6. Synthesis of a polymer/drug.
7. Determination of acid value of an oil
8. Chemical analysis of a salt
9. Determination of Dissolved Oxygen present in the given water sample by Modern Winkler's Method
10. Colurimetric estimation of iron
11. pH metric titrations
12. Determination of the partition coefficient of a substance between two immiscible liquids
13. Adsorption of acetic acid by charcoal Use of the capillary viscosimeters to the demonstrate of the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of egg

14. Potentiometric Titration of a Chloride-Iodide Mixture.
15. Determination of Chloride content present in given water sample.
16. Determination of kinematic viscosity of given lubricating oil.

Text Books

1. "Practical Engineering Chemistry" by K.Mukkanti, etal. B.S.Publications, Hyderabad (2011).
2. "Lab Manual on Engineering Chemistry" by Sudharani, Dhanpat Rai Publications, Co., New Delhi., (2009).

Reference Books

1. "Engineering Chemistry Lab Manual" by Shuchi Tiwari (2010), SCITECH Publications.
2. "Vogel's Text Book of Quantitative Chemical Analysis", 6th Edition by G. J. Jeffery, J. Bassett, J. Mendham, R.C. Denney, Longman Scientific & Technical Publications, New York.
3. "A Text Book of Engineering Chemistry" by R. N. Goyal and H. Goel, Ane Books (P) Ltd.(2009).
4. "A Text Book on experiments and calculations Engineering" by S.S. Dara, S.Chand & Company Ltd. (2003).
5. "Instrumental methods of Chemical Analysis", Gurudeep R, Chatwal Sham, K. Anand, Latest Edition (2015), Himalaya Publications.

Constitution of India
(Common to all Branches)

Subject Code: 20MCT103

L	T	P	C
2	0	0	0

Course Objectives

1. To help Students regulate their behavior in a social environment as Engineering Professionals.
2. To make students aware of the impact of taking social, legal and Administrative decisions about their profession.
3. To understand the political and constitutional parameters in work environment.
4. To understand the need and strengths of our nation and adopt their knowledge for future career.

Course Outcomes

By the end of this course the student will be able to

1. Realize the rigidness of our Indian Politics and Administrative aspects.
2. A Student can understand our nation federalism.
3. Can assess different types of risks involved in misadministration.
4. Can create competitive advantage.
5. Summarizes the legal and administrative establishments
6. A student can infer financial aspects for betterment of the National building.

Unit – I

Introduction

Historical perspective of the constitution of India - Salient features of The Indian Constitution - Amendment Procedure of The Indian Constitution.42nd amendment (Mini Constitution) - 44th amendment (1978 – Janatha Govt.)

Unit – II

Important Features Of Constitution

Fundamental Rights(Article 12 to 35), Duties (51 A – 1976 emergency) and Directive principles (Article 36 to 51) of State Policy - Articles 14 to 18 - Articles 19 - Article 21

Unit – III

Parliamentary form of Govt. In India

President of India - Emergency provisions -National Emergency – Article 352 - President Rules – Article 356 - Financial Emergency – Article 360

Prime Minister and Cabinet - Supreme Court of India (Indian Judiciary)

Unit – IV

Indian Federalism

Union – State relations; - Legislative , Administrative and Financial relations.

Local self Govt. – Constitutional Schemes in India (73 & 74 Constitutional amendments)

Unit – V

Parliamentary Committees:

Public Accounts Committee - Estimates Committee - Committee on Public Undertakings. - Election commission of India (Article -324) - Comptrollar and Auditor General (CAG) of India (Article – 148 to 150)

Unit-VI

Finance Commission (Article – 280) - Neethi Aayog (Planning Commission) and - Political Parties.

Text Books:

1) Introduction to Indian Constitution by D.D Basu,Lexis Nexis Butterworth wadhwa Nagapur, 2008.
2) Poicits in India by Rajini Kothari, Orient LongMan, 2005.
3) The Indian Constitution by Madhav Khosla by Oxford University Press India, 2012.

Differential Equations
(Common to all Branches)

Subject Code : 20BST102

L	T	P	C
2	1	0	3

Course Objectives:

- To solve the first order Ordinary Differential equations and apply to Orthogonal trajectories, Newton's Law of Cooling and Law of Growth (Decay).
- To solve second and higher order ordinary differential equations.
- Derive the Fourier series expansion of one variable functions.
- Understand Taylor's, Maclaurin's series expansion and rules of calculating extreme value of two or more variable functions.
- Learn the methods of solving first order quasi-linear (Lagrange) partial differential equations and first order non-linear partial differential equations.
- Understand the method of solving a linear Partial differential equation with constant coefficients by method of Separation of Variables, solve a one dimensional Wave and a one dimensional Heat equation.

Course Outcomes

The student will be able to:

1. Apply the mathematical tool for the solution of Ordinary Differential equations, Orthogonal trajectories, Newton's Law of Cooling and Law of Growth (Decay).
2. Evaluate higher order homogenous and non-homogenous linear differential equations with constant coefficients.
3. Estimate the Fourier series expansion of one variable functions.
4. Estimate the Taylor's, Maclaurin's series expansion of two variable functions and extreme values of two or more variable functions.
5. Evaluate a first order quasi-linear (Lagrange) partial differential equations and first order non-linear partial differential equations.
6. Evaluate a one dimensional Wave and Heat equation.

Unit – I

Ordinary differential equations of first order: *Linear type - Bernoulli type–Exact type - Equations reducible to exact type- Orthogonal Trajectories-Newton's law of cooling - Law of Growth and Decay.* (8 hrs)

Unit – II

Ordinary differential equations of higher order: *Higher order homogenous and non-homogenous linear differential equations with constant coefficients- Complimentary Functions-Particular integrals for the functions of type sin(ax+b)/cos(ax+b), x^m, e^{ax} , $e^{ax}V(x)$ - Method of variation of parameters, Applications-LCR circuits.* (8 hrs)

Unit – III

Fourier series: Fourier Series -Even and odd functions– Fourier series of functions defined in the interval (0, 2π), (-π, π), (0, 2c),(-c,c) - Half range Fourier sine and cosine series**(8 hrs)**

Unit – IV

Partial Differentiation: *Functions of two or more variables-Partial differentiation-Total Derivative- Taylor's and Maclaurin's Series (without proof) - Maxima, minima of functions without constraints and functions with constraints (Lagrange method of undetermined multipliers).* (8 hrs)

Unit- V

Partial Differential Equations of first order: Partial differential Equations - Formation of partial differential equations– solutions of first order quasi-linear (Lagrange) partial differential equations and first order non-linear (standard type) partial differential equations. (8 hrs)

Unit – VI

Applications of Partial Differential Equations *Solution of linear Partial differential equations with constant coefficients – Method of Separation of Variables- One dimensional Wave and Heat equations.* (8 hrs)

Text Books

1. B.V.Ramana, Higher Engineering Mathematics, 44th Edition, Tata McGraw Hill New Delhi,2014.
2. Dr.B.S.Grewal, Higher Engineering Mathematics, 43nd Edition, Khanna Publishers, 2015.
Reference Books
3. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.

Applied Physics
(Common to all Branches)

Subject Code : 20BST105

L	T	P	C
3	0	0	3

Course Description

This course encompass Fundamental Concepts of Physics that include

- Wave Optics
- Lasers
- Fiber Optics
- Modern Physics
- Electro Magnetic Theory
- Semiconductor Physics

that are inevitable for any Engineering student so that these prerequisites aid the student to readily understand Day to Day Engineering Problems with Pragmatic Approach.

Course Objectives

- To realize the principles of optics in designing optical devices
- To comprehend the Principles of Lasers
- To Infer the Principles of Fiber Optics
- To Recognize the shortcoming of classical physics and describe the need for modifications to classical theory
- To Identify the interaction of electromagnetic fields
- To Summarize the characteristics of semiconductor materials.

Course Outcome

Students will be able to

1. Apply the principles of optics in designing optical devices
2. Illustrate the Principles of Lasers
3. Outline the Principles of Fiber Optics
4. Resolve the discrepancies in classical estimates through quantum principles
5. Analyze the interaction of electromagnetic fields.
6. Interpret the characteristics of semiconductor materials.

Unit – I

Wave Optics

Interference - Introduction, Principle of Superposition of Waves, Interference in Plane Parallel Film due to Reflected Light, Newton's Rings under Reflected Light - Determination of Wavelength of Monochromatic Source of Light.

Diffraction - Introduction, Differences between Interference and Diffraction, Fraunhofer Diffraction due to Single Slit – Intensity Distribution.

Unit – II

Lasers - Introduction, Characteristics of Lasers- Coherence, Directionality, Monochromacity and High Intensity, Principle of Laser – Absorption, Spontaneous and Stimulated Emission, Einstein Coefficients (Qualitative), Population Inversion, Optical Resonator and Lasing Action, Ruby Laser

[Three Level System], Helium-Neon Laser [Four Level System], Applications of Lasers in Industry, Scientific and Medical Fields.

Unit – III

Fiber Optics - Introduction, Optical Fiber Construction, Principle of Optical Fiber – Total Internal Reflection, Conditions for Light to Propagate - Numerical Aperture and Acceptance Angle, Differences between Step Index Fibers and Graded Index Fibers, Differences between Single Mode Fibers and Multimode Fibers, Applications of Optical Fibers in Communication

Unit – IV (Modern Physics)

Quantum Mechanics - Wave Particle Duality, de-Broglie's Hypothesis of Matter Waves, Heisenberg's Uncertainty Principle, Physical Significance of Wave Function. Time independent wave equation and Particle in One Dimensional Potential Box.

Unit – V

Electromagnetic Theory Concept of Electric Field, Point Charge in Electric Field, Gauss Law and it's Applications, Magnetic Field - Magnetic Force on Current Carrying Coil. Ampere's Law, Biot-Savart Law, Faraday's Law of Induction, Lenz's Law, Maxwell's Equations and Applications

Unit – VI

Semiconductors Physics: Introduction- Intrinsic and Extrinsic Semiconductors, Dependence of Fermi Level on Carrier Concentration and Temperature, Diffusion and Drift Currents. Hall Effect – Mobility, Sign of Charge Carriers, Conductivity, Resistivity.

Text Books

1. A Textbook of Engineering Physics, M N Avadhanulu & P G Kshirsagar, S.Chand Publishers
2. Fundamentals of Physics by Resnick, Halliday and Walker
3. Modern Physics by Arthur Beiser

Reference books

1. University Physics by Young and Freedman
2. Solid State Physics by S. O. Pillai, New Age International Pubishers
3. Engineering Physics, Volume-I&II, P.K.PalaniSwamy, Scitech Publications Hyderabad
4. Engineering Physics Volume I&II Dr.K.Vijaykumar, S.Chand Publishing Company, New Delhi
5. Engineering Physics Dr. S. Mani Naidu, Pearson Publications Chennai

Data Structures and Algorithms

Subject Code: 20CST101

L	T	P	C
3	0	0	3

Course Outcomes:

On completion of this course, the student will be able to:

1. Compute the time and space complexities and calibrate the performance of a given algorithm.
2. Compare the performances of various Searching and Sorting techniques.
3. Demonstrate the advantages of dynamic memory allocation via linked lists.
4. Illustrate the applications of Stacks and Queues.
5. Implement the basic operations and Traversals on binary Trees.
6. Understand traversals and shortest path algorithms on a Graph.

Unit – I

Introduction: Basic Concepts of Data Structures; Notations of Time & Space Complexity: Performance Analysis of algorithms: Iterative & Recursive Algorithms; Asymptotic Notations (O, Ω, θ, o, ω)

Unit – II

Searching: Linear Search, Binary Search: Algorithm & Analysis; **Hashing:** Hash functions, Collision Resolution techniques; **Sorting:** Methodology & Performance Analysis of Sorting Algorithms: Selection, Bubble, Insertion, Quick, Merge, Heap Sort.

Unit – III

Linked Lists: Comparison with Arrays; Operations on Singly linked list: Creation, Insertion, Deletion, Traversing, Searching; Operations on Doubly linked list; Operations on Circular Linked Lists;

Unit – IV

Stacks: Definition & Efficient operations: Push & Pop; Applications of Stacks: Conversion & Evaluation of expressions;

Queues: Types of Queues: Simple Queue; Circular Queue: Efficient Operations on Queues; Implementation of Stack and Queue using Linked Lists.

Unit – V

Trees: Basic Terminology of Trees; Binary Tree: Traversals; Binary Search Tree Operations: Insert, Delete; Introduction to Balanced Trees: AVL, B-Tree

Unit – VI

Graph: Basic Terminologies and Representations of Graphs; Graph traversal algorithms: Breadth-FS & Depth-FS; Single-Source Shortest Path Algorithm: Dijkstra's Algorithm.

Text Books:

1. Mark Allen Weiss , **"Data Structures and Algorithm Analysis",** Fourth Edition , Pearson.
2. Ellis Horowitz, Sartaj Sahni, "**Fundamentals of Data Structures**", Illustrated Edition,Computer- Science Press.

Reference Books

1. Michel T. Goodrich, Roberto Tamassia, David Mount, **"Data Structures and Algorithm Analysis",** 2nd Edition, John Wiley & Sons, Inc.
2. Adam. Drozdek , **"Data Structure And Algorithms In C++",** 4th edition, Cengage.

Basic Electrical Engineering
(Common to all Branches)

Subject Code: 20EST101

L	T	P	C
3	0	0	3

Course objectives

- To introduce the basic knowledge of electric circuits
- To illustrate knowledge with network reduction techniques.
- To analyze AC circuits.
- To provide knowledge on Magnetic circuits.
- To become familiar with DC Generator.
- To understand the concept of DC Motor.

