Nalla Narasimha Reddy Group of Institutions

NNRG
Integrated Campus
www.nnrg.edu.in

NALLA NARASIMHA REDDY

Education Society's Group of Institutions - Integrated Campus

UGC AUTONOMOUS INSTITUTION

Accredited by NAAC A+ | NBA CSE ECE

Student Handbook

Name: _____

Branch: _____ Section : _____

Roll No.: _____

B.Tech. 1st Year 2024-25

Name	
Roll No.	
Branch & Section	

CLASS TIME TABLE

DAY/TIME	9:15-10:15	10:15-11:15	11:15-12:15	12:15-1:00	1:00-2:00	2:00-3:00	3:00-4:00
Monday				LUNCH BREAK			
Tuesday							
Wednesday							
Thursday							
Friday							
Saturday							

MID EXAMINATIONS TIME TABLE

Timing: **FN:** 9:30 AM to 11:30 AM; **AN:** 1:30 PM to 3:30 PM

Subject						
MID-I						
MID-II						

Nalla Narasimha Reddy Group of Institutions Integrated Campus

FOUNDER

Secretary	**Shri Nalla Narasimha Reddy**	**Nalla Narasimha Reddy Education Society's Group of Institutions**

KEY FUNCTIONARIES OF NNRG

NAME	DESIGNATION
Dr. C.V. Krishna Reddy	**Director**
Dr. G. Janardhana Raju	**Dean - School of Engineering**
Dr. Ch. Krishna Mohan	**Dean - School of Pharmacy**
Dr. T. Ravindra Reddy	**Dean - School of Management Sciences**

Hallmarks of NNRG
▪ **DISCIPLINE**
▪ **HARD WORK**
▪ **RESPECT AND VALUES**

CONTENTS

SYLLAUBUS, ASSIGNMENTS & PREVIOUS YEAR QUESTION PAPERS

I. ACADEMIC CALENDAR FOR 2024-25

ACADEMIC CALENDAR 2024-25 (Tentative)

B.Tech I YEAR I & II SEMESTERS

I SEMESTER

S.No	Description	Duration	
		From	To
	Induction Program	**19.08.2024 – 24.08.2024 (1 Week)**	
1	Commencement of I Semester class work	**27.08.2024**	
2	1st Spell of Instructions(Including Dusshera Holidays)	**27.08.2024**	**01.11.2024 (10Weeks)**
3	First Mid Term Examinations	**04.11.2024**	**09.11.2024 (1 Week)**
4	Submission of First Mid Term Exam Marks to the Exam Branch on or before	**14.11.2024**	
5	2nd Spell of Instructions	**11.11.2024**	**04.01.2025(8 Weeks)**
6	Parent Teacher Meeting	**16.11.2024**	
7	Second Mid Term Examinations	**06.01.2025 to 21.01.2025 (2.5 Weeks)**	
8	Preparation Holidays and Practical Examinations		
9	Submission of Second Mid Term Exam Marks to the Exam Branch on or before	**18.01.2025**	
10	End Semester Examinations	**22.01.2025**	**01.02.2025 (1.5 Weeks)**

II SEMESTER

S.No	Description	Duration	
		From	To
1	Commencement of II Semester class work	**03.02.2025**	
2	1st Spell of Instructions	**03.02.2025**	**05.04.2025 (9 Weeks)**
3	First Mid Term Examinations	**07.04.2025**	**11.04.2025 (1 Week)**
4	Submission of First Mid Term Exam Marks to the Exam Branch on or before	**16.04.2025**	
5	2nd Spell of Instructions	**14.04.2025**	**03.05.2025 (3 Weeks)**
6	Parent Teacher Meeting	**05.04.2025**	
7	Summer Vacation	**05.05.2025 to 24.05.2025 (3 Weeks)**	
8	3rd Spell of Instructions	**26.05.2025 to 28.06.2025 (5 Weeks)**	
9	Second Mid Term Examinations	**30.06.2025 to 12.07.2025 (2Weeks)**	
10	Preparation Holidays and Practical Examinations		
11	Submission of Second Mid Term Exam Marks to the Exam Branch on or before	**09.07.2025**	
12	End Semester Examinations	**14.07.2025**	**26.07.2025 (2 Weeks)**

DIRECTOR

II. ACADEMIC REGULATIONS (R22)

ACADEMIC REGULATIONS R-22 FOR B.TECH. (REGULAR) STUDENTS

(Applicable for the students admitted from academic year 2022-2023 onwards)

Under-Graduate Degree Programme in Engineering & Technology (UGP inE&T)

Nalla Narasimha Reddy Education Society's Group of Institutions (NNRESGI) offers a 4-year (8semesters) Bachelor of Technology (B.Tech.) degree programme, under Choice Based CreditSystem (CBCS) with effect from the academic year 2022-23.

Eligibility for Admission

Admission to the Under Graduate (UG) programme shall be made either on the basis of the merit rank obtained by the qualified student in entrance test conducted by the Telangana State Government (TS EAMCET) or the University/Institution or on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the government from time to time.

The medium of instructions for the entire under graduate programme in Engineering &Technology will be English only.

B.Tech. Programme Structure

A student after securing admission shall complete the B.Tech. programme in a minimum period of four academic years (8 semesters), and a maximum period of eight academic years (16 semesters) starting from the date of commencement of first year first semester, failing which student shall forfeit seat in B.Tech course. Each student shall secure 160 credits (with CGPA $\geq$ 5) required for the completion of the under graduate programme and award of the B.Tech. degree.

UGC/ AICTE specified definitions/ descriptions are adopted appropriately for various terms and abbreviations used in these academic regulations/ norms, which are listed below.

Semester scheme

Each under graduate programme is of 4 academic years (8 semesters) with the academic year divided into two semesters of 22 weeks ($\geq$ 90 instructional days) each, each semester having - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)' under Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) indicated by UGC and curriculum/course structure as suggested by AICTE are followed.

Credit courses

All subjects/ courses are to be registered by the student in a semester to earn credits which shall be assigned to each subject/course in an L: T: P: C (Lecture periods: Tutorial periods: Practical periods: Credits) structure based on the following general pattern.

One credit for one hour/week/semester for theory/lecture (L) courses or Tutorials.

One credit for two hours/week/semester for laboratory/practical (P) courses. Courses like Environmental Science, Constitution of India, Intellectual Property Rights, Artificial Intelligence, Cyber Security and Gender Sensitization lab are mandatory courses. These courses will not carry any credits.

Subject Course Classification

All subjects/ courses offered for the under graduate programme in E&T (B.Tech. degree programmes) are broadly classified as follows. The Institution has followed almost all the guidelines issued by AICTE/UGC.

S. No.	Broad Course Classification	Course Group/Category	Course Description
1	Foundation Courses (FnC)	BS – Basic Sciences	Includes Mathematics, Physics and Chemistry subjects
2		ES - Engineering Sciences	Includes Fundamental Engineering subjects
3		HS – Humanities and Social sciences	Includes subjects related to Humanities,Social Sciences and Management
4	Core Courses (CoC)	PC – Professional Core	Includes Core Subjects related to the parent discipline/ department/ branch of Engineering.
5	Elective Courses (EℓC)	PE – Professional Electives	Includes elective subjects related to the parent discipline/ department/ branch of Engineering.
6		OE – Open Electives	Elective subjects which includes inter-disciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering.
7	Core Courses	Project Work	B.Tech. project or UG project or UGmajor project or Project Stage I & II
8		Industrial Training/Mini-Project	Industrial Training/ Summer Internship/ Industrial Oriented Mini-Project/ Mini- Project
9		Seminar	Seminar/ Colloquium based on core contents related to parent discipline/ department/ branch of Engineering.
10	Minor courses	-	1 or 2 Credit courses (subset of HS)
11	Mandatory Courses (MC)	-	Mandatory courses (non-credit)

Course Registration

A 'faculty advisor or counselor' shall be assigned to a group of 20 students, who will advise the students about the under graduate programme, its course structure and curriculum, choice/option for subjects/ courses, based on their competence, progress, pre-requisites and interest.

The academic section of the college invites 'registration forms' from students before the beginning of the semester through 'on-line registration', ensuring 'date and time stamping'. The on-line registration requests for any 'current semester' shall be **completed before the commencement of SEEs (Semester End Examinations) of the 'preceding semester'.**

A student can apply for **on-line** registration, **only after** obtaining the '**written approval'** from faculty advisor/ counselor, which should be submitted to the college academic section through the Head of the Department. A copy of it shall be retained with Head of the Department, faculty advisor/counselor and the student.

A student may be permitted to register for all the subjects/courses in a semester as specified in the course structure with maximum additional subject(s)/course(s) limited to 4 credits, based on **progress** and SGPA/CGPA, and completion of the **'pre-requisites'** as indicated for various subjects/courses, in the department course structure and syllabus contents. Choice for **'additional subjects/courses'** must be clearly indicated, which needs the specific approval and signature of the faculty advisor/ counselor.

If the student submits ambiguous choices or multiple options or erroneous entries during **on-line** registration for the subject(s)/course(s) under a given/specified course group/category as listed in the course structure, only the first mentioned subject/course in that category will be taken into consideration.

Subject/Course options exercised through **on-line** registration are final and **cannot** be changed or inter-changed; further, alternate choices also will not be considered. However, if the subject/ course that has already been listed for registration by the Head of the Department in a semester could not be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to have alternate choice eitherfor a new subject (subject to offering of such a subject), or for another existing subject (subject to availability of seats). Such alternate arrangements will be made by the Head of the Department, with due notification and time-framed schedule, within the **first week** after the commencement of class-work for that semester.

Dropping of subjects/ courses may be permitted, only after obtaining prior approval from the faculty advisor/ counselor 'within a period of 15 days' from the beginning of the current semester.

Open Electives:

The students have to choose three open electives (OE-I, II & III) from the list of open electives given. However, the student cannot opt for an open elective subject offered by his own (parent) department, if it is already listed under any category of the subjects offered by parent department in any semester.

Professional Electives:

The students have to choose six professional electives (PE-I to VI) from the list of professional electives given.

Subjects/ Courses to be offered

An Elective subject/ course may be offered to the students, only if a minimum of 15 students opt for it. More than one faculty member may offer the same subject (lab/ practical may be included with the corresponding theory subject in the same semester) in any semester.

However, selection of choice for students will be based on - 'first come first serve basis and CGPA criterion' (i.e. the first focus shall be on early on-line entry from the student for registration in that semester, and the second focus, if needed, will be on CGPA of the student).

If more entries for registration of a subject come into picture, then the Head of the Department concerned shall decide, whether or not to offer such a subject/ course for two (or multiple) sections.

In case of options coming from students of other departments/ branches/ disciplines (not considering open electives), first priority shall be given to the student of the 'parent department'.

Attendance Requirements:

A student shall be eligible to appear for the semester end examinations, if the student acquires a minimum of 75% of attendance in aggregate of all the subjects/ courses (excluding attendance in mandatory courses like Environmental Science, Constitution of India, Intellectual Property Rights, Artificial Intelligence, Cyber Security and Gender Sensitization lab) for that semester. Two periods of attendance for each theory subject shall be considered, if the student appears for the mid-term examination of that subject. **This attendance should also be included. The attendance of Mandatory Non-Credit courses should be considered.**

Shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be condoned by the college academic committee on genuine and valid grounds, based on the student's representation with supporting evidence.

A stipulated fee shall be payable for condoning of shortage of attendance. Shortage of attendance below 65% in aggregate shall in no case be condoned.

Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations of that semester. They get detained and their registration for that semester shall stand cancelled. They will not be promoted to the next semester. They may seek re-registration for all those subjects registered in that semester, in which the student is detained, by seeking re-admission into that semester as and when offered; if there are any professional electives and/ or open electives, the same may also be re-registered if offered. However, if those electives are not offered in later semesters, then alternate electives may be chosenfrom the same set of elective subjects offered under that category.

A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same class.

Academic Requirements

The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in item no.6.

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course, if student secures not less than 35% (14 marks out of 40 marks including minimum 35% of average Mid-Term examinations for 25 marks) in the internal examinations, not less than 35% (21 marks out of 60 marks) in the semester end examination, and a minimum of 40% (40 marks out of 100 marks) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of letter grades, this implies securing 'C' grade or above in that subject/ course.

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Real-time Research Project (or) Field Based Research Project (or) Industry Oriented Mini Project (or) Internship (or) Seminar, if the student secures not less than 40% marks (i.e. 40 out of 100 allotted marks) in each of them. The student is deemed to have failed, if he (i) does not submit a report on Industry Oriented Mini Project/Internship, or (ii) not make a presentation of the same before the evaluation committee as per schedule, or (iii) secures less than 40% marks in Real-time Research Project (or) Field Based Research Project (or) Industry Oriented Mini Project (or)Internship evaluations.

A student may reappear once for each of the above evaluations, when they are scheduled again; if the student fails in such 'one reappearance' evaluation also, the student hasto reappear for the same in the next subsequent semester, as and when it is scheduled.

Promotion Rules

S. No.	Promotion	Conditions to be fulfilled
1	First year first semester to firstyear second semester	Regular course of study of first year first semester.
2	First year second semester	(i) Regular course of study of first year second semester. (ii) Must have secured at least 20 credits out of 40 credits i.e., 50% credits up to first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Second year first semester to second year second semester	Regular course of study of second year first semester.
4	Second year second semester to third year first semester	(i) Regular course of study of second year second semester. (ii) Must have secured at least 48 credits outof 80 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.

5	Third year first semester to thirdyear second semester	Regular course of study of third year first semester.
6	Third year second semester to fourth year first semester.	(i) Regular course of study of third year second semester. (ii) Must have secured at least 72 credits out of 120 credits i.e., 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

A student (i) shall register for all courses/subjects covering 160 credits as specified and listed in the course structure, (ii) fulfills all the attendance and academic requirements for 160 credits, (iii) earn all 160 credits by securing SGPA $\geq$ 5.0 (in each semester), and CGPA (at the end of each successive semester) $\geq$ 5.0, (iv) passes all **the mandatory courses,** to successfully complete the under graduate programme. The performance of the student in these 160 credits shall be taken into account for the calculation of 'the final CGPA (**at the end of under graduate programme**), and shall be indicated in the grade card of IV year II semester.

