MATURI VENKATA SUBBA RAO ENGINEERING COLLEGE
(An Autonomous Institution)

BACHELOR OF ENGINEERING

ACADEMIC REGULATIONS , SCHEME OF INSTRUCTION & SYLLABI (R-21)

COMPUTER SCIENCE & ENGINEERING
(I,II,III & IV Semesters)

ACADEMIC YEAR 2022 - 23

ISO 9001:2015 | nirf 2020 Rank band 251-300 | ACCREDITED BY NAAC NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL | NBA Accredited Courses Civil,CSE,ECE, EEE,Mech & IT

(Sponsored by Matrusri Education Society, Estd.1980)

ACADEMIC RULES AND REGULATIONS
for
Four Years
BACHELOR OF ENGINEERING
DEGREE PROGRAMMES

Maturi Venkata Subba Rao (MVSR) Engineering College

(An Autonomous Institution)

(Sponsored by Matrusri Education Society, Estd.1980)

Approved by AICTE, Affiliated to Osmania University
Accredited by NAAC and ISO 9001:2015 Certified Inst.
NBA Accreditation: CIVIL, CSE, ECE, EEE, IT and MECH.

website: www.mvsrec.edu.in

Counseling Code: TSEAMCET/TSECET/TSICET: MVSR

PGECET: MVSR1

(For the batch admitted in 2022-23 (R-21))

B.E. PROGRAMMES
(Full-time)

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of
ACADEMIC RULES & REGULATIONS

ACADEMIC RULES AND REGULATIONS

For Four Year Degree Programme in Engineering

of

Maturi Venkata Subba Rao (MVSR) Engineering College

(For the batch admitted in 2022-23 (R-21))

PREAMBLE: All the Rules and Regulations, hereinafter specified shall be read as a whole for the purpose of interpretation. Any reference to college in these Rules and Regulations stands for Maturi Venkata Subba Rao (MVSR) Engineering College. In case of arising a doubt, the interpretation of the Academic Council, the Statutory Body constituted as per UGC regulations of the college is final. The Academic council has the powers to make amendments to these regulations whenever necessary and shall be approved by Governing Body(GB).

ABBREVIATIONS:

AC	Academic Council
AICTE	All India Council for Technical Education
BE	Bachelor of Engineering
BoS	Board of Studies
GB	Governing Body
C	Credits
CGPA	Cumulative Grade Point Average
CIE	Continuous Internal Evaluation
CP	Credit Point
D	Drawing
GO	Government Order
GP	Grade Point
L	Lecture
MOOC	Massive Open Online Course
MVSREC	Maturi Venkata Subba Rao Engineering College
NPTEL	National Programme on Technology Enhanced Learning
P	Practical
SEE	Semester End Examination
SGPA	Semester Grade Point Average
SWAYAM	Study Webs of Active Learning for Young and Aspiring Minds
T	Tutorial
UG	Under Graduate
UGC	University Grants Commission

NOMENCLATURE:

S. No.	Keywords	Definition
1	**Governing Body**	Highest administrative body of the Institute. GB is an authority as per the AICTE/ UGC regulations and responsible to perform functions as may be necessary and deemed fit for the proper development ofthe institution.
2	**Academic Council**	Highest academic body of the Institute and is responsible for the maintenance of standards of instruction, education and examination within the Institute. Academic Council is an authority as per the AICTE / UGC regulations and has the right to take decisions on all academic matters including academic research.
3	**Academic Year**	A period that is necessary to complete courses of study. It consists oftwo consecutive (one odd + one even) semesters.
4	**Autonomous Institute**	An Institute designated as 'Autonomous' by University Grants Commission (UGC), New Delhi in concurrence with the affiliating University i.e., Osmania University, Hyderabad and Telangana State Government.
5	**Board of Studies**	An authority, as defined in UGC regulations, constituted by the Principal for each of the department separately. The board is responsible for curriculum design and update in respect of all the programmes offered by a department.
6	**Course**	Usually referred to, as „papers" is a component of a programme. All courses need not carry the same weightage. The learning objectives and learning outcomes are defined for each course. A course is designed to comprise lectures/ tutorials/ laboratory work/ field work/ outreach activities/ project work/ vocational training/viva/ seminars/ term papers/ assignments/ presentations/self-studyetc. or a combination of some of these.
7	**Course Evaluation**	Continuous Internal Evaluation (CIE) in the Semester & Semester End Examination (SEE) constitutes the main assessment prescribed for each course.
8	**Continuous Internal Evaluation (CIE)**	To be normally conducted by the course instructor which includes class tests, problem solving exercises, group discussions, assignments, quizzes, mini-projects & seminars conducted anytime throughout the semester.
9	**Credit**	A unit by which the course work is measured. One credit is equivalent to one lecture hour of teaching (lecture or tutorial) or two hours of practical / field work per week.
10	**Grade Point**	It is a numerical weight allotted to each letter grade on a 10-point scale. A+ =10, A = 9, B = 8, C = 7, D = 6, E = 5 and F = 0.
11	**Credit Point**	A product of grade point and number of credits for a course.

12	**Cumulative Grade Point Average (CGPA)**	It is a measure of overall cumulative performance, of a student in all semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters of the program. It is expressed upto two decimalplaces.
13	**Programme**	A programme or specialization of a degree programme like Civil Engineering, Mechanical Engineering etc.
14	**Curriculum**	Curriculum incorporates all the courses that are offered in a specific programme. It also indicates the planned interaction of students with instructional content, materials and resources.
15	**Degree**	A student who fulfills all the programme requirements is eligible to receive a degree.
16	**Grading**	To be normally done using Letter Grades as qualitative measure of achievement in each Course like: A+ (Outstanding), A (Excellent), B (Very Good), C (Good), D (Average), E (Pass), F (Fail) based on the marks (%) scored in (CIE+SEE) of the course and conversion to grade done byrelative/absolute grading.
17	**Mandatory Courses**	Compulsory non-credit courses that a student need to study as prescribed in the programme.
18	**Massive Open Online Courses (MOOC)**	Open access online courses aimed at providing ways to learn new skills.
19	**Revision of Regulations, Curriculum and Syllabi**	The institution, from time to time may revise, amend or change the regulations, scheme of examinations, curriculum and syllabi with the approval of the academic council.
20	**Semester End Examination (SEE)**	To be normally conducted at the institutional level which will cover the entire course syllabi. The SEE questions are to be set from each unit. The questions are to be based on Blooms Taxonomy
21	**Semester**	Each year of study is divided into two semesters. Semester shall consist of 16 weeks of academic work excluding Semester End Examination and Evaluation.
22	**Semester Grade Point Average (SGPA)**	It is a measure of performance of work done in a semester. It is ratio of total credit points secured by a student in various theory and lab courses offered in each semester and the total course credits taken during that semester. It shall be expressed upto two decimal places.

I. ADMISSION PROCEDURE

1. A candidate for admission to the Four Year Degree Programme in Engineering must have passed the Intermediate Examination of the Board of Intermediate Education, Government of Telangana with Mathematics, Physics and Chemistry as optional courses, or any other examination recognized bythe Government of Telangana as equivalent thereto.

2. A candidate will be admitted strictly in accordance with the guidelines issued by State Government of Telangana from time to time.

II. DURATION AND PROGRAMMES OF STUDY

The duration of the programme is eight semesters (four years) such as I, II, III, IV, V, VI, VII and VIII. Each academic year shall comprise of two semesters.

Instruction per semester	---	16 weeks
Preparation holidays (includes practical exams)	---	02 weeks

No admission/ readmission/ promotion are entertained after four weeks of the commencement of instruction of semester in I, II, III and IV years.

In case there are any court cases consequent to which the authorities are compelled to admit any candidate after the announced last date of admissions, the admission (seat) of such a student would be reserved for the subsequent year on a supernumerary basis.

No refund of Tuition fee will be made after the commencement of instruction for students who wish to cancel their admission.

1. The following programmes of study are offered by the college.

S. No	Programme
i)	Automobile Engineering
ii)	Civil Engineering
iii)	Computer Science & Engineering
iv)	Electrical and Electronics Engineering
v)	Electronics and Communication Engineering
vi)	Information Technology
vii)	Mechanical Engineering

The schedule of study of all programmes is regulated by the Academic council of Maturi Venkata Subba Rao (MVSR) Engineering College.

2. Candidate who fails to fulfill all the requirements for the award of the degree as specified here in after within (N+2) academic years from the time of admission, *as per the UGC Guidelines on determination of uniform span period (UGC Letter No. F-12-1/2015 (CPP-II) dated and 15.10.2015 and Osmania University letter No.336/M/Acad.I/2016 dated 21.03.2016)*, will forfeit his/her seat in the programme and his/her admission will stand cancelled, where „N" is the number of years of programme of study. For four year regular B.E. degree programme maximum duration of study is (N + 2) = 4 + 2 = 6 years.

   Candidate admitted to the second year under lateral entry scheme shall fulfill all the requirements for the award of the degree as specified here in after within (N+2=3+2=5) five academic years from the time of admission failing which he/she will forfeit his/her seat and his/her admission will stand cancelled.

III. RULES AND REGULATIONS OF ATTENDANCE

1. Candidates admitted to a particular programme of study are required to pursue **Regular programme of study** before they are permitted to appear for the Semester End Examination.

2. **A regular programme of study** means putting in attendance of not less than 75% in each semester.

3. In special cases and for sufficient cause shown, the Academic Council (AC) may condone the deficiency in attendance to the extent of 10% on medical grounds subject to the submission of medical certificate (signed by Competent Authority) along with the payment of condonation fee too. However, in respect of women candidates who seek condonation of attendance due to pregnancy, the Academic Council (AC) on the specific recommendations may condone the deficiency in attendance to the extent of 15% (as against 10% condonation for others) on medical grounds (Valid Medical certificate) subject to submission of medical certificate to this effect. Such condonation is permitted only once during the programme of study.
   Medical certificate along with the fitness is to be submitted within a week days on reporting to the class work.
   * **Shortage of attendance below 65 % shall in no case be condoned.**

4. The fee for condonation of attendance on medical grounds shall be Rs. 2000/- (Rupees Two Thousand only) payable through DD/ Banker Cheque drawn in favour of Principal, Maturi Venkata Subba Rao (MVSR) Engineering College.

5. Attendance of N.C.C / N.S.S Camps or Inter collegiate or Inter-University or Inter State or International matches or debates or Educational Excursions or such other Inter University activities as approved by the authorities involving journeys outside the city in which the college is situated will not be counted as absence.

   (i) Such absence shall not exceed four weeks per semester of the total period of instructions.

   (i) Such leave should be availed with prior permission from the Principal and not be availed more than twice during the programme of study.

   (i) Without anyprior permission, such leave shall be treated as absence.

   (iv) While calculating the attendance, the number of classes not attended in each subject shall be added to the numerator.

6. The attendance shall be calculated on the aggregate of courses from the date of commencement of classes/ date of readmission in case of detained candidates as per the almanac.

7. In case of candidates who fail to put in the required attendance in a programme of study, he/she shall be detained in the same semester and will not be permitted to appear for the Semester End Examination. Such candidates shall have to seek readmission into the same semester during the subsequent year in order to appear for the examination after fulfilling the attendance requirements and on payment of requisite tuition fee.

IV. SCHEME OF INSTRUCTIONS AND EXAMINATION

1. Instructions in various courses in each semester of all four years shall be provided by the college as per the scheme of instruction and syllabi prescribed. All students have to register for the courses offered in the Semester before starting ofthat particular semester.

2. The total number of credits for all eight semesters is 160 as per AICTE Model Curriculum

3. The distribution of marks/grade* based on Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE) shall be as follows:

Subject	Continuous Internal Evaluation (CIE)	Semester End Examination (SEE)
Each theorysubject	**30 ****	**70 ******
Each practical or drawing Subject for which less than 6 periods / week are provided in the scheme of instruction	**25 ****	**50**
Each practical or drawing Subject for which 6 or more Periods/week are provided in the scheme of instruction	**50 *****	**100**
Project I	**50 #**	**---**
Project II	**50 #**	**100 ##**

Total marks = CIE + SEE

***** Grades are allotted based on the marks secured in CIE and SEE as per the following criteria.

Academic Performance	Grade		Grade points
	Letter	Description	
90% ≤ Marks ≤ 100%	**A +**	Outstanding	10
80% ≤ Marks < 90%	**A**	Excellent	9
70% ≤ Marks < 80%	**B**	Very Good	8
60% ≤ Marks < 70%	**C**	Good	7
50% ≤ Marks < 60%	**D**	Average	6
40% ≤ Marks < 50%	**E**	Pass	5
0% ≤ Marks < 40%	**F**	Fail	0
	AB	Absent	

** Out of 30 CIE marks for theory, 10 marks are allotted for Assignments/Tutorials/Quizzes etc. (At least two assignments and two quizzes are to be conducted) in the course. The rest of the 20 marks are allotted to internal tests. Two internal tests will be conducted in each semester. Each test will carry 20 marks, out of which 6 marks for PART-A (compulsory), consisting of three short answer questions and from Part- B two questions consisting of subjective questions are to be attempted from the remaining three questions and each question carries 7 marks. Average of two tests plus marks obtained in assignments/tutorials/quizzes etc. will be taken as CIE marks.

*** Out of 25/50 CIE marks for Practical/drawing, 10/ 20 are allotted for viva- voce exam / Quiz test, 15/30 marks for laboratoryrecord/drawing sheets and observations.

**** The SEE question paper consists of seven questions and each question carries 14 marks. The first question is compulsory and covers the entire syllabus as part A. Student has to answer four questions from the remaining six questions that cover the entire syllabus as part B.

The CIE evaluation of BE Project (Project - I & II) consists of a maximum of 50 marks which will be distributed as per the guidelines given below:

- **30 Marks** are allocated for qualityof the project work covering
  - (a) Literature review
  - (b) Innovation/ Originality
  - (c) Methodologyand
  - (d) Relevance / Practical application which will be awarded by the supervisor.

(i) 20 Marks are allocated to candidate"s performance in terms of viva-voce examination and overall subject knowledge. Marks will be awarded by the committee constituted bythe HoD.

The evaluation of BE Project (Project II) for Semester End Examination consists of a maximum of 100 marks which will be distributed as per the guidelines given below:

- **50 Marks** are allocated for qualityofthe project work covering
  - (a) Literature review
  - (b) Innovation / Originality
  - (c) Methodologyand
  - (d) Relevance/ Practical application, which will be awarded jointly by the internal and external examiners.

(i) 50 Marks are provided for candidate"s presentation and performance in terms of viva-voce examination and overall subject knowledge. Out of 50 Marks 30 marks will be awarded by the internal examiner and 20 marks by the external examiner concerned.

Note:

(i) A course that has CIE but no SEE as per scheme is treated as Pass/ Fail for which pass marks are 40% of CIE marks.

(i) Mandatory courses shall not carry any credits but, securing **40% of total marks**, shall be **necessary requirement** for the student to qualify for the **award of Degree.**

1. The details of instruction period, examination schedule, vacation etc. shall be notified by the Principal, Maturi Venkata Subba Rao Engineering College.

2. The mediumof instruction and examination shall be English.

3. At the end of each semester, SEE shall be held as prescribed in the respective Schemes of Examination. The examinations pertaining to the semester just ended, will be called, regular examinations and the examinations pertaining to the other semesters will be called supplementary examinations. To enable the B.E. Final Year students to complete the program requirements in time, there shall be a Make-up / Supplementary Exam for VIII semester only, which will be scheduled within one month of publication of results of VIII semester regular examinations.

4. The examinations prescribed may be conducted by means of written papers, practical and viva-voce, inspection of certified CIE work in Drawing and Laboratories and Workshop, or by means of any combination of these methods as may be deemed necessary. Candidates will be required to produce complete Lab Records of the Practical work done by them in each practical examination, along with other materials prepared or collected as part of Laboratorywork / Project.

5. All the general rules for examinations (given under itemno. X) shall be adhered to.

6. A candidate shall be deemed to have fully passed a course, if he/she secures

   - A minimum of 40% marks for each theory course in the Semester End Examination (SEE)
   - A minimum of 40% marks (E – Grade) for each theory course considering both CIE and SEE.
   - A minimum of 50% marks for each Practical/ Drawing/ Project work in the Semester End Examination (SEE)
   - A minimum of 50% marks (D – Grade) for each Practical/ Drawing/ Project work considering both CIE and SEE.