Course outcomes:

1. Able to summarize different electrical circuits.
2. Able to construct network reduction techniques
3. Able to outline the basics of AC circuits.
4. Able to state magnetic circuits.
5. Able to examine DC Generator.
6. Able to explain DC Motor.

Unit – I

Introduction to Electric Circuits: Basic definitions, Electrical circuit elements (R, L and C), Voltage and current sources Independent and dependent sources, Ohm's Law, Series & Parallel circuits, Source transformation, Kirchhoff's Laws, , simple problems.

Unit – II

Network Reduction Techniques: Star-Delta transformation, Nodal Analysis, Super node, Mesh analysis, super mesh-Problems.

Unit – III

AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series only), real power, reactive power, apparent power, power factor, simple problems.

Unit – IV

Magnetic circuits: Basic definitions of magnetic flux, flux density, Reluctance, Magneto motive force (m.m.f), magnetic field intensity, magnetic permeability and susceptibility. Comparison between magnetic and electrical circuits, inductively coupled circuits, coefficient of coupling, dot convention, simple problems on magnetic circuits.

Unit – V

DC Generator: Generator-Principle of Operation, Construction, EMF equation, Classification, O.C.C, internal and external characteristics of shunt generator, Applications.

Unit – VI

DC Motor: Motor-principle of operation, Torque equation, Classification Speed Control Methods, Operation of 3 point starter, Applications.

Text Books

1. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand& Co.
2. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.

Reference Books .

1. Basic Electrical Engineering Dr.K.B.MadhuSahu scitech publications (india) pvt.ltd.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill,2010.

IT Workshop
(Common to all Branches)

Subject Code : 20ESL104

L	T	P	C
1	0	4	3

Course Objectives:

- PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers.
- All the DOS commands would be covered for maintains of the Operating system.
- Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered.
- Productivity tools module would enable the students in crafting professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools.

Course Outcomes:

1. Students gain knowledge on computer system such as system Unit, input devices, and output devices connected to the computer.
2. Students gain knowledge to understand the booting process that includes switching on the system, and familiar with all the commands of an operating system.
3. Students gain knowledge to understand the working of the internet that include the use of protocols, domains, IP addresses, URLs, web browsers and search engines etc.
4. Students get familiarize with parts of Word window, To create and save a document, To set page settings, create headers and footers, To use various formatting features such as bold face, italicize, underline, subscript, superscript, line spacing, etc.
5. Students get familiarize with parts of Excel window, to create and save a workbook with single and/or multiple worksheets, to apply operations on range of cells using built-in formulae, etc.
6. Students get familiarize with parts of PowerPoint win, to create and save a new presentation, apply design templates to a presentation, to insert, edit and delete a slide , etc.

PC Hardware

Task 1: Identification of the peripherals of a computer.
To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions.

Task 2: (Optional) : A practice on disassemble the components of a PC and assembling them to working condition.

Task 3 : Installation of WINDOW XP operating system in PC.

Task 4: Introduction to all internal and external DOS commands

Task 5 : Installation of LINUX operating system in PC.

Internet & World Wide Web

Task 6: S**urfing the Web using Web Browsers and Search engine:** How to access the websites and email. Students customize their web browsers using bookmarks, search toolbars and pop up blockers. And Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google.

MS – Word

Word Orientation : Describe Importance of MS- Word

Task 7 :Using word to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word.

Task 8: Creating project abstract for using MS-WORD: Abstract Features to be covered:- Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check , Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

Task 9 : Creating a Newsletter : Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs

Task 10 : Creating a Feedback form - Features to be covered- Forms, Text Fields, Inserting objects, Mail Merge in Word.

MS-Excel

Excel Orientation : The mentor needs to tell the importance of MS/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel –Accessing, overview of toolbars, saving excel files, Using help and resources

Task 11 : Creating a Scheduler - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 12 : Creating Performance Analysis - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting.

Task 13: Calculating GPA - Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function,

Task 14: Creating Cricket Score Card - Features to be covered:-Pivot Tables, Interactive Buttons, Importing Data, Data Protection, Data Validation

MS-Power Point

Task 15 : Students will be working on basic power point utilities and tools which help them create basic power point presentation.

Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in Powerpoint.

Task 16 : Concentrating on the in and out of Microsoft power point, Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week

includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides.

Text Books:

1. Vikas Gupta ,"Comdex Information Technology course tool kit" , WILEY Dreamtech
2. Cheryl A Schmidt ,"The Complete Computer upgrade and repair book", 3rd edition, WILEY Dreamtech
3."Introduction to Information Technology", ITL Education Solutions limited, Pearson Education.
4. Kate J. Chase ,"PC Hardware and A+ Handbook" –PHI (Microsoft)

Reference Books:

1 Scott. Mueller, 2008, Upgrading and Repairing PCs, 22/e, QUE,
2 Cheryl A Schmidt ,The Complete Computer upgrade and repair book,3/e , Dreamtech

Physics Lab
(Common to all Branches)

Subject Code: 20BSL101

L	T	P	C
0	0	3	1.5

Course Description

This Laboratory course is intended to apply the scientific method to expedite experiments that include

- Error analysis
- Waves Fundamentals
- Mechanics
- Physical Optics
- Lasers and Fiber Optics
- Semiconductor devices

So that student can verify theoretical ideas and concepts covered in lecture through host of analytical techniques, statistical analysis and graphical analysis.

Course Objectives

- To Operate Sensitive Instruments for precision measurements
- To Identify Error for targeted accuracy
- To Interpret the results of mechanical parameters such as modulus of elasticity and acceleration due to gravity through simple oscillatory experiments using torsional pendulum or physical pendulum
- To Determine relevant parameters associated with Interference and Diffraction phenomena using Travelling Microscope and Spectrometer.
- To Exhibit Techniques and Skills associated with Modern Engineering Tools such as Lasers and Fiber Optics
- To Characterize semiconducting material devices.

Course Outcomes: Will be able to

1. Demonstrate the ability for precision measurements to design instrumentation
2. Estimate the Error for targeted accuracy
3. Infer the results of mechanical parameters such as modulus of elasticity and acceleration due to gravity through simple oscillatory experiments using torsional pendulum or physical pendulum
4. Apply the knowledge of Optics to calculate geometrical parameters of thickness of thin object and radius of curvature of a lens
5. Illustrate techniques and skills associated with Modern Engineering Tools such as Lasers and Fiber Optics
6. Evaluate characteristics of semiconducting material devices

List of Experiments

1. Precision Measurements and Instruments
2. Error Analysis and Graph Drawing

3. Determination of Rigidity Modulus of the Material of Wire using Tensional Pendulum
4. Determination of Acceleration due to Gravity (g) using Compound Pendulum
5. Newton's Rings – Determination of the Radius of Curvature of a given Plano Convex Lens
6. Determination of Thickness of Thin Object using Wedge Method
7. Verify the characteristic curve of NTC Thermistor.
8. Determination of width of a single slit using LASER
9. Determination of Numerical Aperture and Bending Loss of an Optical Fiber
10. Determination of Energy Band Gap using the given Semiconductor

Manual / Record Book

1. Manual cum Record for Engineering Physics Lab, by Prof. M. Rama Rao, Acme Learning.
2. Lab Manual of Engineering Physics by Dr.Y. Aparnaand Dr. K. VenkateswaraRao (VGS books links, Vijayawada)

Basic Electrical Engineering Lab
(Common to all Branches)

Subject Code: 20ESL101

L	T	P	C
0	0	3	1.5

Course Objective

To introduce the student to study different electrical components and to verify the basic laws related to electrical engineering, Speed control of D.C. motor, testing of transformer, electrical wiring system through study, practice, and experiments.

Course Outcomes

Students will be able to

1. Label various types of electrical components.
2. Demonstrate various basic electrical laws.
3. Demonstrate speed control DC motor & Characteristics of generator.
4. Experiment with lamps.
5. Examine electrical wiring system

List of Experiments:

1. Study of electrical components.
2. To verify Ohm's law.
3. To verify (a) Kirchhoff's current law (b) Kirchhoff's voltage law.
4. To verify the total resistance of the series and parallel connected circuits.
5. Find armature resistance, field resistance and filament Lamp Resistance using V-I method.
6. Magnetization characteristics of DC shunt generator.
7. Speed control of D.C. Shunt motor by a) Armature Voltage control b) Field flux control method
8. Fluorescent tube connection.
9. (a) One way control of lamp
   (b) Two way control of lamp
10. Fan wiring.

Additional Experiments:

11. Soldering and bread board precautions.
12. To find voltage current relationship for series RL circuit and determine power factor

Data Structures and Algorithms Lab

Subject Code : 20CSL101

L	T	P	C
0	0	3	1.5

Course Outcomes:

1. Develop Programs as recursive solutions for problems.
2. Demonstrate different strategies to solve the common searching and sorting algorithms.
3. Illustrate the use of dynamic memory allocation through linked list operations.
4. Design programs for linear data structures such as Stacks, and Queues.
5. Develop Programs for implementing various operations on Binary Trees and Binary Search Trees.
6. Apply the fundamental graph algorithms to solve problems using Depth-First and Breadth- First Search.

List of Experiments:

1] a) Write a C program to generate a Fibonacci series using recursive function.
b) Write a C program to find the GCD of given numbers using recursive function.
c) Write a C program to solve the Towers of Hanoi problem using recursive function.

2] a) Design, Develop and Implement a C program to perform linear search for a key value in a given list.
b) Design, Develop and Implement a C program to perform Binary search for a key value in a given list.

3] Given a File of **N** employee records with a set **K** of Keys(4-digit) which uniquely determine the records in file **F**. Assume that file **F** is maintained in memory by a Hash Table(HT) of **m** memory locations with **L** as the set of memory addresses (2-digit) of locations in HT. Let the keys in **K** and addresses in **L** are Integers. Design and develop a Program in C that uses Hash function **H: K→L** as H(**K**)=**K** mod **m (remainder** method), and implement hashing technique to map a given key **K** to the address space **L.** Resolve the collision (if any) using **linear probing**.

4] a) Design, Develop and Implement a C program that implement Selection Sort to sort a given list of integers.
b) Design, Develop and Implement a C program that implement Bubble Sort to sort a given list of integers.

5] a) Design, Develop and Implement C program that implement Quick Sort to sort a given list of integers.
b) Design, Develop and Implement C program that implement Merge Sort to sort a given list of integers.

6] Design, Develop and Implement a menu driven Program in C for the following operations on **Singly Linked List (SLL)** of Student Data with the fields: ***USN, Name, Branch, Sem, PhNo***
a. Create a SLL of N Students Data by using front insertion.
b. Display the status of SLL and count the number of nodes in it
c. Perform Insertion / Deletion at End of SLL
d. Perform Insertion / Deletion at Front of SLL (Demonstration of stack)
e. Exit

7] Design, Develop and Implement a menu driven Program in C for the following operations on **STACK** of Integers (Array Implementation of Stack with maximum size **MAX**)

a. ***Push*** an Element on to Stack
b. ***Pop*** an Element from Stack
c. Demonstrate how Stack can be used to check ***Palindrome***
d. Demonstrate ***Overflow*** and ***Underflow*** situations on Stack
e. Display the status of Stack
f. Exit
Support the program with appropriate functions for each of the above operations

8] Design, Develop and Implement a Program in C for converting an Infix Expression to Postfix Expression. Program should support for both parenthesized and free parenthesized expressions with the operators: **+, -, *, /, %(Remainder), ^(Power)** and **alphanumeric** operands**.**

9] Design, Develop and Implement a menu driven Program in C for the following operations on **QUEUE** of Characters (Array Implementation of Queue with maximum size **MAX**)
a. Insert an Element into QUEUE
b. Delete an Element from QUEUE
c. Demonstrate ***Overflow*** and ***Underflow*** situations on QUEUE
d. Display the status of QUEUE
e. Exit
Support the program with appropriate functions for each of the above operations

10]a) Design, Develop and Implement a C program to implement Binary tree traversals using iterative functions.
b)Design, Develop and Implement a C program to implement Binary tree traversals using recursive functions.

11]Design, Develop and Implement a menu driven Program in C for the following operations on **Binary Search Tree (BST)** of Integers
a. Create a BST of **N** Integers: 6, 9, 15, 22, 8, 45, 24, 18, 71, 8, 5, 2
b. Traverse the BST in Inorder, Preorder and Post Order
c. Search the BST for a given element (**KEY**) and report the appropriate message
e. Exit

12]Design, Develop and Implement a Program in C for the following operations on **Graph(G)** of Cities
a. Create a Graph of **N** cities using Adjacency Matrix.
b. Print all the nodes **reachable** from a given starting node in a digraph using DFS/**BFS** method.

Text Books:

1. Mark Allen Weiss , **"Data Structures and Algorithm Analysis",** Fourth Edition , Pearson.
2. Ellis Horowitz, Sartaj Sahni, "**Fundamentals of Data Structures**", Computer Science Press.

References Books

1. Michel T. Goodrich, Roberto Tamassia, David Mount, "Data Structures and Algorithm Analysis", 2nd Edition, John Wiley & Sons, Inc.
2. Debasis Samanta, "Classic Data Structures", Second Edition, PHI, 2012, New Delhi, India.
3. B.A. Forouzan and R.F. Gilberg, ,"Computer science, A structured programming approach using C", Third edition, 2011, Thomson, New Delhi, India.

Reference Link

1. https://www.geeksforgeeks.org/data-structures/

Environmental Science
(Common to all Branches)

Subject Code: 20MCT202

L	T	P	C
2	0	0	0

Course Objectives

- Memorize the knowledge of environment and status of different resources on earth.
- Identify the significance, arrangement, causes of annihilation and conservation of
- ecosystems and biodiversity.
- Identify the significance, types and conservation of biodiversity
- Discriminate causes, effects of a variety of pollutions and suitable control methods.
- Identify the hurdles of sustainable development; evaluate the different environmental
- management and legal issues.
- Describe the population growths, health problems and evaluate the environmental assets.