If a student registers for **'extra subjects'** (in the parent department or other departments/branches of Engineering) other than those listed subjects totaling to 160 credits as specified in the course structure of his department, the performances in those **'extra subjects'** (although evaluated and graded using the same procedure as that of the required 160 credits) will not be taken into account while calculating the SGPA and CGPA. For such **'extra subjects'** registered, percentage of marks and letter grade alone will be indicated in the grade card as a performance measure, subject to completion of the attendance and academic requirements as stated in regulations 6 and 7.1 – 7.4 above.

A student eligible to appear in the semester end examination for any subject/ course, but absent from it or failed (thereby failing to secure 'C' grade or above) may reappear for that subject/course in the supplementary examination as and when conducted. In such cases, internal marks (CIE) assessed earlier for that subject/ course will be carried over, and added to the marks to be obtained in the SEE supplementary examination for evaluating performance in that subject.

A student **detained in a semester due to shortage of attendance may be re-admitted in the same semester in the next academic year for fulfillment of academic requirements.** The academic regulations under which a student has been readmitted shall be applicable. However, no grade allotments or SGPA/ CGPA calculations will be done for the entire semester in which the student has been detained.

A student detained **due to lack of credits, shall be promoted to the next academic year only after acquiring the required academic credits**. The academic regulations under which the student has been readmitted shall be applicable to him.

Evaluation - Distribution and Weightage of marks

The performance of a student in every subject/course (including practical's and Project Stage – I & II) will be evaluated for 100 marks each, with 40 marks allotted for CIE (Continuous Internal Evaluation) and 60 marks for SEE (Semester End- Examination).

In CIE, for theory subjects, during a semester, there shall be two mid-term examinations.Each Mid-Term examination consists of two parts i) **Part – A** for 10 marks, ii) **Part – B** for 15 marks with a total duration of 2 hours as follows:

1. Mid-Term Examination for 25 marks:
   a. Part - A : Objective/quiz paper for 10 marks.
   b. Part - B : Descriptive paper for 15 marks.

   Student shall have to earn 35%, i.e 9 marks out of 25 marks from average of two mid-term examinations (I Mid-Term & II Mid-Term).

The remaining 15 marks of Continuous Internal Assessment (out of 40) are distributed as:

2. Assignment for 5 marks. (Average of 5 Assignments, one for each unit, each for 5 marks)
3. Subject Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in the concerned subject for 10 marks.

- The objective/quiz paper is set with multiple choice, fill-in the blanks and match the following type of questions for a total of 10 marks. The descriptive paper shall contain 5 full questions out of which, the student has to answer 3 questions, each carrying 5 marks. The student has to get minimum of 35% (on 25 marks allocated for Mid-Term examinations) on average of two Mid-Term examinations.
- While the first mid-term examination shall be conducted on 50% of the syllabus, the second mid-term examination shall be conducted on the remaining 50% of the syllabus.
- Five (5) marks are allocated for assignments (as specified by the subject teacher concerned). The first two assignments should be submitted before the conduct of the first mid-term examination, and the remaining three assignments should be submitted before the conduct of the second mid-term examination. The average of the five assignments shall be taken as the final marks for assignment (for 5 marks).

Subject Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in the subject concerned for 10 marks before II Mid -Term Examination.

The Semester End Examinations (SEE) will be conducted for 60 marks consisting of two parts viz. i) Part- A for 10 marks, ii) Part - B for 50 marks.

Part-A is a compulsory question consisting of ten sub-questions (two questions from each unit) carries one mark each.

Part-B consists of five questions (numbered from 2 to 6) carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

The duration of Semester End Examination is 3 hours.

For subjects like **Computer Aided Engineering Graphics**, the SEE shall consist of five questions. For each question there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions. There shall be no Part – A, and Part – B system.

For the Subject **Quantity Survey & Valuation**, the SEE paper should consist of Part- A, Part-B and Part C. (i) Part – A – 1 out of 2 questions from Unit – I for 20 Marks, (ii) Part
– B – 1 out of 2 questions from Unit – II for 10 Marks, (iii) Part– C – 3 out of 5 questions from Units – III, IV, V for 30 Marks.

For subjects **Structural Engineering – I & II (RCC & STEEL),** the SEE will be conducted for 60 marks consisting of 2 parts viz. (i) Part – A for 20 marks and, (i)Part– B for 40 marks. Part – A is a compulsory question consisting of ten sub- questions. One question from each unit and carries 2 marks each. Part – B consists of 5 questions (numbered 2 to 6) carrying 8 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there is either or choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

For practical subjects there shall be a Continuous Internal Evaluation (CIE) during the semester for 40 marks and 60 marks for semester end examination. Out of the 40 marks for internal evaluation:

1. A write-up on day-to-day experiment in the laboratory (in terms of aim, components/procedure, expected outcome) which shall be evaluated for 10 marks
2. Marks for viva-voce (or) tutorial (or) case study (or) application (or) poster presentationof the course concerned.
3. Internal practical examination conducted by the laboratory teacher concerned shall be evaluated for 10 marks.
4. The remaining 10 marks are for Laboratory Project, which consists of the Design (or) Software / Hardware Model Presentation (or) App Development (or) Prototype Presentation submission which shall be evaluated after completion of laboratory course and before semester end practical examination.
5. The Semester End Examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed from the cluster / other colleges which will be decided by the examination branch of the University. In the Semester End Examination held for 3 hours, total 60 marks are divided and allocated as shown below:
    1. 10 marks for write-up
    2. 15 for experiment/program
    3. 15 for evaluation of results
    4. 10 marks for presentation on another experiment/program in the same laboratory course and
    5. 10 marks for viva-voce on concerned laboratory course.

The evaluation of courses having ONLY internal marks in I-Year I Semester and II- Year II Semester is as follows:

I Year I Semester course (ex., Elements of CE/ME/EEE/ECE/CSE): The internal evaluation is for 50 marks and it shall take place during I Mid-Term examination and II Mid-Term examination. The average mark of two Mid-Term examinations is the final for 50 marks. Student shall have to earn 40%, i.e 20 marks out of 50 marks from average of the two examinations. There shall be NO external evaluation. The student is deemed to have failed, if he (i) is absent as per schedule, or (ii) secures less than 40% marks in this course.

II Year II Semester Real-Time (or) Field-based Research Project course: The internal evaluation is for 50 marks and it shall take place during I Mid-Term examination and

I Mid-Term examination. The average mark of two Mid-Term examinations is the final for 50 marks. Student shall have to earn 40%, i.e 20 marks out of 50 marks from average of the two examinations. There shall be NO external evaluation. The student is deemed to have failed, if he (i) does not submit a report on the Project, or (ii) does not make a presentation of the same before the internal committee as per schedule, or
(ii) secures less than 40% marks in this course.

There shall be an Industry training (or) Internship (or) Industry oriented Mini-project (or) Skill Development Courses (or) Paper presentation in reputed journal (or) Industry Oriented Mini Project in collaboration with an industry of their specialization. Students shall register for this immediately after II-Year II Semester Examinations and pursue it during summer vacation/semester break & during III Year without effecting regular course work. Internship at reputed organization (or) Skill development courses (or) Paper presentation in reputed journal (or) Industry Oriented Mini Project shall be submitted in a report form and presented before the committee in III-year II semester before end semester examination. It shall be evaluated for 100 external marks. The committee consists of an External Examiner, Head of the Department, Supervisor of the Industry Oriented Mini Project (or) Internship etc, Internal Supervisor and a Senior Faculty Member of the Department. There shall be **NO internal marks** for Industry Training (or) Internship (or) Mini-Project (or) Skill Development Courses (or) Paper Presentation in reputed journal (or) Industry Oriented Mini Project.

The UG project shall be initiated at the end of the IV Year I Semester and the duration of the project work is one semester. The student must present Project Stage – I during IV Year I Semester before II Mid examinations, in consultation with his Supervisor, the title, objective and plan of action of his Project work to the departmental committee for approval before commencement of IV Year II Semester. Only after obtaining the approval of the departmental committee, the student can start his project work.

UG project work shall be carried out in two stages: Project Stage – I for approval of project before Mid-II examinations in IV Year I Semester and Project Stage – II during IV Year II Semester. Student has to submit project work report at the end of IV.

Year II Semester. The project shall be evaluated for 100 marks before commencement of SEE Theory examinations.

For Project Stage – I, the departmental committee consisting of Head of the Department, project supervisor and a senior faculty member shall approve the project work to begin before II Mid-Term examination of IV Year I Semester. The student is deemed to be not eligible to register for the Project work, if he does not submit a report on Project Stage - I or does not make a presentation of the same before the evaluation committee as per schedule.

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if he fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

For Project Stage – II, the external examiner shall evaluate the project work for 60 marks and the internal project committee shall evaluate it for 40 marks. Out of 40 internal marks, the departmental committee consisting of Head of the Department, Project Supervisor and a Senior Faculty Member shall evaluate the project work for 20 marks and Project Supervisor shall evaluate for 20 marks. The topics for Industry Oriented Mini Project/ Internship/SDC etc. and the main Project shall be different from the topic already taken. The student is deemed to have failed, if he (i) does not submit a report on the Project, or (ii) does not make a presentation of the same before the External Examiner as per schedule, or (iii) secures less than 40% marks in the sum total of the CIE and SEE taken together.

For conducting viva-voce of project, Examination section selects an externalexaminer from the list of experts in the relevant branch submitted by the chairperson, BOS. A student who has failed, may reappear once for the above evaluation, when it is scheduledagain; if student fails in such 'one reappearance' evaluation also, he has to reappear for thesame in the next subsequent semester, as and when it is scheduled.

A student shall be given one time chance to re-register for a maximum of two subjects:

- If the internal marks secured by a candidate in Mid examinations (average of two mid-term examinations consisting of Objective & descriptive parts) are less than 35% and failed in those subjects (or)
- failed in Assignment & Subject Viva-voce/ PPT/Poster Presentation/ Case Study on a topic in the concerned subject but fulfilled the attendance requirement.

A student must re-register for the failed subject(s) for 40 marks within four weeks of commencement of the classwork in next academic year. Also, the student has to earn 35% of total internal marks (14 out of 40 marks including Mid-Term examinations, Assignment & Subject Viva-voce/PPT/ Poster presentation/ Case Study on a topic in the concerned subject).

In the event of the student taking this chance, his Continuous Internal Evaluation marks for 40 and Semester End Examination marks for 60 obtained in the previous attempt stand cancelled. For mandatory courses, a student has to secure 40 marks out of 100 marks (i.e. 40% of the marks allotted) in the continuous internal evaluation for passing the subject/course. These marks should also be submitted along with the internal marks of other subjects. No marks or letter grades shall be allotted for mandatory/non-credit courses. Only Pass/Fail shall be indicated in Grade Card.

Grading procedure

Grades will be awarded to indicate the performance of students in each theory subject, laboratory / practicals, seminar, Industry Oriented Mini Project, and project Stage - I& II. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 8 above, a corresponding letter grade shall be given.

As a measure of the performance of a student, a 10-point absolute grading system using the following letter grades (as per UGC/AICTE guidelines) and corresponding percentage of marks shall be followed:

% of Marks Secured in a Subject/Course (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
Greater than or equal to 90%	O (Outstanding)	10
80 and less than 90%	A+ (Excellent)	9
70 and less than 80%	A (Very Good)	8
60 and less than 70%	B+ (Good)	7
50 and less than 60%	B (Average)	6
40 and less than 50%	C (Pass)	5
Below 40%	F (FAIL)	0
Absent	Ab	0

A student who has obtained an **'F'** grade in any subject shall be deemed to have **'failed'** and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In such cases, internal marks in those subjects will remain the same as those obtained earlier.

To a student who has not appeared for an examination in any subject, **'Ab'** grade will be allocated in that subject, and he is deemed to have **'failed'**. A student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered next. In this case also, the internal marks in those subjects will remain the same as those obtained earlier.

A letter grade does not indicate any specific percentage of marks secured by the student, but it indicates only the range of percentage of marks.

A student earns Grade Point (GP) in each subject/ course, on the basis of the letter grade secured in that subject/ course. The corresponding 'Credit Points' (CP) are computed by multiplying the grade point with credits for that particular subject/ course.

Credit points (CP) = grade point (GP) x credits …. For a course

A student passes the subject/ course only when **GP ≥ 5 ('C' grade or above)**

The Semester Grade Point Average (SGPA) is calculated by dividing the sum of credit points (ΣCP) secured from $^{i=}a^{1}$ll subjects/ courses registered in a semester, by the total number of credits registered during that semester. SGPA is rounded off to two decimal places. SGPA is thus computed as

$$SGPA = \{ \sum^{N} C_i G_i \} / \{ \sum^{N} C_i \}$$ **…. For each semester**

where 'i' is the subject indicator index (takes into account all subjects in a semester), 'N' is the no. of subjects **'registered'** for the semester (as specifically required and listed under the course structure of the parent department), Ci is the no. of credits allotted to the ith subject, and Gi represents the grade points (GP) corresponding to the letter grade awarded for that ith subject.