   Important note: The candidate has to mandatorily appear at the SEE in all the Practical/Laboratory/Drawing Courses irrespective of marks secured under CIE.

7. In case of hearing impaired, orthopedically handicapped and visually challenged candidates, 10% reduction in pass marks in each subject is admissible as per G.O. Ms. No.150, dated 31-08-2006.

8. If a candidate desires to have his/her answer scripts revaluated, he/she can apply for it as per the college norms and notification ofthe College Examination Branch.

9. A candidate can also obtain a photocopy of the corrected answer book of the theory courses of SEE only against payment. For more details in this regard, the press note of the College Examination Branch after the declaration of results may be referred.

V. RULES OF PROMOTION

S. No.	Semester / Class	Conditions to be fulfilled
1.	From I-Semester to II-Semester	Regular programme of studyof B.E. I-Semester
2.	From II-Semester to III-Semester	a) Regular programme of studyof B.E. II-Semester b) Must have earned at least 50% of credits (rounded to the next nearest integer) prescribed for B.E. I-Semester and II-Semester.
3.	From III-Semester to IV-Semester	Regular programme of studyof B.E. III-Semester
4.	From IV-Semester to V-Semester	a) Regular programme of studyof B.E. IV-Semester

4.	From IV-Semester to V-Semester	b)	No. of backlog credits, if any of B.E. I, II, III and IV Semester put together shall not exceed 50% (rounded to the next nearest integer) of the total number of credits prescribed for the B.E. III & IV-Semester
5.	From V-Semester to VI-Semester	Regular programme of studyof B.E. V-Semester	
6.	From VI- Semester to VII-Semester	a)	Regular programme of studyof B.E. VI-Semester
		b)	Number of backlogs, if any of B.E. I, II,III, IV, V and VI Semester put together shall not exceed 50% (rounded to the next nearest integer) of the total number of credits prescribed for the B.E. V & VI-Semester
7.	From VII-Semester to VIII-Semester	Regular programme of studyof B.E. VII-Semester	

Note: 1. If a candidate has more than permitted number of credits as backlogs, he/she will be detained.

2. The candidate who wishes to take readmission into the year in which he/she is detained will have to pay the total tuition fee of that year and all the credits earned during that year shall become null and void.

VI. GRADING SYSTEM

1. Candidates who have passed all the examinations of the B.E. Degree Programme shall be awarded Cumulative Grade Point Average (CGPA) in accordance with the grade secured by them in all eight Semesters taken together, including the CIE marks secured in those semesters.
   The grade secured shall be shown in the memorandum of marks as per the performance in CIE and SEE.
   A minimum CGPA of 5 is required for the award of Degree. The consolidated memorandum of marks will reflect the credits/ grade scored in each course.

1. Semester Grade Point Average (SGPA) & Cumulative Grade Point Average (CGPA)

Calculation:

a) $$SGPA = \frac{\sum_{i=1}^{p} (\text{Letter Grade Point}_i \times \text{Credits}_i)}{\sum_{i=1}^{p} \text{Credits}_i}$$

Where i = 1, 2, …..p represent the number of courses in a particular semester. SGPA is calculated upto second decimal point and it is calculated only when all courses in that semester are Cleared/ Passed.

b) $$CGPA = \frac{\sum_{j=1}^{m} [(SGPA)_j \times (\text{Total Credits})_j]}{\sum_{j=1}^{m} \text{Total Credits}_j}$$

where j= 1, 2, ….mrepresent the number of semesters of the entire programme.
CGPA at a given point of Semester is calculated upto second decimal point. It is calculated only when total credits earned are equal to total credits prescribed as per scheme upto a semester in which the candidate has last appeared for SEE.

c) Courses in which the candidate has failed are not included in computing SGPA/ CGPA.

VII. AWARD OF DEGREE

The degree of bachelor of engineering will be conferred on candidate who has pursued a regular programme of study of four academic years (three academic years for candidates admitted in II-Year under lateral entry scheme), as hereinafter prescribed in the scheme of instruction and has passed all the examinations as prescribed in the scheme of examinations.

Note: For **mandatory and audit courses (non-credit),** student shall be awarded a Grade without anycredit. This shall not be counted for the computation of SGPA/CGPA.

VIII. AWARD OF GOLD MEDAL

(i) A student securing highest CGPA in **single attempt** is eligible for award of Gold Medal.

(**i**) A readmitted student is not eligible for Gold medal.

IX. IMPROVEMENT OF OVERALL SCORE

1. A candidate who wishes to improve his/her overall score may do so within one academic year immediately after having passed all the examinations of the B.E. degree programme, by reappearing in not more than two semesters (all courses pertaining to the semester takentogether) examinations without violating the rule mentioned in the item II.3.

2. For the award of the overall score, he/she will have the benefit of the higher SGPA secured in the corresponding semester(s).

X. GENERAL RULES OF EXAMINATIONS

1. Application for permission to appear in any examination shall be made available online through college website (www.mvsrec.edu.in) as per the notification.

2. When a candidate"s application is found in order and he/she is eligible to appear in Semester End Examination (SEE), the College Examination Branch shall furnish him with a Hall-Ticket, enabling the candidate to appear in the Semester End Examination. The Hall-Ticket shall have to be produced by the Candidate before he/she is admitted to the premises where the Examination is likelyto be held.

3. A candidate who does not present himself/herself for examination for any reason whatsoever, excepting shortage of attendance, shall not be entitled to claim refund of the whole or part ofthe examination fee, for subsequent Examination(s).

4. A candidate after he/she has been declared successful in the all examinations, shall be given a provisional certificate stating the year of examination, the branch in which he/she was examined and, the overall grade secured. However, the candidates have to obtain degree certificate (convocation) fromthe Examination Branch, Osmania University, Hyderabad.

5. No candidate shall be allowed to put in attendance for a programme or appear at examinations for different degrees and different faculties simultaneously.

6. Students who have appeared once in any examination of the programme need not put in fresh attendance, if they wish to reappear at the corresponding examination, notwithstanding the fact that the college may have introduced new courses. They will, however, have to appear at the examinations according to the scheme of examination any syllabi in force.

XI. TRANSITORY REGULATIONS

1. Whenever a course or scheme of instruction is changed in a particular semester/year, two more examinations immediately following thereafter shall be conducted according to the old syllabus/regulations, provided the content in the course has changed more than 40%.

2. Candidates not appearing at the examinations or failing in them shall take the examination subsequently according to the changed syllabus/regulations.

XII. RANGE OF CREDITS

1. A regular student will be eligible to get an Under Graduate degree in Engineering if he/she secures the credits as specified in the Scheme of Instruction and Examinations.
   A lateral entry student shall be declared eligible to get an Under Graduate degree in Engineering if he/she
   a) Secures required credits as specified in the Scheme of Instruction and Examinations from Semester - III to Semester - VIII
   b) Qualifies bridge courses and mandatory courses specified if any during Semester - I and Semester – II

XIII. MALPRACTICE AND AWARD OF PUNISHMENT

Schedule on the Nature of Malpractice and Award of Punishment

"Examination" in this context refers to all the papers taken by the candidate on the same hall-ticket.

MALPRACTICE AND AWARD OF PUNISHMENT

S. No	Malpractice	Award of Maximum Punishment
1	Possession of the prohibited (written or printed) papers, books, notes during the examination period but which were not used.	Only that exam shall be cancelled. No reference either to the previous or future exams.
2	Matter relevant to the examination being written on any part of the body or on the clothes worn, or in the instrument, wrapping, etc.	-do-
3	Attempting to take help from any prohibited papers, notes, written or printed matter, writings on the walls, furniture and attempting to take help from or giving help to other regarding answer to any question or questions of the examination paper.	-do-

4	Taking help from or consulting of prohibited written or printed material; consulting and/or taking help from or helping other examinee during the examination period inside the examination hall or outside it; with or without their consent, or helping other	-do-
	candidate to receive help from anyother.	
5	An examinee who attempts to disclose his/her identity to the paper valuer by writing his/her roll number at a place other than the place prescribed for it, or by writing his/her name or any coded message or an examinee who makes an appeal to the paper valuer in the answer book.	-do-
6	Writing such as invocation of God"s name in any form.	To be ignored
7	Writing on the question paper or other papers; the answer to questions, rough work, etc., with no intention of passing it on to another examinee.	To be warned not to do so.
8	Using abusive and obscene language in the answer book.	To warn and assess on the basis of content.
9	Examinee allowing or destroying prohibited material found in his possession or acting in any other manner with a view to destroy evidence.	Only that exam shall be cancelled. No reference either to the previous or future exams.
10	Refusing to obey instructions of the Chief Superintendent/Invigilator.	Only that exam shall be cancelled. No reference either to the previous or future exams.
11	Smuggling an answer book/ additional answer book/ matter into or out of the examination hall.	Only that exam shall be cancelled. No reference either to the previous or future exams.
12	Inserting in or removing from the answer book/additional answer book of any sheet.	-do-
13	Substituting wholly or partly an answer book/additional answer book.	-do-
14	Impersonation even at a single examination.	To be dealt with as per Law.
15	Cases of examinees when conspiring to interchange in Roll Nos.	Only that exam shall be cancelled. No reference either to the previous or future exams.
16	Creation of disturbance or otherwise misbehaving in and around the examination hall during or before the examination.	Only that exam shall be cancelled. No reference either to the previous or future exams.
17	Guilty of assaulting/abusing intimidating any person connected with the examination work anytime before, during or after the examination.	Only that exam shall be cancelled. No reference either to the previous or future exams.
18	Punishments for malpractices not defined here would be recommended on the merits of the individual cases bythe malpractices committee.	

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Maturi Venkata Subba Rao (MVSR) Engineering College (Autonomous)
Department of Computer Science & Engineering

Scheme of Instructions for B.E. (Computer Science & Engineering) for 8 Semesters

S. No	Course Work – Subject Area	Credits/ Semester								Credits Obtained/ Required
		I	II	III	IV	V	VI	VII	VIII	
1	Humanities and Social Sciences (HS)	3	-	5	-	-	-	-	-	8/12
2	Basic Sciences (BS)	10	8	-	3	-	-	-	-	21/24
3	Engineering Sciences (ES)	6	11	3	5	-	-	-	-	25/29
4	Professional Subjects –Core (PC)	-	-	14	12	15	12	11	-	64/49
5	Professional Subject-Electives (PE)	-	-	-	-	3	6	6	3	18/18
6	Open Subjects – Electives (OE)	-	-	-	-	-	3	3	3	9/12
7	Project Work, Seminar and/or Internships (PW)	-	-	-	-	2	2	1	10	15/15
8	Mandatory Courses (MC) (Non-Credit)	-	-	-	-	-	-	-	-	-
	TOTAL	19	19	22	20	20	23	21	16	160/159
	Contact Hours/ Week	26	27	28	25	27	24	28	26	

B.E. (C.S.E.) I – SEMESTER

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/ week	CIE	SEE	Duration of SEE (Hr.)	
Theory Courses										
1	U21BSN01MT	Engineering Mathematics – I	3	1	-	4	30	70	3	4
2	U21BSN01PH	Engineering Physics	3	-	-	3	30	70	3	3
3	U21HSN01EG	English	2	-	-	2	30	70	3	2
4	U21ESN01CS	Programming for Problem Solving using C	3	-	-	3	30	70	3	3
5	U21MCN01PO	Indian Constitution	2	-	-	2	30	70	3	-
Practical/ Laboratory Courses										
6	U21BSN81MT	Computational Mathematics Lab	-	-	2	2	25	50	3	1
7	U21BSN81PH	Physics Lab	-	-	4	4	25	50	3	2
8	U21HSN81EG	English Lab	-	-	2	2	25	50		1
9	U21ESN81CS	Programming for Problem Solving using C Lab	-	-	4	4	25	50	3	2
10	U21ESN82ME	Basic Workshop Practice	-	-	2	2	25	50	3	1
Total			**13**	**1**	**14**	**28**	**275**	**600**	**-**	**19**

* **3 Weeks** induction program will be organized before commencement of the coursework of Semester – I

BS: Basic Science,
ES: Engineering Science
HS: Humanities and Social Sciences

L: Lecture
T: Tutorial
P: Practical
D: Drawing

CIE: Continuous Internal Evaluation
SEE: Semester End Evaluation

Note:
1. Each contact hour is a clock hour
2. The duration of the practical class is two hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

Course Code	Course Title						Core/Elective
U21BSN01MT	**Engineering Mathematics - I**						**Core**
Prerequisite	Contact Hour s per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**1**	**-**	**-**	**30**	**70**	**4**

Course Objectives

The objectives of this course is to

- Introduce the concepts of sequences, series and their properties
- Introduce the concepts of mean value theorems and curvature
- Introduce the concepts of multiple integrals
- Study vector differential and vector integral calculus

Course Outcomes

After completing this course, the student will be able to:

- Determine the convergence of infinite series using various tests of convergence
- Solve problems based on the fundamental theorem of differential calculus, find radius of curvature, evaluate and envelopes and expand functions using Taylor & MacLaurin series
- Evaluate Double and Triple integrals in Engineering Problems
- Solve problems based on vector differentiation.
- Solve problems based on vector integration

UNIT-I:

Infinite Series: Introduction to sequences, Infinite series, general properties of infinite series, geometric series, series of positive terms, Harmonic series(p-series),Comparison test, D' Alembert's ratio test, Raabe's test, Cauchy's nth root test, Alternating series, absolute and conditional convergence

UNIT-II:

Differential Calculus: Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem(without proofs) and their applications, Taylor and Maclaurin series, Curvature, Radius of curvature(Cartesian form),Centre of Curvature, Evolute and Involute, Envelope of a family of curves

UNIT-III:

Multiple Integrals: Introduction to functions of two and three variables, Double integrals, Change of order of integration, Change of variables from Cartesian to Plane Polar coordinates, Triple integrals(Cartesian)

UNIT-IV:

Vector Differentiation: Scalar and vector point functions, Vector operator del, Gradient, Unit normal vector, Directional derivative, Angle between surfaces, Divergence, solenoidal vector, Curl, Irrotational vector, Laplace operator applied to scalar and vector point functions.

UNIT-V:

Vector Integration: Line integral-work done, Surface integral, Volume integral, Green's theorem in a plane, Stoke's theorem, Gauss divergence theorem(without proofs) and their verifications.

Text Books:

1. R. K. Jain &S. R .K. Iyengar, *Advanced Engineering Mathematics,* Narosa Publications, 5th Edition 2016.
2. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publications, 44th Edition, 2018.

Reference Books:

1. B.V. Ramana, Higher Engineering Mathematics, 23rd reprint, 2015.
2. N. Bali, M. Goyal, *AtextbookofEngineeringMathematics*, Laxmi publications, 2010
3. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley, 9th Edition, 2012.
4. B. Thomas Jr. and Ross L. Finney *Calculus and Analytic Geometry*.
5. M. Tom. Aposta, l *Calculus: One -Variable Calculus with An Introduction to Linear Algebra*, Vol 1

Course Code	Course Title						Core/Elective
U21BSN01PH	**Engineering Physics**						**Core**
Prerequisite	Contact Hour s per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

The objectives of this course is to

- To introduce principles of Wave Mechanics and Electromagnetic theory
- To explain the properties and applications of semiconducting materials
- To explain the properties and applications of Magnetic and Superconducting materials
- To explain the principles of Laser technology, Optical fibers and their applications in various disciplines
- To introduce Nano Science and Nanotechnology

Course Outcomes

After completing this course, the student will be able to:

- Recall the principles of Wave Mechanics and apply them to solve particle in a box, list the fundamental laws of electricity and magnetism and make use of these laws to derive Maxwell's Electromagnetic wave equation and Poynting theorem.
- Explain and illustrate Semiconducting materials along with their applications.
- Classify Magnetic Materials and explain properties, Identify applications of Ferro Magnetic Materials and Superconducting Materials.
- Explain the principle of Laser and Optical Fiber; Summarize different types of Laser sources and optical fibers; identify the applications of Laser and Optical Fiber.
- Summarize various types of Nanomaterials, their preparation methods and list out various Characterization Techniques and applications of Nanomaterials.