Course Outcomes

By Studying this Course Student will

1. Recognize and speaks well again on the general issues of environment and know how to conserve resources for better usage.
2. Explain and demonstrate the ecosystems setup, assess
3. Recognize and conserving of diversity to upkeep.
4. Examine a range of pollution problems along with control and their eco-friendly disposal methods.
5. Translate the sustainable development practice through clean development mechanisms.
6. Evaluate the changing trends of world population and compile the information in order to document the environmental assets.

Unit – I

Importance of Environmental Studies and Natural Resources: Definition of Environment – Importance - Need for Public Awareness

Forest Resources - Use and over exploitation - deforestation – consequences – case study

Water Resources - Use and over utilization - dams - benefits and problems on Tribes and Environment

Food Resources – Food security concept - changes caused by agriculture and overgrazing -effects of modern agriculture – fertilizer - pesticide problems - water logging - salinity – concept of sustainable agricultural methods - case study

Energy Resources - Non-renewable energy resources – coal – crude oil - natural gas - use of renewable and alternate energy sources. **(*6 lectures*)**

Unit – II

Ecosystems: Definition – Structure of ecosystem: producers - consumers – decomposers.

Functions of ecosystem: Food chains - food webs - ecological pyramids - Energy flow – Nutrient cycles (Carbon cycle and Nitrogen cycle). Ecological succession. **(*3 lectures*)**

Unit – III

Biodiversity and its conservation: Definition of Biodiversity - Values of biodiversity – Biogeographical classification of India - Hot Spots of India - Endangered and endemic species of India –Threats to biodiversity - Conservation of biodiversity. **(*3 lectures*)**

Unit – IV

Environmental Pollution: Definition – causes - effects - control measures of Air pollution - Water pollution - Noise pollution – Marine Pollution - Nuclear hazards.

Solid waste Management: Causes - effects - disposal methods of urban waste – biomedical wastes - case studies

Disaster management: floods – earthquakes – cyclones **(*6 lectures*)**

Unit – V

Social Issues and the Environment: Concept of Unsustainable and Sustainable development – Water conservation: Rain water harvesting- Watershed management – Global environmental challenges: climate change - global warming – acid rains - ozone layer depletion -World summits on environment: Stockholm conference – Rio-earth summit – Kyoto protocol – Environment (Protection) Act - Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act - Wildlife (Protection) Act -Forest (Conservation) Act **(*6 lectures*)**

Unit-VI

Human Population and the Environment: Population growth patterns - variation among nations - Population problems - control -Environment and human health - Role of information Technology in Environment and human health. **(*4 lectures*)**

Text Books:

1. Shashi Chawla. 2015, *A Text book of Environmental Studies*, Revised edition, TMH, New Delhi
2. Bharucha, E. 2005, *Text book of Environmental Studies*, First edition, Universities Press (India) Pvt. Ltd., Hyderabad
3. Suresh K. Dhameja. 2006-07, *Environmental Studies*, Third revised edition, S.K. Kataria & Sons (P) Ltd., New Delhi
4. Benny Joseph. 2015, *Environmental Studies*, Revised edition, TMH, New Delhi

Reference Books:

1. Odum, E.P, *Fundamentals of Ecology*, Third edition, W.B. Saunders & Co (P) Ltd., Philadelphia.
2. P. D. Sharma, *Ecology and Environment*, Revised edition, Rastogi Publications (P) Ltd.
3. Cunningham, W.P., Cunningham, M.A., *Principles of Environmental Science*, TMH, New Delhi.
4. Peavy, Rowe and Tchobanoglous, *Environmental Engineering*, Mc Graw – Hill Internationaledition.
5. Graedel, T.E., Allenby, B.R., *Industrial Ecology and Sustainable Engineering*, Pearson Publications.

Python programming
(Common to all Branches)

L	T	P	C
3	0	3	4.5

Subject Code: 20ESI204

Course Objectives

This course will enable students to

- Learn Syntax and Semantics and create Functions in Python
- Handle Strings and Files in Python
- Understand Lists, Dictionaries and Regular expressions in Python
- Understand use of functions and file handling in python
- Implement Object Oriented Programming concepts in Python
- Introduction to Regular Expressions and matching in Python

Course Outcomes

By the end of this course the student will be able to

1. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions
2. Demonstrate proficiency in handling Strings and File Systems
3. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions
4. Implement file handling functions and user defined functions in python
5. Interpret the concepts of Object-Oriented Programming as used in Python
6. Implement Regular Expressions and matching in Python

Unit – I

Introduction to Python: History, Features, Installing Python, Running Python, Operators, Statements and Expressions.

Control Structures: Conditional Statements, Loops

Exercise Questions: 1

Ex 1: Write the python programs to calculate the following

a) Find the factorial of given number
b) To print all the prime numbers below n. n value should be taken from the user at the time of execution

Ex 2: Write the python programs to perform the following

a) To check given number Armstrong or not.
b) To check Strong number.
c) To print Fibonacci series.

Unit – II

Data Types: Mutable vs immutable data type, Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules

Sequences - Strings, Lists, and Tuples, Dictionaries and Set Types

Exercise Questions: 2

Ex 3: Write the python programs to calculate the following

a) Write a Python program to get a string from a given string where all occurrences of its first char have been changed to '$', except the first char itself.

b) Write a Python program to remove the characters which have odd index values of a given string.

c) To remove punctuations from the string

d) Write a Python program to count repeated characters in a string

e) Write a Python program to count Uppercase, Lowercase, special character and numeric values in a given string

Ex 4: Write the python programs to perform the following

a) Implement a STACK program by using PYTHON.
b) Implement a QUEUE program by using PYTHON.
c) Implement a Python Program for creating a dictionary and display its keys alphabetically.
d) Write a Python program to convert a list into a nested dictionary of keys.
e) Write a python program to remove duplicates from the list

Unit – III

Functions: Definitions, Declaration, Parameter passing, calling functions

File Handling: creating a file, opening a file, I/O with file (read, write, append), closing a file

Exercise Questions: 3

Ex 5: Write the python programs to calculate the following

a) To find HCF or GCD of two numbers

b) To find sum of natural numbers using recursive function

Ex 6: Write the python programs to perform the following

a) Read a file line by line into a list
b) Get filename, line count, file extension, file creation and modification date .
c) Reads and displays the content of the file
d) Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.

Unit – IV

Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules.

Exercise Questions: 4

Ex 7: Write the python programs to calculate the following

a) Write a python program to define a module to find Fibonacci Numbers and import the module to another program.

b) Write a python program to define a module and import a specific function in that module to another program.

Unit – V

Classes in Python : Principles of Object Orientation , Creating Classes , Instance Methods , Special Methods ,class Variables and Inheritance, Data base connectivity .

Exercise Questions: 5

Ex 8: Write the python programs to calculate the following

a) Define a class, which have a class parameter and have a same instance parameter.

b) Define a class named 'Shape' and its subclass 'Square'. The Square class has an 'init' function which takes a given length as an argument. Both classes have an area function which can print the area of the shape, where Shape's area is 0 by default..

Unit-VI

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python

Exercise Questions: 6

Ex 9: Write the python programs to calculate the following

a) implement Re.findall, re.split, re.sub, re.subn, re.search and Match.group.

b) Write a Python program to check the validity of a password (input from users).
Validation :

- At least 1 letter between [a-z] and 1 letter between [A-Z].
- At least 1 number between [0-9].
- At least 1 character from [$#@].
- Minimum length 6 characters.
- Maximum length 12 characters.

Text Books

1. Wesley J .C hun "Core Python Applications Programming", 3rd Edition, 2012, Prentice Hall.
2. Brian jones, David Beazley “Python Cookbook ”, 3rd Edition.

References Books

1. Mark Lutz "Programming Python, 4th Edition" O'Reilly Media.
2. Think Python, Allen Downey, Green Tea Press

Web Links

https://docs.python.org/3/tutorial/index.html
https://pythonprogramminglanguage.com

Digital Logic Design
(Common to all Branches)

L	T	P	C
3	0	0	3

Subject Code: 20EST205

Course Objectives
The course is designed with the objective to:

- To solve a typical number base conversions
- To optimize logic gates for digital circuits using various techniques
- To apply knowledge of adders for higher order digital circuits
- To develop advanced combinational circuits
- To design various circuits using PLDs
- To identify new areas for applying the knowledge of flip-flops

Course Outcomes
After the successful completion of this course, students will be able to

1. Distinguish different number systems and digital codes
2. Design different arithmetic logic gates
3. Design various types of adder circuits using combinational circuits
4. Distinguish different combinational logic circuits and design logic circuits using Combinational circuits
5. Design logic circuits using PLDs
6. Distinguish different sequential logic circuits and design logic circuits using sequential circuits

Unit – I
Number Systems: Binary, Octal, Decimal, Hexadecimal Number Systems. Conversion Of Numbers from One Radix to another Radix, r's Complement and (r-1)'s Complement Subtraction, Weighted and Non- weighted codes.

Unit – II
Logic Gates and Boolean Algebra: Basic Gates: NOT, AND, OR, Boolean Theorems, Universal Gates, Ex-OR and Ex-NOR Gates, Compliment and dual of logic functions. Minimizations of Logic Functions, Multilevel Realization Of Logic Functions.

Gate-Level Minimization: Karnaugh Map Method (K-Map): Minimization Of Boolean Functions upto four variables, POS and SOP Simplifications with don't care conditions using K map, Quine mccluskey Method

Unit – III
Combinational logic circuits-I: Design of half adder, full adder, half subtractor, full subtractor, applications of full adders, 4-bit binary adder, 4-bit binary subtractor, BCD adder, excess – 3 adder, carry look ahead adder

Unit – IV
Combinational logic circuits-II: Design of decoder, encoder, multiplexer, de-multiplexer, and comparators and LED seven segment display

Unit – V

Programmable Logic Devices: PLA, PAL, PROM. Realization of Switching Functions Using PROM, PAL and PLA. Comparison of PLA, PAL and PROM. Programming Tables of PLA, PAL and PROM

Unit-VI

Itnroduction to Sequential Logic Circuits: Classification, Basic Sequential Logic Circuits:. RS, JK, T and D Flip flops, truth tables & excitation tables. Conversion of Flip Flops,Flip Flops with Asynchronous Inputs (Preset and Clear).

Registers and Counters: Design of Registers, Buffer Register, Control Buffer Registers, Bidirectional Shift Registers, Universal Shift Register, Design of Ripple Counters, Synchronous Counters and Variable Modulus Counters, Ring Counter, Johnson Counter

Text Books:

1. M.Morris Mano, Michael D Ciletti, Digital Design ,4/e, PEA
2. Roth, Cengage Fundamentals of Logic Design, 5/e.

Reference Books:

1. Kohavi, Jha, Switching and Finite Automata Theory,3/e, Cambridge.
2. Leach, Malvino, Saha,Digital Logic Design, TMH 3. Jaya Bhaskar, Verilog HDL primer, PEA

Reference Links

1. https://nptel.ac.in/courses/108/105/108105132/

Discrete Mathematics
(Common to all Branches)

Subject Code: 20CST202

L	T	P	C
2	1	0	3

Course Objectives
Students are expected to learn:

- Understand the theory and techniques of logic, graphs and trees, and algebraic systems
- Apply the knowledge and skills obtained to investigate and solve a variety of discrete mathematical problems
- Communicate mathematical ideas

Course Outcomes
Upon successful completion of this course, students will be able to:

1. Apply equivalence formulas, tautological implications in finding normal forms, and theory of inference in Statement Calculus and predicates, and explain Mathematical Induction principle and apply the same
2. Apply equivalences and inference theory in Predicate Calculus
3. Explain the basic properties of relations, POSETS, LATTICES, functions and apply the same in solving the problems
4. Identify the basic properties of graphs and related structures and solve the related problems
5. Identify the basic properties of Trees and solve minimum cost spanning tree problems
6. Solve and formulate, generating functions and recurrence relations

Unit – I
Logic & Mathematical Reasoning Propositional calculus: statements and notations, connectives, Truth tables, Tautologies, Equivalence of formulas, Tautological implications, Normal forms, Theory of inference for statement calculus.

Unit – II
Predicate Calculus Predicate logic, statement functions, variables and quantifiers, free and bound variables. Inference Theory of the Predicate Calculus: Logical implication involving quantifiers, Statements with more than one variable.

Unit – III
Relations Properties of Relations, Equivalence relations, partial orders, Lattices, properties of Lattices, Special types of Lattices (Proofs not required).

Unit – IV
Graph Theory Basic Concepts of Graphs, Matrix representation of graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerain & Hamiltonian graphs, Planar Graphs, Graph coloring.

Unit – V
Trees: Introduction and applications of trees, Tree traversals, Spanning Trees, Minimum cost spanning trees (Prim's & Kruskal's)

Unit-VI

Combinatorics: Generating Function of Sequences, calculating coefficient of Generating function, Partial Fractions. **Recurrence relations**: First order and second order Linear Homogeneous and Non-Homogeneous recurrence relations, method of generating functions.

Text Books:

1. J.P.Tremblay & R. Manohar, "Discrete Mathematical Structure with Applications to Computer Science" Mc.Graw Hill, 2004.
2. Kolman, Busby Ross , "Discrete Mathematical Structures", PHI,5th Edition,2003.
3. D.S.Chandrasekharaiah, "Mathematical Foundation of Computer Science" Prism Publications 2009.

Reference Books:

1. Trembly J.P. and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 30th Re-print (2007).
2. Discrete Mathematics for Computer Scientists & Mathematicians, 2/e Mott, Kandel, Baker, PHI
3. Kenneth H.Rosen, "Discrete Mathematics and its Applications", 6th Edition, Special Indian edition , Tata McGraw – Hill Pub. Co. Ltd., New Delhi, (2007).
4. V. Krishnamurthy, "Combinatories:Theory and Applications", East-West Press.
5. Seymour Lipschutz, M.Lipson, "Discrete Mathemataics" Tata Mc Graw Hill, 2005.