The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student in all semesters considered for registration. The CGPA is the ratio of the total credit points secured by a student in **all** registered courses in **all** semesters, and the total number of credits registered in **all** the semesters. CGPA is rounded off to two decimal places. CGPA is thus computed from the I year II semester onwards at the end of each semester as per the formula

$$CGPA = \{ \sum_{j=1}^{M} C_j G_j \} / \{ \sum_{j=1}^{M} C_j \} \quad \text{… for all S semesters registered}$$

(i.e., up to and inclusive of S semesters, S ≥ 2),

where **'M'** is the **total** no. of subjects (as specifically required and listed under the course structure of the parent department) the student has **'registered'** i.e., from the 1st semester onwards up to and inclusive of the 8th semester, 'j' is the subject indicator index (takes into account all subjects from 1 to 8 semesters), Cj is the no. of credits allotted to the jth subject, and Gj represents the grade points (GP) corresponding to the letter grade awarded for that jth subject. After registration and completion of I year I semester, the SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

Illustration of calculation of SGPA:

Course/Subject	Credits	Letter Grade	Grade Points	Credit Points
Course 1	4	A	8	4 x 8 = 32
Course 2	4	O	10	4 x 10 = 40
Course 3	4	C	5	4 x 5 = 20
Course 4	3	B	6	3 x 6 = 18
Course 5	3	A+	9	3 x 9 = 27
Course 6	3	C	5	3 x 5 = 15
	21			152

SGPA = 152/21 = 7.24

Illustration of calculation of CGPA up to 3rd semester:

Semester	Course/ Subject Title	Credits Allotted	Letter Grade Secured	Corresponding Grade Point (GP)	Credit Points (CP)
I	Course 1	3	A	8	24
I	Course 2	3	O	10	30
I	Course 3	3	B	6	18
I	Course 4	4	A	8	32
I	Course 5	3	A+	9	27
I	Course 6	4	C	5	20
II	Course 7	4	B	6	24
II	Course 8	4	A	8	32
II	Course 9	3	C	5	15
II	Course 10	3	O	10	30
II	Course 11	3	B+	7	21
II	Course 12	4	B	6	24
II	Course 13	4	A	8	32
II	Course 14	3	O	10	30
III	Course 15	2	A	8	16
III	Course 16	1	C	5	5
III	Course 17	4	O	10	40
III	Course 18	3	B+	7	21
III	Course 19	4	B	6	24
III	Course 20	4	A	8	32
III	Course 21	3	B+	7	21
	Total Credits	**69**		**Total Credit Points**	**518**

CGPA = 518/69 = 7.51

The above illustrated calculation process of CGPA will be followed for each subsequent semester until 8th semester. The CGPA obtained at the end of 8th semester will become the final CGPA secured for entire B.Tech. Programme.

For merit ranking or comparison purposes or any other listing, **only** the **'rounded off'** values of the CGPAs will be used. SGPA and CGPA of a semester will be mentioned in the semester Memorandum of Grades if all subjects of that semester are passed in first attempt. Otherwise the SGPA and CGPA shall be mentioned only on the Memorandum of Grades in which sitting he passed his last exam in that semester. However, mandatory courses will not be taken into consideration.

Passing standards

A student shall be declared successful or 'passed' in a semester, if he secures a GP ≥ 5 ('C' grade or above) in every subject/course in that semester (i.e. when the student gets an SGPA ≥ 5.00 at the end of that particular semester); and he shall be declared successful or 'passed' in the entire under graduate programme, only when gets a CGPA ≥ 5.00 for the award of the degree as required.

After the completion of each semester, a grade card or grade sheet shall be issued toall the registered students of that semester, indicating the letter grades and credits earned. It will show the details of the courses registered (course code, title, no. of credits, grade earned, etc.) and credits earned. **There is NO exemption of credits in any case.**

Declaration of results

Computation of SGPA and CGPA are done using the procedure listed in 9.6 to 9.9.

For final percentage of marks equivalent to the computed final CGPA, the following formula may be used.

% of Marks = (Final CGPA – 0.5) x 10

Award of degree

A student who registers for all the specified subjects/ courses as listed in the course structure and secures the required number of 160 credits (with CGPA ≥ 5.0), within 8 academic years from the date of commencement of the first academic year, shall be declared to have **'qualified'** for the award of B.Tech. degree in the chosen branch of Engineering selected at the time of admission.

A student who qualifies for the award of the degree as listed in item 12.1 shall be placed in the following classes.

A student with final CGPA (at the end of the under graduate programme) ≥ 8.00, and fulfilling the following conditions - shall be placed in **'first class with distinction'**.

However, he

(i) Should have passed all the subjects/courses in **'first appearance'** within the first 4 academic years (or 8 sequential semesters) from the date of commencement of first year first semester.

(ii) Should have secured a CGPA ≥ 8.00, at the end of each of the 8 sequential semesters, starting from I year I semester onwards.

(iii) Should not have been detained or prevented from writing the semester end examinations in any semester due to shortage of attendance or any other reason.

A student not fulfilling any of the above conditions with final CGPA > 8 shall be placed in **'first class'.**

Students with final CGPA (at the end of the under graduate programme) ≥ 6.50 but < 8.00 shall be placed in **'first class'**.

Students with final CGPA (at the end of the under graduate programme) ≥ 5.50 but < 6.50, shall be placed in **'second class'.**

All other students who qualify for the award of the degree (as per item 12.1), with final CGPA (at the end of the under graduate programme) ≥ 5.00 but < 5.50, shall be placed **in 'pass class'.**

A student with final CGPA (at the end of the under graduate programme) < 5.00 willnot be eligible for the award of the degree.

Students fulfilling the conditions listed under item 12.3 alone will be eligible for award of **'Gold Medal'.**

Award of 2-Year B.Tech. Diploma Certificate

1. A student is awarded 2-Year UG Diploma Certificate in the concerned engineering branch on completion of all the academic requirements and earned all the 80 credits (with in 4 years from the date of admission) upto B. Tech. – II Year – II Semester, if the student want to exit the 4-Year B. Tech. program. The student **once opted and awarded for 2-Year UG Diploma Certificate, the student will not be permitted to join** in B. Tech. III Year – I Semester and continue for completion of remaining years of study for 4-Year B. Tech. Degree.

A student may be permitted to take one year break after completion of II Year – II Semester or B. Tech. – III Year – II Semester (with university permission through the principal of the college well in advance) and can re-enter the course in **next Academic Year in the same college** and complete the course on fulfilling all the academic credentials within a stipulated duration i.e. double the duration of the course (Ex. within 8 Years for 4-Year program).

Withholding of results

If the student has not paid the fees to the Institution at any stage, or has dues pending due to any reason whatsoever, or if any case of indiscipline is pending, the result of the student may be withheld, and the student will not be allowed to go into the next higher semester. The award or issue of the degree may also be withheld in such cases.

Transitory Regulations

A. For students detained due to shortage of attendance:

1. A Student who has been detained in I year of R18, R21 Regulations due to lack of attendance, shall be permitted to join I year I Semester of R22 Regulations and he is required to complete the study of B.Tech./B. Pharmacy programme within the stipulated period of eight academic years from the date of first admission in I Year.

2. A student who has been detained in any semester of II, III and IV years of R18, R21 regulations for want of attendance, shall be permitted to join the corresponding semester of R22 Regulations and is required to complete the study of B.Tech./B. Pharmacy within the stipulated period of eight academic years from the date of first admission in I Year. The R22 Academic Regulations under which a student has been readmitted shall be applicable to that student from that semester. See rule (C) for further Transitory Regulations.

B. For students detained due to shortage of credits:

3. A student of R18, R21 Regulations who has been detained due to lack of credits, shall be promoted to the next semester of R22 Regulations only after acquiring the required number of credits as per the corresponding regulations of his/her first admission. The total credits required are 160 including both R18, R21 & R22 regulations. The student is required to complete the study of B.Tech. within the stipulated period of eight academic years from the year of first admission. The R22 Academic Regulations are applicable to a student from the year of readmission. See rule (C) for further Transitory Regulations.

C. For readmitted students in R22 Regulations:

4. A student who has failed in any subject under any regulation has to pass those subjects in the same regulations.

5. The maximum credits that a student acquires for the award of degree, shall be the sum of the total number of credits secured in all the regulations of his/her study including R22 Regulations**. There is NO exemption of credits in any case.**

6. If a student is readmitted to R22 Regulations and has any subject with 80% of syllabus common with his/her previous regulations, that particular subject in R22 Regulations will be substituted by another subject to be suggested by the Institution.

Note: If a student readmitted to R22 Regulations and has not studied any subjects/topics in his/her earlier regulations of study which is prerequisite for further subjects in R22 Regulations, shall conduct remedial classes to cover those subjects/topics for the benefit of the students.

Student Transfers

There shall be no branch transfers after the completion of admission process.

The students seeking transfer to the Institution from various other Universities/institutions have to pass the failed subjects which are equivalent to the subjects of the Institution, and also pass the subjects of the Institution which the students have not studied at the earlier institution. Further, though the students have passed some of the subjects at the earlier institutions, if the same subjects are prescribed in different semesters of the Institution, the students have to study those subjects in the Institution in spite of the fact that those subjects are repeated.

The transferred students from other institutions to the Institution who are on rolls are tobe provided one chance to write the Computer Based Test (CBT) for internal marks in the **equivalent subject(s)** as per the clearance letter issued by the Institution.

The Institution will provide one chance to write the internal examinations in the **equivalent subject(s)** to the students transferred from other universities/institutions to the Institution who are on rolls, as per the clearance (equivalence) letter issued by the Institution.

Scope

The academic regulations should be read as a whole, for the purpose of any interpretation. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Head of the Institution is final.

The Institution may change or amend the academic regulations, course structure or syllabi at any time, and the changes or amendments made shall be applicable to all students with effect from the dates notified by the Institution authorities.

Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

AMENDMENT OF ACADEMIC REGULATIONS R-22 FOR B.TECH. (REGULAR) STUDENTS

(Applicable for the students admitted from academic year 2022-2023 onwards)

In CIE, for theory subjects, during a semester, there shall be two mid-term examinations. Each Mid-Term examination consists of two parts i) **Part – A** for 10 marks, ii) **Part – B** for 20 marks with a total duration of 2 hours as follows:

1. Mid-Term Examination for 30 marks:
   a. Part - A : Objective/quiz paper for 10 marks.
   b. Part - B : Descriptive paper for 20 marks.
   - The objective/quiz paper is set with multiple choice, fill-in the blanks and match the following type of questions for a total of 10 marks. The descriptive paper shall contain 6 full questions out of which, the student has to answer 4 questions, each carrying 5 marks. The average of the two Mid Term Examinations shall be taken as the final marks for Mid Term Examination (for 30 marks).
   - The remaining 10 marks of Continuous Internal Evaluation are distributed as:
2. Assignment for 5 marks. (Average of 5 Assignments each for 5 marks)
3. Subject Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in the concerned subject for 5 marks.

While the first mid-term examination shall be conducted on 50% of the syllabus,the second mid-term examination shall be conducted on the remaining 50% of the syllabus.

- Five (5) marks are allocated for assignments (as specified by the subject teacher concerned). The two assignments should be submitted before the conduct of the first mid-term examination, and the remaining three assignments should be submitted before the conduct of the second mid-term examination. The average of the five assignments shall be taken as the final marks for assignment (for 5 marks).

Subject Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in the subject concerned for 5 marks before II Mid -Term Examination.

- The Student, in each subject, shall have to earn 35% of marks (i.e. 14 marks out of 40 marks) in CIE, 35% of marks (i.e. 21 marks out of 60) in SEE and Over all 40% of marks (i.e. 40 marks out of 100 marks) both CIE and SEE marks put together.
- The student is eligible to write Semester End Examination of the concerned subject, if the student scores ≥ 35% (14 marks) of 40 Continuous Internal Examination (CIE) marks.
- In case, the student appears for Semester End Examination (SEE) of the concerned subject but not scored minimum 35% of CIE marks (14 marks out of 40 internal marks), his performance in that subject in SEE shall stand cancelled inspite of appearing the SEE.

There is **NO Computer Based Test (CBT)** for R22 regulations. The following is added to the existing matter.

- The Student, in each subject, shall have to earn **35%** of marks (i.e. **14 marks out of 40 marks**) in CIE, 35% of marks (i.e. **21 marks out of 60**) in SEE and Over all **40%** of marks (i.e. **40 marks out of 100 marks**) both CIE and SEE marks put together.
- The student is eligible to write Semester End Examination of the concerned subject, if the student scores ≥ 35% (14 marks) of 40 Continuous Internal Examination (CIE) marks.
- In case, the student appears for Semester End Examination (SEE) of the concerned subject but not scored minimum 35% of CIE marks (14 marks out of 40 internal marks), his performance in that subject in SEE shall stand cancelled inspite of appearing the SEE.

A student shall be given one time chance to re-register for a maximum of two subjects in a semester:

If the internal marks secured by a student in the Continuous Internal Evaluation marks for 40 (Sum of average of two mid-term examinations consisting of Objective & descriptive parts, Average of two Assignments & Subject Viva- voce/PPT/ Poster presentation/ Case Study on a topic in the concerned subject) are less than 35% and failed in those subjects.

A student must re-register for the failed subject(s) for 40 marks within four weeks of commencement of the class work in next academic year. In the event of the student taking this chance, his Continuous Internal Evaluation marks for 40 and Semester End Examination marks for 60 obtained in the previous attempt stand cancelled.

ACADEMIC REGULATIONS R-22 FOR B.TECH. (REGULAR) STUDENTS

(Applicable for the students admitted from academic year 2022-2023 onwards)

For practical subjects there shall be a Continuous Internal Evaluation (CIE) during the semester for 40 marks and 60 marks for semester end examination. Out of the 40 marks for internal evaluation:

1. A write-up on day-to-day experiment in the laboratory (in terms of aim, components/procedure, expected outcome) which shall be evaluated for 10 marks.
2. 10 marks for viva-voce (or) tutorial (or) case study (or) application (or) poster presentation of the course concerned.
3. Internal practical examination conducted by the laboratory teacher concerned shallbe evaluated for 10 marks.
4. The remaining 10 marks are for Laboratory Project, which consists of the Design (or) Software / Hardware Model Presentation (or) App Development (or) Prototype Presentation submission which shall be evaluated after completion of laboratory course and before semester end practical examination.

The Semester End Examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed by the examination branch of the Institution.

In the Semester End Examination held for 3 hours, total 60 marks are divided and allocated as shown below:

1. 10 marks for write-up
2. 15 for experiment/program
3. 15 for evaluation of results
4. 10 marks for presentation on another experiment/program in the sameLaboratory course and
5. 10 marks for viva-voce on concerned laboratory course.

- The Student, in each subject, shall have to earn 35% of marks (i.e. **14 marks out of 40 marks**) in ClE, 35% of marks (i.e. **2l marks out of 60**) in SEE and Over all **40%** of marks (i.e. **40 marks out of 100 marks**) both CIE and SEE marks put together.

The student is eligible to write Semester End Examination of the concerned subject, if the student scores ≥ 35% (**14 marks**) of 40 Continuous Internal Examination (CIE) marks.