UNIT-I:

Wave Mechanics And Electromagnetic Theory: De-Broglie's hypothesis, Wave function and its physical significance, Schrodinger's time independent wave equation, Schrodinger's time dependent wave equation, Particle in 1D potential box. Gauss's laws in electrostatics and magnetostatics, Faraday's law and Ampere's law in Electromagnetic induction, Maxwell's equations in Integral and differential forms, Conducting current and Displacement current, Electromagnetic wave equation in dielectric medium, Poynting theorem.

UNIT-II:

Semiconductors And Devices: Introduction to Semiconductors - Intrinsic and Extrinsic Semiconductors, Concept of hole, Expression for Carrier concentration and conductivity in Intrinsic Semiconductors, Hall Effect and its applications. Semiconductor devices P-N junction diode, LED, Thermistor.

UNIT-III:

Magnetic Materials And Super Conductors: Introduction- Basic definitions of magnetism- Origin of Magnetic moment, Classification of Magnetic materials- Dia, Para, Ferro, Anti-ferro and Ferri Magnetic materials Types of magnetic materials and their properties, Weiss molecular field theory of Ferromagnetism, Hysteresis of Ferromagnetic material based on domain theory, Soft and Hard magnetic materials, Ferrites and their applications.

Superconductors and their properties, Meissner effect, Type-I and Type-II Superconductors, BCS Theory, High Tc superconductors, Applications of Superconductors.

UNIT-IV:

Modern Optics: Introduction to LASERs, Characteristics of Lasers, Spontaneous and Stimulated emissions, Components of LASERs, LASERs operating in UV- Vis-IR Regions, Types of LASERS- Solid State LASER(RUBY LASER), Gas LASER(He-Ne Laser), and Semiconductor LASER, Applications of LASERs.
Introduction to Optical fibre, Basic principle – Total internal reflection, Propagation of light through the fibre - Numerical Aperture and Acceptance angle, Step-Index and Graded- Index optical fibres, Applications of Optical fibres.

UNIT-V:

Nano Materials And Experimental Techniques: Origin of Nano Science- Bulk and Nano materials, types of nanomaterials, Surface to volume ratio and Quantum confinement effect, properties of nanomaterials, fabrication of nanomaterials- Top-down approach and Bottom-up approach, Ball milling method, and Sol-Gel methods, Elementary ideas of Carbon nanotubes (CNT'S). Material characterization techniques- X- Ray diffraction, RAMAN Spectroscopy, SEM and TEM, Applications of nanomaterials

Text Books:

1. M.S. Avadhanulu and P.G. Kshirasagar, A text book Engineering Physics, S. Chand and Co., 9th edition, 2010.
2. R.K. Gaur and S.L. Gupta, Engineering Physics, Dhanpat Rai publications, 8th edition, 2001.
3. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning India(P) Ltd., 2012
4. R. Murugesan and K. Sivaprasath, Modern Physics, S. Chand & Company, 13th edition, 2007.
5. A. Goswami, Thin Film Fundamentals, New Age International, 2007.
6. A.K. Bandopadhyay, Nano Materials, New Age International, 1st edition, 2007.
7. Engineering Physics by M. Armugam
8. Engineering Physics by K.J. Pratap, et. al.

Course Code	Course Title						Core/Elective
U21HSN01EG	**English**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**2**	**-**	**-**	**-**	**30**	**70**	**2**

Course Objectives

The objectives of this course is to enhance the English language abilities of students by

- Using authentic material for language learning
- Developing appreciation to a variety of content-rich texts
- Strengthening their grammar and vocabulary
- Improving reading and comprehension skills and also encouraging them to think critically and creatively
- Honing their writing skills

Course Outcomes

After completing this course, the student will be able to:

- Demonstrate the skill of reading to summarize, paraphrase and give an accurate account of authentic texts of various genres
- Infer and make predictions based on the comprehension of a text
- Employ Academic Vocabulary appropriately with a distinction of its formal and informal use
- Apply different reading strategies to comprehend different texts and decode new words encountered
- Undertake guided and extended writing using accurate grammatical structures and vocabulary

Unit-I

Reading : A.G. Gardener – "On Saying Please"
Vocabulary : Word formation-Prefixes, Suffixes, Root Words
Grammar : Articles, Prepositions, Determiners
Writing : Guided Writing (Expanding the outline/Writing from verbal cues)

Unit –II

Reading : Fritz Karinthy – "Refund "
Vocabulary : Word formation- Compounding and Blending, Contractions
Grammar : Transitions, Connectives
Writing : Paragraph-writing

Unit- III

Reading : Narayan Murthy – "Value System"
Vocabulary : Synonyms, Antonyms, One Word Substitutes
Grammar : Voice
Writing : Letter-writing

Unit- IV

Reading : Robert Frost – "Stopping by Woods on a Snowy Evening"
Vocabulary : Homophones, Homonyms, Homographs
Grammar : Narration (Direct-Indirect Speech)
Writing : Precis writing

Unit- V

Reading	:	Stephen Leacock – "On the Need for a Quiet College"
Vocabulary	:	Inclusive Language, Euphemisms
Grammar	:	Tenses
Writing	:	Paraphrasing and Summarizing

Text Books:

1. Board of Editors. Language and Life: A Skills Approach. Orient BlackSwan, 2018.
2. Sudharshana, NP and C Savitha, English For Engineers. Cambridge University Press, 2018.
3. Kumar, Sanjay and Pushp Lata, English Language and Communication Skills for Engineers. Oxford University Press,

Course Code	Course Title						Core/Elective
U21ESN01CS	**Programming for Problem Solving Using C**						**Core**
Prerequisite	Contact Hour s per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

The objectives of this course is to impart knowledge of

- To introduce the concept of computing environment, number systems, algorithms, flowcharts and implementation using variables with various data types and selection statements.
- To introduce the logic building techniques using control statements and arrays
- To understand modular and structure programming using functions and strings
- To learn the alternative to iteration using recursion and familiarization with structures and macros
- To understand memory management using pointers and dealing with files

Course Outcomes

After completing this course, the student will be able to:

- Formulate simple algorithms/flowcharts there by translating them into programs using variables with various data types and selection statements.
- Implement logic building techniques using control statements and arrays
- Apply modular and structure programming using functions and strings
- Analyze the iteration with recursion and implementation of structures and macros.
- Illustration of memory management techniques using pointers and implement the file handling approach

UNIT-I:

Introduction to computers: Introduction to components of a computer system, Operating system, Number system: Decimal, binary, octal, hexa decimal systems.
Algorithms/Flowcharts: Logical and Numerical problem solving
Introduction to C Programming: Structure of C, Execution phases in C (Compiler, interpreter, Linker, loader), C-tokens, syntax & semantics in compilation, Identifiers, variables, keywords, Data Types, Operators, precedence & associativity rules, Expression evaluation, Type conversion.
Selection statements: simple if, if-else, else-if ladder, nested if-else, switch

UNIT-II:

Iteration statements: while, do-while, for, **Unconditional statements:** break, continue, goto, return
Arrays: 1-D arrays, **Searching Techniques:** Linear, binary search, **Sorting algorithms:** bubble sort and selection sort,2-D arrays: Matrices

UNIT-III:

Strings: Defining & initializing strings, String manipulation functions (predefined, user-defined)
Functions: Taxonomy of functions, built-in functions, parameter passing techniques: call by value, Passing arrays to functions: Idea of call by reference
Storage classes: auto, register, static, extern

UNIT-IV:

Recursive functions: Recursion definition, Iteration vs Recursion, Example programs: GCD, Factorial, sum of digits, fibonacci
Structures: Defining & accessing structured data, Array of structures, passing structure to function, nested structures, Difference between structure & union
Preprocessor directives: Macros, #define, #if, #elif

UNIT-V:

Pointers: Introduction to pointers, Defining pointers, pointer arithmetic, Array of pointers, pointer to array, Null pointer, generic pointer, double pointers, passing pointer to function: call by address, Accessing structure using pointer, self-referential structure, Dynamic memory allocation

File Handling: I/O streams, File operations, file modes, Sequential/Random accessing files, command line arguments.

Text Book:

1. B.A. Forouzan and R.F.Gieverg, "A structured Programming Approach in C" language learning 2013.

Reference Books:

1. Paul Deitel & Harvey Deitel, *"C How to program"* 7th edition,PHI
2. A.K. Sharma,, *"Computer Fundamentals and Programming in C"* - Universities Press,2nd edition,2018
3. E. Balagurusamy, *"Programming in ANSI C"* -, TMH, 2008
4. Byron Gottfried - "*Theory and practice of Programming with C",* Schaum's Outline McGrawHill,1990
5. Pradip Dey, Manas Ghosh, *"Programming in C"*- Oxford University Press, 2nd edition
6. Brian W Kernighan and Dennis M Ritchie, *"The C programming Language",* Prentice Hall of India,1988

Course Code	Course Title						Core/Elective
U21MCN01PO	**Indian Constitution**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**2**	**-**	**-**	**-**	**30**	**70**	**0**

Course Objectives

The objectives of this course is to impart knowledge of

- To educate the students on Democratic values and Principles articulated in the Constitution.
- To help the students understand the structure of Union, State and local governments.
- To create awareness among the students about the Fundamental Rights and Duties.
- To make the students understand the nature and characteristics of relations between union and state governments.
- To divulge the students about the statutory institutions and policies.

Course Outcomes

After completing this course, the student will be able to:

- Demonstrate comprehensive knowledge of the constitution of India
- Understand the basic provisions of the Union, State and Local Governments.
- Differentiate between the Fundamental rights and Directive principles of State policy.
- Show an enhanced level of analyzing the relations between Union and State governments.
- Understand the functioning of statutory bodies.

UNIT-I:

Evolution of the Indian Constitution: 1909 Act,1919 Act,1935 Govt of India Act. Constituent Assembly: Composition and Functions.; Basic structure of Indian Constitution, Fundamental features of the Indian Constitution.

UNIT-II:

Rights and Duties: Fundamental Rights, Directive principles of State Policy and Fundamental Duties, Public Interest Litigation (PIL).

UNIT-III:

Union Government: Legislature, Executive-President, Prime Minister, Council of Minister Judiciary, Judicial Review and activism.

State Government: Executive: Governor, Chief Minister, Council of Minister.

Local Government: Panchayat Raj Institutions, Urban Governance.

UNIT-IV:

Union-State relations – Administrative (Inter-state council), Legislative & Financial relations. Finance Commission of India, NITI Aayog.

UNIT-V:

Statutory Institutions: Elections-Election Commission of India, National Human Rights Commission, National Commission for Women.

Text Book:

1. Laxmikanth, *"Indian Polity"*
2. D.D.Basu, *"Constitution of India"*
3. Rajeev Bhargav, *"Politics and Ethics"*

Course Code	Course Title						Core/Elective
U21BSN81MT	**Computational Mathematics Lab**						**Core**
Prerequisite	Contact Hour s per Week				CIE	SEE	Credits
	L	T	D	P			
-	**-**	**-**	**-**	**2**	**25**	**50**	**1**

Course Objectives

The objectives of this course is to

- know the history and features of Math tools like SCI LAB/MATLAB
- know the local environment of MATLAB/SCI LAB
- study the concept of definite integrals, differential equations and system of equations using MATLAB/SCI LAB
- study the concept of Eigenvalues and Eigenvectors using MATLAB/SCI LAB.
- study simple mathematical functions using 2D and 3D plots

Course Outcomes

After completing this course, the student will be able to:

- understand the main features of the MATLAB/SCI LAB program development environment to enable their usage in the higher learning
- evaluate definite integrals using MATLAB/SCI LAB.
- solve linear differential equations with constant coefficients using MATLAB/SCI LAB .
- solve system of linear equations using MATLAB/SCI LAB.
- find Eigenvalues and Eigenvectors using MATLAB/SCI LAB
- Interpret and visualize simple mathematical functions using 2D and 3D plots.

List of Programs:

1. Introduction to MATLAB and GUI
2. Basic operators of MATLAB/ SCI LAB
3. Finding roots of algebraic equations.
4. Determinant of matrices.
5. Rank of a matrix
6. Solving system of linear equations using matrices.
7. Eigenvalues.
8. Eigenvectors.
9. Solutions of first order linear differential equations.
10. Solutions of second order linear homogeneous differential equation with constant coefficients.
11. Evaluating definite integrals
12. Data plotting for 2D and 3D

Reference Books:

1. Computational Mathematics Lab Manual.

Course Code	Course Title						Core/Elective
U21BSN81PH	**Physics Lab**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**-**	**-**	**-**	**4**	**25**	**50**	**2**

Course Objectives

During the course the student is expected to

- To analyze a Semiconducting device and determine its temperature Coefficient of Resistance, Energy Gap, Electrical Conductivity, Mobility, concentration of charge carriers and its efficiency.
- To determine the wavelength of given laser source, Sodium vapour lamp by using diffraction grating.
- To explain the principle of Optical Fiber and determine its Numerical Aperture, Acceptance Angle and losses.
- To demonstrate Torsional Pendulum, LCR Series and Parallel Circuit and calculate Rigidity Modulus of a given wire and frequency of LCR Series and Parallel Circuit.
- To examine the nature of Ferro Magnetic Materials, Dielelctric Materials and Calculate their related parameter
- To explain Seebeck Effect and Determine Seebeck Coefficient of thermoelectric device.

Course Outcomes

After completing this course, the student will be able to:

- Analyze a Semiconducting device and determine its temperature Coefficient of Resistance, Energy Gap, Electrical Conductivity, Mobility, Concentration of charge carriers and efficiency.
- Determine the Wavelength of Laser source, Sodium Vapour lamp using diffraction grating.
- Explain the principle of Optical Fiber and determine its Numerical Aperture, Acceptance angle and losses.
- Demonstrate Torsional Pendulum, LCR series and Parallel circuit and calculate the Rigidity Modulus of given metallic wire, resonant frequency of LCR Series & Parallel circuit.
- Examine the nature of ferromagnetic materials, dielectric materials and calculate their related parameter
- Explain Seebeck Effect and determine Seebeck Coefficient of thermoelectric device

List of experiments:

1. To Determine the Numerical aperture (NA), Acceptance Angle of the Optical Fiber, and To study the various losses of that occur in optical fiber.
2. To determine the wave length (λ) of the given Laser source.
3. To determine V-I characteristics of the given LED.
4. To draw the V-I characteristics of a Solar Cell and calculate the Fill Factor and Series Resistance.
5. To draw the I - V Characteristics of P-N Junction diode and to evaluate the resistance for forward biasand revers bias.
6. To determine the constants of A, B and α using Thermistor characteristics.
7. To find the values of Electrical conductivity and energy gap of Ge crystal.
8. To determine the wave length of radiation emitted by Sodium vapour lamp using Diffraction Grating.
9. To study the behavior of Series LCR Resonant circuit and to estimate the resonant frequency and Q factor.
10. To study the variation in currant and voltage in parallel LCR Circuit and to find the resonant frequency of parallel LCR Circuit.
11. Determination of rigidity of modulus of Torsional pendulum.
12. To determine the Dielectric constant ofthe given Dielectric samples.
13. To draw the curve between the magnetizing field and the intensity of magnetization of the specimen (soft iron rod) and to find out i) Coercivity ii) Retentivity and iii) Hysteresis loss.
14. To calculate Seebeck Coefficient of the given sample.
15. To determine the Hall coefficient, Carrier concentration and mobility of charge carriers of semi conducting material.
16. To determine the velocity of the Ultrasonic Waves

Course Code	Course Title						Core/Elective
U21HSN81EG	**English Lab**						**Core**
Prerequisite	Contact Hour s per Week				CIE	SEE	Credits
	L	T	D	P			
-	**-**	**-**	**-**	**2**	**20**	**50**	**1**

Course Objectives

The objectives of this course is to enhance the listening and speaking skills of students by

- Giving them sufficient practice in listening with comprehension.
- Providing them ample opportunities to improve their public speaking skills.
- Training them in the use of correct pronunciation, stress, and intonation.
- Sensitizing them to the use of verbal and non-verbal communication appropriate to the context.
- Encouraging them to learn the art of conversation to suit formal and informal situation.
- Preparing them to make formal presentations and face interviews.