Computer Organization & Architecture

L	T	P	C
3	0	0	3

Subject Code: 20CST203

Course Objectives

Students are expected to learn

- How Computer Systems work & the basic principles
- Instruction Level Architecture and Instruction Execution
- The current state of art in memory system design
- How I/O devices are accessed and its principles
- To provide the knowledge on Instruction Level Parallelism and concept of pipelining
- techniques and multiprocessor.

Course Outcomes

Upon successful completion of this course, student will be able to:

1. Draw the functional block diagram of a computer and describe the function of the instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set
2. Describe hardware algorithms for fixed-point and floating-point arithmetic
3. Understand different types of storage element used in a computer
4. Understand input output device and their interconnection to CPU along mode of data transfer from I/O device to memory
5. Enhance the performance of a system by applying pipelining technique
6. Understand multiprocessor concepts

Unit – I

Functional blocks of a computer CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU – registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set.

Unit – II

Data representation Signed number representation, fixed and floating-point representations, Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look-ahead adder. Multiplication – shift-and add, Booth multiplier, array multiplier. Division restoring and non-restoring techniques, floating point arithmetic.

Unit – III

Memory organization Memory Hierarchy, Main Memory-RAM, ROM Chips, Associative Memory-Hardware Organization and Match Logic, Cache Memory-Associative Mapping, Direct Mapping and Set Associative Mapping, Virtual Memory.

Unit – IV

Peripheral devices and their characteristics: Peripheral device, Input-output interface I/O Bus and Interface Modules, I/O versus memory bus, Isolated versus memory-mapped I/O, Asynchronous data transfer, modes of transfer, priority interrupt and direct memory access.

Unit – V

Pipelining: Introduction to parallel processing, Basic concepts of pipelining, Arithmetic pipeline, Instruction pipeline throughput and speedup, pipeline hazards. Vector processing and Array Processor.

Unit-VI

Multiprocessors: Characteristics of Multiprocessors, Interconnection Structures, Interprocessor arbitration, Interprocessor communication and synchronization, Cache Coherence.

Text Books:

1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
2. "Computer System Architecture", Revised 3rd Edition by M. Morris Mano and Rajiv Mall, Pearson Education.

Reference Books:

1. "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill
2. "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.
3. "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.
4. "Computer Organization and Embedded Systems", 6th Edition by Carl Hamacher, McGraw Hill Higher Education.

Object Oriented Programming
(Common to all Branches)

Subject Code: 20CST204

L	T	P	C
3	0	0	3

Course Objectives

- The objective of the course is to teach the basic concepts and techniques which form the object oriented programming paradigm
- Well equipped with Java SDK environment to create, debug and run simple Java programs

Course Outcomes

By the end of this course the student will be able to

1. Knowledge of the structure and model of the Java programming language
2. Explain the concept of class and objects with access control to represent real world entities
3. Demonstrate the implementation of inheritance by using extends and implements keywords
4. Illustrate different techniques on creating and accessing packages (fully qualified name and import statements)
5. Understand the impact of exception handling to avoid abnormal termination of program using checked and unchecked exceptions
6. Use multithreading concepts to develop inter process communication and also design applet Programs.

Unit – I

Introduction To Java: Evolution of Java, Java Buzzwords, The Java Virtual Machine, An overview of Java- Simple Java Program, Naming Conventions in Java, Data types, Variables, Expressions, Automatic type Conversion, Operators, Control Statements , Arrays, Strings

Unit – II

Classes & Objects: Class fundamentals, Declaring Objects, Initializing the instance variables, Access Control, Constructors, Methods in Java, Overloading Methods and constructors, Static Methods, Recursion, final keyword, this keyword, garbage collection, finalize() method

Unit – III

Inheritance: Inheritance Basics, Types of Inheritance, The Keyword ‘super’, Final with inheritance.
Polymorphism: Method Overriding, Dynamic Method Dispatch, Abstract Classes. INTERFACES: Interface, Multiple Inheritance using Interface, Abstract Classes vs. Interfaces

Unit – IV

Packages: Packages, Different Types of Packages, Access Protection, Importing Packages.
Exception Handling: Exception-handling fundamentals, throw Clause, throws Clause. Types of Exceptions: Built-in Exception, User Defined Exception.

Unit – V

Threads: Java Thread Model, Main Thread, Creating a Thread and Running it, terminating the Thread, Creating Multiple Threads, Thread Synchronization, and Thread Priorities.

Unit-VI

Applets: Applet Basics, Applet Life Cycle, A Simple Applet, HTML applet tag, Applet Parameters.

Text Books:

1. Herbert Schildt, "Java The complete reference", 9thEdition, McGrawHill, 2017.
2. Timothy budd, "An introduction to object-oriented programming", 3rdEdition, Pearson Education, 2009.

Reference Books

1 E.Balaguruswamy, "Programming with Java A Primer", 5th Edition, TataMcGraw-Hill, 2017.
2. Y. Daniel Liang, "Introduction to Java programming", 9thEdition, Pearson education, 2012

Reference Link

1. http://en.wikibooks.org/wiki/Java_Programming - Java Learning WikiBook
2. http://www.javabeginner.com - Java Beginner Tutorial

Digital Logic Design Lab
(Common to all Branches)

Subject Code: 20ESL205

L	T	P	C
0	0	3	1.5

Course Objectives

- Verify the truth tables of logic gates
- Design and verify the operation of combinational circuits.
- Design and verify the operation of code converters.
- Design and verify the operation of sequential circuits
- Verify the operation of Johnson/ring counter
- Verify the operation of memory element

Course Outcomes

By the end of this course the student will be able to

1. Distinguish logic gates for design of digital circuits
2. Design different types of Combinational logic circuits
3. Design different types of Code converters
4. Analyze the operation of flip-flops
5. Apply knowledge of flip-flops in designing of Registers and Counters
6. Analyze the Read/write operations of memory element

List of Experiments (At least ten experiments are to be done) :

1. Verification of logic Gates
2. Half/Full Adder
3. Half/Full/Subtractor
4. Binary-Gray & Gray-Binary Converter using Ex-or gates
5. BCD –Excess3 & Excess 3 –BCD converter using Full adder
6. MUX/DEMUX
7. Comparators
8. Encoder/Decoder
9. Flip-Flops
10. 4 Bit - Counter
11. Shift Registers
12. RAM

Object Oriented Programming through Java Lab
(Common to all Branches)

L	T	P	C
0	0	3	1.5

Subject Code: 20CSL202

Course Objectives

- To develop skills to design and analyze the applications with respect to java programming
- To strengthen the ability to identify and apply the suitable object oriented concept for the given Real world problem

Course Outcomes

By the end of this course the student will be able to

1. Able to write, compile and execute simple java programs
2. Explain the concept of class and objects with access control to represent real world entities
3. Use overloading methodology on methods and constructors to develop application programs
4. Describe the concept of interface and abstract classes to define generic classes
5. Able to create user defined packages and handle exceptions at run time
6. Apply Threading concept based on application requirement and design Applet programming

List of Experiments

1. A) Write a java program that displays welcome to follow by user name. Accept user name from the user.
   B) Write a java program that prompts the user for an integer and then prints out all the prime numbers up to that integer.

2. A) Write a java program to create a class Rectangle. The class has attributes Length and Width. It should have methods that calculate Area and Perimeter of the Rectangle. It should have read Attributes () method to read Length and Width from the user.
   B) The Fibonacci sequence is defined by the following rule: The first two values in the sequence are1 and 1. Every subsequent value is the sum of the two values preceding it.

3. A) Write a java program that uses both Recursive and Non-Recursive functions to find the factorial of a given number.
   B) Write a java program that checks whether the given string is Palindrome or not. Ex: MALAYALAM is a Palindrome.

4. A) Write a java program to illustrate method overloading and method overriding.
   B) Writ a java program that illustrates how java achieved Run Time Polymorphism.
5. A) Write a java program to demonstrate the use of subclass.
   B) Write a java program for abstract class to find areas of different shapes.

6. Write a Java program to implement the concept of importing classes from user defined package and creating packages.

7. Write a java program to implement the concept of Exception Handling by using predefined and user defined exceptions.

8. Write a java program to implement the concept of Threading by Extending Thread class and by Implementing Runnable Interface.

9. Write a program using Applet to display a message in the Applet and for configuring Applets by passing parameters.

10 Write a java program to implement thread priorities

Text Books

1. Herbert Schildt: "Java The complete reference", 9th Edition, Tata McGraw Hill, 2017.
2. E.Balaguruswamy: "Programming with Java A Primer", 5th Edition, Tata McGraw Hill, 2017.

Reference Books

1. Timothy budd, "An introduction to object-oriented programming", 3rdEdition, Pearson Education, 2009.
2. Y. Daniel Liang, "Introduction to Java programming", 9thEdition, Pearson education, 2012

Human Values
(Common to all Branches)

L	T	P	C
2	0	0	0

Subject Code: 20MCT205

Course Objectives

- To educate the students how to governance the professional behavior in their carrier as employee.
- To make aware of culture when they are working in different organizations.
- Understand value of education and self- development.
- Imbibe good values in students.
- Let the student know about the importance of character.
- Let the student to discriminate the personality and behaviour development.

Course Outcomes

By the end of this course the student will be able to

1. Upon completion of this course students can aware of ethical behavior in the work place
2. To shapes the students by the end of this curriculum with appropriate behavior in the society
3. To understand the challenging environment in work place
4. To understand the Global culture in engineering problems
5. Learn the importance of Human values
6. Knowledge of self-development, Developing the overall personality

Unit – I

INTRODUCTION TO VALUES AND MORALS: Theory of Evolution – Ethics as a necessity for spiritual evolution-- Description of Human Values & Morals ---- Values --- Integrity, Honesty, Courage, Empathy, Personality, Character, Self-Confidence, Respect for Others, 7 Ways of Misusing Truth – Work Culture, Social Responsibility, Responsibilities as a Citizen, Cooperation and Commitment, Caring and Sharing--- Religion vs. Spirituality, Philosophy, Customs and Practices --- Impediments to Responsibility – Self-Interest, Fear, Self-Deception, Ignorance, Ego, Narrow Vision, Uncritical Acceptance of Authority, Group Thinking

Unit – II

MIND AND ITS MYSTERIES: What is Mind? Mind and Body, Mind and Food--- Mental faculties, Theory of perception, Memory, Tendencies, Thought Creates the World -- Power of Thought, Thought Culture, Desires, Pleasure and Pain -- Cultivation of Virtues, Control of Senses and Mind -- Discrimination, Dispassion, Sacrifice – Concentration, Meditation and Enlightenment

Unit – III

RISK, SAFETY AND ENVIRONMENT: Difficulties in Estimating Risk -- Approach to Acceptable Risk, Regulator's Approach to Risk – Engineer's Liability, Changing Legal Rights of the

Employees -- Organizational Disobedience by Contrary Action, by Non-Participation, by Protest – Environmental Laws and Judicial Intervention in Related Matters -- Environmental Movements

Unit – IV

NON-ETHICAL PRACTICES IN VOGUE: Engineer's Responsibility for Rights - Respect for Authority – Conflict of Interests - Occupational crime -- Global Issues – How Multinational Corporations Influence Government Decisions, Risk and Public Policy- Engineers as Managers, Advisors and Experts, Engineers as Moral Leaders Problem of Bribery, Extortion, Grease Payments, Nepotism ----Nexus between Politicians and Industrialists. Case Study – Chinese Minister Sentenced to Death for Corruption

Unit – V

VALUES AND SELF-DEVELOPMENT: Social values and individual attitudes. Work ethics, Indian vision of humanism Moral and non- moral valuation Standards and principles Value judgments

Unit-VI

PERSONALITY AND BEHAVIOR DEVELOPMENT: Soul and Scientific attitude Positive Thinking. Integrity and discipline Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance true friendship, happiness Vs suffering, love for truth. Aware of self-destructive habits, Association and Cooperation, Doing best for saving nature

Text Books:

1. Charles E Harris, Micheal J Rabins, "Engineering Ethics, Cengage Learning
2. Mike Martin and Roland Schinzinger, "Ethics in Engineering" McGraw Hill
3. Mind, Its Mysteries and Control, Swami Sivananda, Divine Life Society Pub.
4. Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi

Probability & Statistics with R

L	T	P	C
3	0	0	3

Subject Code: 20BST204

Course Objectives

- To introduce the concept of discrete random variable and describe Binomial, Poisson distributions.
- To introduce the concept of a continuous random variable and describe Normal distribution.
- To analyze sampling distribution of means and estimation.
- To perform large sample tests – test of means and proportion.
- To perform the small sample tests - t-test, F-test and Chi-square test and ANOVA for the give data.
- To determine correlation and regression coefficients for given data**.**

Course Outcomes

By the end of this course the student will be able to

1. Calculate the probability of a random variable following Binomial, Poisson distributions.
2. Obtain the probability of a random variable Normal distribution.
3. Determine the sampling distribution of means for the given data and estimate the parameters using point estimation and interval estimation.
4. Perform the large sample tests – test of means and proportion.
5. Perform the small sample tests - t- test, F-test, Chi-Square and analyze ANOVA for the given data.
6. Determine correlation and regression coefficients for given data.

Unit – I

Discrete Random variables and Distributions: Introduction- Random variables- Discrete Random variable-Distribution function-Expectation- Discrete distributions: Binomial, Poisson distributions.

Unit – II

Continuous Random variable and distributions: Introduction-Continuous Random variable-Distribution function- Expectation- Continuous distribution: Normal distributions.