- In case, the student appears for Semester End Examination (SEE) of the concerned subject but not scored minimum 35% of CIE marks (**14 marks out of 40 internal marks**), his performance in that subject in **SEE** shall stand cancelled in spite of appearing the **SEE**.

AMENDMENT OF ACADEMIC REGULATIONS R-22 FOR B.TECH. (REGULAR) STUDENTS

(Applicable for the students admitted from academic year 2023-2024 onwards)

1. For the subject, **Computer Aided Engineering Graphics**, the Continuous Internal Evaluation (CIE) and Semester End Examinations (SEE) evaluation pattern is same as for other theory subjects.

Continuous Internal Evaluation (CIE): 30 marks

- **Part-A:** 10 Marks: Objective/Quiz
- **Part-B:** 20 Marks: Descriptive Paper
- Remaining 10 Marks: 5 Marks for assignment & 5 Marks for Viva-Voce/PPT/Poster Presentation/Case Study
- Semester End Examination (SEE) will be conducted for 60 marks consisting of two parts viz. Part A for 10 marks & Part B for 50 marks.

2. I Year I Semester course (ex., Elements of CE/ME/EEE/ECE/CSE etc):
   For CSE/IT and allied branches, the Continuous Internal Evaluation (CIE) will be for 50 marks. Each Mid-Term examination consists of two parts i) Part – A for 20 marks, ii) Part – B for 20 marks with a total duration of 2 hours.
   - **Part A:** Objective/quiz paper is set with multiple choice, fill-in the blanks and match the following type of questions for a total of 20 marks.
   - **Part B:** Descriptive paper shall contain 6 full questions out of which, the student has to answer 4 questions, each carrying 5 marks.

   The remaining 10 marks of Continuous Internal Evaluation are for Assignment (5 marks) and Subject Viva-Voce/PPT/Poster Presentation/ Case Study (5 marks) and the evaluation pattern will remain same as for other theory subjects.

For all other branches, the Continuous Internal Evaluation (CIE) will be for 50 marks. Out of the 50 marks for internal evaluation:

a) A write-up on day-to-day experiment in the laboratory (in terms of aim, components/procedure, expected outcome) which shall be evaluated for 10 marks

b) 10 marks for viva-voce (or) tutorial (or) case study (or) application (or) poster presentation of the course concerned.

c) Internal practical examination conducted by the laboratory teacher concerned shall be evaluated for 15 marks.

d) The remaining 15 marks are for Laboratory Report/Project and Presentation, which consists of the Design (or) Software / Hardware Model Presentation (or) App Development (or) Prototype Presentation submission which shall be evaluated after completion of laboratory course and before semester end practical examination.

3. A student shall be given to re-register for any number of subjects in a semester :
   - If the internal marks secured by a student in the Continuous Internal Evaluation marks for 40 (Sum of average of two mid-term examinations consisting of Objective & descriptive parts, Average of two Assignments & Subject Viva-voce/PPT/Poster presentation/Case Study on a topic in the concerned subject) are less than 35% and failed in those subjects.

A student must re-register for the failed subject(s) for 40 marks within four weeks of commencement of the class work in next academic year.

In the event of the student taking this chance, his Continuous Internal Evaluation marks for 40 and Semester End Examination marks for 60 obtained in the previous attempt stand cancelled.

III. VISION & MISSION

VISION:

To be a premier institution ensuring globally competent and ethically strong professionals

MISSION:

1. To provide higher education by refining the traditional methods of teaching to make globally competent professionals
2. To impart quality education by providing state of the art infrastructure and innovative research facilities
3. To practice and promote high standards of professional ethics, transparency and accountability

HUMANITIES & SCIENCES

VISION:

To foster the excellence of analytical, critical and speculative approaches of the physical sciences and English so as to provide a firm foundation for intellectual and creative experiences as well as to enrich students' lives enabling them to meet the needs of the society.

MISSION:

The department plays a pivotal role in preparing the students to face the challenges at the global level by imparting intensive training in English communication skills, ethics, Mathematics, Physics, Chemistry and Environmental studies. It offers a platform to exhibit their hobbies such as literature, photography, etc, providing respective clubs and related faculty in the college.

IV. QUALITY POLICY

We practice excellence in our teaching and research, nurturing education with Human Values. We emphasize quality education by adopting latest teaching methodologies through state of the art infrastructural facilities. NNR Education Society's Group of Institutions believes in self evaluation and continuous improvement.

V. GENERAL INFORMATION

Nalla Narasimha Reddy Education Society's Integrated campus was established in 2009 to educate, enrich and empower the youth. NNRG provides the best technical education by maintaining the standards and quality of engineering education. The endeavour of the institution stretches beyond just offering a degree towards building a good character of the young professionals in shaping them to serve the nation and humanity. It imparts technological competence and social consciousness in the new undergraduates.

VI. LOCATION & ACCESS

The campus is located amidst sprawling and lush green surroundings with an amicable atmosphere for learning. NNRG's integrated campus is about 17 kms from Secunderabad & Koti and 10 Kms from Uppal Ring road on Warangal Highway. The campus is accessible by public transport system and it takes a 15 minute drive from Uppal to reach the campus. The state RTC runs city buses frequently to Ghatkesar, Korremula and Narapally. The Institute provides college buses in various routes for faculty, staff and students and also runs TSRTC Bus specially plying from NNRG Institution to Uppal X Road.

VII. COURSES@NNRG

<table>
<tr><th colspan="2">SCHOOL OF ENGINEERING</th></tr>
<tr><td>UG - B.Tech</td><td>PG - M.Tech</td></tr>
<tr><td>Computer Science & Engineering (CSE)
Computer Science & Engineering (Data Science)
Computer Science & Engineering (Artificial Intelligence & Machine Learning)
Electronics and Communication Engineering (ECE)
Civil Engineering(CE)</td><td>Embedded Systems &VLSI</td></tr>
<tr><td colspan="2">SCHOOL OF PHARMACY
• B.Pharmacy</td></tr>
<tr><td colspan="2">SCHOOL OF MANAGEMENT SCIENCES
• MBA</td></tr>
</table>

VIII. CENTRAL FACILITIES

1. Infrastructure

The Campus main building includes the academic and the administrative blocks with well-resourced laboratories in various departments. The classrooms are spacious and well ventilated. The campus has a large playground, basket ball and football courts. The college has a well maintained canteen. RO purifying water plants, hygienic washrooms and other amenities.

2. Internet Facility

The campus systems are connected within intranet sharing facility to a central server. As part of the research and practical work, students can access the internet facility in all working hours. It provides access to e-books, study materials, previous question papers, teaching schedules, internal marks, attendance reports, daily circulars and many. A productive e learning atmosphere is promoted through the college Local Area Network (LAN), internet facility with 600 Mbps band bandwidth.

3. Auditorium

NNRG has a well-structured auditorium with a seating capacity of 600 with latest provisions. It is spacious and provides the right ambience for presentations, interactive sessions, as well as national and international conferences.

4. Sports & Games

NNRG believes that **Physical** fitness plays an important role in developing the overall personality of a student. The institute endeavors to foster overall development of students both in academic and sports fields and includes sports and games as an integral part of the curriculum. The college has extensive sports infrastructure and environment to encourage students to excel in them. The students are trained to improve physical fitness, mental ability, team spirit and discipline. NNRG has indoor sports and outdoor fields for athletics, cricket, badminton and basketball courts. Our students have participated in annual Inter-College, Inter-University and National level Sports Festivals and won laurels. The sports department is led by a full time Physical Director and competent staff.

5. Cafeteria

The institute has an ideal cafeteria that takes utmost care in providing hygienic and quality food at subsidized rates. The authorities take personal care in maintaining the quality of food served in the canteen. The canteen is amidst large and vibrant area, with a beautiful view of greenery all around. The canteen is most popular place among students on campus for food, student bonding and informal discussions.

6. Pure & Hygienic Drinking Water

NNRG campus has installed RO water purifying systems for the students and staff. Purified drinking water is supplied to all the departments/blocks. Water coolers are available in each building/block.

7. Girls Hostel

An exclusive girls' hostel is built on a 2 acre campus. The hostel provides a homely atmosphere for the students who come from city outskirts and distant places. It provides a secure environment for them to excel in studies. 24 hours security and emergency medical services and also an ambulance service is exclusively provided for the benefit of the students. The students develop a sense of responsibility and learn to manage their lives independently staying in hostels.

8. Transport

The institution provides transport to students and staff from all parts of the city to the campus. The buses are comfortable and safe in the hands of well trained drivers.

9. Seminar Halls

The college has spacious, furnished and well equipped seminar halls with audio visual facility, one for each department which can accommodate about 300 students, where departmental activities like Student Seminars, PowerPoint Presentations, Group Discussions, and Mock Interviews, etc. are conducted.

10. Center for online exams

NNRESGI maintains International standards in obtaining the best computer technology. This made NNRESGI the hub for online exams like GATE, CAT, RRB, IBPS, Govt. Entrance exams, TCS, Infosys, Deemed university entrance exams like SRM, Amrutha, CMC, etc.

11. Dispensary

The institution has its own dispensary for medical supplies and treatment. A senior doctor's medical advice is always available to all the students and staff.

12. Stationery Store

A stationery store is available in the college campus from where students can purchaseall stationery items for their day to day requirement at affordable prices.

13. ATM

An ATM center of HDFC bank is opened in the college premises for smooth and hassle- free money transactions.

IX CAMPUS OVERVIEW

- Picturesque 12- Acre Campus
- 3,00,000 Sft built-up area
- Well Qualified and Experienced faculty
- State-of- the art Laboratories
- High level safety standards at Laboratories
- Advanced English CommunicationSkills Laboratories
- Department - wise Seminar Halls
- 1200 LAN connected High Configuration Computers
- Central Seminar Hall & Auditorium
- Internet with 600 Mbps Bandwidth
- Well stacked, spacious library with a number of volumes and National & International Journals
- Digital library
- Research & Development Centre
- Training and Placement Cell

- Industry-Institute Interaction Cell
- Center for Human Excellence
- Entrepreneurship Development Cell
- CPCSEA approved animal house
- Incubation Centre
- Robotics Centre
- Professional Societies & Clubs
- WiFi enabled Campus
- Sports and Games Department
- NCC & NSS Units
- Cafeteria
- Girls Hostel
- Dispensary
- Stationery stores
- Transport facility
- Medicinal Garden

X. GUIDELINES, RULES AND REGULATIONS OF THE CAMPUS

A. GENERAL

1. Dress Code

Students should wear formal clothes.

2. Ragging and Indiscipline

Ragging is strictly prohibited on the campus. Any student found guilty would be severely punished. All senior students of the college are aware of the consequences of ragging. Students who misbehave with staff or other students will also be penalized. If students are involved in smoking, liquor consumption or in fights, they will be punished as per the Institute norms.

3. College Timings

The college commences at 09.00AM and ends at 04:00 PM with 45 minutes lunch break 12:15 PM to 1:00 PM. Students must strictly adhere to the timings of the college. They should not linger inthe college premises or outside the classrooms when the classes are in progress.

4. Bonafide Certificates

The Academic branch issues bona fide certificates for bus passes and other purposes tothe college students.

5. Bus Passes

College bus ID-cards will be issued by the transport in-charge. NNRG's Administrative Officer will attest TSRTC bus pass applications.

6. Notices/Notice Boards

Students are expected to read the College, Department and the Exam Branch notice boards regularly. The Main notice board is available at the entrance of the Engineering block.

7. Original Certificates

Students' Original certificates have to be deposited with the college and the same will bereturned after the completion of the course.

8. Memorandum of Marks

The memorandum of marks of a particular year/semester will be issued by the Examination branch.

9. Intimation of Change of Address

Students are required to intimate the change in Address or Phone number immediately ifany, to the academic branch through their Class Mentor or HOD.

10. Wearing ID cards

College Identity card is mandatory for all the students as long as they are in the college premises. They are not allowed to attend the classes or labs or write the examinations without their identity cards.

11. Obtaining Gate Passes

Students found bunking classes or leaving the college without prior permission will not be permitted to attend classes on the next day until proper explanation is provided by the student or the parent/guardian to the Head of the Department concerned. In case of emergency, studentcan approach the class in-charge for a gate pass. The Class in-charge can issue the gate pass after receiving the consent of the parents and approval of the HOD.

12. Ban on Usage of Mobile Phones

To prevent distractions caused by mobile phones, students are not permitted to use mobiles in the college campus. If any student is found using a cell phone in the campus, disciplinary action will be taken.

13. Absenteeism

No student is supposed to be absent from the class without prior permission of the HOD. If a student is absent for three days continuously without reason/prior permission, disciplinary action will be taken. The student must submit a leave application in advance to the HOD if they want to go on leave for a day and for a valid reason.

14. SMS service

If a student is absent, an SMS will be sent to the parent's mobile (registered mobile) by afternoon on the same day. Parents and students are advised to download the **-UOLO** app for any important communication from the institute/department and requested to respond appropriately.

15. Electronic Items for Music and Entertainment

No musical gadgets are allowed in the college campus. If any student is found using such items, the items will be seized and disciplinary action will be initiated.

16. Discipline in Buses

The students must commute in the allocated buses. In case of emergency, they will be permitted to change route with the permission of the authority/bus In-charge. If any student's behavior is found objectionable to the staff or other students, disciplinary action will be taken. No student is permitted to travel without the bus ID card.

17. Punctuality

Students have to be punctual to their classes. In case of delay to the class, the student may be permitted to attend the class with the permission of their respective Department Head. If the student is a regular late comer, appropriate disciplinary action will be taken.

18. Leave/Sick Leave

If the absence is on medical grounds, students are required to notify their HOD for being absent and submit the medical certificate the next day. Disciplinary action will be initiated if any student is absent without information to the Class In-charge/HOD for more than three days.

19. Assignments/Lab Records Submission

Students are supposed to submit their Lab records and Assignments given by the faculty concerned and get them corrected and graded in time. Late submission is not acceptable.