Course Outcomes

After completing this course, the student will be able to:

- Listen, understand, and interpret formal and informal spoken language
- Speak English with acceptable pronunciation, stress, and intonation
- Present themselves with confidence in formal situations
- Be able to perform in fluency, accuracy and time management based activities such as JAM and Picture Perception
- Participate in individual and group activities with relative ease.

List of Activities:

1. Listening for Comprehension
2. Pronunciation, Intonation, Stress, and Rhythm
3. Conversation Skills
4. Introducing Oneself and others
5. Asking for and Giving Information
6. Making Requests and Responding to them Appropriately
7. Giving Instructions and Responding to them Appropriately
8. Making Formal Announcements and Emceeing
9. Picture Perception
10. JAM
11. Role play
12. Group Discussions
13. Interview Skills
14. Presentation Skills

Text Books:

1. Board of Editors. *Language and Life: A Skills Approach*. Orient BlackSwan, 2018.
2. Balasudbramanian, T. A Textbook of English Phonetics for Indian Students. Macmillan, 1981
3. CIEFL. *EXERCISES IN Spoken English.* Parts. I- III. Oxford University Press. Pillai,
4. Radhakrsihna G. Spoken *English For You – Level II*. 8the Edition. Emerald Publishers, 2014.
5. Sethi, J and PV Dhamija. *A Course in Phonetics and Spoken English*. 2ndEdition. Prentice Hall India Learning Private Limited,1999.

Course Code	Course Title						Core/Elective
U21ESN81CS	**Programming for Problem Solving Using C Lab**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	**4**	**25**	**50**	**2**

Course Objectives

The objectives of this course is to impart knowledge of

- Understand the fundamentals of programming in C Language.
- Write, compile and debug programs in C.
- Formulate solutions to problems and implement them in C.
- Effectively choose programming components to solve computing problems
- To apply the sorting and searching techniques on given set of data

Course Outcomes

After completing this course, the student will be able to:

- Choose appropriate data type for implementing programs in C language.
- Design and implement modular programs involving input output operations, decision making and looping constructs.
- Implement search and sort operations on arrays.
- Apply the concept of pointers for implementing programs on dynamic memory management and string handling.
- Design and implement programs to store data in structures and files.

Write C programs for following:

1. Express and compute few mathematical equations in C language

Selection statements:

2. Finding roots of a quadratic equation
3. Implement arithmetic calculator using switch
4. Check whether entered year is a leap year or not

Iteration statements:

5. Find maximum and minimum value in a given set of numbers
6. Print multiplication table of value X upto Y times
7. Print prime numbers between M & N, Check for armstrong number or not
8. Convert a decimal number to binary and vice versa
9. Display pyramid of numbers and pascal triangle upto N rows

Arrays:

10. Find maximum, minimum and sum of all numbers in a 1-D array
11. Implement linear & binary search using 1-D array
12. Implement bubble sort & selection sort using 1-D array
13. Find the sum and product of two matrices using 2-d arrays
14. Check whether a matrix is an identity matrix or not using 2-d arrays
15. **Programs on Strings:** perform string manipulation functions , convert a lowercase string into uppercase
16. Demonstrate on call by value & call by reference using functions
17. **Programs on Recursion:** GCD, sum of digits, fibonacci series, factorial

Structures & Union:

18. Using an array of structures, Store 5 students information (name, roll no, subject1,subject2,subject3,total_marks), compute total_marks of each student and display details of each student.

19. Store 3 employee information (name, salary, designation) and access each employee using union.

Pointers:

20. Demonstrate on pointer arithmetic
21. Find the biggest and smallest of array using pointer to array
22. Implement dynamic memory allocation

Files:

23. Writing/reading/appending some data to a file
24. Copy the contents of one file to other file
25. Count the frequency of characters, lines and words in a given file

Text Books:

1. Paul Deitel & Harvey Deitel "*C How to program"* by 7th edition,PHI
2. A.K. Sharma, *"Computer Fundamentals and Programming in C"*-, Universities Press,2nd edition,2018
3. E. Balagurusamy, *Programming in ANSI C* TMH, 2008
4. Byron Gottfried - *"Theory and practice of Programming with C",* Schaum's Outline McGrawHill,1990
5. Pradip Dey, Manas Ghosh ,*"Programming in C"*-, Oxford University Press, 2nd edition
6. Brian W Kernighan and Dennis M Ritchie, *"The C programming Language"*, Prentice Hall of India,1988

Course Code	Course Title						Core/Elective
U21ESN82ME	**Basic Workshop Practice**						**Core**
Prerequisite	Contact Hour s per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	**2**	-	**25**	**50**	**1**

Course Objectives

The objectives of this course is to

- Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.
- To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field.
- To gain a good basic working knowledge required for the production of various engineering products.
- To study different hand operated power tools, uses and their demonstration.
- Adopt safety practices while working with various tools.

Course Outcomes

After completing this course, the student will be able to:

- Demonstrate an understanding of and comply with workshop safety regulations.
- Identify and apply suitable tools for different trades of Engineering processes including material removing, measuring and chiselling.
- Undertake jobs connected with Engineering Workshop trades including sheet metal and house wiring.
- Apply basic electrical engineering knowledge for house wiring practice.

A. TRADE FOR EXERCISES:

Course Objective: To impart hands-on practice on basic engineering trades and skills.

1. **House wiring**-Exercises-Single lamp, parallel/Series connection of 2 bulbs and Stair case wiring.
2. **Sheet metal**-Forming and Bending. Model making. Exercises-Taper Tray, Open Scoop, Funnel.

B. IT WORKSHOP: Computer hardware, identification of parts, Disassembly, Assembly of computer to working condition, operating system installation.

1. System Assembling, Disassembling and identification of Parts / Peripherals
2. Operating System Installation-Install Operating Systems like Windows, Linux along with necessary Device, Drivers.
3. MS-Office / Open Office
   a) Word - Formatting, Page Borders, Reviewing, Equations, symbols.
   b) Spread Sheet - organize data, usage of formula, graphs, charts.
   c) Power point - features of power point, guidelines for preparing an effective presentation.
   d) Access- creation of database, validate data.
4. Trouble Shooting-Hardware trouble shooting, Software trouble shooting.

Reference Books:

1. Venugopal.K, "Workshop manual", Anuradha Publications, Kumbakonam, TN, 2012
2. K.C. John, "Mechanical Workshop" 2ndEdn., PHI, 2010.
3. Hajra Choudary, "Elements of Workshop Technology" Vol. 1, Asian Publishers, Edn., 1993.
4. Computer Hardware, Installation, Interfacing, Troubleshooting and Maintenance, K.L. James, Eastern. Economy Edition.

Note: At least three exercises to be done from each trade

B.E. (C.S.E.) II – SEMESTER

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/ week	CIE	SEE	Duration of SEE (Hr.)	
Theory Courses										
1	U21BSN02MT	Engineering Mathematics – II	3	-	-	3	30	70	3	3
2	U21BSN01CH	Engineering Chemistry	3	-	-	3	30	70	3	3
3	U21ESN03CS	Programming for Problem Solving using Python	3	1	-	4	30	70	3	4
4	U21ESN01EE	Basic Electrical Engineering	3	-	-	3	30	70	3	3
Practical/ Laboratory Courses										
5	U21BSN81CH	Chemistry Lab	-	-	4	4	25	50	3	2
6	U21ESN82CE	Engineering Drawing Practice	-	-	2	2	25	50	3	1
7	U21ESN83CS	Programming for Problem Solving using Python Lab	-	-	4	4	25	50	3	2
8	U21ESN81EE	Basic Electrical Engineering Lab	-	-	2	2	25	50	3	1
Total			**12**	**01**	**12**	**25**	**220**	**480**	**-**	**19**

L: Lecture **CIE**: Continuous Internal Evaluation

BS: Basic Science,

ES: Engineering Science **T**: Tutorial **SEE:** Semester End Evaluation

HS: Humanities and Social Sciences **P**: Practical

D: Drawing

Note:

1. Each contact hour is a clock hour
2. The duration of the practical class is two hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

Course Code	Course Title						Core/Elective
U21BSN02MT	**Engineering Mathematics - II**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

The objectives of this course is to

- Provide an overview of ordinary differential equations and their applications.
- Study Linear algebra and its uses in solving system of linear equations.
- Study Eigenvalue problems and Quadratic forms.
- Study the special functions Gamma and Beta functions.

Course Outcomes

After completing this course, the student will be able to:

- Solve first order differential equations.
- Solve higher order differential equations.
- Solve system of linear equations.
- Solve eigenvalue problems and Quadratic forms.
- Apply Beta and Gamma Functions to evaluate definite integrals

UNIT-I:

Differential Equations of First Order: Exact differential equations, Integrating factors, Linear differential equations, Bernoulli's and Riccati's. Applications of first order differential equations - Orthogonal trajectories of a given family of curves(Cartesian form) Newton's Law of Cooling, Growth and Decay.

UNIT-II:

Differential Equations of Higher Order: Solutions of second and higher order linearhomogeneous equations with constants coefficients, Solutions of non-homogeneous linear differential equations with constants coefficients, Method of reduction of order, Method of variation of parameters,Applications of second order differential equations-LCR circuits.

UNIT-III:

Matrices: Rank of a matrix, Elementary Row/Column operations, Echelon form, Normal form, Linear dependence and independence of vectors, System of linear equations, Linear transformation.

UNIT-IV:

Eigenvalues and Eigenvectors: Eigenvalues, Eigenvectors, properties of Eigenvalues,Cayley -Hamilton theorem(without proof), Quadratic forms, Reduction of quadratic form to canonical form, Rank, Index, Signature and Nature of quadratic forms.

UNIT-V:

Special Functions: Gamma function, Beta function, properties of Gamma and Beta functions, relation between Beta and Gamma functions, evaluation of definite integrals using Beta and Gamma functions.

Text Books:

1. R. K. Jain & S .R. K. Iyengar, *Advanced Engineering Mathematics,* Narosa Publications, 5th Edition 2016.
2. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publications, 44thEdition,2018.

Reference Books:

1. B.V. Ramana, *Higher Engineering Mathematics*, 23rd reprint, 2015.
2. N. Bali, M. Goyal, *A text book of Engineering Mathematics*, Laxmi publications,2010.
3. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley, 9th Edition, 2012.

Course Code	Course Title						Core/Elective
U21BSN01CH	**Engineering Chemistry**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

The objectives of this course is to

- To relate how the basic concepts and principles of chemistry can be applied to practical utility in a broader perspective of the society.
- To distinguish the ranges of electromagnetic spectrum and its interaction with matter and to develop knowledge of various spectroscopic techniques at atomic and molecular levels.
- To identify and apply various principles of electrochemistry and corrosion which are essential for an engineer in industry
- To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineerTo provide an overview of ordinary differential equations and their applications.

Course Outcomes

After completing this course, the student will be able to:

- Explain and apply the knowledge of various electrodes, electrode potentials and Nernst equation to construct electrochemical cells and thereby to calculate EMF of cell.
- Analyze different types of corrosion, mechanism, factors affecting metallic corrosion and control corrosion by various methods.
- Explain the origin of UV-Vis absorption in terms of electronic transitions in determination of structures of various molecules and Analyze microscopic chemistry in terms of atomic and molecular orbitals
- Identify and make use of various polymers as material for engineering applications.
- Classify various energy sources and illustrate the importance and applications of renewable and non-renewable energy sources.
- Relate the concepts liquid crystals, composites and green chemistry to modify engineering processes and materials.

UNIT –I:

Electro Chemistry &Corrosion and It's control: Electro Chemistry: Electrochemical Cells-Electrolytic and galvanic cells-notation. Cell Reaction and Cell EMF. Electrode potential, Standard electrode potential. Electrochemical series and Applications. Free Energy and EMF. Nernst equation and its derivation, Applications -Numerical problems. Types of electrodes-Standard hydrogen electrode, Calomel electrode Silver-Silver Chloride, Quinhydrone and glass electrodes. Determination of pH using Quinhydrone electrode coupled with saturated Calomel electrode.

Corrosion: Definition, Causes and effects. Types of corrosion, Chemical corrosion, and its mechanism. Electrochemical corrosion and its mechanism. Galvanic corrosion, Concentration cell Corrosion-Waterline and Pitting corrosion. Factors effecting rate of corrosion. Corrosion control methods- Cathodic Protection –Sacrificial anode and impressed current cathode methods. Surface Coatings-Types. Electro plating and Electroless plating of metal coatings.

UNIT–II:

Molecular Structure & Spectroscopic techniques: Regions of electromagnetic spectrum, Molecular spectroscopy. Rotational Spectroscopy: Rotation of molecules, rotational spectra of rigid diatomic molecules, selection rules. Vibrational Spectroscopy: The vibrating diatomic molecule, simple and anharmonic oscillators of a diatomic molecule, selection rules, applications of IR spectroscopy. NMR Spectroscopy: Criteria for NMR activity (Magnetic and nonmagnetic nuclei), basic concepts and principle of ^{1}H NMR spectroscopy, Chemical shift, Magnetic Resonance Imaging.

UNIT-III:

Polymeric Materials: Polymers: Basic terminology - Monomer and its functionality, Polymers, and degree of polymerization. Types of Polymerizations- Chain Growth, Step Growth Polymerization – Examples. Plastics, Fibers, Elastomers – Characteristics and Examples. Preparation, Properties & Uses of the following polymers- PVC, Bakelite, Nylon 6:6,Buna-S, Butyl Rubber and Silicone Rubber. Conducting polymers: Concept, Classification of conducting polymers with examples. Mechanism of conduction in trans Poly-acetylene. Enhancement of conduction by doping. Applications of conducting polymers. Biodegradable polymers: Concept, Preparation, Properties, and applications of polylactic acid.

UNIT-IV:

Energy Sources: Introduction-Renewable and non-renewable energy sources with Examples. Chemical fuels: Definition, Classification of chemical fuels-primary, Secondary and Solid, Liquid, Gaseous fuels -examples. Solid fuels: Coal& its composition, and its ranking Liquid fuels: Petroleum- Fractional distillation of petroleum. Cracking and its significance. Knocking, Octane Number and Cetane number. Gaseous Fuels: LPG, CNG-composition, properties and uses .Biodiesel: Concept -Transesterification- Carbon neutrality. Advantages of Biodiesel. Batteries: Definition, Types of batteries-Primary batteries; Zn-Carbon battery. Secondary batteries; Construction, working & applications of Lead-acid, Lithium -ion batteries. Fuel cells: Definition, Types of fuels cells, Construction, Applications of working of H_2-O_2fuel cellsand Methanol-O_2fuel cells. Solar cells: Concepts of photovoltaic cell and its applications.

UNIT-V:

Liquid Crystals, Composites and Green Chemistry: Liquid Crystals: Introduction, classification of liquid crystals- Thermotropic and Lyotropic liquid crystals - Chemical constitution & liquid crystalline behavior. Molecular ordering in liquid crystals- Nematic, Smectic and Cholesteric liquid crystals - Applications. Composite materials: Concept ,composition, and characteristic properties of composites. Classification of composites based on matrix, reinforcement, and ply. Advantages and applications of composites. Green Chemistry: Concept, Principles of green Chemistry with Examples.

Text Book:

1. PC Jain, M Jain Engineering Chemistry, Dhanapathi Rai and sons (16th edition), New Delhi

Reference Books:

1. Sashi Chawla, Textbook of Engineering Chemistry, Dhanapathi Rai &sons, New Delhi.
2. O.G. Palanna, Engineering Chemistry, TMH Edition.
3. Puri, Sharma and Pathania Principles of physical chemistry, Vishal Publishing Co.
4. Polymer chemistry by Gowariker.
5. Fundamentals of Molecular Spectroscopy, by C.N. Banwell, McGraw Hill Publication.
6. Fundamentals ofSpectroscopy by Y. R. Sharma.
7. Shikha Agarwal, Engineering Chemistry fundamentals and applications, Cambridge University press.