Unit – III

Sampling Theory: Introduction - Population and sample- Sampling distribution of means (with σ known and σ unknown) - Central limit theorem- sampling distribution of sums and differences - Point estimation- Maximum error of estimate - Interval estimation.

Unit – IV

Tests of Hypothesis (Large samples): Introduction –Hypothesis-Null and Alternative Hypothesis-Type I and Type II errors –Level of significance - One tail and two tail tests- Tests concerning single mean and single proportion- Tests concerning difference of means and difference of proportions.

Unit – V

Test of Hypothesis (Small Samples): Introduction - student's - t -test, F-test, Chi-square Test (Test of independence of attributes and goodness of fit) -ANOVA for one-way and two-way classified data.

Unit-VI

Correlation and Regression: Introduction - Concept of correlation–types of correlation-Karl-Pearson correlation coefficient method and its properties-Rank Correlation Coefficient. Regression-Linear regression and its properties.

Text Books:

1. Probability and Statistics for Engineering, Richards A Johnson, Irvin Miller and Johnson E Freund, 9th Edition, PHI.
2. Introduction to Probability and Statistics Using R, G. Jay Kerns, First Edition, ISBN: 978-0-557-24979-4. (Free e-book from R software website)
3. Probability and Statistics, Dr.T.K.V.Iyengar, Dr.B.Krishna Gandhi, S.Ranganatham and Dr.M.V.S.S.N.Prasad, S.Chand Publications.

Reference Books:

1. Probability and Statistics Engineers and the Scientists, Shron L. Myers, Keying Ye, Ronald E Walpole, 8th Edition, Pearson 2007.
2. Introduction to probability and statistics, William Menden Hall, Robert J. Bever and Barbara Bever, Cengage learning, 2009.
3. Introduction to probability and statistics Engineers and the Scientists, Sheldon, M. Rosss, Academic Foundation,2011.
4. Applied statistics for Engineers and Physical Scientists, Johannes Ledolter and Robert V.Hogg, 3rd Edition, Pearson,2010.
5. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley-India, 10th Edition.

Design & Analysis of Algorithms

L	T	P	C
2	1	0	3

Subject Code: 20CST205

Course Objectives

- Analyze the asymptotic performance of algorithms
- Write rigorous correctness proofs for algorithms
- Demonstrate a familiarity with major algorithms
- Apply important algorithmic design paradigms and methods of analysis
- Synthesize efficient algorithms in common engineering design situations

Course Outcomes

By the end of this course the student will be able to

1. Measure the performance and calculate the Time & Space complexities of algorithms
2. Design effective algorithms based on Divide and Conquer
3. Develop strategic plans to optimize solutions using Greedy method
4. Discuss various problems suitable to Dynamic programming
5. Construct a state space tree to solve different problems using Backtracking technique
6. Find an optimal solution by applying different Branch and Bound techniques and illustrate Non- deterministic algorithms

Unit – I

Introduction Areas of Study of Algorithms; Pseudo-code Conventions; Performance Analysis, Asymptotic notations, Amortized analysis.

Unit – II

Divide and conquer: General method, Applications: Binary search, Quick sort, Merge sort, Strassen's Matrix multiplication.

Unit – III

Greedy method: General method, Applications: Job sequencing within deadlines, Knapsack problem, Minimum cost spanning trees, Single source shortest path problem

Unit – IV

Dynamic Programming: Principle of Optimality, Applications: Matrix chain multiplication, Optimal Binary Search Trees (OBST), 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem.

Unit – V

Graph traversals: DFS & BFS, Connected components, Articulation point & Bi-Connected components.

Backtracking: General method, Applications: n-Queens problem, Sum of subsets problem, Graph Colouring, Hamiltonian cycles.

Unit-VI

Branch and Bound: Least Cost (LC) Search, FIFO Branch and Bound & LC Branch and Bound, Applications: 0/1 knapsack problem, Travelling sales person problem.

NP-Hard and NP-Complete problems: Basic concepts, Non-deterministic algorithms, Cook's theorem.

Text Books:

1) Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Second Edition, Universities Press, India, 2010.
2) Aho, Ullman and Hopcroft, "Design and Analysis of algorithms", Pearson Education, Fourth Edition, India, 2009

Reference Books:

1) Anany Levitin, "Introduction to Design & Analysis of Algorithms", Second Edition, Pearson Education, India, 2008.
2) Jon Kleinberg & Eva Tardos, "Algorithm Design", Second Edition, Pearson Education, India, 2008.

Web reference:

1) http://nptel.ac.in/courses/106101060/

Data Base Management Systems

L	T	P	C
3	0	0	3

Subject Code: 20CST206

Course Objectives

- To introduce basic RDBMS concepts, SQL, Database Design and Query processing. And also to introduce transaction processing, issues and techniques relating to concurrency and recovery in multi-user database environments, and various Data structures for External Data storage and efficient retrieval.

Course Outcomes

After successful completion of the course, the students will be able to:

1. Differentiate Database Systems from File Systems and Define the Terminology, Features, Classifications, Characteristics embodied in Database Systems
2. Interpret, Design and Implement an E-R Model
3. Create/Modify the structure and write optimized SQL queries to extract and modify Information from Tables or Views
4. Apply proper Techniques such as Normalization and analyze the applicability of a specific Normal Form in designing a Database
5. Explain broad range of Database Management issues including Data integrity, Concurrency and Recovery
6. Compare various Indexing, Hashing and File Organization Techniques.

Unit – I

Database System Applications: Database Systems versus file Systems; View of Data: Data Abstraction, Instances and Schemas; Data Models: The ER Model, Relational Model, Other Data Models; Database Languages: DDL, DML, Database Access from Application Programs; Database Users and Administrators; Transaction Management; Database System Structure: Storage Manager, the Query Processor.

(**Text Book 2**)

Unit – II

Database Design and ER Diagrams: Beyond ER Design; Entities, Attributes and Entity sets; Relationships and Relationship sets; Additional features of ER Model; Conceptual Design with the ER Model; Introduction to the Relational Model; Integrity Constraints over relations; Enforcing Integrity constraints; Querying relational data; Logical database Design: ER to Relational; Introduction to Views: Destroying/Altering tables and Views; Relational Algebra: Selection and projection, set operations, renaming , Joins, Division. (**Text Book 1**)

Unit – III

SQL: Queries, Constraints, Triggers: Overview; The Form of a Basic SQL Query; Nested Queries: Introduction to Nested Queries, Correlated Nested Queries, Set-Comparison Operators; Aggregative

Operators ; NULL values : Comparison using Null values; Logical connectives AND, OR, and NOT, Impact on SQL Constructs, Outer Joins, Disallowing NULL values; Triggers and Active Data bases. (**Text Book 1**)

Unit – IV

Schema Refinement and Normal Forms: Problems Caused by Redundancy, Problems related to Decomposition; Functional Dependencies; Normal Forms: FIRST, SECOND, THIRD Normal Forms, BCNF; Properties of Decompositions: Lossless-Join Decomposition, Dependency-Preserving Decomposition. (**Text Book 1**)

Unit – V

Transaction Concept: Transaction State; Implementation of Atomicity and Durability; Concurrent Executions; Serializability; Recoverability; Lock–Based Protocols: Locks, Granting of locks, The Two-Phase Locking Protocol (2PL), Implementation of locking ; Timestamp-Based Protocols.

Recovery System: Failure classification; Log–Based Recovery; Shadow Paging; Buffer Management; Failure with loss of Nonvolatile storage.(**Text Book 2**)

Unit-VI

File Organization and Indexes: Comparison of File Organizations; Properties of Indexes: Clustered versus Unclustered Indexes, Dense versus Sparse Indexes, Primary and Secondary Indexes; Index Data Structures: Hash Based Indexing, Tree based Indexing: ISAM; B+ Trees: A Dynamic Index Structure.

(**Text Book 1**)

Text Books:

1. Raghu Ramakrishnan, Johannes Gehrke: Database Management Systems, TATA McGraw Hill, Fourth Edition, 2010.
2. Abraham Silberschatz, Henry F. Korth : Database System Concepts, McGraw Hill, Sixth Edition, 2011.

Reference Books

1. Peter Rob, Carlos Coronel: Database Systems: Design, Implementation, and Management, Cengage Learning, Seventh Edition, 2006.
2. Elmasri, Navathe: Fundamentals of Database Systems. Pearson Education, Sixth Edition, 2010.
3. C.J. Date: Introduction to Database Systems, Pearson Education, Fourth Edition, 2005.
4. https://www.coursera.org/course/db

Operating Systems

L	T	P	C
3	0	0	3

Subject Code: 20CST207

Course Objectives

- Understand structures and functions of operating systems
- Learn about Processes, Threads and Scheduling algorithms
- Understand the principles of concurrency
- Understand Deadlock Management
- Learn various memory management schemes
- Study File systems and Mass-storage devices

Course Outcomes

By the end of this course the student will be able to

1. Explain different types of operating systems and implement various process management concepts for maximization of CPU throughput
2. Analyze the mechanisms used for process synchronization
3. Implement deadlock handling methods
4. Compare and contrast various memory management schemes
5. Design and Implement file systems
6. Familiarize with disk organization and device drivers

Unit – I

Operating System structures: Overview of Operating System, Operating systems services, types of operating systems, system calls, types of system calls

Process Management: Process concept, process scheduling, operations on processes, scheduling criteria, scheduling algorithms, and their evaluation.

Unit – II

Concurrency: Process synchronization, the critical-section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors

Unit – III

Principles of deadlock: System model, deadlock characterization, deadlock prevention, deadlock detection, deadlock avoidance, recovery form deadlock

Unit – IV

Main Memory Management: Swapping, Contiguous memory allocation, paging, structure of the page table, segmentation, segmentation with paging

Virtual Memory Management: Virtual memory, demand paging, page replacement algorithms: FIFO, optimal page replacement and LRU, Allocation of frames, Thrashing.

Unit – V

File System Interface: The concept of a file, file attributes, file types, access methods: sequential access, direct access and indexed access, directory structure, files sharing, protection.

File System Implementation: File system structure, file system implementation, directory implementation, allocation methods: contiguous allocation, linked allocation and indexed allocation, free-space management.

Unit-VI

Mass-storage structure: Overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling, block and character devices.

Text Books:

1. Abraham Silberchatz, Peter B. Galvin and Greg Gagne, Operating System Concepts, 9th Edition, John Wiley & Sons(Asia) Pvt Ltd.
2. William Stallings, Operating Systems-Internal and Design Principles,7th Edition, Pearson

Reference Books:

1. D.M. Dhamdhere, Operating systems-A concept based approach, 3rd Edition, TMH
2. Crowley, Operating Systems-A Design-Oriented Approach,7th Edition, Pearson
3. Andrew S Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson

Referencelinnks

1. http://www.cs.kent.edu/~farrell/osf03/oldnotes/index.html : Lecture Notes
2. http://www.computerhope.com/os.htm : Different Types of Operating Systems
3. http://nptel.iitm.ac.in/courses/Webcourse-contents/IISc-BANG/
4. http://www.personal.kent.edu/~rmuhamma/OpSystems/os.html : OS Lecture Notes

Probability & Statistics with R Lab

L	T	P	C
0	0	3	1.5

Subject Code: 20BSL203

Course Objectives

- To introduce basic R operations and determine the probabilities of a random variable using Binomial, Poisson's, Normal distribution.
- To determine the probabilities of sample mean using central limit theorem and to estimate confidence interval using R programming.
- To perform z-test for sampling distribution using R - programming.
- To analyze t-test and F-test for sampling distribution using R - programming.
- To perform χ^2-test and Analysis of variance (ANOVA) using R - programming.
- To calculate correlation and regression for given data using R programming.

Course Outcomes

On completion of this course, students will be able to

1. Obtain probabilities of random variable of a Binomial, Poisson's, Normal distribution using R programming.
2. Calculate probabilities of sample mean and confidence interval using R - programming.
3. Perform z – test for sampling distributions using R programming.
4. Perform t – test and F-test for sampling distributions using R programming.
5. Analyze tests of significance using χ^2-test and ANOVA using R programming.
6. Determine the coefficient of correlation and regression equations for given data using R programming.

List of Experiments

1. Calculate the probability of random variable for Binomial distribution using R.
2. Calculate the probability of random variable for Poisson distribution using R.
3. Calculate the probability of random variable for Normal distribution using R.
4. Calculate probability of mean of random variable using central limit theorem using R.
5. Calculate the confidence interval for mean and proportions C.
6. Perform z-test for testing single mean and difference of means at α level of significance using R.
7. Perform z-test for testing single proportion and difference of proportions at α level of significance using R.
8. Perform t-test for testing the single mean and difference of means at α level of significance using R.
9. Perform F-test for testing the equality of population variances at α level of significance using R.
10. Perform χ^2-test for testing the goodness of fit and independence of attributes using R.
11. Perform ANOVA of one way and two way classifications to test on the basis of sample observations whether the means of 3 or more populations are equal or not, using R.
12. Perform Correlation and regression for given data, using R.