RAGGING:

- Ragging is uncivilized besides being an offence.
- Students must not involve in ragging.
- Ragging is prohibited as per Act 26 of T.S. Legislative Assembly -1997.
- Ragging entails heavy fine and/or imprisonment.
- Ragging invokes suspension and dismissal from the college.
- Outsiders are prohibited from entering the college and hostel without permission.
- Girl students must be in their hostel rooms by 6:00pm.
- Suspended students are debarred from entering the campus except when required to attend enquiry and to submit an explanation.
- Whenever any student complains about ragging, that complaint shall be enquired into oran enquiry will be made into the same forthwith and if the complaint is found true, the student(s) complained against shall be suspended for a period as may be deemed necessary.
- Every student has to give an undertaking to the college that he/she will not indulge in ragging.
- Every student's parent/guardian is also required to give an undertaking that they will ensure that their son/daughter/ward will not indulge in ragging and also comply with all the guidelines, rules and regulations concerning prevention of ragging.
- All students should carry identity cards with them both inside and outside the college.
- An Anti Ragging committee is constituted with senior faculty to carry out its activities.

Prohibition of Ragging

- Ragging within or outside the Educational Institution is prohibited.
- Ragging means doing an act which causes or is likely to cause insult or annoyance or fearor apprehension or threat or intimidation or outrage of modesty or injury to a student.
- The punishment at different levels is mentioned below.

S.No.	Nature of Ragging	Punishment
1	Teasing, embarrassing and humiliating	Imprisonment up to 6 months or fine upto Rs.1,000/-
2	Assaulting or using criminal force or criminal intimidation	Imprisonment up to 1 Year or fine upto Rs.2000/- or both.
3	Wrongly restraining or confining or causing hurt	Imprisonment up to 2 years or fine upto Rs.5000/- or both.
4	Causing grievous hurt kidnapping or raping or committing unnatural offence	Imprisonment up to 5 years and fine up to Rs.10,000/-
5	Causing death or abetting suicide	Imprisonment up to 10 years and fine upto Rs.50,000/-

Note:

- A student convicted of any of the above offences will be dismissed from the college.
- A student imprisoned for more than six months for any of the above offences will not beadmitted in any other college.
- If a student commits suicide due to or in consequence of ragging, the person who committed such ragging shall be deemed to have abetted such suicide.
- The full text of Act 26 is placed in the college library.

B. Examinations:

Students are advised to refer to the copy of regulations (R22) issued by the university/JNTUH website to be aware of the rules and regulations.

C. Malpractice:

Students must not indulge in any malpractice in the Internal/External examinations.

Malpractice cases are dealt with as per the rules/guidelines of JNTU Hyderabad.

D. Laboratory Guidelines:

- Students are expected to be punctual and regular to the lab classes and follow the labdress code.
- They are expected to carry out all the experiments prescribed by the University.
- They will not be permitted to attend the end practical examinations unless they carry out the minimum number of experiments prescribed by the University.
- They are required to attend the lab fully prepared, with a clear understanding of the concept of the theory underlying the experiment and other experimental details with a plan about how to carry out the experiment after referring to the lab manual.
- Observation notebooks should be neatly maintained. Experiments must be recorded only in the books approved by the departments/college.
- Observation notebook must be shown to the faculty In-charge of the lab and signed by the teacher at the end of the experiment/exercise.

- Records must be submitted as per the schedule prescribed by the faculty In-charge of the lab and must be certified before appearing for the end examinations.
- Students must handover the equipment to the technician in good condition before leaving the lab.
- Students must maintain utmost cleanliness in the lab. Breakages/damages of equipment have to be reported immediately to the lab in-charge.
- Students are advised to clear all dues to the lab before taking end practical examinationsto avoid complications at a later date.
- Laboratory session marks will be awarded on the basis of continuous evaluation.
- Students must clear the work bench soon after the experiment is over.
- Waste material, if any, must not be dropped on the floor of the laboratory. Students shoulduse the waste material baskets kept for the purpose.
- Experiments need to be carried out following all the instructions meticulously and observing all the precautions to avoid personal injuries and damage to equipment.

E. Undertaking from Students and Parents:

Students, parents/guardians need to sign an undertaking in a prescribed form by the college at the time of admission process that they shall adhere to the college rules and regulations. Student who has taken admission in this Institute shall be deemed to have agreed to the rules and regulations of the Institute as given in the handbook. Change of rules if any are to be en-corporated.

F. Class Review Committee (CRC):

The Class Review Committee is constituted for each class. The Class In-charge nominates three students (on good, average & below average basis) from each section through the HOD concerned to know the students' response about the class work. The CRC meets twice a month to review the coverage of syllabus; progress of students; extra classes to be arranged; and resolves students' inhibitions and concerns in the problematic subjects.

G. NOTIFICATION OF STUDENT ABSENCE AND ACADEMIC PERFORMANCETO PARENTS (LETTERS AND SMS)

In order to ensure that the students are regular to college and to be aware of their safety, the institute sends text messages to parents when their child is absent from the class. This is done soon after the first hour so that parents are kept informed.

Parents will be informed about their ward's performance through SMS and their examination results posted from time to time. Parents can contact the HOD/Class In-charge as and when required. The parents are expected to keep in touch with the Class In-charge/HOD and monitor the academic progress of their ward. If the student's attendance /academics is poor the parent should report immediately to review the situation.

PARENT-TEACHER MEETING:

One of the most important features of NNRESGI is the Parent-Teacher Meeting conducted every semester for all the students. It aims at keeping the parents informed about their child's academic and personal progress.

1. Girls' Hostel:

Rules of Admission:

- Students who join the hostel have to pay the prescribed admission fee and caution depositat the time of admission.
- Admission shall be made only after clearing all the dues to the college and previous dues(if any) to the hostel.
- Separate Identity Card will be issued to every student who stays in the college hostel. Suspension/dismissal of a hostel (residential) student from the college will automatically result in her suspension/dismissal from the hostel.

Rules of Discipline

- Every inmate should return to the hostel by 5 p.m.
- Inmates are not allowed to leave the hostel. However, in exceptional circumstances they may take permission from the warden if they need to go outside. Leaving the hostel without the written permission of the warden shall be considered a violation of hostel rules and will be dealt seriously.
- All inmates must carry their college identity cards whenever they leave the hostel premises. They will be permitted to enter the hostel only after producing the identity cardat the hostel main gate.
- Parents/guardians of inmates will be allowed to visit their daughter/ward between 5 p.m. and 6 p.m. on all college working days and between 8 a.m. and 6 p.m. on Sundays and other college holidays. Visitors will be allowed to meet the inmates after making required entries in the visitors' register.
- No inmate will be permitted to go out with parents or local guardians without prior and proper authorization from the warden. Any request for permission from parents to take their daughter/ward out during college working hours will not be granted.
- No inmate will be permitted to go home except during vacation.
- Hostel students are not allowed to stay in the hostel rooms during the college timings.
- Collective gatherings of any kind are prohibited within the hostel premises.
- Students living in the hostel should not indulge in any act or activity that is unacceptable or detrimental for the smooth and proper running of the hostel.
- Residential students shall be held responsible for any damage caused to hostel property and the loss to the property shall be recovered from them.
- Hostel students are prohibited from using any electronic or power consuming appliancewithout the permission of the warden.

XI. LIBRARY

The Central Library has state-of-the-art facilities with books both in print and digital formats. Spread in an area of 1500 Sqmts, the library has separate lending, reading, periodical and digital library sections. The fully computerized library with online public access catalogue system contains over 35,000 volumes covering about 5,000 titles. Apart from textbooks, it has a large number of reference books, national and international journals, magazines and e-journals. NNRG's central library has institutional membership with DELNET, National Digital Library (NDL) and subscribed IEEE, ASME & J_Gate e – journals. Using the On-line Public Access Catalogue (OPAC) system, these can be accessed through intranet. The library has an Integrated Library Management Software Package called KOHA.

The digital library is equipped with 32 latest systems and provides 50 Mbps internet connection exclusively.

- Books 35,000
- CD/DVD's 500
- Project Reports 1500
- Print Journals 228
- Online Journals 600+
- E-Books 200+

LIBRARY FEATURES

- Book lending facility for students and staff
- The library has subscription to 228 International and National print journals and around 600 e-journals through DELNET, IEEE, ASME, Sage and J - Gate Publications.
- The reference section is a spacious enclave containing books on GATE, TOEFL, GRE, GPAT, General Studies, encyclopedias, dictionaries, handbooks, theses and prescribed textbooks.
- The Digital Library has 32 latest version systems connected through LAN and internetwith 50 Mbps band width. It has a complete collection of NPTEL video lectures of IIT experts.
- Print and replication related stationery assistance is made available.

The detailed Rules and Regulations of the Library are displayed on thelibrary Notice Board.

LIBRARY RULES AND REGULATIONS:

- Members / Users have to show their I.D cards, while entering the Library and write their name, branch, Roll.no., time and sign the Register kept at the entrance.
- Keep all the belongings at the entrance and take only one note book or loose sheets.
- Files, bags, personal text books are not allowed inside the Library.
- No person shall write on, damage or make any mark on any book, journal or other materials belonging to the Library.
- The borrower shall be responsible for any damage or loss done to the Library documents borrowed by them and shall be required to replace such material or to pay the Triple cost thereof.
- Before leaving the Library, the reader shall leave on the table any books/periodical, which he/she has taken for reference. The same shall not be kept back on the shelf by the reader to avoid misplacement.
- Maintaining peace, silence in the Library is a must.
- Loss of borrower books has to be reported immediately to the Librarian in writing.
- Members should take care of their personal belongings. The Library is not responsible for any claim of loss of such articles. However, notice will be put if such articles found in the Library.
- Cell phoning and consuming chocolates, etc., in the Library is strictly prohibited.
- Any infringement of the norms and procedures will render the privilege of admission and borrowing reading materials from Library liable to suspension.

- Librarian reserves the right to recall at any time any book issued from the library. Librarian is also empowered to terminate the loan facility to any borrower, if he/she is found to infringe on library rules.
- Library books are issued on barcode based circulation method, please produce ID cards while borrowing books in the circulation counter.

ISSUE OF BOOKS AND PERIODICALS:

- Members of the Library may borrow three books for MBA and Three Books for B.Tech. and B. Pharmacy at a time for a period of 15 days.
- Books can be renewed only once at one given period provided there is no reservation for them.
- Students who fail to return the books on or before due date will have to pay a penalty of Rs. 1/- per day from the due date.
- Reference books and current journals are not for issue. They should be referred within the library only.

LIBRARY SERVICES:

- Xerox is available with nominal charges.

LIBRARY HOURS:

- 9.00 am to 5.00 pm

XII. TRAINING & PLACEMENT CELL

The Training and Placement Cell is an important link between students and industry. We at NNRG are extremely earnest about guiding students in their career path and development. The T&P cell inculcates professional attitude, ethics, and overall personality development in students. It trains them in team building, group activities, mock interview sessions and leadership abilities.

We provide them with hands-on training by providing opportunities to work, interact with entrepreneurs through lectures, seminars, and group discussions. Distinctive focus is given to all- round development through confidence building, teamwork abilities, and exhaustive English communication classes, enhancing their employability skills. It prepares them for future challenges not only by enhancing their academic knowledge but by improving qualities such as taking responsibilities, communication, decision making and interpersonal skills. The Cell trains the students to face Interviews through live recruitment situations. It instills confidence in students to face Interviews and come out with flying colours.

INCUBATION CENTRE:

The Incubation centre is an educational project which provides specially designed incubators for colleges within the premises. Once a student registers for the course, collaboration ensures the overall development of the student ranging from technical training to personality development which widens the chances for the students to achieve the best in the competitive job market.

ROBOTICS DEVELOPMENT CENTRE:

The Robotics centre provides students a platform for practical application of technology and learning from their curriculum by participating in interestingly designed problem solving tasks.

RESEARCH AND DEVELOPMENT COMMITTEE:

In order to encourage and motivate the faculty and students towards the research and development, the institute has established a separate R&D consultancy and External Funded Project Cell. Faculty and students are motivated to write and publish research articles in various national and international journals. The R&D Committee also encourages the faculty and students to participate in various national and international conferences, workshops, and seminars, etc.

MAJOR RESEARCH FACILITIES:

a. Cadence Tools
b. DSP development boards on floating point TMS320C6713
c. MATLAB
d. ProE and ANSYA software tools
e. CNC Milling Machine
f. IOT Labs
g. 3D Printing

Training Programs and Facilities

- Aptitude and Verbal training sessions
- Coding Skills and Skill Development Programs
- Group discussion and Mock Interview sessions
- Personality Development Classes
- Soft skills and Employability skills workshops
- Mock written tests, Group discussions, interviews
- Expert classes for GATE, GPAT, CAT, GMAT, TOEFL, GRE, IELTS etc.
- Industrial visits
- Advanced Communication Skills Lab

The institute has maintained excellent consistency in the placement of the students backed by exceptional placement infrastructure. NNRESGI has been consistently improving its placement record by placing students in various reputed organizations. The Placement Cell at NNRESGI offers excellent guidance to the students by helping them gain necessary skills and practical knowledge of respective engineering domain. The institute offers several on-campus and off-campus activities to enhance the employability of the students. Some of our prominent recruiters are as follows

XIII. STUDENT ACTIVITIES

NNRG's ANNUAL TECHNICAL FESTS – Tech Samprathi is the annual technical festival of Nalla Narisimha Reddy Education Society's Group of Institutions. It is a Three-Day National Level Student Symposium organized every year. This fest aims at providing a platform for the student community in and around our nation to develop and showcase their technical prowess. The emphasis at **Tech Fest** is on technology and its applications rather than just on the engineering know-how. It offers a conductive stage for innovation in all the students and also instills social and environmental responsibility among innovators creating a platform for effective collaboration between technical fests and nation building.

Tech Samprathi has several distinguished events.

Technical Event: Paper Presentation, Project Expo, Poster Presentation, App Expo and C Terror. Non-Technical Event: Short Film, Devinette (quiz), (riddle) Caricature, Model United Nations. This year Tech Samprathi also hosted intern College Cultural and Sports festival.

Elite Gathering:

ELITE GATHERING is conducted in the campus every fortnight. During the club activity all the students and the staff of NNRESGI gather at the Assembly Point of the campus the activities are carefully planned to enhance the confidence of the students. It gives them a platform to practice and communicate without any inhibitions, and to impart industry-specific skills needed.