Course Code	Course Title						Core/Elective
U21ESN03CS	**Programming for Problem Solving using Python**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**1**	**-**	**-**	**30**	**70**	**4**

Course Objectives

The objectives of this course is to impart knowledge of

- To learn how to use variables, lists, tuples and dictionaries in python programs.
- To learn how to write control statements and defining modules in python
- To learn how to read and write files and handle exceptions in python.
- To learn and apply object-oriented concepts and creating simple Graphical User Interface in python
- To learn the basics and usage of Numpy, Pandas and matplotlib modules.

Course Outcomes

After completing this course, the student will be able to:

- Understand and use the basics of python programming and core data structures like lists, set, tuple and dictionaries.
- Create, run and manipulate python programs by using python modules and writing functions.
- Understand and apply different file handling and exception handling operations
- Understand OOP concepts and create simple GUI based applications
- Use the python modules Numpy, Pandas, matplotlib

UNIT-I:

Introduction to Python programming: Python overview, applications, python interpreter, executing python program, comments, identifiers, variables, Data Types: Number, String, List, Tuple, Dictionary, Set, keywords, constants, input/output statements, operators, expression evaluation, Type conversions

Control statements: conditional branching, looping, nested loops, indentation rules, break, continue, pass statements.

UNIT-II:

Functions: Function definition, function call, Built in functions, creation of user defined function, Recursion, Lambda Functions, Anonymous Function, Variable Scope, Default Parameters, variable-length parameters, returning multiple values from function, Keyword Arguments **kwarg, Command Line Arguments.

Modules: Introduction to Built- in Modules (OS, Sys, Math, Statistics, Random), Creating a Module, Importing a Module.

UNIT-III:

Object-Oriented Programming: OOP principles, Classes and Objects, Creating Classes & objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, Inheritance, polymorphism, operator overloading, method overloading, method overriding, data hiding, private & public members, private methods.

UNIT-IV:

Exception handling: Introduction to Errors & Exceptions, handling exceptions, multiple except block, **except** block without exceptions, else clause, built-in & user defined exceptions, finally block, Raising & instantiating exceptions.

File handling: Introduction, file types, file paths, file positions, file operations: creating, reading, writing, closing, renaming, deleting files

Introduction to GUI Programming: Dialog-Style, Main-Window-Style Programs, Creating a Main Window, Creating a Custom Dialog.

UNIT-V:

Basics of Numpy, Pandas, matplotlib modules Numpy Arrays: Introduction, creating Arrays, Indexing, Slicing, Types, copy vs View, Shape, Reshape, Iterating, Join, Split, Search, Sort, Filter
Pandas: Introduction, Series, Data Frames, Read CSV, Analyzing Data
Matplotlib: Introduction, Pyplot, Line, Labels, Scatter, Bars, Histograms, Pie Charts

Text Book:

1. Reema Thareja, *"Python programming using problem solving approach ",* Oxford university press.

References Books*:*

1. Mark Summerfield, "*Programming in Python 3:A Complete Introduction to the Python Language"*,2nd edition, Addison-Wesley
2. Martin C. Brown*," PYTHON: The Complete Reference",* McGraw-Hill, 2001.
3. E Balagurusamy,"*Introduction to Computing and Problem Solving Using Python"*, McGrawHill

Course Code	Course Title						Core/Elective
U21ESN01EE	**Basic Electrical Engineering**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**1**	**-**	**-**	**30**	**70**	**3**

Course Objectives

The objectives of this course is to

- Provide an understanding of basics in Electric circuits
- To explain the working principles of Electrical Machines and single phase transformers.

Course Outcomes

After completing this course, the student will be able to:

- Apply network theorems to solve DC and AC circuits.
- Analyze DC and AC circuits.
- Illustrate the construction, operation and performance of DC machines.
- Comprehend construction and working principles of AC Machines.
- Identify the Electrical Installation, Switchgear, Safety measures

UNIT - I:

DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, analysis of simple circuits with dc excitation, Superposition, Thevenin and Norton Theorems.

UNIT - II:

AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, and RL, RC, RLC combinations (series only). Three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT - III:

Transformers and 3-ph Induction Motors:, Transformers: Electromagnetic induction, Faradays laws, statically induced emf, Lenz law, BH characteristics, ideal and practical transformer, losses and efficiency, Auto-transformer and three-phase transformer connections. **Three Phase Induction motor:** Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, squirrel cage IM, slip-ring IM, Applications.

UNIT - IV:

Single-phase induction motor & DC Machines, Single-phase induction motor: Construction and principle of operation, Capacitor start & capacitor run motor, applications.

DC Generators: Dynamically induced emf, Fleming's Right and Left hand rules, Construction and principle of operation of DC generator, EMF equation, Types of DC Generators, OCC characteristics, applications. **DC Motors:** principle of operation of DC Motor, Types of DC motors, applications.

UNIT - V:

Electrical Installations: Components of LT Switch gear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries, Elementary calculations for energy consumption, power factor improvement and battery backup.

Text Books:

1. N. K. De, "*Basic Electrical Engineering",* Universities Press, 2015.
2. J. B. Gupta, "*Fundamentals of Electrical Engineering and Electronics"* S.K .Kataria & Sons Publications, 2002.
3. J. B. Gupta, *"Utilization of Electric Power and Electric Traction" S.*K. Kataria & Sons Publications, 2010.
4. Abhijit Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, "*Basic Electrical Engineering"* TMH - 2009.
5. Hughes, *"Electrical Technology",* VII Edition, International Student-on, Addison Welsey Longman Inc., 1995.

Course Code	Course Title						Core/Elective
U21BSN81CH	**Chemistry Lab**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**-**	**-**	**-**	**4**	**25**	**50**	**2**

Course Objectives

During the course the student is expected to

- Introduce practical applications of chemistry concepts to solve engineering problems.
- Measure the molecular or ionic properties such as conductance, redox potentials.
- To determine the rate constant of reactions from concentrations as a function of time.
- Know the laboratory practices implemented in a research and industrial chemistry laboratory setting.
- To learn to Synthesize polymers

Course Outcomes

After completing this course, the student will be able to:

- Estimate the hardness of water sample.
- Apply the principles of Electrochemistry & Colorimetry in quantitative estimations.
- Measure the properties of liquids such as surface tension and Viscosity.
- Estimate the rate constants, of reactions from concentration of reactants/ products as a function of time.
- Synthesize Polymer.

List of experiments:

1. Estimation of Fe (II) by Permanganometry.
2. Estimation of Fe (II) by Dichrometry.
3. Estimation of hardness of water by EDTA method.
4. Estimation of HCl by Potentiometry.
5. Potentiometric estimation of Iron Fe (II) by Permanganometry.
6. Estimation of HCl by Conductometry.
7. Estimation of CH_3COOH by Conductometry.
8. Estimation of HCl & CH_3COOH in mixture by Conductometry.
9. Estimation of HCl by pH metry.
10. Verification of Beer-Lamberts Law and estimation of Manganese in $KMnO_4$by Colorimetry.
11. Determination of viscosity of liquids using Oswald's viscometer
12. Determination of Surface tension by using Stalagmometer.
13. Synthesis of nylon 6,6.
14. Determination of rate constant of acid catalyzed hydrolysis of methyl acetate.
15. Determination of Partition Coefficient of CH_3COOH in n-Butanol and Water.

Text Books:

1. Vogel's text book of Practical organic chemistry, 5thEdition.

Reference Books:

1. B.D. Khosala, A. Gulati and V. Garg, *Senior Practical Physical Chemistry*, (R. Chand & Co.,Delhi)
2. S.S.Dara, *Text book on experiments and Calculations in Engineering Chemistry*
3. K.K. Sharma and D.S. Sharma, *An introduction to practical chemistry* (Vikas Publications, NewDelhi)
4. S.K.Bhasin & Sudha Rani, *Laboratory manual on Engineering Chemistry*, (Dhanpat Rai Publishing Company

Course Code	Course Title						Core/Elective
U21ESN82CE	**Engineering Drawing Practice**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**-**	**-**	**2**	**-**	**25**	**50**	**1**

Course Objectives

The objectives of this course is to impart knowledge

- To make students communicate effectively through a common drawing language and understand any engineering drawing
- To prepare the students to use techniques, skills and modern engineering tools necessary for engineering practice
- To prepare students to design a system, component and any desired requirement through computer drafting
- To enhance the imaginative skills of a student and thereby making them creative

Course Outcomes

After completing this course, students will be able to:

- Understand engineering drawing and its place in society
- Expose virtual aspects of engineering drawing practice
- Recognize modern technical tools of engineering drawing like AUTOCAD and apply in different fields of engineering
- Think creatively in getting alternative options to practical problems to engineering
- Communicate technical aspects through engineering drawing

Sheet No	Description of the Topic	Contact Hours Drawing
1	**Introduction to Engineering Drawing** - Principles of Engineering Drawing andtheir Significance ***Introduction to AutoCAD*** **-** Basic commands and simple drawings	**2**
2	**Construction of Scales -** Types of scales and Construction of plain scale	2
3	***Conic Sections*** **-** Construction of ellipse, parabola and hyperbola by general methodand any special method	**2+2**
4	**Concept of Quadrant System-** Understand the quadrant system with the help ofpoints and lines	**2+2**
5	**Projection of Planes -** Simple positions and plane inclined to single plane	**2+2**
6	**Projection of Solids -** Simple positions and plane inclined to single plane	**2+2**
7	**Isometric Drawing -** Simple planes and solids in isometric views (Combination ofSolids)	**2+2**
8	**Orthographic Projections -** Conversion of geometric figures and drawings fromisometric view to orthographic view	**2+2**

Text Books:

1. N.D. Bhatt, V. M Panchal & P. R. Ingle , *"Engineering Drawing",* Charotar Publishing House, 2014
2. M. B. Shah, & B. C. Rana , *"Engineering Drawing and Computer Graphics",* Pearson Education, 2008
3. S. N. Lal, *"Engineering Drawing with Introduction to Auto CAD",* Cengage Learning India Pvt Lid, New Delhi, 2018.
4. B. Agrawal & C. M. Agrawal, *"Engineering Graphics",* TMH Publication, 2012
5. K. L. Narayana, & P Kannaiah, *"Text book on Engineering Drawing",* Scitech Publishers, 2008
6. (Corresponding set of) CAD Software Theory and User Manuals

NOTE:

1. At least 6 sheets must be drawn.
2. Sheet number 1 to 3 (Graph sheets / drawing sheets)
3. Sheet number 4 to 8 (AutoCAD drawings)

Course Code	Course Title						Core/Elective
U21ESN83CS	**Programming for Problem Solving using Python Lab**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**-**	**-**	**-**	**4**	**25**	**50**	**2**

Course Objectives

The objectives of this course is to impart knowledge of

- Enabling students to learn basic fundamentals of python
- To improve logical skills by working with control statements, mathematical functions
- To learn about modular programming through functions and recursive programs
- To handle logical, syntax errors and define custom errors as per real world problems
- Enabling students to access files and perform operations
- To introduce and work with object-oriented principles
- Enabling students to learn python built-in modules

Course Outcomes

After completing this course, the student will be able to:

- Implement basic syntax, semantics in python and improve logical skills
- Formulate mathematical computations, store data using strings, collection types
- Perform modular programming using functions and recursion
- Analyze and implements OOP concepts in real world problems
- Handle and define multiple exceptions logically, syntactically and also able to access files
- Implement built-in modules in various domains like big data, machine learning

Write python programs for the following:

1. Read a set of numbers from the command line, add & print those numbers.
2. Display two random numbers that are to be added, the program should allow the student to enter the answer. if the answer is correct, a message of congratulations should be displayed, if the answer is wrong the correct answer should be displayed.
3. Read a date and check whether the date is valid or not, if it is valid print incremented date.
4. Read x,y and print all prime numbers between x and y where x<=y
5. Accept Three Digits and Print all Possible Combinations from the Digits
6. Check for “amicable” numbers, armstrong number & strong number
7. Compute a Polynomial Equation given that the Coefficients of the Polynomial are stored in a List
8. Search the Number of Times a Particular Number Occurs in a List
9. Read a List of Words and Return the Length of the Longest One
10. Remove the ith Occurrence of the Given Word in a List where Words can Repeat
11. Count the number of alphabets, consonants, vowels, digits, special characters in a sentence
12. Store some elements in the dictionary and remove a given key from the dictionary.
13. To display which Letters are in the First String but not in the Second
14. Write a function to compute gcd, factorial, fibonacci series
15. Write a recursive function to compute gcd, factorial, fibonacci series
16. Create a class and compute the Area and the Perimeter of the Circle
17. Creating a class “employee” with fields name, id, designation, salary. Initialize N employees and print details of N employees. Use self and__init_() method.
18. Demonstrate on single-level and multi-level inheritance.
19. Demonstrate on operator overloading, method overloading, method overriding

20. Demonstrate on predefined multiple exceptions
21. Demonstrate on custom exceptions
22. Read the Contents of a File in Reverse Order
23. GUI program to convert celsius temperature to fahrenheit
24. Read .csv file to print the statistical summary of each attribute and visualize the data
25. numpy program to compute sum of all elements, sum of each column and sum of each row of a given array.

Text Book:

1. Reema Thareja, *"Python programming using problem solving approach ",* Oxford university press.

Reference Books*:*

1. Mark Summerfield, "*Programming in Python 3:A Complete Introduction to the Python Language",*2nd edition, Addison-Wesley
2. Martin C. Brown*," PYTHON: The Complete Reference",* McGraw-Hill, 2001.
3. E Balagurusamy,"*Introduction to Computing and Problem Solving Using Python",* McGrawHill

Course Code	Course Title						Core/Elective
U21ESN81EE	**Basic Electrical Engineering Lab**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
U21ESN01EE	**-**	**-**	**-**	**2**	**25**	**50**	**1**

Course Objectives

The objectives of this course is to

- To impart the practical knowledge and analysis of electrical circuits, theorems and transformers.
- To impart the practical knowledge on testing of DC and AC Machines and the usage of common electrical measuring instruments.

Course Outcomes

After completing this course, the student will be able to:

- Get an exposure to common electrical components and their ratings.
- Analyze the performance of DC and AC Circuits.
- Analyze the performance of DC and AC Machines.
- Comprehend the usage of common electrical measuring instruments.
- Test the basic characteristics of transformers and electrical machines.

List of Laboratory Experiments/ Demonstrations:

1. Demonstration of Basic safety precautions. Introduction and use of measuring instruments–voltmeter, ammeter, multi-meter, oscilloscope, Real-life resistors, capacitors and inductors.
2. Verification of KVL and KCL, superposition theorem (with DC excitation)
3. Verification of Thevenin's and Norton's theorems (with DC excitation)
4. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification of phase differences between current and voltage and Power factor calculation.
5. Transformers: Observation of the no-load current waveform on an oscilloscope (non-sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics).
6. Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
7. Three-phase transformers: Star and Delta connections, Voltage and Current relationships (line- line voltage, phase-to-neutral voltage, line and phase currents).
8. Measurement of phase voltage/ current, line voltage/ current and power in a balanced three-phase circuit connected in star and delta.
9. Demonstration of cut-out sections of machines: DC machine, induction machine (squirrel-cage rotor), synchronous machine (field winding- slip-ring arrangement) and single-phase induction machine.
10. OC characteristics of DC Generator
11. Synchronous speed of two and four-pole, three-phase induction motors, Direction reversal by change of phase-sequence of connections.
12. Power factor improvement of Induction Motor using static capacitors
13. Load Test of DC Motor

Note: Minimum eight experiments should be conducted in the semester

Text Books:

1. J. B. Gupta, *"Fundamentals of Electrical Engineering and Electronics"* S.K .Kataria & Sons Publications, 2002.
2. J. B. Gupta, "*Utilization of Electric Power and Electric Traction"* S.K. Kataria & Sons Publications, 2010.
3. Satish Kumar Peddapelli, G.Sridhar, *"Electrical Machines – A Practical Approach",* De Gruyter Publications, 2020.
4. Hughes, *"Electrical Technology",* VII Edition, International Student-on, Addison Welsey Longman Inc., 1995.