Data Base Management Systems Lab

Subject Code: 20CSL203

L	T	P	C
0	0	3	1.5

Course Objectives

- To teach defining Logical Database schema, Query writing to retrieve required information from single/multiple tables, Creation and manipulation of views. Implementing Operations on relations (Tables) using PL/SQL, Writing Triggers for implementing automatic operations and constraints, Writing Cursors, Functions and Procedures for various tasks on tables, Exception handling and Packages

Course Outcomes

After completion of this course, the Students will be able to:

1. Create relational database
2. Manipulate data using SQL
3. Compose Queries to retrieve required information from Database
4. Use Aggregate functions
5. Develop programs using Triggers and Cursors
6. Design Procedures, Functions and Packages for required Database tasks

List of Experiments

1. Execute DDL and DML commands
   Execute single line and group functions on a table.
2. Create tables for various relations in SQL with necessary integrity constraints, keys, data types.
   Verify messages by violating the constraints.
   Perform various join operations like Equi and non-equi, outer join, self join on two tables and show the results.
3. Execute DCL and TCL Commands.
   Write a PL/SQL program for accepting a number and indicate whether it is odd or even.
4. Write a PL/SQL program to find the largest of three integers.
   Write a PL/SQL program to find the factorial of a given integer and store the integer with it's factorial in a table.
5. Write a PL/SQL program to display the sum of digits of given number.
   Write a PL/SQL program to display the reverse of given number.
6. Write a PL/SQL program to accept two numbers N1 and N2 and perform division operation.
   And also handle the exception "Divide by zero "when N2 is zero.
   Write a PL/SQL program to accept the customer id from the user and display the corresponding customer name and address from customer table. Raise user defined exception "invalid- id" when customer id is <=0 and catch built in exceptions "no data found " and display suitable messages for each exception.
7. Write a PL/SQL program using Cursors to update the salaries of Employees as follows.

And also count and display the no. of records have been updated.*/
if sal<1000 then update the salary to 1500.
if sal>=1000 and <2000 then update the salary to 2500.
if sal>=2000 and <=3000 then update the salary to 4000.

8. Write a PL/SQL program using triggers to automatically store all the deleted records from employee table in a separate table called "employees history " along with date of deletion,user-id of the person who deleted.
9. Write a PL/SQL program to which computes and returns the maximum of two values using a function.
   Write a PL/SQL procedure to display all the records of employee table in a neat format.
10. Write a PL/SQL program to create a Package to group logically related variables, types and sub programs and use the package elements later.

Text Books:

1. SQL, PL/SQL the Programming Language of Oracle by Ivan Bayross, BPB Publications, 4th Edition

Operating Systems Lab

Subject Code: 20CSL204

L	T	P	C
0	0	3	1.5

Course Objectives

- To understand the design aspects of operating system.
- To study the process management concepts & Techniques.

Course Outcomes

1. Choose the best CPU scheduling algorithm for a given problem
2. Describe and analyze the memory management and its allocation policies.
3. Identify the performance of various page replacement algorithms
4. Develop algorithm for deadlock avoidance, detection.
5. Design and implement file allocation techniques

List of Experiments

1) Simulate the following CPU scheduling algorithms
   a) FCFS b) SJF
2) Simulate the following CPU scheduling algorithms
   a) Round Robin b) Priority
3) Simulate Bankers Algorithm for Dead Lock Avoidance
4) Simulate Bankers Algorithm for Dead Lock Detection
5) Simulate MVT and MFT
6) Simulate all page replacement algorithms
   a) FIFO b) LRU c) Optimal
7) Simulate Paging Technique of memory management.
8) Simulate all file allocation strategies
   a) Sequential b) Indexed c) Linked

Text Books:

1 Abraham Silberchatz, Peter B. Galvin, Greg Gagne Operating System Principles- 7th Edition, John Wiley.
2 Stallings, 2005, Operating Systems – Internal and Design Principles Sixth Edition, Pearson education.

Reference Books:

1. http://nptel.iitm.ac.in/courses/Webcourse-contents-IISc-BANG/Operating%20Systems New_index1.html
2. D.M. Dhamdhere Operating systems-A concept based approach-, 2nd Edition, TMH
3. Crowley Operating System A Design Approach-, TMH.
4. Andrew S Tanenbaum Modern Operating Systems, 2nd edition Pearson/PHI

Transform Theory

(Interdisciplinary Elective – I)

(Common to Mechanical, Civil)

L	T	P	C
3	0	0	3

Subject Code: 20IET211

Course Objectives

- To study the Laplace transform of different basic functions and its properties.
- To study Inverse Laplace Transforms and apply Laplace transforms to solve differential equations.
- To Study the mathematical tool of Fourier transforms their properties and applications.
- To study Inverse Fourier transforms their properties.
- To study the mathematical tool of Z- transform, their properties and implementation.
- To study Inverse Z Transforms and apply Z- transform to solve Difference Equations..

Course Outcomes

The student will be able to:

1. Evaluate Laplace Transform of different functions utilizing its properties.
2. Evaluate Inverse Laplace Transform of different functions and solve Differential Equations.
3. Estimate Fourier transform/ Fourier sine(cosine) Transform of functions.
4. Estimate inverse Fourier transform/ inverse Fourier sine(cosine) transform of different functions.
5. Evaluate Z-transform of different functions utilizing different properties.
6. Evaluate inverse Z- transform of different functions and solve Difference Equations utilizing different properties.

Unit – I

Laplace Transforms: Laplace Transform for elementary functions – Properties- 1^{st} shift and 2^{nd} shifting theorems - Laplace transform of derivative, integrals, multiplication by t^n and division by t- unit step and unit impulse function.

Unit – II

Inverse Laplace Transforms: Inverse Laplace Transform –Evaluation by partial fractions, convolution theorem(without proof), application of Laplace transforms to solve ordinary differential equations.

Unit – III

Fourier Transforms : Fourier Integral Theorem (without proof)- Fourier sine and cosine integrals – complex form of Fourier Integral - Fourier transform – Fourier sine and cosine transforms – properties.

Unit – IV

Inverse Fourier Transforms: Inverse Fourier Transforms, Inverse sine and cosine transforms - properties – Convolution Theorem.

Unit – V

Z - Transforms:

Z-transform – Linear property – Damping rule – Shifting rule – Initial and final value theorems- Z transforms of functions multiplied and divided by n.

Unit – VI

Inverse Z- Transforms:

Inverse Z-Transforms of basic functions, Partial fractions, Convolution theorem. Application of Z transforms to solve Difference Equations.

Text books:

1) B.V.Ramana, Higher Engineering Mathematics, 44th Edition, Tata McGraw Hill New Delhi,2014.
2) Dr.B.S.Grewal, Higher Engineering Mathematics, 43nd Edition, Khanna Publishers, 2015.

References

1. Advanced Engineering Mathematics , Erwin Kreyszig, 9th Edition, John Wiley & Sons.
2. Engineering Mathematics for first year, Veerarajan T., Tata McGraw-Hill, New Delhi.
3. A text book of Engineering Mathematics, N.P. Bali and Manish Goyal, Laxmi Publications.

Numerical Methods

(Interdisciplinary Elective – I)

(Common to ECE, EEE)

L	T	P	C
3	0	0	3

Subject Code: 20IET212

Course Objectives

- To Solve the algebraic and transcendental equations, using different numerical method.
- Calculate the value of dependent variable for a particular x by deducing the unknown function y=f(x) for an evenly or unevenly spaced points.
- To estimate the value of derivatives using different numerical methods.
- To evaluate the definite integrals using different numerical methods.
- To calculate the numerical solution of an ordinary differential equation i.e IVP .
- Estimate an equation of curve which fits a given data.

Course Outcomes

On completion of this course, students should be able to

1. Solve the algebraic and transcendental equations by identifying suitable numerical methods.
2. Estimate a linear and non-linear curve to the given data by the method of least squares.
3. Calculate the value of dependent variable for a particular x by deducing the unknown function y = f(x) for an evenly or unevenly spaced points.
4. Estimate the value of derivatives and evaluate the definite integrals using different numerical methods and evaluate an IVP.
5. Calculate the numerical solution of an ordinary differential equation i.e IVP .
6. Enables to fit a equation of curve to the given data.

Unit – I

Algebraic and Transcendental Equations: Solution of Algebraic and Transcendental Equations: Introduction – The Bisection Method – The Method of False Position – The Iteration Method – Newton-Raphson Method.

Unit – II

Interpolation: Interpolation**:** Introduction – Finite differences- Forward Differences – Backward differences – Central differences-Relation between different operators- Newton's Interpolation formulae –Gauss Interpolation Formulae- Interpolation with unevenly spaced points – Lagrange's Interpolation formula.

Unit – III

Numerical Differentiation: Numerical Differentiation– Differentiation using finite differences- Newton's Forward – Backward- Lagranges- Stirling's formula-Lagrange's interpolation formula.

Unit – IV

Numerical Integration: Numerical Integration – Trapezoidal rule – Simpson's 1/3 Rule –Simpson's 3/8 Rule. Numerical double integration - Trapezoidal rule – Simpson's 1/3 Rule.

Unit – V

Numerical solution of Ordinary Differential equations: Solution by Taylor's series – Picard's Method of successive Approximations – Euler's Method – Runge – Kutta Method(4^{th} order).

Unit – VI

Curve Fitting: Curve fitting: Fitting a straight line-Second degree curve-Exponential curve-Power curve by method of least squares.

Text Books:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, New Delhi, 42nd edition, 2012.
2. A Text Book on Mathematical Methods, Ravindranath, V. and Vijayalaxmi, A.,Himalaya Publishing House, Bombay, 2nd edition, 2012.

Reference Books:

1. Engineering Mathematics Vol.2.-Mathematical Methods(JNTU Kakinada), Dr.T. K.V.Iyengar, Dr.M.V.S.S.N.Prasad, S.Ranganatham, Dr.B.Krishna Gandhi, , S. Chand Publications.
2. Engineering Mathematics, B. V. Ramana, Tata McGraw Hill, New Delhi.

Introduction to Number Theory

(Interdisciplinary Elective – I)

(Common to CSE, IT)

Subject Code: 20IET213

L	T	P	C
3	0	0	3

Course Objectives

- Identify importance of divisibility, prime and composite numbers in engineering field.
- Understand the process of congruence and solve linear congruence using their properties.
- Gain knowledge and importance of Euler-Fermat Theorem, Wilson Theorem, Chinese Remainder Theorem.
- Know the application of Mobious function and Euler totient function in their relevant problems.
- Calculate Quadratic Residues and use Quadratic reciprocity law in engineering subjects.
- Encrypt and decrypt the messages using Cryptography.

Course Outcomes

By the end of this course the student will be able to

1. Solve the divisibility problems, GCD, LCM, Bracket function.
2. Solve congruence problems, solutions of linear congruence equations.
3. Apply Euler-Fermat Theorem, Wilson and Chinese Remainder Theorems in engineering problems
4. Apply Euler-totient function and solve engineering relevant problems.
5. Estimate the reciprocity of a number.
6. Applying the process of encryption and decryption in converting the messages using Cryptography.

Unit – I

Divisibility Divisibility, Statement of Division Algorithm, GCD, Prime, Composite numbers, Statement of Fundamental theorem of Arithmetic, LCM, Bracket function, The " O" and "o" Symbols, Properties.

Unit – II

Congruence's Introduction to Congruence's, Residue systems, Euler's $\emptyset$ function, linear congruence's, properties and their solutions

Unit – III

Euler-Fermat Theorem, Wilson Theorem, The Chinese Remainder Theorem Statement of Euler's Theorem, Fermat Theorem, Wilson Theorem, the Chinese Remainder Theorem, properties and problem.

Unit – IV

Multiplicative Number theoretic Functions Definitions and properties, Euler's totient function $\emptyset(n)$, the sum of divisors function, the number of divisors function, product formula, Mobius function $\mu(n)$ and Mobious Inverse formula, perfect, Mersenne and Fermat Number.

Unit – V

Primitive Roots and Quadratic Residues Order of Integers and Primitive roots, primitive roots for primes, the existence of primitive roots, Quadratic residues, Legendre's symbol and its properties, Evolution of (-1/p) and (2/p), Gauss' lemma, the Quadratic Reciprocity law, application of the reciprocity law, the Jacobi symbol.

Unit – VI

Cryptography Introduction to Cryptography, Ciphers, Block and Stream Ciphers, Exponential Ciphers, Public Key Cryptography, Cryptographic protocol and applications.

Text books:

1. Introduction to Analytic Number theory, Tom M, Apostol,(Springer International Student Edition). Naroda Publishing House, Springer Publisher -8th reprint. ISBN: 81-85015-12-0.
2. Elementary Number Theory and its Applications, Kenneth H. Rosen, Pearson Publications (Sixth edition-Online, ISBN 10:0-321-50031-8, ISBN 13: 978-0-321-50031-1.)
3. An Introduction to the theory of Numbers, Ivan Niven- Herbert S, Zuckermam-Hugh L. Montgomery –John Wiley & Sons Publisher (Online- Fifth Edition , ISBN 0-471-62546-9)

References

1. Theory of Numbers, Prakash Om, Laxmi Publications (p) LTD, New Delhi.

Elements of Building Planning

(Interdisciplinary Elective – I)
(Common to Civil)

Subject Code: 20IET214

L	T	P	C
3	0	0	3

Course Objectives
Students will have

- To interpret the conventional building materials.
- To summarize the objectives of building byelaws, principles and regulations
- To apply the minimum standards for various parts of buildings.
- To draw the line plan of a school and hospital for given site plan
- To describe the orientation of buildings based on earth's motion around the sun and significance of bond for brick walls
- To draw plan, elevation and sectional elevation of single room buildings from the given line diagram.

Course Outcomes
After completion of this course, students should be able to

1. Interpret the conventional building materials.
2. Summarize the objectives of building byelaws, principles and regulations
3. Apply the minimum standards for various parts of buildings.
4. Draw the line plan of a school and hospital for given site plan
5. Describe the orientation of buildings based on earth's motion around the sun and significance of bond for brick walls
6. Draw plan, elevation and sectional elevation of single room buildings from the given line diagram.

Unit – I
Building Materials: Conventional Building Materials such as Brick, Cement, Steel, Wood - Modern Building Materials – Plumbing Fixtures – Sanitary fittings – Materials for Building Electrification – Ready to use building materials currently available in the market.

Unit – II
Building Byelaws and Regulations: Introduction- terminology- objectives of building byelaws floor area ratio floor space index- principles under laying building bye laws- classification of buildings- open space requirements – built up area limitations- height of buildings- wall thickness – lightening and ventilation requirements.