The students who are selected through screening test deliver speeches on various topics given. Elite Gathering also conveys ongoing and upcoming events of the campus. The aim of conducting the assembly is to build confidence and interest in the students, to enable them to improve their communication skills and to develop public speaking skills along with thought process culmination. All the interested students exhibit their talent irrespective of their academic performance.

Center for Human Excellence:

NNRESGI established a Center for Human Excellence in association with Vivekananda Institute of Human Excellence, Ramakrishna Math, Hyderabad. The center aims to impart the age-old cherished ideals, values and the words of Swami Vivekananda, life-building, man-making, character-building, education and training in order to build a stronger nation. The Programs conducted under this wing aim to instill faith in oneself and impart nobler values of life and life- giving strength, to raise individuals to higher levels of strength and felicity with spiritual, moral, ethical and eternal values of personality development and human excellence.

Center for Human Excellence wing, NNRESGI conducts programs frequently in the campus. Eminent philosophical gurus as speakers and monks from VIHE invigorate the young minds.

E-Plus Club:

The E-Plus club activity is an initiative of The Hindu (newspaper) group. It was inaugurated in 2012. The club aims at recognizing the importance of excellent communication skills, sound reasoning, and the confidence to present one's ideas and opinions clearly. E-Plus club undertakes group activities that help students practice English through debating skills, etc. No tests or exams are involved, and students are encouraged to be adventurous, to experiment, and to actually use English instead of just learning about it.

Model United Nations (MUN)

MUN is an educational recreation. It is an academic activity in which students can learn about diplomacy, international relations, and the United Nations. MUN involves researching, public speaking, debating, and writing skills, in addition to critical thinking, teamwork, and leadership abilities.

Photography Club:

The Club –started its journey in the year 2012. It is a student-led club focused on bringing together students who share a passion for photography. Our purpose is to explore various topics within photography and help our members learn and grow within their art.

Literary Club:

The Literary club was established in 2012. It is a platform which instills fondness for language and enhances the students' literary skills. The club provides exciting social and cultural events for students such as creative writing, poetry recitation, mock press conferences, debates and elocution competitions to prune various forms of creative expressions of students.

Yoga and Meditation Club:

The Club was inaugurated on 21st June, 2016. The club aims at teaching and training the students in techniques for resting the mind and attaining a state of consciousness that is totally different from the normal waking state. It is the means for experiencing the center of consciousness within. The goal of the Club is to go beyond the mind and experience our essential nature—which is described as peace, happiness and bliss, busting the stress caused by the highly competitive and stressful life and discovering mental and physical energy generators, wonderful abilities, peace and bliss hidden within ourselves.

Mathematics Club:

The Mathematics Club was inaugurated on 22 December 2015. Its objective is to train students with Mathematics logics through games like Sudoku, Rubric's Cube, etc. It aims at making the students aware and helping them to learn about eminent mathematicians and the history of Mathematics through paper presentations. The club creates curiosity in the students to research and keep themselves updated in the latest mathematical developments and applicationsin engineering.

C-Wizard Club:

The event is organized to enhance the students' knowledge of C Language. It is a quiz competition which elevates their computer skills.

Science Club:

The Science Club organizes model exhibition every year to give the students a platform to exhibit their knowledge and creativity and also encourage other students who do not usually participate in extra and co-curricular activities. It is a strong base for many students to launch their ideas and build on them carrying it forward into their professional lives.

Art/Culture Club:

Apart from the regular academic curriculum it is also very important for the students toget involved in the various cultural and other activities which will bring out their hidden talents. Art and Culture Club established in the institute to encourage students to take part in these activities. These activities will help the students to have a holistic growth. Through this students are given an opportunity to collaborate with various media, to exhibit the inherent talents. Such programs give them the societal exposure for public interaction.

Apart from the regular activities of various clubs, the institute also celebrates many events like World Environment Day, Engineers' Day, Ramanujan's birth anniversary, National Science Day, World Water Day and World Photography Day.

Women Cell:

Our Institute provides all the encouragement to women to excel in their field of expertise. A separate Cell is established in the institution to provide all the necessary encouragement to women to prove their capabilities and enhance them. The objective is to develop women students to self- motivated, self-esteemed and self-disciplined persons who can realize their aspirations and achieve their dreams.

Sexual Harassment Eradication Cell:

The institute protects the students and staff against sexual harassment through the Sexual Harassment Eradication Cell. This facility ensures security and confidence to everyone

Freshers' Day:

The college organizes Freshers' Day to welcome the Freshers. The Director, Dean and Department Heads grace the occasion. Second Year students organize cultural events and conduct competitions for newly joined students.

Annual Day:

The College celebrates its Annual Day in a grand manner. The Director presents the annual report of the college for the academic year. Academic prizes are awarded to the toppers in JNTU exams. Prizes are distributed to the winners in different activities like sports, cultural activities, games, extra-curricular and co-curricular events.

Sports Day:

Sports are an integral part of a student's life. A student must study hard to be successful in examinations as well as play sports to enjoy good health and vigor of life. The college organizes various outdoor events such as Cricket, Football, Volleyball, Throw ball, Tennikoit and Indoor events like Chess, Table Tennis, and Caroms on Sports Day to make students physically and mentally strong.

Alumni Day:

An institution's alumni are the reflection of its past, representation of its present and a link to its future. NNRG organizes Alumni Meet every year in the campus. The Alumni were invited and all the old students attend the gathering. The Alumni Association plays an important role in informing the current students about opportunities available in the industry.

Student Seminars:

The institute provides a great opportunity for the students to improve their skills within their curriculum. These seminars can improve students' language and encourage them to prepare and present seminars in all the subjects in the schedule given in the Time Table by using LCD Projectors.

Industrial Visits:

NNRESGI has active collaboration with several industries enabling regular industrial visits for all the students to keep them abreast with industry needs. Some of the visits organizedby the departments of the institute are-

- TCS
- Infosys
- Tech Mahindra
- Cloud4c
- RCL
- BHEL
- ECIL
- Astra Microwave Products Limited(AMPL)
- NRSA-ISRO
- Primary Radar and Sensory Radar Stations
- 400KV Sub Station & many more
- RTTC-BSNL
- Nuclear Fuel Complex
- Doordarshan Kendra
- Roshni Microsystems
- Mana TV
- Diesel Loco Shed
- Analogics Tech India Limited …..

Memorandum of Understanding (MOU)

NNRESGI has signed MOUs with various organizations and industries to train the students and to upgrade their technical skills, aptitude and overall personality development. This also helps the students to undergo internships, project works and get hands – on experience.

MOU's signed by NNRESGI:

- TASK
- Oracle Academy
- CYMAX
- IMFS
- VMware
- Vedic Systems
- CI smart connect technologies
- Astra Microwave Products Limited(AMPL)
- Digital lync

- Smart Infe – Est
- Ram Tech
- EAISEB
- Medha
- Axiom Energy Solutions
- Udai Engineering works
- H – Bots
- SRCNC Technology
- DEFW Automations
- GPR Electrical &Automation
- Siliconus……

Professional Societies/Student Chapters

Today's industries and organizations which provide career opportunities look for the following capabilities in students:

1. Latest knowledge in their respective and related fields
2. Communication skills, interactive skills and professional acquaintances
3. Technical writing skills

There are some societies related to each discipline/branch where students can become members, to achieve the capabilities mentioned above. These societies organize lectures, seminars, workshops, and conferences for students and professionals. They also publish magazines and journals with the latest discoveries, which they send to the students at their addresses as part of their membership package. These publications are monthly, quarterly, yearly and annual. It is beneficial for students to become members of these societies.

S. No.	Branch	Name of the Institution
1	CSE	1. Indian Society for Technical Education (ISTE) 2. Computer Society of India (CSI) 3. Institute of Electrical and Electronics Engineers (IEEE)
2	ECE	1. Institute of Electronics and Telecommunication Engineers (IETE) 2.Indian Society for Technical Education (ISTE) 3.Institute of Electrical and Electronics Engineers (IEEE)
3	EEE	1. Institute of Electrical and Electronics Engineers (IEEE) 2.Indian Society for Technical Education (ISTE) 3.Institute of Engineers(IE)
4	ME	1. Indian Society for Technical Education (ISTE) 2. American Society of Mechanical Engineers(ASME)
5	CE	1. Indian Society for Technical Education (ISTE) 2. Institute of Engineers (IE)

Programs as part of Corporate Social Responsibility (CSR) being conducted include:

- Blood Donation Camp
- Village Survey
- Free Medical Camp
- Hygiene & Cleanliness Awareness Program in nearby villages
- Save Water and Trees
- Tree Plantation
- Digital Literacy Program

NNRESGI-IEEE Women in Engineering:

NNRESGI's IEEE Women in Engineering (WIE) Group is the largest international professional organization dedicated to promoting women engineers and scientists. The mission of IEEE WIE is to facilitate the recruitment and retention of women in technical disciplines globally. Technical events, activities and conferences are conducted exclusively to enhance networking and to promote WIE's motto.

NCC Wing:

NCC at NNRESGI has been functioning extremely well since the inception of the institute with the constant and motivating support from the management. All the cadets have been selected based on their skills and ambition. The main aim of NCC is to cultivate Unity and Discipline. All the selected cadets are trained in various fields and they actively participate in social service.

NSS Wing:

NSS provides an excellent opportunity to the students who desire to serve the community and to develop interpersonal relationships and skills. They conduct Swacch Bharat (Clean & Green), tree planting campaigns, blood donation camps and free medical camps. First Aid awareness programmes and AIDS awareness programmes are also organized. Engaging in social activities to bridge the gap between the fortunate and the less fortunate and empowering them is the main focus of NSS activity.

Entrepreneurship Development Cell (EDC):

The Entrepreneurship Development Cell is established in the institution to organize Entrepreneurship Awareness Camps, Entrepreneurship Development Programmes and Faculty Development Programmes with the aim to encourage the students towards Entrepreneurship and to encourage faculty to be better prepared to train the students.

Industry Institute Interaction Cell (IIIC) & Institution's Innovation Council (IIC)

The Institute has placed emphasis on the cultivation of strong links with the industry to promote various industrial activities by the faculty members and students. In order to keep up with the growing volume of industrial liaison activities and even more importantly, to catalyze the further growth and development of interaction between the Institute and Industry, a separate cell (Industry-Institute Interaction Cell - IIIC) was established in the institution. IIIC coordinates with all the faculties of the University and Industry.

XIV. INDUCTION PROGRAMME:

NNRESGI organizes induction programme for the fresher's and their parents at the beginning of the first semester in order to familiarize them with the fundamentals of the institute. The Induction programme includes lectures by motivational speakers, writers, soft skills trainers, yoga and meditation trainers, language trainers and entrepreneurs of international repute. Another interesting feature of the Induction programme is the literary and cultural competitions for students to exhibit their creativity.

Induction is an extremely significant part of our students' lives here at NNRESGI as it is a major junction where we try to bridge the gap between school and college input on human values and ethics to equip them to be globally competent and ethically strong professionals.

XV. CONTACT INFORMATION

Website Address : http://www.nnrg.edu.in
E-mail : admin@nnrg.edu.in, director@nnrg.edu.in, tpo@nnrg.edu.in
Phone Numbers : 040-29705282, 9985311103, 9885294405, 8886531118
Fax : 040-29705284

For any administrative issues and information, please contact:

Designation	Name	Mobile No.
Administrative Officer	Mr. Anand Paul Meripo	9704820333
Admin In-charge for general problems and scholarship issues	Mr. E. Sampath Reddy	9885294408
Admin In-charge for general problems	Mr. N. Sreedhar Reddy	9885294405
Transport In-charge	Mr. N. Mallesh	9985311105
Security Officer	Mr. B. Narasimha	8886531117

Designation	Name	Mobile No.
HOD, H&S	Dr. E. Chandra Shekar	9440605489
HOD, Civil	Prof. Y. Srinivas	9849641543
HOD, CSE	Dr. K. Rameshwaraiah	9553977907
HOD, ECE	Dr. B. Ravi	9030717749
HOD, EEE	Dr. P. Ramesh	9502941951
HOD, ME	Dr. G. Janardhana Raju	9885294437
TPO	Mr. K. Sreekanth	9985930301
I/C of Examinations	Mr. P. S. Srinivasa Reddy	9493014534

*** Contact in case of urgency only**

XVI. COMMITTEES

The following Committees have been constituted to streamline the Administration of the Institution. These committees plan and execute various activities for smooth functioning and general development of the Institution.

- College Academic Committee
- Grievances And Redressal Committee
- Anti Sexual Harassment Committee/Women Empowerment Cell
- Anti Ragging Committee
- Disciplinary Committee
- Time Table Committee
- Placement Committee
- Alumni Committee
- Library Committee
- Arts/Cultural/Literary & Hobby Club Committee
- Sports & Games Committee
- Transport Committee
- Student Affairs Committee
- Quality Assurance Committee etc.