B.E. (Computer Science & Engineering) III - SEMESTER

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/ D	Contact Hrs/ week	CIE	SEE	Duration of SEE (Hrs.)	
Theory Courses										
1	U21HSN02EG	Effective Technical Communication in English	2	-	-	2	30	70	3	2
2	U21ESN01EC	Logic and Switching Theory	3	-	-	3	30	70	3	3
3	U21PC301CS	Database Management Systems	3	-	-	3	30	70	3	3
4	U21PC302CS	Data Structures Using C++	3	-	-	3	30	70	3	3
5	U21PC303CS	Discrete Mathematics	2	1	-	3	30	70	3	3
6	U21HSN01CO	Finance and Accounting	3	-	-	3	30	70	3	3
7	U21MCN01CE	Environmental Science	2	-	-	2	30	70	3	-
Practical/ Laboratory Courses										
8	U21PC381CS	Data Structures Using C++ Lab	-	-	4	4	25	50	3	2
9	U21PC382CS	Database Management Systems Lab	-	-	4	4	25	50	3	2
10	U21PW383CS	Theme based Project	-	-	-	4	25	50	3	2
		Total	**18**	**1**	**8**	**31**	**285**	**640**	**-**	**23**

Course Code	Course Title						Core/Elective
U21HSN02EG	**Effective Technical Communication in English (Common to all branches)**						Core
Prerequisite	**Contact Hours Per Week**				**CIE**	**SEE**	**Credits**
	L	**T**	**D**	**P**			
----	**3**	**---**	**---**		**30**	**70**	**2**

Course Objectives

To facilitate the students to learn the:

- Features of Technical Communication
- Aspects of data interpretation with the help of visual aids
- Types of Official Correspondence/IOC
- Types of Professional Correspondence
- Techniques of Report Writing

Course Outcomes

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

- Handle technical communication effectively
- Enhance their skills of information transfer using variety of visual aids
- Use different types of Inter Office Correspondence
- Use different types of Professional correspondence to communicate effectively
- Use various techniques of writing to generate different types of Reports

Unit-I

Introduction to Communication: General & Technical

- General Communication: Introduction, Process, Types, Flow/Channels of communication, Barriers to Communication
- Technical Communication: Introduction, Process, Types, Features – Accuracy, Precision, Brevity, Clarity, Format, Layout& Style, Use of Visual Aids
- Differences between General writing and Technical writing

Unit- II

Technical Writing I- Information Transfer

- Information Transfer - Introduction & Types
- Verbal to Non-verbal
- Non-verbal to Verbal
- Visual Aids: Significance &Classification in Data Interpretation, Use of Graphic Organisers

Unit -III

Technical Writing I1 -Official Correspondence

- Introduction of various types of correspondence: Format, Layout, Style & Etiquette
- Emails
- Inter Office Correspondence – Circulars, Agendas, Minutes of Meetings, Memos

Unit -IV

Technical Writing III- Business Correspondence

- Business Letters – Sales Letters, Credit Letters, Cover letters/Job Applications, CV& Resume Writing

Unit -V

Technical Writing IV- Report Writing

- Drafting a Scientific Paper
- Project report
- Feasibility report
- Progress report

Suggested Reading:

1. Raman, Meenakshi & Sharma, Sangeeta. (2015). *Technical Communication: Principles and Practice* (3rd ed.). New Delhi, OUP.

2. Rizvi, Ashraf, M.(2017). *Effective Technical Communication* (2nd ed.). New Delhi, Tata McGraw Hill Education.

3. Sharma, R.C., & Mohan, Krishna. (2017.) *Business Correspondence & Report Writing: A practical approach to business &technical Communication* (4th ed.). New Delhi, Tata McGraw Hill Education.

4. Tyagi, Kavita &Misra, Padma. (2011). *Advanced Technical Communication.* New Delhi, PHI Leaning.

5. Jungk, Dale. (2004). *Applied writing for technicians.* New York, McGraw-Hill Higher Education.

6. Munter, Mary. (2011). Guide to Managerial *Communication: Effective Business Writing and*

7. Andrea J. Rutherford(2006) *Basic Communication Skills for Technology.* 2nd Edition, Chennai, Pearson Publications.

8. Geraldine E.Hynes. (2010) *Managerial Communications-Strategies and Applications.* New York,McGraw Hill

9. Terry O' Brien. (2012) *Little Red Books – Modern Writing Skills.* Hydrabad, Rupa Publications.

10. Martin Cutts. (2013) *Oxford Guide to Plain English.* New Delhi, OUP.

Course Code	Course Title						Core/Elective
U21ESN01EC	Logic and Switching Theory						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Boolean Algebra	3	1	-	-	30	70	3

Course Objectives:

- Discuss number systems, Code converters and Properties of Boolean algebra.
- Analyze the minimization of logic equations using K-map and Tabular method.
- Explain the operation of combinational logic circuits.
- Demonstrate the operation of Sequential logic circuits.
- Introduce the various Programmable Logic Devices.

Course Outcome:

- Understand the number representation, their conversion and Properties of Boolean algebra.
- Understand the Minimization of Switching Functions and optimize the implementation of logic functions.
- Design Combinational circuits using PLDS and write VHDL code for basic gates and combinational circuits.
- Analyze the various flip-flops and design Synchronous/ Asynchronous sequential circuits.
- Represent a sequential circuit using Finite State machine and apply state minimization techniques to design a FSM.

UNIT – I

Number system and Codes: Binary, Octal, Hexa Decimal numbers, Number base conversion, 1's Complement, 2's complement, BCD, Excess -3 code, Development of Graycode, Parity code.

Boolean Algebra: Properties of Boolean algebra, Basic Laws and Theorems, DeMorgan's theorem, Switching Functions, definitions, simplifications, Canonical and Standard Forms, Logic Gates, Functional Properties.

UNIT – II

Minimization of Switching Functions: The Map Method (K-Map), 5-variable map, Minimal Functions and their properties. Prime implicants, Essential Prime Implicants, Quine-McCluskey Tabular Method, Don't – care combinations. AND-OR, OR-AND and NAND/NOR Realizations, Exclusive-OR and Equivalence Functions.

UNIT – III

Combinational Logic Design: Design with basic logic gates, Single Output and Multiple Output Combinational Logic Circuit Design Adders and Subtractors, Multiplexers. Demultiplexers, Decoders, Encoders. Code converters: BCD to 7-segment converter, Arithmetic comparator circuits. Races and hazards. Introduction to VHDL: VHDL code for basic Logic gates, Adders (Half adder and Full adder)

UNIT – IV

Sequential Circuits: Memory element, S-R, J-K and D Latch operation, Race around condition, Master Slave J-K Flip Flop, Flip-Flop types: S-R, J-K, D, T, State table, State diagram, Characteristic equation and excitation table, Flip flop conversions.

Sequential Logic Design: Asynchronous and Synchronous counters, Shift registers and basic applications.

UNIT – V

Programmable Logic Devices (PLDs): General structure of a Programmable Array Logic (PAL), Programmable Logic Arrays (PLAs), Programmable Read only Memory (PROM), Structure of CPLDs and FPGAs, 2-input and 3-input lookup tables (LUT).

Finite State machine (FSM) representation using Moore and Mealy state models- Sequence Detector.

Tex Books:

1. Ronald J.Tocci, Neal S. Widmer &Gregory L.Moss, "Digital Systems: Principles and Applications," PHI, 10/e, 2009.
2. Zvi Kohavi, Switching and Finite Automata Theory, 3rd ed., Cambridge University Press-New Delhi,
3. Stephen Brown and Zvonko Vranesic, Fundamentals of Digital Logic with Verilog Design

Reference Books:

1. Moris Mano and Michael D Ciletti, Digital Design, Pearson, fourth edition, 2008, 2011.
2. Anand Kumar A, "Fundamentals of Digital Circuits", Prentice-Hall of India private Limited, New Delhi, 2007
3. R. P Jain, Modern Digital Electronics,4th ed., McGraw Hill Education (India) Private Limited, 2003

Course Code	Course Title						Core/Elective
U21PC301CS	Database Management Systems						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	-	-	-	30	70	3

Course Objectives:

- To Learn mathematical concepts as applied in computer
- To introduce three scheme architecture and DBMS functional components.
- To learn formal and commercial query languages of RDBMS
- To Studydifferent file organization and indexing techniques
- To familiarize theory of serializablity and implementation of concurrency control, and recovery

Course Outcomes:

- Understand the mathematical foundations on which RDBMS are built
- Model a set of requirements using the Extended Entity Relationship Model (EER), transform an EERmodel into a relational model and refine the relational model using theory of normalization
- Use the knowledge of file organization and indexing to improve database application performance
- Understand the working of concurrency controland recovery mechanisms in RDBMS
- Compare and contrast RDBMS with NoSQL databases

Unit-I

Introduction: Database System Application, Purpose of Database Systems, View of Data, Database Language, Relational Databases, Database Design, Object-Based and Semi-Structured Databases, Data Storages and Querying , Transaction Management, Data Mining and Analysis, Database Architecture, Database Users and Administrators.

Database Design and the E-R Model: Overview of the Design Process, The Entity Relationship Model Constraints, Entity-Relationship Design issues, Weak Entity Sets Extended E-R Features Database Designfor banking Enterprise, Reduction to Relational Schemas, Other Aspects of Database Design

UNIT-II

Relational Model: Structure of Relational Databases, Fundamental Relational-Algebra Operations, Additional Relational-Algebra Operations, Extended Relational-Algebra Operations, Null Values, Modification of the Databases.

Relational Database Design: Features of Good Relational Design, Atomic Domains and First Normal Form, Functional Dependency Theory, Decomposition using Functional Dependencies.

UNIT-III

Indexing and Hashing: Basic Concepts, Ordered Indices, B+-tree index files, B-tree index files, multiple key access, static hashing, dynamic hashing, comparison of ordered indexing and hashing bitmap indices.

UNIT-IV

Transactions: Transaction concepts, transaction state, implementation of atomicity and durability,

concurrent executions, serializability, recoverability, implementation of isolation, testing for serializability.

Concurrency Control: Lock based protocols, timestamp based protocols, validation based protocols, multiple granularity, multi version schemes, deadlock handling, insert and delete operations, weak levels of consistency, concurrency of index structures.

UNIT-V

Recovery system: Failure classification, storage structure, recovery and atomicity, log-based recovery, recovery with concurrent transactions, buffer management, failure with loss of non-volatile storage, advanced recovery techniques, remote backup systems.

Introduction, Overview, and History of NoSQL Databases – The Definition of the Four Types of NoSQL Databases. Comparison of relational databases to NoSQL

Text Books:

1. Abraham Silberschatz, Henry F Korth, S Sudarshan, Database System Concepts, McGraw-Hill, 6th Edition, 2010
2. Ramakrishnan, Gehrke, Database Management Systems, McGraw-Hill, 3rd Edition, 2003

Reference Books:

1. Elmasri, Navathe, Somayajulu, Fundamentals of Database Systems, Pearson Education, 4th Edition, 2004.
2. Sadalage, P. & Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Wiley Publications,1st Edition ,2019.

Course Code	Course Title						Core/Elective
U21PC302CS	Data structures using C++						Core
Prerequisite	Contact hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	-	-	-	30	70	3

Course Objectives:

- To Teach the basic programming concepts in C++
- To teach the importance of structuring data for easy storage and Access
- To teach the implementation of various data structures
- To acquire skills in using generic principles for data representation and manipulation with a view for efficiency, maintainability and code reuse
- To introduce the basic concepts of advanced data structures

Course Outcomes:

After learning this course students will be able to:

- Implement programs in C++ and Understand the importance of Abstract data type in various data structures implementation
- Evaluate an algorithm by using its performance measures
- Distinguish between linear and non-linear data structures and their representations in the memory using arrays and linked lists
- Understand sorting and searching and Develop applications using Linear and non-linear data structures
- Apply suitable data structures for a real world problem by critical thinking to improve solutions

UNIT – I

Introduction to C++: Basics of C++: Program organization in C++, Input/output , Classes and Constructors, Access Modifiers, friend function, friend class, Dynamic Memory Allocation, Templates, inheritance

UNIT – II

Algorithms: Introduction, Algorithm Specifications, Recursive Algorithms, Performance Analysis of an algorithm- Time and Space Complexity, Asymptotic Notations.
Arrays: Arrays - ADT, Representation of Polynomials
Stacks: Stack ADT, Stacks using dynamic arrays,
Applications :Infix to Postfix conversion, Evaluating Postfix Expression
Queues: Queues ADT, operations, Circular Queues, Dequeues

UNIT – III

Linked Lists: Singly Linked Lists, Circular linked list, Doubly Linked Lists, Stacks and Queues using linked list, representing Polynomials using linked list

UNIT – IV

Trees: Introduction, Representations, Binary Trees, Expression trees, Binary Tree Traversals, Heaps
Dictionaries: Binary Search tree - Definition, Insertion, Deletion, Searching operations Hashing- Hash table, Hash functions, Collision-resolution techniques
Efficient Binary Search Trees: AVL Tree: Definition, Insertion, Deletion, Search operations, B-Trees- Insertion, Deletion, Search operations

UNIT – V

Graphs: Graph Abstract Data Type, Representations, Graph Traversal traversals (DFS and BFS)
Sorting and Searching: Insertion sort, Heap sort, Linear and Binary Search- algorithms, time complexities

Text Book:

1. Horowitz E, Sahni S and Susan Anderson-Freed, Fundamentals of Data structures in C++, 2nd Edition (2008), Universities Press

Reference Books:

1. Object Oriented Programming with C++, E Balagurusamy, Fifth edition
2. Data Structures Using C and C++ , YedidyahLangsam , Moshe J. Augenstein, Aaron M. Tenenbaum, Second Edition (2009), PHI
3. Data structures using C++ , Yashwanth Kantkar
4. Data structures Using C++ , Varsha H Patil, Oxford University of Higher Education

Course Code	Course Title				Core/Elective		
U21PC303CS	Discrete Mathematics				Core		
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	2	1	-	-	30	70	3

Course Objectives:

- To learn logical notations to define and reason about fundamental mathematical concepts such as sets, relations, functions and Induction.
- To model relationships, analyze data, apply probability concepts and use functions to solve problems.
- Understand random and discrete variables.
- To formulate problems and solve generating functions and recurrence relations
- To model and solve problems using graphs and trees.

Course Outcomes:

After completing this course, the student will be able to:

- Apply Propositional and Predicate logic for a variety of problems in various domains.
- To distinguish random and discrete variables and compute expected value and variance.
- Formulate recurrence relations for a sequence and solve first order and second order recurrence relations by finding the corresponding generating functions.
- To understand the properties implied by the definitions of algebraic system and demonstrate examples of groups, subgroups, homomorphism.
- Develop the given problem as a graph network and solve with the techniques of graph theory.

UNIT-I

Logic and Set theory – Logic, Propositional equivalences – Predicates and quantifiers – Nested Quantifiers-Sets-Set Operations, Venn diagrams.

Mathematical Reasoning- Mathematical Induction, Recursive Definitions . The Fundamental Theorem of Arithmetic.

Relations and Functions: Relations & their Properties, Representing relations – Closures, equivalence relations, partial orderings, Types of functions-bijective, inverse and composite functions.

UNIT -II

Counting Techniques: Principle of Inclusion and Exclusion, Pigeonhole principle, Binomial coefficients, Permutations and Combinations, Derangements.

Discrete Probability: An Introduction to Discrete Probability theory, Expected Value and Variance.

UNIT -III

Generating Functions: Introduction, Definitions and examples**,** Exponential Generating function.

Recurrence relations – Solving First-order and second order linear Recurrence Relations, Recurrence relations with constant coefficients, Divide and conquer relations.

UNIT -IV

Algebraic Structures: Algebraic System, Properties, Semi-groups, groups, monoids, homomorphism, isomorphism, Group codes and their applications.

UNIT-V

Graph Theory: Graphs and their Properties, Degree, Connectivity, Path, Cycle, Isomorphism, Hamiltonian graphs, Euler and Planar graphs, Graph coloring, Chromatic number.
Trees: Definitions, Properties and Examples, Rooted Trees, Spanning Trees, Minimum Spanning Trees.