Unit – III
Residential buildings: Minimum standards for various parts of buildings, requirements of different rooms and their grouping, characteristics of various types of residential buildings - Study of structural elements of Building – Minimum standards for Septic tank, balcony, corridor and staircase.

Unit – IV

Public Buildings: Planning of educational institutions, hospitals and dispensaries. Requirements and minimum standards for various public buildings. Draw the line plan of a school and hospital for given site plan

Unit – V

Principles of Planning and Orientation of the Residential Building: Orientation of Buildings based on Earths motion round the Sun – Significance of Bond for Brick walls – Study of specifications of doors, Windows, ventilators and roofs – Prefabricated Buildings and Toilets.

Unit – VI

Drawing practice: Single room building, given line diagram with specifications to draw, plan, elevation and sectional elevation.

Text Books:

1. Planning and Design of buildings by Y.S. Sane, 2015
2. Planning, designing and Scheduling by Gurucharan Singh and Jagadish Singh, 2012
3. Building planning and drawing by M. Chakravarthi, 2016

Reference Books:

1. Building drawing by Shah and Kale
2. ‘A’ Series & ‘B’ Series of JNTU College of Engineering, Anantapur,

Remote Sensing

(Interdisciplinary Elective – I)

(Common to CSE, IT, ECE, EEE)

L	T	P	C
3	0	0	3

Subject Code: 20IET215

Course Objectives

The objective of the course is to

- To demonstrate the working principle of remote sensing
- To differentiate the types platforms and orbits
- To describe the various types of sensors and resolutions
- To utilize different digital image processing and visual interpretation techniques to extract
- meaningful information from spatial data
- To illustrate the image classification procedure
- To explain the use of remote sensing in different applications.

Course Outcomes

On completion of the course, the students will be able to:

1. Demonstrate the working principle of remote sensing
2. Differentiate the types of platforms and orbits
3. Describe the types of sensors & resolutions
4. Utilize different digital image processing and visual interpretation techniques to extract meaningful information from spatial data
5. Illustrate the image classification procedure
6. Explain the use of remote sensing in different applications.

Unit – I

Introduction: Definition, Basic components of remote sensing, Electromagnetic radiation, Electromagnetic spectrum, EMR interaction with atmosphere - EMR interaction with Earth Surface Materials.

Unit – II

Platforms: Introduction, Platforms- Ground borne, Airborne remote sensing, Space borne remote sensing; Orbital Characteristics, Type of Orbits

Unit – III

Sensors & Resolution: Introduction, Sensors- Passive sensors, Active sensors; Spatial Resolution, Spectral Resolution, Temporal Resolution, Radiometric Resolution.

Unit – IV

Image Analysis: Introduction, Digital Image processing, elements of visual interpretations, image enhancement techniques.

Unit – V

Image classification: Introduction, Principles of Image classification, Process of image classification supervised classification, unsupervised classification.

Unit – VI

Applications: Land use/Land cover, Agriculture, Forest, Water Resources and Urban Planning

Text books

1. LRA Narayana, *"Remote Sensing and its Applications"* University Press, 1999.
2. M. Anji Reddy, *"Remote Sensing and Geographical Information Systems*", BS Publications, 4th edition,2014.
3.Basudeb Batta, *"Remote Sensing and GIS",* Oxford University Press, New Delhi, 2nd Edition, 2011

Reference Books

1. S.Kumar, *"Basics of Remote Sensing and GIS"*, Laxmi Publications, 1st Edition, 2016.
2. Lillesand, Kiefer, Chipman, *"Remote Sensing and Image Interpretation"*, Willy Publishers, 7th Edition, 2015
3. James B. Cambell, Rondolph H. Wynne, *"Introduction to Remote Sensing"*, Guilford Press, London and Newyork, 5th Edition, 2011

Mathematical Simulation and Modeling

(Interdisciplinary Elective – I)

(Common to CSE, IT, ECE, Mechanical, Civil)

Subject Code: 20IET216

L	T	P	C
3	0	0	3

Course Objectives

- By the end of this course, students in this class will understand the basic principles of programming and implementing mathematical concepts in MATLAB. Specifically, they will be able to write numerical algorithms and evaluate the computational results using graphical representations. The ultimate goal is to motivate the students for their profession and for future courses in curriculum.

Course Outcomes

1. Translate mathematical methods to MATLAB code.
2. Generalize results and represent data visually.
3. Apply computer methods for solving a wide range of engineering problems.
4. Utilize computer skills to enhance learning and performance in other engineering and science courses.
5. Demonstrate professionalism in interactions with industry.
6. Understands about Scilab.

Unit – I

Introduction to Matlab Historical Background, Applications, Scope of MATLAB, Importance of MATLAB for Engineers, Features, MATLAB Windows (Editor, Work Space, Command History, Command Window). Operations with Variables, Clearing Operations, Commands, Data types, Operators.

Unit – II

Data and Data Flow in Matlab Vectors, Matrix Operations & Operators, Reshaping Matrices, Arrays, Colon Notations, Functions

Unit – III

Matlab Programming Conditional Statements, Loops, Writing Script Files, Error Correction, Saving Files, Worked out Examples.

Unit – IV

Matlab Advanced Plotting graphs, Creating Plot & Editing Plot, MATLAB-Algebra, Calculus, Differential, Integration, Polynomials, solving a system of linear equations.

Unit – V

Simulink-I

Introduction, Importance, Model Based Design, Tools, Mathematical Modeling,

Unit – VI

Simulink-II Converting Mathematical Model into Simulink Model, Running Simulink Models, Introduction to scilab.

Text books

1. Getting Started With Matlab: A Quick Introduction for Scientists and Engineers (English) by RudraPratap, OXFORD University Press.
2. Matlab Programming by Y. Kirani Singh, B.B. Chaudhuri, PHI Publication

Reference Books

1. MATLAB® Programming For Engineers Fourth edition by Stephen J. Chapman
2. Applied Numerical Methods Using MATLAB 1st Edition by Won Y. Yang ,WenwuCao,Tae-SangChung,JohnMorris.
3. https://in.mathworks.com/products/simulink.html

Fundamentals of Material Science

(Interdisciplinary Elective – I)

(Common to CSE, IT, ECE, EEE, Civil)

Subject Code: 20IET217

L	T	P	C
3	0	0	3

Course Objectives

- To understand different engineering materials and their structures.

Course Outcomes

1. On completion of this course, students should be able**:** To gain thorough knowledge in engineering materials and their structures.
2. To gain thorough knowledge in deformation in different engineering materials.
3. Understand necessity of hot and cold working methods.
4. Understand thoroughly mechanical properties.
5. To acquire knowledge on material testing methods and its process
6. Understand necessity of making components using powder metallurgy route

Unit – I

Introduction: Introduction, classification of materials, crystal defects.

Unit – II

Plastic deformation of single crystals: Plastic deformation of single crystals. Deformation by slip, Deformation of single crystal. Deformation by twinning.

Unit – III

hot working, cold working. Recovery, recrystallization and grain growth. Solidification mechanism.

Unit – IV

Mechanical properties: Mechanical properties. Tensile stress-strain diagrams, proof stress, yield stress diagrams, modules of elasticity. Hardness Testing: -Rockwell, Brinell and Vickers.

Unit – V

Impact toughness, Charpy V-Notch, fracture, ductile, brittle, creep, creep mechanisms, fatigue-mechanism-factors to improve fatigue resistance

Unit – VI

Powder Metallurgy: Definition, Methods of production of metal powders, Stages in powder metallurgical components preparation, Design considerations.

Text books

1. An introduction to material Science – V Raghavan
2. Mechanical Metallurgy – GE Dieter.
3. Material Science – Callister.

Reference Books

1. Material Science for Engineers – Vanvlack.
2. Material Science for Engineers – Schakleford.

Introduction to Electronic Measurements

(Interdisciplinary Elective – I)

(Common to CSE, IT, Mechanical, EEE, Civil)

Subject Code: 20IET218

L	T	P	C
3	0	0	3

Course Objectives

- To provide knowledge of performance characteristics and classify static errors of different measuring instruments.
- To construct DC Ammeter, DC Voltmeter, Ohmmeters for measurement of unknown current, voltage and resistance.
- To introduce various Signal generators and Harmonic Distortion analyzers.
- To become familiar with the working of CRO and special Oscilloscopes for measurement of electronic parameters.
- To construct AC and DC bridges for measurement of unknown Resistance, Inductance and Capacitance.
- To understand working principles of transducers for the measurement of non-electrical quantities.

Course Outcomes

At the end of the course, the student will be able to:

1. Define various performance characteristics and classify static errors of Instruments.
2. Calculate the resistance values for construction of DC voltmeter, Ammeter and Ohmmeters.
3. Explain the working of various signal generators and analyzers for distortion measurements.
4. Describe the working and use of CRO and special oscilloscopes.
5. Determine the value of unknown resistance, inductance, capacitance and frequency of excitation.
6. Classify transducers and identify suitable transducer for measuring various non-electrical quantities.

Unit – I

Performance characteristics of instruments: Static characteristics - accuracy, resolution, precision, expected value, error and sensitivity, Error in measurement, Types of Static error, Dynamic characteristics - speed of response, fidelity, lag and dynamic error.

Unit – II

DC Meters: DC Ammeter Construction, Multirange ammeter, Universal Shunt and Extending Range. RF ammeter. DC Voltmeter – Construction, Multirange voltmeter, Extending Range. Ohmmeters - Series type and shunt type.

Unit – III

Signal Generators and Harmonic Distortion Analyzers:

Signal Generators - Standard signal generator, AF sine and square wave generator, Function Generator.

Harmonic Distortion Analyzers: Fundamental Suppression Type – Resonance Bridge, Wien's Bidge, Bridged T-Network.

Unit – IV

CRO and Special Oscilloscopes: CRT features, Block Diagram of oscilloscope, Dual Beam CRO, Dual trace oscilloscope, Storage oscilloscope.

Unit – V

DC and AC Bridges: DC Bridge – Measurement of Resistance – Wheatstone's Bridge. AC Bridges - Measurement of inductance - Maxwell's Bridge, Anderson's bridge. Measurement of capacitance – Schering's Bridge and Wien's Bridge

Unit – VI

Transducers: Classification**,** Resistive Transducer – Potentiometer type – Pressure Transducer and Position Transducer, unbonded and bonded strain gauges, Thermistor, Inductive Transducer- LVDT, Capacitive Transducer – Pressure Transducer, Temperature Transducer-Thermocouple.

Text books

1. Electronic instrumentation – H.S.Kalsi, Tata McGraw Hill, 2004, 2/e.
2. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, PHI, 2002, 5/e.

Reference Books

1. Electronic Instrumentation & Measurements - David A. Bell, PHI, 2003, 2/e.
2. Electronic Test Instruments, Analog and Digital Measurements - Robert A.Witte, Pearson Education, 2004, 2/e.

Reference Links

1. https://nptel.ac.in/courses/108/105/108105153/
2. http://nitttrc.edu.in/nptel/courses/video/108105153/108105153.html

UNIX Utilities

(Interdisciplinary Elective – I)

(Common to ECE, EEE, Mechanical, Civil)

Subject Code: 20IET219

L	T	P	C
3	0	0	3

Course Objectives

- Know about UNIX operating system
- Understand important commands which are used in UNIX
- Learn shell programming
- Study UNIX file system
- Understand the process mechanism

Course Outcomes

By the end of this course the student will be able to

1. Describe UNIX Architecture and Functions of OS
2. Demonstrate the basic set of commands and utilities in UNIX system
3. Design and Implement of UNIX file system
4. Familiar with various shell commands
5. Develop shell scripts to automate various tasks
6. Analyze the different types of processes in UNIX environment

Unit – I

Introduction to Unix-Brief History,What is Unix-Unix Components, Operating system services, Assumptions about hardware. Introduction to the Kernel: Architecture of the UNIX operating system, Introduction to system concepts – Kernel data structures – System administration.

Unit – II

Using Unix-Commands, Unix-Some Basic Commands-. Unix Command - man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip. Unix Utilities:- Introduction to unix file system, vi editor, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmask, ulimit, ps, w, Text processing utilities and backup utilities , detailed commands to be covered are tail, head , sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, comm, cmp, diff, tr.

Unit – III

The File system –The Basics of Files-What's in a File-Directories and File Names- Permissions-I Nodes-The Directory Hierarchy, File Attributes and Permissions-The File Command knowing the File Type-The Chmod Command Changing File Permissions-The Chown Command Changing the Owner of a File-The Chgrp Command Changing the Group of a File.

Unit – IV

Using the Shell-Command Line Structure-Met characters-Creating New Commands- Command Arguments and Parameters-Program Output as Arguments-Shell Variables- -More on I/O Redirection-Looping in Shell Programs.

Unit – V

Shell Programming-Shell Variables-The Export Command-The Profile File a Script Run During Starting-The First Shell Script-The read Command-Positional parameters-The $? Variable knowing the exit Status-More about the Set Command-The Exit Command- Branching Control Structures-Loop Control Structures-The Continue and Break Statement- The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<<)-The Sleep Command-Debugging Scripts-The Script Command-The Eval
Command-The Exec Command.

Unit – VI

The Process-The Meaning-Parent and Child Processes-Types of Processes-More about Foreground and Background processes-Internal and External Commands-Process Creation-The Trap Command-The Stty Command-The Kill Command-Job Control.

Text books:

1. Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Parson.
2. Your Unix the ultimate guide, Sumitabha Das, TMH. 2nd Edition.