XVII. B.TECH. COURSE STRUCTURE

Electronics and Communication Engineering

I YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.	22MA101BS	Matrices and Calculus	3	1	0	4
2.	22AP102BS	Applied Physics	3	1	0	4
3.	22CS103ES	Programming for Problem Solving	3	0	0	3
4.	22ME104ES	Engineering Workshop	0	1	3	2.5
5.	22EN105HS	English for Skill Enhancement	2	0	0	2
6.	22EC101PC	Elements of Electronics and Communication Engineering	0	0	2	1
7.	22AP105BS	Applied Physics Laboratory	0	0	3	1.5
8.	22EN107HS	English Language and Communication Skills Laboratory	0	0	2	1
9.	22CS108ES	Programming for Problem Solving Laboratory	0	0	2	1
		Total	**11**	**3**	**12**	**20**

I YEAR II SEMESTER

S. No.	CourseCode	Course Title	L	T	P	Credits
1.	22MA201BS	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2.	22CH202BS	Engineering Chemistry	3	1	0	4
3.	22ME205ES	Computer Aided Engineering Graphics	1	0	4	3
4.	22EE204ES	Basic Electrical Engineering	2	0	0	2
5.	22EC201PC	Electronic Devices and Circuits	2	0	0	2
6.	22EC203PC	Applied Python Programming Laboratory	0	1	2	2
7.	22CH206BS	Engineering Chemistry Laboratory	0	0	2	1
8.	22EE208ES	Basic Electrical Engineering Laboratory	0	0	2	1
9.	22EC202PC	Electronic Devices and Circuits Laboratory	0	0	2	1
		Total	**11**	**3**	**12**	**20**

B.TECH COURSE STRUCTURE

Common for CSE & CSE (Data Science)

I YEAR I SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	22MA101BS	Matrices and Calculus	3	1	0	4
2	22CH102BS	Engineering Chemistry	3	1	0	4
3	22CS103ES	Programming for Problem Solving	3	0	0	3
4	22EE104ES	Basic Electrical Engineering	2	0	0	2
5	22ME105ES	Computer Aided Engineering Graphics	1	0	4	3
6	22CS106ES	Elements of Computer Science & Engineering	0	0	2	1
7	22CH106BS	Engineering Chemistry Laboratory	0	0	2	1
8	22CS108ES	Programming for Problem Solving Laboratory	0	0	2	1
9	22EE109ES	Basic Electrical Engineering Laboratory	0	0	2	1
Total Credits			**12**	**2**	**12**	**20**

I YEAR II SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	22MA201BS	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2	22AP202BS	Applied Physics	3	1	0	4
3	22ME203ES	Engineering Workshop	0	1	3	2.5
4	22EN205HS	English for Skill Enhancement	2	0	0	2
5	22EC201PC	Electronic Devices and Circuits	2	0	0	2
6	22AP205BS	Applied Physics Laboratory	0	0	3	1.5
7	22CS207ES	Python Programming Laboratory	0	1	2	2
8	22EN207HS	English Language and Communication Skills Laboratory	0	0	2	1
9	22CS209PC	IT Workshop	0	0	2	1
Total			**10**	**4**	**12**	**20**

B.TECH. COURSE STRUCTURE
Computer Science and Engineering (AI & ML)

I YEAR I SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1.	22MA101BS	Matrices and Calculus	3	1	0	4
2.	22AP102BS	Applied Physics	3	1	0	4
3.	22CS103ES	Programming for Problem Solving	3	0	0	3
4.	22ME104ES	Engineering Workshop	0	1	3	2.5
5.	22EN105HS	English for Skill Enhancement	2	0	0	2
6.	22CS106ES	Elements of Computer Science & Engineering	0	0	2	1
7.	22AP105BS	Applied Physics Laboratory	0	0	3	1.5
8.	22CS108ES	Programming for Problem Solving Laboratory	0	0	2	1
9.	22EN107HS	English Language and Communication Skills Laboratory	0	0	2	1
		Total	**11**	**3**	**12**	**20**

I YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.	22MA201BS	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2.	22CH202BS	Engineering Chemistry	3	1	0	4
3.	22ME205ES	Computer Aided Engineering Graphics	1	0	4	3
4.	22EE204ES	Basic Electrical Engineering	2	0	0	2
5.	22EC201PC	Electronic Devices and Circuits	2	0	0	2
6.	22CH206BS	Engineering Chemistry Laboratory	0	0	2	1
7.	22EE208ES	Basic Electrical Engineering Laboratory	0	0	2	1
8.	22CS207ES	Python Programming Laboratory	0	1	2	2
9.	22CS209PC	IT Workshop	0	0	2	1
		Total	**11**	**3**	**12**	**20**

B.TECH COURSE STRUCTURE
Civil Engineering

I YEAR I SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	22MA101BS	Matrices and Calculus	3	1	0	4
2	22AP102BS	Applied Physics	3	1	0	4
3	22CS103ES	Programming for Problem Solving	3	0	0	3
4	22ME104ES	Engineering Workshop	0	1	3	2.5
5	22EN105HS	English for Skill Enhancement	2	0	0	2
6	22CE106PC	Elements of Civil Engineering	0	0	2	1
7	22AP105BS	Applied Physics Laboratory	0	0	3	1.5
8	22EN107HS	English Language and Communication Skills Laboratory	0	0	2	1
9	22CS108ES	Programming for Problem Solving Laboratory	0	0	2	1
Total			**11**	**3**	**12**	**20**

I YEAR II SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	22MA201BS	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2	22CH202BS	Engineering Chemistry	3	1	0	4
3	22ME205ES	Computer Aided Engineering Graphics	1	0	4	3
4	22CE204ES	Applied Mechanics	3	0	0	3
5	22CE205PC	Surveying	2	0	0	2
6	22CS207ES	Python Programming Laboratory	0	1	2	2
7	22CH206BS	Engineering Chemistry Laboratory	0	0	2	1
8	22CE208PC	Surveying Laboratory – I	0	0	2	1
Total			**12**	**3**	**10**	**20**

MATRICES AND CALCULUS

Pre-requisites: Mathematical Knowledge at pre-university level

Course Objectives: To learn

- Types of matrices and their properties.
- Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form
- Geometrical approach to the mean value theorems and their application to the mathematical problems
- Evaluation of surface areas and volumes of revolutions of curves.
- Evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative
- Finding maxima and minima of function of two and three variables.
- Evaluation of multiple integrals and their applications

Course outcomes: After learning the contents of this paper the student must be able to

- Write the matrix representation of a set of linear equations and to analyze thesolution of thesystem of equations
- Find the Eigen values and Eigen vectors
- Reduce the quadratic form to canonical form using orthogonal transformations.
- Solve the applications on the mean value theorems.
- Evaluate the improper integrals using Beta and Gamma functions
- Find the extreme values of functions of two variables with/ without constraints.
- Evaluate the multiple integrals and apply the concept to find areas, volumes

UNIT-I: Matrices

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss- Jordan method, System of linear equations: Solving system of Homogeneous and Non- Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

UNIT-II: Eigen values and Eigen vectors

Linear Transformation and Orthogonal Transformation: Eigen values, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT-III: Calculus

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series (without proofs).
Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT-IV: Multivariable Calculus (Partial Differentiation and applications)

Definitions of Limit and continuity.
Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT-V: Multivariable Calculus (Integration)

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form), Evaluation of Triple Integrals: Change of variables for double (Cartesian to polar) and triple integrals(Cartesian to Spherical and Cylindrical polar coordinates).
Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications,5th Editon, 2016.

REFERENCE BOOKS:

1. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition,Pearson, Reprint,2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and CompanyLimited, New Delhi.

ASSIGNMENT QUESTIONS

UNIT-I

Short Answer Questions:-

1) Define symmetric matrix and give an example.
2) Define skew symmetric matrix and give an example.
3) Define orthogonal matrix and give an example.
4) Define rank of a matrix.
5) Find the value of k such that rank of $\begin{bmatrix}1 & 2 & 3\\ 2 & K & 7\\ 3 & 6 & 10\end{bmatrix}$ is '2'.
6) State the conditions when the system of non-homogeneous equations AX = Bwill have
   (i) Unique solution (ii) infinite no. of solutions (iii) no solution.
7) Find the inverse of $\begin{bmatrix}cos\theta & 0 & sin\theta\\ 0 & 1 & 0\\ sin\theta & 0 & cos\theta\end{bmatrix}$
8) State the conditions when the system of homogeneous equations AX = 0will have
   (i) Trivial solution (ii) non trivial solutions.
9) If A=$\begin{bmatrix}3 & a & b\\ -2 & 2 & 4\\ 7 & 4 & 5\end{bmatrix}$ is symmetric then find 'a' and 'b'.
10) What do you mean by system of consistency and inconsistency?

Long Answer Questions:-

1) Define Normal form a, and find the Rank of the matrix by reducing into Normal form .$\begin{bmatrix}2 & 3 & -1 & -1\\ 1 & -1 & -2 & -4\\ 3 & 1 & 3 & -2\\ 6 & 3 & 0 & -7\end{bmatrix}$
2) Define Echelon form of a Matrix and find the Rank of the matrix by reducing into Echelon form
   $\begin{bmatrix}0 & 1 & -3 & -1\\ 1 & 0 & 1 & 1\\ 3 & 1 & 0 & 2\\ 1 & 1 & -2 & 0\end{bmatrix}$
3) For what value of 'k' the matrix $\begin{bmatrix}4 & 4 & -3 & 1\\ 1 & 1 & -1 & 0\\ k & 2 & 2 & 2\\ 9 & 9 & k & 3\end{bmatrix}$ has rank '3
4) Determine the Non-singular matrices 'P' and 'Q' such that 'PAQ' is in the normal form for 'A'. and hence find the rank $\begin{bmatrix}3 & 2 & 1\\ 2 & 1 & 1\\ 6 & 2 & 4\end{bmatrix}$

5) Using rank method, investigate for consistency of the system of linear equations 4x-2y+6z = 8, x+y- 3z = -1, 15x-3y+9z = 21 and solve them if they are consistent.

6) For what values of □, the system of equations x + y + z = 1, x + 2y + 4z = □, x + 4y + 10z = □^{2} have a solution and solve them completely in each case.

7) Determine the values of λ, for which the following set of equations possess non trivial solution and solve them completely
$3x_1 + x_2 - \lambda x_3 = 0, 4x_1 - 2x_2 - 3x_3 = 0, 2\lambda x_1 + 4x_2 + \lambda x_3 = 0.$

8) Use Gaussian Elimination method to solve
$x + 2y - 3z = 9\ 2x - y + z = 0\ 4x - y + z = 4.$

9) Solve he system of equations, using Gauss- seidel method.
10x+y+z = 12, 2x+10y+z = 13, 2x+2y+10z =14.

10) Find the inverse of the matrix $\begin{bmatrix} -2 & 1 & 3 \\ 0 & -1 & 1 \\ 1 & 2 & 0 \end{bmatrix}$ by Gauss-Jordan method.

UNIT-II

Short Answer Questions:-

1) Define Eigen value and Eigen Vector of a matrix.
2) Define linearly independent and linearly dependent vectors.
3) Show that the vectors X_1=(1,1,2), X_2=(1,2,5) and X_3=(5,3,4) are linearly dependent.
4) Show that the vectors X_1=(1,1,1) X_2=(3,1,2) and X_3=(2,1,4) are linearly independent.
5) State Cayley- Hamilton theorem.
6) Find the sum and product of the Eigen values of $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 3 \\ 3 & 1 & 1 \end{bmatrix}$
7) If the Eigen values of A are 1,2,3 then find (i) det A (ii) Trace of A
8) Define Modal and spectral matrices.
9) Define Quadratic form.
10) Define canonical form of a Quadratic form.
11) Define Nature of a Quadratic form.
12) Define orthogonal vectors.

Long Answer Questions:-

1. Find the Eigen values and the corresponding Eigen vectors of the matrix **A**= $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$
2. Find the Eigen values of $\mathbf{5A^5-2A^2+7A-3A^{-1}+I}$, where A=$\begin{bmatrix} -3 & -7 & -5 \\ 2 & 4 & 3 \\ 1 & 2 & 2 \end{bmatrix}$
3. Verify Cayley-Hamilton theorem for the matrix A=$\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}$.Express $B=A^8-11A^7-4A^6+A^5+A4-11A^3-3A^2+2A+I$ as a Quadratic polynomial in A. Find B.

4. If A= $\begin{bmatrix} 1 & 2 & -1 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ then verify Cayley-Hamilton theorem. Find A^{-1}& A^4 using Cayley – Hamilton theorem.

5. Diagonalize the matrix A= $\begin{bmatrix} 1 & 1 & 1 \\ 0 & 2 & 1 \\ -4 & 4 & 3 \end{bmatrix}$, hence find $\mathbf{A^4}$

6. Reduce the matrix A = $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ to diagonal form by orthogonal transformation.

7. Reduce the quadratic form to canonical form $8x^2+7y^2+3z^2+12xy+4xz-8yz$. and hence find its rank, nature, index and Signature

8. Reduce the Quadratic form $3x^2+5y^2+3z^2-2yz+2zx-2xy$ to the canonical form by orthogonal transformation.

UNIT-III
Short Answer Questions:-

1 State Rolle's Theorem.
2. Verify whether Rolle's Theorem can be applied to $f(x) = \tan x$ in $[0, \pi]$
2. State Lagrange's Mean value theorem.
3. State Cauchy's Mean value theorem.
4. Prove that B (m, n) = B (n, m).
5. Find $\beta(2,2)$
6. Find $\Gamma\left(\frac{11}{2}\right)$.
7. Write the relation between beta and gamma functions.
8. Evaluate $\int_0^\infty e^{-x} x^7 dx$.
9. Evaluate $\int_0^1 x^5(1-x)^3 dx$.
10. Write the formula to find the surface area of revolution about x-axis.

Long Answer Questions:-

1. Verify the Rolle's Theorem for the function $f(x) = \frac{\sin x}{e^x}$ in $(0, \pi)$.

2. Verify Rolle's Theorem for the function $f(x) = \log\left[\frac{x^2+ab}{x(a+b)}\right]$ in [a, b].

3. Show that $\frac{\pi}{3} - \frac{1}{5\sqrt{3}} > \cos^{-1}\frac{3}{5} > \frac{\pi}{3} - \frac{1}{8}$ using Lagrange's mean value theorem.

4. If a<b, Prove that $\frac{b-a}{1+b^2} < tan^{-1}b - tan^{-1}a < \frac{b-a}{1+a^2}$ using Lagrange's mean value theorem and hence deduce that $\frac{\pi}{4} + \frac{3}{25} < \tan^{-1}\frac{4}{3} < \frac{\pi}{4} + \frac{1}{6}$.

5. Verify Cauchy's mean value theorem for the function e^x and e^{-x}in the Interval [a, b].

6. Prove that $\beta(m,n) = \int_0^\infty \frac{x^{m-1}}{(1+x)^{m+n}} dx$

7. Prove that $\beta(m,n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$ where m > 0, n > 0.

8. Show that $\int_a^b (x-a)^m (b-x)^n dx = (b-a)^{m+n+1}\beta(m+1, n+1)$.

9. Find the volume of Spherical cap of height h cut off from a sphere of radius a.

10. Find the surface area of the solid generated by the revolution of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, (a>b) about the x-axis (i.e. major axis).