Text Books:

1. Kenneth H. Rosen – Discrete Mathematics and its Application – 5th Edition, McGraw Hill, 2003
2. Joel. Mott. Abraham Kandel, T.P. Baker, Discrete Mathematics for Computer Scientist & Mathematicians, Prentice Hail N.J., 2nd Edition, 1986.

Reference Books:

1. Ralph P. Grimaldi , B. V. Ramana -Discrete and Combinatorial Mathematics : An Applied Introduction-5th Edition.
2. J.P. Tremblay, R. Manohar, Discrete Mathematical Structure with Application to Computer Science, McGraw Hill – 1997.
3. J. K. Sharma, Discrete Mathematics, Second Edition, Macmillan, 2005.

Course Code	Course Title						Core/Elective
U21HSN01CO	Finance And Accounting						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	-	-	-	30	70	3

Course Objectives:
The course will introduce the students to

- To provide understanding of the accounting aspects of business.
- To provide understanding of financial statements.
- To provide understanding of financial system.
- To provide inputs necessary to evaluate the viability of projects.
- To provide the skills necessary to analyse the financial statements.

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

- To be able to evaluate the financial performance of the business unit.
- To be able to take decisions on selection of projects.
- To be able to take decisions on procurement of finances.
- To be able to analyse the liquidity, solvency and profitability of the business unit.

UNIT-I
Basics of Accounting: Financial Accounting-Definition - Accounting Cycle –Journal - Ledger - Cash Book –Bank Reconciliation Statement and Trial Balance (including problems)

UNIT-II
Final Accounts: Trading Account - Profit and Loss Account - Balance Sheet (including problems with adjustments like Closing Stock, Expenses Outstanding, Prepaid Expenses, Income earned but not received, Income received in advance, Depreciation, Bad debts, Provision for Bad and Doubtful Debts, Provision for Discount on Debtors, Provision for Discount on Creditors, Interest on Capital, Interest on Drawings)

UNIT-III
Financial Statement Analysis: Importance-Users - Ratio Analysis - Liquidity, Solvency, Turnover & Profitability Ratios.

UNIT-IV
Capital Budgeting: Meaning – Importance - Time Value of Money- Discounting - Compounding - Financial Appraisal of Project – Payback Period, ARR, NPV, PI, IRR (Simple problems)

UNIT-V
Financial System and Markets: Financial System - Financial Markets – Financial Institutions – Financial Instruments – Financial Intermediaries – RBI, SEBI and IRDA (Functions only)

Text Books:

1. Accountancy – I: Haneef & Mukarjee, Tata McGrahill Company
2. Accountancy – I: SP. Jain & KL. Narang, Kalyani Publishers
3. Advanced Accountancy – I: S.N. Maheshwari & V.L. Maheswari, Vikas Publishers
4. Financial Management – I.M. Pandey, Vikas Publishers
5. Financial Institutions & Markets – Prashanta Athma, PBP

Course Code	Course Title						Core/Elective
U21MCN01CE	Environmental Science						Mandatory
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	2	-	-	-	30	70	0

Course Objectives:

- To create awareness and impart basic knowledge about the environment and its allied problems.
- To knowthe significance and functions of ecosystem.
- To understand importance of biological diversity.
- To studydifferent forms of pollution and their impact on environment.
- To know socialand environment related issues and their preventive measures.

Course Outcomes:

After completing this course, students will be able to:

- Develop an attitude of concern towards the environment.
- Understand the importance of ecosystem.
- Conservation of naturalresources and biological diversity.
- Develop knowledge on Environmental pollution and Environmental loss
- Adopt environmental ethics to attain sustainable development

MODULE -I

The Multidisciplinary Nature of Environmental Studies: Definition, scope and importance, need for public awareness.

Natural Resources: Water Resources – Use and over utilization of surface and ground water, flood, drought, conflicts over water, Dams: Benefits and Problems. Food Resources–World Food Problems, effects of modern agriculture, fertilizer-pesticides problems, waterlogging, salinity, Forest Resources – Use and over exploitation, deforestation & its effect on tribal people. Land Resources–Land Degradation, soil erosion and desertification**.** Energy Resources –Growing energy needs, Renewable and Non-renewable energy resources.

MODULE -II

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in ecosystem, food chains, ecological pyramids, ecological succession, types of ecosystems (marine, pond, river, forest, grassland, desert)

MODULE -III

Biodiversity: Levels of Biodiversity, Bio-geographical classification of India, Value of biodiversity, Threatsto biodiversity, endangered and endemic species of India, Conservation of biodiversity.

MODULE -IV

Environmental Pollution: Definition, Causes, effects and control measures of air pollution, water pollution,Soil pollution, noise pollution, thermal pollution, solid waste management

Environment Protection Act: Air, water, forest and wildlife Acts, issues in the enforcement of environmental legislation.

MODULE -V

Social Issues and the Environment: Watershed management and environmental ethics. Climate change, global warming, acid rain, ozone layer depletion.

Environmental Disaster Management: Types of disasters, impact of disasters on environment, infrastructure, and development. Disaster management cycle and disaster management in India.

Text books:

1. A.K.De, *Environmental Chemistry*, Wiley Eastern Ltd., 2016.
2. E.P.Odum, *Fundamentals of Ecology*, W.B. Sunders Co., USA, 2017
3. M.N. Rao and A.K.Datta, *Waste Water Treatment*, Oxford and IBK Publications, 2020
4. Benny Joseph, *Environmental Studies*, Tata McGraw Hill, 2005.
5. V.K.Sharma, *Disaster Management*, National Centre for Disaster Management, IIPE,1999.

Course Code	Course Title				CIE	SEE	Core/Elective
U21PC381CS	Data Structures Using C++ Lab						Core
Prerequisite	Contact hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	4	25	50	2

Course Objectives:

- Design and construct simple programs by using the concept of structures as abstract data type.
- To have a broad idea about how to use pointers in the implement of data structures.
- To enhance programming skills while improving their practical knowledge in data structures.
- To strengthen the ability to apply the suitable data structures for real world problems.

Course Outcomes:

- Implement C++ fundamental programs.
- Demonstrate linear, non-linear data structures and its applications.
- Implement various sorting and searching techniques.
- Knowledge for evaluating various computing problems and reusability of code.
- Apply suitable data structure for the given real-world problem.

Implement the following

1. Dynamic Memory Allocation
2. Function and class templates
3. Inheritance

Linear data structures:

4. Stack using arrays
5. Infix to Postfix conversion
6. Evaluation of Postfix expression
7. Circular queue using arrays
8. Singly linked list operations
9. Doubly linked list operations
10. Stack using linked list
11. Queue Using Linked List
12. Polynomial operations using linked list
13. Insertion sort
14. Heap sort
15. Linear search
16. Binary search
17. Hashing

Non-linear data structures

18. Binary tree traversals
19. Binary search tree operations
20. Graph traversal techniques

Course Code	Course Title						Core/Elective
U21PC382CS	Database Management Systems Lab						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	4	25	50	2

Course Objectives:

- To practice various DDL commands in SQL
- To write simple and complex queries in SQL
- To familiarize PL/SQL

Course Outcomes:

- Design ER and relational model for the given problem-domain
- Declare and enforce integrity constraints on a database
- Querya database using SQL DML / DDL
- Implement procedures, Cursors and Triggers.
- Familiarity with NoSQL Database using MangoDB

Week 1: E-R Model
Identifying Entities, attributes with different types of keys for a given case study.

Week 2: Conceptual design with E-R Model
Identify relationships appropriately and apply cardinalities for each relationship. Identify strong entities and weak entities (if any). Indicate the type of relationships (total / partial).

Week 3: Relational Model
Reduce E-R model designed in Week-2 into Relational model.

Week 4: Normalization
Apply Normalization concepts on the tables designed in week-3 so as to remove various anomalies.

Week 5: Installation of MySQL and practicing DDL commands

Week 6: Practicing DML commands

Week-7: Usage of Aggregate functions with group by and having.

Week 8: Querying: Usage of set operators and Creation and dropping of Views.

Week 9: PLSQL: Implementing Procedures

Week 10: PLSQL: Implementing Triggers

Week 11: PLSQL: Implementing Cursors

Week 12: NoSQL CRUD operations with MongoDB

Course Code	Course Title						Core/Elective
U21PW383CS	Theme Based Project						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	4	25	50	2

Course Objectives:

- To enhance practical and professional skills.
- To familiarize tools and techniques of systematic literature survey and documentation.
- To expose the students to industrypractices and teamwork.
- To encourage students to work with innovative and entrepreneurial ideas.

Course Outcomes:

Student will be able to

- Demonstrate the ability to synthesize and apply the knowledge and skills acquired in the academic program to the real-world problems.
- Evaluate different solutions based on economic and technical feasibility.
- Effectively plan a project and confidently perform all aspects of project management.
- Demonstrate effective coding, written, presentation and oral communication skills.

I. CASE STUDY

The students are required to carry out mini projects in any of the areas such as Data Structures, Microprocessors and Interfacing, Database Management Systems, Operating Systems, Design and Analysis of Algorithms, Software Engineering, Data Communications, Web Programming & Services, Computer Networks, Compiler Construction, and Object- Oriented System Development.

Problems Statements are suggested to be taken from Smart India Hackathon (SIH) Portal invited from the Ministries / PSUs / MNCs / NGOs to be worked out through.

The project could be classified as hardware, software, modeling, simulation etc. The project should involve one or many elements of techniques such as analysis, design, and synthesis.

The department will appoint a project coordinator who will coordinate the following:

1. Grouping of students (maximum of 3 students in a group)
2. Allotment of projects and project guides.
3. All projects allotment is to be completed by the 4th week of the semester so that the students get sufficient time for completion of the project.
4. Disseminate guidelines given by monitoring committee comprising of senior faculty members to the students and their guides.

Sessional marks are to be awarded bythe monitoring committee.

Common norms will be established for the final presentation and documentation of the project report bythe respective departments.

Students are required to submit a presentation and report on the mini project at the end of the semester.

B.E. (Computer Science & Engineering) IV– SEMESTER

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/ week	CIE	SEE	Duration of SEE (Hrs.)	
Theory Courses										
1	U21ESN03CS	Object Oriented Programming using JAVA	3	-	-	3	30	70	3	3
2	U21BSN03MT	Engineering Mathematics - III (Probability & Statistics)	3	-	-	3	30	70	3	3
3	U21PC401CS	Design and Analysis of Algorithms	3	-	-	3	30	70	3	3
4	U21PC402CS	Software Engineering	3	-	-	3	30	70	3	3
5	U21PC403CS	Computer Organization	3	-	-	3	30	70	3	3
Practical/ Laboratory Courses										
6	U21PCN83CS	Object Oriented Programming Lab using JAVA	-	-	4	4	25	50	3	2
7	U21PC481CS	Design and Analysis of Algorithms Lab	-	-	2	2	25	50	3	1
8	U21PC482CS	Software Engineering Lab	-	-	4	4	25	50	3	2
9		*Summer Internship	-	-	-	-	-	-	-	-
		Total	**15**	**-**	**10**	**25**	**225**	**500**	**-**	**20**

* To be conducted after the IV Semester in the Summer Vacation and to be evaluated in V Semester

Course Code	Course Title				Core/Elective		
U21ESN03CS	Object Oriented Programming Using Java				Core		
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	-	-	-	30	70	3

Course Objectives:

- To understand fundamentals of object-oriented programming in Java which includes definingclasses, invoking methods, difference between applet and application programs, using class libraries
- To create Java application programs using sound OOP practices such as interfaces, exceptionhandling, multithreading.
- Explore I/O, language and other packages.
- Use Collection framework, AWT and event handling to solve real world problems.
- Exploring JDBC package to create database centric applications

Course Outcomes:

- Identify classes, objects, members of a class and the relationships needed to solve a problem.
- Useinterfaces and creating user-defined packages.
- Utilize exception handling and Multithreading concepts to develop Java programs.
- Compose programs using the Java Collection API.
- Design a GUI using GUI components with the integration of event handling along with Database.
- Create files and read from computer files.

UNIT-I

Introduction: OOP concepts, history of Java, Java buzzwords, data types, variables, scope and lifetime of variables, operators, expressions, control statements, type conversion and casting, simple java programs.

Classes and Objects: Concept of classes, objects, constructors, methods, this keyword, super keyword, garbage collection, overloading methods and constructors, parameter passing, Arrays.

String handling: String, String Buffer, String Builder

UNIT -II

Inheritance: Base class object, subclass, member access rules, super uses, using final with inheritance, method overriding, abstract classes.

Interfaces: Defining and implementing an interface, differences between classes and interfaces and extending interfaces, Polymorphism.

Packages: Defining, creating and accessing a package, importing packages

UNIT -III

Exception handling: Concepts and benefits of exception handling, exception hierarchy, checked and unchecked exceptions, usage of-try, catch, throw, throws and finally, built in exceptions, creating User

defined exceptions.
Multithreading: Difference between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads

UNIT -IV
Basic I/O Streams: Java I/O classes and interfaces, Files, Stream and Byte classes, Character streams, Serialization
Exploring java.lang: Object class, Wrapper classes
Exploring java.util: Scanner, StringTokenizer, Date
Collections framework: Overview, Collection interfaces: List, Set, Map Collection classes: ArrayList, LinkedList, HashSet, HashMap, Accessing Collection over Iterator, ListIterator.

UNIT -V
AWT & Event Handling:
The AWT class hierarchy, user interface components - labels, buttons, canvas, scrollbars, text components, checkbox, checkbox groups, choices, lists. Events, event sources, event classes, event listeners, delegation event model, handling mouse and key board events, adapter classes.
Layout manager: Border, Grid, Flow, Card and Grid Bag layouts.

JDBC: Database Programming using JDBC: Introduction to JDBC, JDBC Drivers & Architecture, CRUD operation Using JDBC

Text Books:
1. Java The complete reference, 9th edition, Herbert Schildt, TMH.
2. Java Server Programming Java EE7 (J2EE 1.7): Black Book, (2014), Dreamtech Press

Reference Books:
1. Understanding OOP with Java, up dated edition, T. Budd, Pearson education.
2. Head First Java, 2nd Edition by Bert Bates, Kathy Sierra Publisher: O'Reilly Media, Inc.
3. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons.
4. Database Programming with JDBC & Java, Second Edition, O'Reilly Media

Course Code	Course Title						Core/Elective
U21BSN03MT	Engineering Mathematics-III (Common to All Branches)						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	-	-	-	30	70	3

Course Objectives:

- To introduce the basic concepts of probability
- To studythe concepts of discrete and continuous probability distributions
- To introduce and studythe concepts of fitting of curves, Correlation and Regression
- To studythe concepts of testing of hypothesis for small samples

Course Outcomes:

- Solve the problems by using the concepts of probability and random variables.
- Determine the statistical parameters for discrete probability distributions.
- Determine the statistical parameters for continuous probability distributions.
- Solve problems on curve fitting, correlation and lines of regression.
- Test the hypothesis for small samples.

UNIT-I

Probability: Introduction to Probability, Conditional Probability, Theorem of Total probability, Bayes Theorem and its applications, Random variables, Types of random variables, Probability mass function and Probability density function, Mathematical expectation, variance. (12 hours)

UNIT-II

Discrete probability distributions: Introduction to Binomial and Poisson distributions, evaluation of statistical parameters -mean, variance, moment generating function, moments, skewness and kurtosis by central moments. (9 hours)

UNIT-III

Continuous probability distributions: Introduction to Uniform, Normal distributions, evaluation of statistical parameters - mean, variance, moment generating function, moments, skewness and kurtosis by central moments, Central limit theorem (without proof) (9 hours)

UNIT-IV

Correlation and Regression: Fitting of straight-line, second-degree Parabola and Power curves. Correlation, Regression and Rank correlation. (11 hours)

UNIT-V

Tests of significance: Small Samples-Introduction, Test of Hypothesis, t-test for single mean, difference of means, F-test for ratio of variances, Chi-square test for goodness of fit. (11 hours)

Text Books:

1. R. K. Jain & S. R. K. Iyengar, Advanced Engineering Mathematics, Narosa Publications.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications.
3. S.C. Gupta & V. K. Kapoor, "Fundamentals of Mathematical Statistics", S. Chand Pub.