References

1. Unix and shell programmingby B.M. Harwani, OXFORD university press.
2. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education
3. Beginning shell scripting, E. Foster – Johnson & other, Wile Y- India

Fundamentals of Data Structures

(Interdisciplinary Elective – I)

(Common to ECE, EEE, Mechanical, Civil)

Subject Code: 20IET21A

L	T	P	C
3	0	0	3

Course Outcomes:

On completion of this course, the student will be able to:

1. Compute the time and space complexities and calibrate the performance of a given algorithm.
2. Compare the performances of various Searching and Sorting techniques.
3. Illustrate the applications of Stacks and Queues.
4. Demonstrate the advantages of dynamic memory allocation via linked lists.
5. Implement the basic operations and Traversals on binary Trees.
6. Understand traversals and shortest path algorithms on a Graph.

Unit – I

Introduction: Basic Concepts of Data Structures and types of Data Structures; Performance Analysis of algorithms; Asymptotic Notations (O,Ω, θ)

Unit – II

Searching: Linear Search, Binary Search: Algorithm & Analysis; Sorting: Methodology & Performance Analysis of Sorting Algorithms: Selection, Bubble, Insertion, Quick, Merge sort.

Unit – III

Stacks: Definition, operations, Applications of Stacks: Conversion of infix to postfix expression
Queues: Definition, operations, Applications of Queues;

Unit – IV

Linked Lists: Comparison with Arrays; Operations on Singly linked list: Creation, Insertion, Deletion, Traversing; Operations on Doubly linked list; Operations on Implementation of Stack and Queue using Linked Lists.

Unit – V

Trees: Basic Terminology of Trees; Binary Tree: Traversals; Binary Search Tree Operations:Insert, Delete;

Unit – VI

Graph: Basic Terminologies and Representations of Graphs; Graph traversal algorithms: Breadth-FS & Depth-FS; Minimum spanning tree algorithms: Prim's and kruskal's algorithms

Text Books:

1. Mark Allen Weiss , “Data Structures and Algorithm Analysis”, Fourth Edition , Pearson.
2. Ellis Horowitz, Sartaj Sahni, “Fundamentals of Data Structures”, Illustrated Edition,Computer- Science Press.

Reference Books

1. Michel T. Goodrich, Roberto Tamassia, David Mount, “Data Structures and Algorithm Analysis”, 2nd Edition, John Wiley & Sons, Inc.
2. Adam. Drozdek , “Data Structure And Algorithms In C++”, 4th edition, Cengage.

Reference Links

1. https://nptel.ac.in/courses/106/102/106102064/
2. https://nptel.ac.in/courses/106/106/106106127/

Advanced Coding – I

(Interdisciplinary Elective – I)

(Common to CSE, IT)

L	T	P	C
3	0	0	3

Subject Code: 20IET21B

Course Objectives

- Understanding importance of Mathematics and Problem solving approaches for Programming
- Understanding importance of Optimized solution for problem solving

Course outcomes

After completion of the course, the students will be able to

1. Solve problems using programming
2. Design solution using OOP principles
3. Analyze time and space Complexity of Solution of a problem.
4. Select appropriate container to organize data for problem solving.
5. Develop solution for problems Using Recursion
6. Analyze the problem using Mathematics

Unit – I

CPP Essentials: Basics: Basic Syntax, Variables, Data types, Operators, Input and output, Conditional Statements and loops, pointers and Dynamic memory allocation, arrays ,vector , built in functions, user defined functions.

Problems to Practice: Missing Number ,Integer to English Words ,Integer to Roman, Roman to Integer, 2sum, 3sum,3sum closet,4sum,Remove duplicates in a list, Circular Array Loop, Fruit Into Baskets, K-diff Pairs in an Array, Move Zeroes, Rotate Array, Flipping an Image, Circular Array Loop

Unit – II

OOP Principles: Implementation of OOP principles (Encapsulation , Abstraction, Inheritance ,polymorphism) in cpp and Exception Handling.

Unit – III

Algorithm Analysis: Characteristics of algorithm, Algorithm Analysis-operation count , step counts,. asymptotic complexity, recurrence equations.

Unit – IV

Standard Template Library: Containers, Container Classes, Vectors, Lists, Iterators, Maps, Set structures, Bit set, Stack, Queue, De queue, Priority queue

Unit – V

Recursion: Recursion and its applications, Exhaustive search using Backtracking.

Problems to Practice: Permutations, Palindrome Partitioning, Beautiful Arrangement, N-Queens , Path with Maximum Gold

Unit – VI

Number Theory: Modular arithmetic, exponentiation ,Modular exponentiation, Greatest Common Divisor, Extended Euclidean algorithm, Modular multiplicative inverse, Prime Number, Sieve of Eratosthenes.

Problems to Practice: Factorial Trailing Zeroes, Happy Number, Ugly Number, Smallest Integer Divisible by K, Prime Arrangements, Poor Pigs, Check If It Is a Good Array, Rabbits in Forest

Text Books

1. The Complete Reference C++ by Herbert Schildt ,4th Edition
2. E. Horowitz. et.al., Fundamentals of computer Algorithms, Universities Press, 2008, 2nd Edition.

Reference Books

1. J.Kleinberg & E. Tardos – Algorithm Design, Pearson Education, New Delhi, 2006.
2. G.Brassard & P. Bratley – Fundamentals of Algorithms, PHI, New Delhi, 2005.
3. T.H. Cormen et.al. – Introduction to Algorithms – PHI, New Delhi, 2005.
4. S.Dasgupta et.al. – Algorithms, TMH, New Delhi – 2007.

Reference Links

1. https://leetcode.com/problems/
2. https://nptel.ac.in/courses/106106145/
3. https://www.spoj.com/problems

Competitive Programming – I

(Interdisciplinary Elective – I)

(Common to ECE, EEE, Mechanical, Civil)

Subject Code: 20IET21C

L	T	P	C
3	0	0	3

Course Objectives

- Understanding importance of Mathematics and Problem solving approaches for Programming
- Understanding importance of optimized solution for problem solving

Course Outcomes

After completion of the course, the students will be able to

1. Solve problems using programming
2. Design solution using OOP principles
3. Analyze time and space Complexity of a Solution.
4. Select appropriate container to organize data for problem solving.
5. Design a Relational Database schema for a subject of interest
6. Identify Redundancy in the Database using Normal Forms

Unit – I

CPP Essentials:

Basics: Basic Syntax, Variables, Data types, Operators, Input and output, Conditional Statements and loops, pointers and Dynamic memory allocation, arrays , vector , built in functions, user defined functions.

Problems to Practice: Missing Number ,Integer to English Words ,Integer to Roman, Roman to Integer, 2sum, 3sum,3sum closet,4sum,Remove duplicates in a list, Circular Array Loop, Fruit Into Baskets,, K-diff Pairs in an Array, Move Zeroes, Rotate Array, Flipping an Image, circular Array Loop

Unit – II

OOP Principles: Implementation of OOP principles (Encapsulation, Abstraction, Inheritance, Polymorphism) in cpp and Exception Handling.

Unit – III

Algorithm Analysis: Characteristics of algorithm, Algorithm Analysis-operation count , step counts,. asymptotic complexity, recurrence equations

Unit – IV

Standard Template Library: Containers, Container Classes,Vectors, Lists, Iterators, Maps, Set structures, Bit set, Stack, Queue, Deque, Priority queue.

Recursion: Recursion and its applications, Exhaustive search using Backtracking.

Problems to Practice: Permutations, Palindrome Partitioning, Beautiful Arrangement, N-Queens , Path with Maximum Gold

Unit – V

Introduction to DBMS, ER Model, ER to Relation Model Conversion

SQL Part1: SQL Command, Data Types, Operators and Expressions, DDL statements, DML statements, Functions, Sorting Data, Grouping Data

Unit – VI

SQL Part2: Cartesian Product and Inner Join, Self Join, Outer Join, Subquery, Independent Subquery, Correlated Subquery

Normalization: Functional Dependency and Normal Forms (1NF,2NF,3NF,BCNF)

Text Books

1. The Complete Reference C++ by Herbert Schildt ,4th Edition
2. Raghurama Krishnan, Johannes Gehrke: Database Management System, TATA McGrawHill 3rd Edition

Reference Books

1. J.Kleinberg & E. Tardos – Algorithm Design, Pearson Education, New Delhi, 2006.
2. G.Brassard & P. Bratley –Fundamentals of Algorithms, PHI, New Delhi, 2005.
3. T.H. Cormen et.al. – Introduction to Algorithms – PHI, New Delhi, 2005.
4. S.Dasgupta et.al. – Algorithms, TMH, New Delhi – 2007.

Reference Links

1. https://leetcode.com/problems/
2. https://nptel.ac.in/courses/106106131/
3. https://www.spoj.com/problems

Computational Statistics and Data Analysis
(Common to all Branches)

L	T	P	C
4	0	0	4

Honours / Minor Course: *Artificial Intelligence and Machine Learning*
Subject Code: 20AIT201

Course Objective
To introduce several statistical techniques found to be serving as tools even today in the development of machine learning and artificial intelligence based computer algorithms.

- To imbibe strong foundation of statistics in students for implementation in computation.
- To understand modern computational methods used in statistics.
- To get detailed approach of simulation, estimation and visualization of statistical data.
- To understand the role of computation as a tool of discovery in data analysis.
- To be able to appropriately apply computational methodologies to real world statistical problems.
- To learn the data processing techniques required to get applied on machine learning algorithms.

Course Outcome
On completion of the course, learner will be able to–

1. Identify the suitable method of statistics on the given data to solve the problem of any heuristic approach of prediction.
2. Apply appropriate statistical concepts and skills to solve problems in both familiar and unfamiliar situations including those in real-life contexts.
3. Design and analyze real world engineering problems by applying various statistical modeling techniques.
4. Formulate suitable statistical method required as pre-processing technique for finding the solution of machine learning algorithm.
5. Model and solve computing problem using correlation, and resampling using appropriate statistics algorithms.
6. To introduce students to the basic concepts and techniques of Machine Learning for solving practical problems.

Unit – I
Introduction to Statistics : What is statistics, Statistical Data-Categorical, Numerical (Continuous), Univariate and Bivariate Analysis, Mean, Median, Mode, Standard Deviation, Harmonic Mean, Data Visualization-Line, Scatter, Box plots, Histogram, Descriptive statistics: qualitative and quantitative Variable, discrete variable, population, sample, random sample. **(8 hours)**

Unit – II
Probability and Distribution: Probability, Random Variable, Joint and Conditional Probability, Baye's Theorem, Monte Carlo Method, Probability Distributions, Characterizing a Distribution,

Discrete Distributions, Normal Distributions, Continuous Distributions Derived from the Normal Distribution, Poisson Distribution, Other Continuous distributions: Lognormal, Weighbull, Exponential, Uniform. **(8 hours)**

Unit – III

Hypothesis and Statistical Tests: Null hypothesis, Alternative hypothesis, Typical Analysis procedures, Hypothesis Concept, Errors, p-Value, z-value, Crucial value, Test on Numerical Data-Distribution of a Sample Mean, Comparison of Two Groups, Comparison of Multiple Groups, degree of freedom, T-test, Z-test, ANOVA analysis. **(8 hours)**

Unit – IV

Data Pre-processing and Performance Analysis

Data Pre-processing steps: data cleaning-missing data, noisy data, binning method, regression, clustering, data transformation - attribute selection, data reduction-feature selection, dimensionality reduction. Normalization- Decimal Scaling, Min-Max scaling, Z-score

Performance metrics: Confusion matrix, sensitivity, specificity, F1 score, Recall, Precision, ROC-AUC Curve, Cross validation technique – K-fold

Model evaluation: Residual error, Bias, Variance, Mean square error, RMSE, Loss.

(8 hours)

Unit – V

Statistical Methods: Dimensionality Reduction Techniques- Principal Component Analysis, Discriminant Analysis, Feature Selection- Chi2 square method, Variance Threshold, Recursive Feature Elimination, Outliers detection methods, Resampling-Random, under-sampling and over re-sampling. **(8 hours)**

Unit – VI

Machine Learning: Introduction to Machine Learning: Supervised and unsupervised ML, Regression (Linear regression, Logistic regression) Classification (Naïve-Bayes classifier), Clustering (K-means, K-mediod). **(8 hours)**

Text Books:

1. Thomas Haslwanter, "An Introduction to Statistics with Python with Applications in the Life Sciences", Springer International Publishing Switzerland 2016, ISBN 978-3-319-28315-9, ISBN 978-3-319-28316-6 (eBook)
2. Allen B. Downey, "Think Stats", Second Edition, O'Reilly Media, ISBN: 978-1-491-90733-7
3. Foundations of Machine Learning, Mehryar Mohri, Afshin Rostamizadeh, and Ameet Talwalkar, MIT Press, Second Edition, 2018.

Reference books:

1. José Unpingco, "Python for Probability, Statistics, and Machine Learning", Springer International Publishing Switzerland, ISBN 978-3-319-30715-2, DOI 10.1007/978-3-319-30717-6, ISBN 978-3-319-30717-6 (eBook)

2. Claus Weihs, Olaf Mersmann, Uwe Ligges, "Foundations of Statistical Algorithms", CRC Press, ISBN-978-1-4398-7887-3 (eBook - PDF)

e-Books:

- http://file.allitebooks.com/20151204/Foundations%20of%20Statistical%20Algorithms.pdf
- http://onlinestatbook.com/Online_Statistics_Education.pdf
- https://upload.wikimedia.org/wikipedia/commons/8/82/Statistics.pdf
- http://cnx.org/content/col10522/1.38/pdf
- http://www.greenteapress.com/thinkstats/thinkstats.pdf

MOOC/ Video Lectures available at:

- https://www.udemy.com/course/introduction-to-bayesian-statistics/ (Free Course)
- https://www.youtube.com/watch?v=xxpc-HPKN28
- https://www.udacity.com/course/intro-to-statistics--st101# (Free Course)
- https://nptel.ac.in/courses/111/105/111105090/
- https://nptel.ac.in/courses/111/105/111105077/