Reference Books:

1. N. P. Bali, &M. Goyal, "A text book of Engineering Mathematics", Laxmi publications, 2010.
2. P. G. Hoel, S. C. Port & C. J. Stone, "Introduction to Probability Theory", Universal Book Stall, 2003.
3. W. Feller, "An Introduction to Probability Theory and its Applications", Vol. I, Wiley, 1968.

Course Code	Course Title						Core/Elective
U21PC401CS	Design and Analysis of Algorithms						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	-	-	-	30	70	3

Course Objectives:

- Determine performance of algorithms using asymptotic notations.
- Formulate methodologies to solve recursive algorithms using recurrence relations.
- Interpret algorithms using standard paradigms like: Greedy, Divide and Conquer, Dynamic Programming, Backtracking, Branch & Bound
- Understand NP class problems and formulate solutions using standard approaches.
- Apply algorithm design principles to derive solutions for real life problems and comment on complexity of solution.

Course Outcomes: After successful completion of this course, student will be able to:-

- Compare complexities of algorithms written in pseudo code notation using asymptotic notation
- Identify efficient data structures for various problems and demonstrate a suitable design technique or computing model.
- Apply suitable algorithm design paradigm such as Divide & Conquer, Greedy etc. for the given problem.
- Apply design paradigms Dynamic Programming, Backtracking, and Branch and Bound for the given optimization problem
- Analyze a problem to verify if it belongs to NP complete.

UNIT–I

Introduction & Elementary Data Structures: Introduction, Fundamentals of algorithm (Line Count, Operation Count), Analysis of algorithms (Best, Average, Worst case), Asymptotic Notations(O,Ω,Θ) Recursive Algorithms, Analysis using Recurrence Relations, Master's Theorem.

Review of elementary data structures–Graphs: BFS, DFS, Bi-Connected Components. Sets: representation, UNION, FIND operations.

UNIT–II

Divide-and-Conquer Method: The general method, Binary search, Finding maximum and minimum, Merge sort, Quick sort.

Brute Force: Knapsack, Traveling salesman problem, Convex-Hull

UNIT–III

Greedy Method: Knapsack problem, Minimum spanning trees, Single source shortest path, Job sequencing with deadlines, Optimal storage on tapes, Optimal merge pattern

Dynamic programming method: All pairs shortest paths, Optimal binary search tress, 0/1 Knapsack problem, Reliability design, Traveling salesman problem,

UNIT–IV

Back tracking: N-queens problem, Graph coloring, Hamiltonian cycles

Branch-and-bound: FIFO & LC branch and Bound methods, 0/1 Knapsack problem, Traveling salesperson

UNIT–V

NP-hard and NP-complete problems: Non Deterministic algorithms, The classes: P, NP, NP Complete, NP Hard, Satisfiability problem, Proofs for NP Complete Problems: Clique, Vertex Cover.

Parallel Algorithms: Introduction, models for parallel computing.

Text Book:

1. Horowitz E, Sahni S, Fundamentals of Computer Algorithms, 2nd Edition, Universities Press, 2007

Reference Books:

1. Thomas H.Cormen, Charles E.Lei**serson, Ronald L. Rivest and Clifford Stein,** "Introduction to Algorithms", Third Edition, PHI Learning Private Limited, 2012

2. Michael T. Goodrich, Roberto Tamassia, Algorithm Design: Foundations, Analysis and InternetExamples, John Wiley & Sons,2002

Course Code	Course Title						Core/Elective
U21PC402CS	Software Engineering						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	-	-	-	30	70	3

Course Objectives:

- To introduce the basic concepts of software development processes from defining a product to shipping and maintaining
- To impart knowledge on various phases, methodologies and practices of software development
- To understand the importance of testing in software development, study various testing strategies along with its relationship with software quality and metrics

Course Outcomes:

Student will be able to:

- Acquired working knowledge of alternative approaches and techniques for each phase of software development
- Judge an appropriate process model(s) assessing software project attributes and analyze necessary requirements for project development eventually composing SRS
- Creation of visual models to describe (non-) algorithmic solutions for projects using various design principles.
- Acquire skills necessary as an independent or as part of a team for architecting a complete software project by identifying solutions for recurring problems exerting knowledge on patterns.
- Concede product quality through testing techniques employing appropriate metrics by understanding the practical challenges associated with the development of a significan software system.

UNIT-I

Introduction to Software Engineering: Definition of Software Engineering, The Software Process, A Generic Process Model, Process Assessment and Improvement.

Prescriptive Process Models: The Waterfall Model, Incremental Process Models, Evolutionary Process Models, The Unified Process, Personal and Team Process Models

Agile Development: Agility, Agile Process, Agile Process Models (XP,Scrum)

UNIT-II

Software Engineering Principles: Core Principles, Communication principles, Planning principles, Modeling principles, Construction principles, Deployment principles.

Requirements Engineering: Identifying Stakeholders, Requirements Engineering Tasks, Eliciting Requirements, Developing Use-Cases, Building the Requirements Model, Negotiating Requirements, Validating Requirements.

UNIT-III

Building the Analysis Model: Requirements Analysis, Modeling Approaches, Scenario-based Modeling, Data Modeling Concepts, Class-based Modeling.

Design Engineering: Design within the context of SE, Design Process, Design Concepts, The Design Model.

UNIT-IV

Architectural Design: Software Architecture, Architectural Styles, Architectural Design.
Component-Level Design: Definition of Component, Designing Class-based Components, Conducting Component-level Design, Designing Traditional Components.
User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.

UNIT-V

Software Quality: Definition, Quality Assurance, Six Sigma, ISO 9000 Quality Standards
Testing: Test Strategies for Conventional Software, Test Strategies for O-O Software, Validation Testing (Alpha and Beta Testing), System testing, White-Box Testing, Black-Box Testing
The Art of Debugging: Debugging Process, Debugging Strategies
Software Configuration Management: SCM Repository, SCM Process
Product Metrics: A Framework for Product Metrics, Metrics for Source Code, Metrics for Maintenance

Text Book:

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, 7th Edition, McGraw Hill, 2009

Reference Books:

1. Ali Behforooz and Frederick J. Hudson, Software Engineering Fundamentals, Oxford University Press, 1996
2. Pankaj Jalote, An Integrated Approach to Software Engineering, 3rd Edition, Narosa Publishing House, 2008

Course Code	Course Title						Core/Elective
U21PC403CS	Computer Organization						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Digital Electronics	3		-	-	30	70	3

Course Objectives:

- To understand the structure and basic working principles of a computer system in terms of Instruction Level Architecture and Instruction Execution, processing unit and Memory System Design.
- To learn various communication techniques between I/O devices and the processing unit.
- To impart the knowledge on underlying algorithms used by the computer for arithmetic operations and performance enhancement of processor using Pipelining techniques.

Course Outcomes:

After completing this course, the student will be able to:

- Understand the components and working of a computer system involving instruction sequencing and execution using memory.
- Understand the working principles and design of a basic processing unit.
- Explain the techniques used by a computer to communicate with I/O devices.
- Evaluate various memory organizations and understand the design of memory management techniques.
- Understand and Applythe underlying arithmetic algorithms used by the computer and design techniques to enhance the performance of CPU using pipelining.

Unit I

Basic Structure of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Software, Performance, Multiprocessors and Multicomputer. **Machine Instructions:** Memory Locations and addresses, Memory Operations. Instructions and Instruction Sequencing, Addressing Modes.

Unit II

Basic Processing Unit: Some Fundamental Concepts- Register Transfers, Performing Arithmetic, Logic Operations, Execution of a Complete Instruction, Multiple Bus Organization, Hardwired Control. Micro programmed Control.

Unit III

Input Output organization: Accessing I/O Devices, Interrupts, Direct Memory Access and Buses, Standard I/O interfaces.

Unit IV

Memory System: Basic Concepts, Semiconductor RAM Memories, Read-Only memories, Associative Memory, Cache Memory, Performance Considerations, Virtual Memories, Memory Management Requirements.

Unit V

Arithmetic: Addition and subtraction of Signed numbers, Multiplication of Positive numbers, Booth Algorithm. **Pipelining:** Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction sets, Data Path and Control Considerations.

Text Books:

1. Carl. V Hamacher, Zvonko Vranesic, Safwat Zaky, Computer Organization, 5th Edition (2017), Tata McGraw Hill Education.
2. William Stallings, "Computer Organization and Architecture, Designing for Performance", Pearson, 10th Edition, 2016.

Reference Books:

1. M.Morris Mano, Rajib Mall, Computer System Architecture, 3rd Edition (2017), Pearson Education Asia.
2. David A Patterson, John L Hennessy, Computer Organization and Design: The Hardware/Software Interface, 5th Edition (2016), Morgan Kaufmann.

Course Code	Course Title						Core/Elective
U21PCN83CS	Object Oriented Programming Lab Using Java						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	-	-	-	4	25	50	2

Objectives:

The objectives of the course are to impart knowledge of:

- To build software development skills using java programming for realworld applications.
- To implement frontend and backend of an application
- To implement classical problems using java programming.

Outcomes:

After the completion of the course, the student will be able to:

- Develop Java applications using the concepts of Inheritance, interfaces, packages, access controlspecifiers.
- Implement the concepts of Exception Handling in java Applications.
- Read and write data using different Java I/O streams.
- Create graphical user interfaces and Applets byapplying the knowledge of Event Handling.
- Create robust applications using Java standard class libraries and retrieve data from a database with JDBC.
- Ability to solve real-world problems by designing user friendly GUI with befitting backend throughthe APIs of Java.

List of Experiments

1. Write a Java program to illustrate the concept of class with method overloading
2. Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use StringTokenizer class of java.util)
3. Write a Java program to illustrate the concept of Single level and Multi level Inheritance.
4. Write a Java program to demonstrate the Interfaces & Abstract Classes.
5. Write a Java program to implement the concept of exception handling.
6. Write a Java program to illustrate the concept of threading using Thread Class and Runnable Interface.
7. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.
8. Write a Java program to illustrate collection classes like Array List, LinkedList, TreeMap and HashMap.
9. Write a Java program to implement iteration over Collection using Iterator interface and ListIterator interface
10. Write a Java program that reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
11. Write a Java program to illustrate the concept of I/O Streams
12. Write a Java programto implement serialization concept
13. Write a Java program to perform following CRUD operations on student data using JDBC
    i. create & insert a student record
    i. retrieve and display the existing student records

ii. update & delete a student record

14. Write a Java awt program for handling mouse & key events
15. Write a Java awt programto implement Adapter classes

Course Code	Course Title						Core/Elective
U21PC481CS	Design and Analysis of Algorithms Lab						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	-	-	-	2	25	50	1

Course Objective(s):

- Implement given algorithm using a programming language and compute the execution time
- Demonstrate the rate of growth of execution time of a program with increase in input size.
- Differentiate between the design approaches for solving a given optimization problem
- Formulate a suitable algorithm for addressing graph based problems such as spanning tree, traversal etc.
- Understand the importance of designing an algorithm in an effective way by considering space and time complexity

Course Outcome(s):

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

- Implement divide & conquer based sorting algorithms and analyze performance of algorithms
- Implement optimization algorithms using greedy, dynamic programming for specific applications.
- Solve graph problems using algorithm design strategies such as greedy, dynamic programming etc.
- Test backtracking strategy for solving problems with constraints
- Compare across various algorithmic solutions of a given problem

List of programs:

S.No	Description of the program
1	Print all the nodes reachable from a given starting node in a digraph using BFS method and Check whether a given graph is connected or not using DFS method.
2	Sort a given set of elements and determine the time required to sort the elements using following algorithms: • Merge Sort • Quick Sort
3	Implement Knapsack problem using • Brute Force Approach • Greedy Method • Dynamic Programming
4	Find Minimum Cost Spanning Tree of a given undirected graph using • Kruskal's algorithm

	• Prim's algorithm
5	From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm
6	Implement Travelling Salesperson Problem using • Brute Force Approach • Dynamic Programming
7	Implement All-Pairs Shortest Paths Problem using Floyd's algorithm
8	Implement the following using Back Tracking • N Queen's problem • Hamiltonian Cycle • Graph Coloring

Course Code	Course Title						Core/Elective
U21PC482CS	Software Engineering Lab						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	-	-	-	4	25	50	2

Course Objectives:

- To understand the software engineering methodologies for project development.
- To gain knowledge about open source tools for Computer Aided Software Engineering (CASE).
- To develop test plans and test cases to perform various testing.

Course Outcomes:

Student will be able to:

- Analyze and design software requirements in an efficient manner.
- Use open source case tools to develop software, Implement the design , debug and test the code

I. Forward Engineering

Students have to form a team with a batch size of two or three and take up a **case study based project** to analyze, plan, design UML models and create a prototypical model (by identifying deliverables) by coding the developed designs and finally document considering any one example of the following domains:-

1. Academics (Eg: Course Registration System, Student marks analyzing system)
2. Health Care (Eg: Expert system to prescribe medicines for given symptoms, Remote Diagnostics, Patient/Hospital Management System)
3. Finance (Eg: Banking: ATM/Net Banking, UPI: PayTM/PhonePay, Stocks: Zerodha)
4. E-Commerce (Eg: various online shopping portals like FlipKart/Amazon/Myntra)
5. Logistics (Eg. Postal/Courier: India Post/DTDC/UPS/FedEx, Freight: Maersk)
6. Hospitality (Eg: Tourism Management: Telangana Tourism/Incredible India, Event Management: Mera Events/BookMyShow / Explara / Event Brite)
7. Social Networking (Eg: LinkedIn, Face Book, Shaadi.com, Bharat Matrimony, Tinder)
8. Customer Support (Eg. Banking Ombudsman, Indian Consumer Complaints Forum)
9. Booking/Ticketing (Eg. for Food: Zomato/Swiggy/BigBasket/Grofers/JioMart, Hotel: OYO/Trivago or Travel: {Cars:Uber/OLA/Zoom, Railways : IRCTC, Buses: OnlineTSRTC/RedBus/AbhiBus, Flights: MakeMyTrip/Goibibo, Ships: Lakport})

II. Reverse Engineering: Students have to refer any project repository:GitLab/GitHub, execute the code in order to observe its functionalities/features/requirements and by the help of any tool derive the designs from the code for understanding the relationships among various subsystems/classes/components and if the tool partially generates models then identify by associating elements to judge/mark the appropriate relationships.

III. Testing: Prepare Test Plan and develop Test Case Hierarchy to monitor or uncover/report errors using manual/automated testing tools

Software Required: *StarUML/Umbrello, NetBeans/Eclipse IDE, XAMPP/MEAN stack, JUnit, JMeter, Selenium, Bugzilla*

SUMMER INTERNSHIP

Instruction: 2P periods per week Duration of SEE: 3 hours
CIE: 50 marks SEE: ----
Credits: 2*

Objectives:

To prepare the students
1. To give an experience to the students in solving real life practical problems with all its constraints.
2. To give an opportunity to integrate different aspects of learning with reference to real life problems.
3. To enhance the confidence of the students while communicating with industry engineers and give an opportunity for useful interaction with them and familiarize with work culture and ethics of the industry.

Outcomes:

On successful completion of this course student will be
1. Able to design/develop a small and simple product in hardware or software.
2. Able to complete the task or realize a pre-specified target, with limited scope, rather than taking up a complex task and leave it.
3. Able to learn to find alternate viable solutions for a given problem and evaluate these alternatives with reference to pre-specified criteria.
4. Able to implement the selected solution and document the same.

Summer Internship:

Summer internship is introduced as part of the curricula for encouraging students to work on problems of interest to industries. A batch of two or three students will be attached to a person from an Industry / R & D Organization / National Laboratory for a period of 4 weeks. This will be during the summer vacation following the completion of the VI semester course. One faculty member will act as an internal guide for each batch to monitor the progress and interacts with the Industry guide.
After the completion of the project, students will submit a brief technical report on the project executed and present the work through a seminar talk to be organized by the department. Award of sessional marks are based on the performance of the student at the work place and awarded by industry guide and internal guide (25 Marks) followed by presentation before the committee constituted by the department (25 Marks). One faculty member will coordinate the overall activity of Summer Internship.
Note: * Students have to undergo summer internship of 4 weeks duration at the end of semester VI and credits will be awarded after evaluation in VII semester.