UNIT-IV

Short Answer Questions:-

1. Write properties of Jacobian.

2. Define homogeneous function and give an example

3. Verify if $\frac{\partial^2 f}{\partial x \partial y} = \frac{\partial^2 f}{\partial y \partial x}$ if $f(x,y) = x^3 + y^3 - 3axy$

4. State Euler's theorem for function of two variables**.**

5. Verify Euler's theorem for $z = ax^2 + 2hxy + by^2$

6. $u = x^2+y^2$, $x=at^2$, $y=2at$ then find $\frac{du}{dt}$.

7. . $If\ u = f(x+y, x-y)$, then find $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y}$

8. If $x=u(1+v)$, $y=v(1+u)$ then prove that $\frac{\partial(x,y)}{\partial(u,v)} = 1+u+v$.

9. If f(x, y) = xy+(x-y) then find the stationary points.

10. Define maximum and minimum of f(x, y)

11. What do you mean by saddle point?

Long Answer Questions:-

1. If $r^2 = x^2 + y^2 + z^2$ *and* $u = r^m$ *then prove that* $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = m(m+1)r^{m-2}$.

2. $f\ u = f(y-z, z-x, x-y)$, then show that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$.

3. If x + y + z = u, y + z = uv, z = uvw, then evaluate $\frac{\partial(x,y,z)}{\partial(u,v,w)}$

4. If $u = \log(\frac{x^2+y^2}{x+y})$ then prove that $xu_x + yu_y = 1$.
5. If$x = rcos\theta, y = rsin\theta$ $find$ $\frac{\partial(x,y)}{\partial(r,\theta)}$ and $\frac{\partial(r,\theta)}{\partial(x,y)}$. Also show that $\frac{\partial(x,y)}{\partial(r,\theta)} . \frac{\partial(r,\theta)}{\partial(x,y)} = 1$
6. Show that functions u =xy+yz+zx, v= $x^2+y^2+z^2$ and w=x+y+z are functionally related.
   Find the relation between them.
7. If $u = x + y - z, v = x - y + z, v = x^2+y^2+z^2 - 2yz$ then show that the functions are
   Functionally dependent Find the relation between them.
8. Find the relative maximum and minimum values of the function
   $$f(x,y) = 3x^2y + y^3 - 3x^2 - 3y^2 + 1$$
9. Examine for minimum and maximum values of sinx + siny + sin(x+y).
10. The temperature T at any point (x, y, z) in space is $T=400xyz^2$ Find the highest temperature on the surface of the unit sphere $x^2+y^2+z^2=1$.
11. A rectangular box open at the top is to have volume of 32cubic ft. Find the dimensions of the box requiring least material for its construction.
12. Find the maximum of$x^2+y^2+z^2$ such that 2x+3y+z=14 using Lagrange's multiplier method.

UNIT-V

Short Answer Questions:-

1. Evaluate $\int_0^1 \int_0^1 x^2 y^2 dxdy$
2. Evaluate$\int_{-1}^1 \int_{-2}^2 \int_{-3}^3 d\, xdydz.$
3. Evaluate Evaluate $\int_1^2 \int_0^x y^2\, dxdy$.
4. Find the limits after changing the order of integration $\int_0^b \int_{\frac{a}{b}\sqrt{b^2-y^2}} f(x,y)dxdy.$
5. Evaluate $\int_{\theta=0}^{\pi} \int_{r=0}^{acos\theta} d\, rd\theta.$
6. Evaluate $\int_0^1 \int_0^{\sqrt{1+x^2}} \frac{dxdy}{1+x^2+y^2}$.
7. $\int_0^1 \int_1^2 \int_2^3 xyz\, dx\, dy\, dz$

Long Answer Questions:-

1. Evaluate $\int_0^{\pi} \int_0^{a(1+cos\theta)} r^2 \, cos\theta \; drd\theta$.
2. Evaluate $\iint_R x\, y \; dxdy$ where R is the region bounded by $x - axis$ ordinate $x = 2a$ and the curve $x^2 = 4ay$
3. Change into polar co-ordinates and evaluate $\int_0^{\infty} \int_0^{\infty} e^{-(x^2+y^2)} \; dxdy$.
4. By changing into polar coordinates, evaluate $\iint \frac{x^2y^2}{x^2+y^2} \; dxdy$ over the annular region between the circles $x^2 + y^2 = a^2$ and $x^2 + y^2 = b^2$
5. Evaluate $\iint r^3 \; drd\theta$ over the area included beyween the circles $r = 2sin\theta$ and $r = 4sin\theta$
6. Change the order of integration in $\int_0^1 \int_{x^2}^{2-x} x\, y \; dxdy$ and hence evaluate the double integral.
7. Change the order of integration and evaluate $\int_0^{4a} \int_{x^2/4a}^{2\sqrt{ax}} dydx$.
8. Change the order of integration and evaluate $\int_0^{a} \int_{x/a}^{\sqrt{x/a}} (x^2 + y^2)dxdy$.
9. Evaluate $\int_0^1 \int_0^{1-z} \int_0^{1-y-z} x\, yz \; dxdydz$
10. Evaluate $\int_0^{log2} \int_0^{x} \int_0^{x+logy} e^{x+y+z} \; dx \; dy \; dz$
11. Find the area of the region bounded by the parabolas $y^2 = 4x$ and $x^2 = 4y$.

ENGINEERING CHEMISTRY

Course Objectives:

1. To bring adaptability to new developments in Engineering Chemistry and toacquire the skills required to become a perfect engineer.
2. To impart the basic knowledge of atomic, molecular and electronic modifications whichmakes the student to understand the technology based on them.
3. To include the importance of water in industrial usage, fundamental aspects of battery chemistry, significance of corrosion it's control to protect the structures.
4. To imbibe the basic concepts of petroleum and its products.
5. To acquire required knowledge about engineering materials like Polymers, cement, smartmaterials and Lubricants.

Course Outcomes:

1. The knowledge of atomic, molecular and electronic changes, band theory related toconductivity
2. Students will acquire the basic knowledge of electrochemical procedures related tocorrosion and its control.
3. The students are able to understand the basic properties of water and its usage in domesticand industrial purposes.
4. They can learn the fundamentals and general properties of polymers and other engineeringmaterials.
5. They can predict potential applications of chemistry and practical utility in order to becomegood engineers and entrepreneurs.

UNIT - I: Molecular structure and Theories of Bonding:

Atomic and Molecular orbitals. Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N_2, O_2 and NO molecules..

π molecular orbitals of butadiene and benzene.

Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion d- orbitals in Tetrahedral and Octahedral geometries. Band structure of solids and effect of doping on conductance.

UNIT - II : Water and its treatment:

Introduction-sources & impurities of water, hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and break - point chlorination. Defluoridation-Determination of F^- ion by ion- selective electrode method.

Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion- exchange processes. Desalination of water – Reverse osmosis.

UNIT – III Battery Chemistry & Corrosion

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of: Lithiumion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

Corrosion: Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.

UNIT - IV: Energy Sources:

Introduction, Calorific value of fuel – HCV, LCV- Dulongs formula. Classification- solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG, Biodiesel – Trans esterification, advantages.

UNIT - V: **Engineering Materials:**

Cement: Portland cement, its composition, setting and hardening.

Smart materials and their engineering applications

Shape memory materials- Poly L- Lactic acid. Thermo response materials- Polyacrylamides, Poly vinylamides

Lubricants: Classification of lubricants with examples-characteristics of a good lubricants, properties of lubricants: viscosity, cloud point,pour point, flash point and fire point.

Conducting polymers: Characteristics and Classification with examples-mechanism of conduction intrans-polyacetylene and applications of conducting polymers.

Biodegradable polymers: Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

TEXT BOOKS:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning,2016

REFERENCE BOOKS:

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)

ASSIGNMENT QUESTIONS

UNIT - I

1. What are postulates of MO theory and Explain LCAO method in the formation of molecularorbitals.
2. Draw molecular orbital energy level diagram of O_2, CO & O_2^+ ion.
3. Explain crystal field splitting pattern of d orbitals in Octahedral geometry.
4. Differentiate bonding and antibonding molecular orbitals.
5. Explain crystal field splitting pattern of d orbitals in square planar geometry.
6. Explain band structure of solids and effect of doping on conductance.
7. List out the various factors affecting crystal field splitting.
8. List out the postulates and drawbacks of CFT.
9. Draw the pi molecular orbitals of benzene.

UNIT – II

1. Explain ion exchange method of purification of hard water.
2. List out the specifications of potable water and explain the steps involved in treatment ofDomestic water.
3. What are the types of hardness? Explain the estimation of hardness of water by EDTAcomplexometric method.
4. Explain how Brakish water can be desalinated by Reverse Osmosis Method with the help ofdiagram.
5. a) Explain causes, effects and prevention of Caustic embrittlement and Scales & Sluges.
   b) Describe various methods of internal treatment of water.
6. Calculate the temporary, permanent and total hardness of a water sample containing the following impurities in mg/lit: Ca(HCO3)2 = 4.86, Mg(HCO3)2 = 5.84, MgSO4 = 8.4, CaSO4 = 6.8.
7. Explain determination of F - ion by ion- selective electrode method.
8. Explain the determination of COD and BOD in a water sample.

UNIT – III

1. Explain the construction, working and applications of Lithium ion battery.
2. Explain the construction and applications of Methanol Oxygen fuel cell.
3. Compare primary, secondary, reserve battery and a fuel cell.
4. What are Solar cells? List out the applications of Solar cells.
5. Explain the mechanism of electrochemical theory of wet corrosion by taking iron as an example.
6. Explain how corrosion can be minimized by cathodic protection.
7. Explain how metal and environment affect the rate of corrosion.
8. Explain Galvanic, water line and pitting corrosion.

UNIT – IV

1. Define Calorific value of fuel. Differentiate HCV & LCV.
2. Explain proximate analysis of coal and its significance.
3. Explain Ultimate analysis of coal and its significance.
4. Explain the refining of petroleum by fractional distillation.
5. Explain synthesis of petrol by Fischer-Tropsch's process.
6. Compare CNG, LPG and natural gas.
7. What is Trans esterification of biodiesel? List out its advantages.
8. Define cracking. Explain moving bed catalytic cracking.
9. Differentiate Octane and Cetane rating.

UNIT- V

1. What is the composition of Portland cement? Explain Setting and hardening of cement.
2. What are Conducting polymers? Explain the mechanism of conduction in trans-polyacetylene and list out the applications of conducting polymers.
3. What are biodegradable polymers? Write the applications of Polylactic acid and poly vinylalcohol.
4. List out the characteristics of a good lubricant. Explain viscosity, cloud point and pour pointof a lubricant.
5. Differentiate flash point and fire point of a lubricant.
6. What are Shape memory materials? Give examples.
7. Explain Thermo response materials with examples.
8. Explain any two smart materials and their applications.

PROGRAMMING FOR PROBLEM SOLVING

Course Objectives:

- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the syntax and semantics of the C programming language.
- To learn the usage of structured programming approaches in solving problems.

Course Outcomes: The student will learn

- To write algorithms and to draw flowcharts for solving problems.
- To convert the algorithms/flowcharts to C programs.
- To code and test a given logic in the C programming language.
- To decompose a problem into functions and to develop modular reusable code.
- To use arrays, pointers, strings and structures to write C programs.
- Searching and sorting problems.

UNIT - I: Introduction to Programming

Compilers, compiling and executing a program.
Representation of Algorithm - Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number Flowchart/Pseudocode withexamples, Program design and structured programming
Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion,The main method and command line arguments Bitwise operations: Bitwise AND, OR, XOR and NOT operators
Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do-while loops
I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr. Command line arguments

UNIT - II: Arrays, Strings, Structures and Pointers:

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings
Structures: Defining structures, initializing structures, unions, Array of structures
Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self- referential structures, usage of self referential structures in linked list (no implementation) Enumeration data type

UNIT - III: Preprocessor and File handling in C:

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data toexisting files, Writing and reading structures using binary files, Random access using fseek,ftell andrewind functions.

UNIT - IV: Function and Dynamic Memory Allocation:

Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

UNIT - V: Searching and Sorting:

Basic searching in an array of elements (linear and binary search techniques), Basic algorithms tosort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexitythrough the example programs

TEXT BOOKS:

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7thEdition,Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning,(3rdEdition)

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice HallofIndia
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

ASSIGNMENT QUESTIONS

UNIT-1

1. List and explain the functions of various parts of computer hardware and software.
2. Explain the process of converting from one number system to another in detail.
3. What are different steps followed in program development?
4. Define an Algorithm and State Properties of it? Write an algorithm and flowchart to findwhether a number is prime or not.
5. Explain different types of data types supported in C language?
6. What is an operator and List different categories of C operators based on their functionality?
7. Explain the types of type conversions in C with example?
8. What are different types of 'if'statements available in c? Explain them.
9. Write in detail about different types of loop statements in C.
10. Explain the formatted and unformatted I/O functions with example?
11. Explain the command line arguments? Write a c program to add two numbers using command line arguments?
12. Explain briefly about different types of storage classes in C with an example program.

UNIT-2

1. What is an array? Explain different types of arrays with an example each?
2. Define C string? How to declare and initialize C strings with an example? Explain about String handling functions with example programs.
3. How can we declare and initialize Array of strings in C? Write a program to read and display array of strings.
4. Explain a structure and array of structure? Define a structure type book that would contain book name, author, pages and price. Write a program to read this data using member operator (".") and display the same.
5. Write a C program using array of structure to create employee records with the following fields: emp-id, name, designation, address, salary and display it.
6. A. What is self- referential structure? Explain through example.
   B. Explain unions in C language? Differentiate structures and unions.
7. Explain the process of declaring and initializing pointers. Write a program to access a onedimensional array using pointers?
8. Explain how pointers are used as function arguments. Write a "C" function using pointers toexchange the values stored in two locations in the
9. A. What is a pointer to pointer? Write syntax and explain with example program.
   B. Write short notes on
   a) void pointer b) Null Pointer c) dangling pointer?
10. Write Short notes on enumeration data type

UNIT -3

1. Briefly explain the pre-processor directives in detail.
2. Define file and explain about the types of files with examples.
3. Explain different modes of opening files with syntax and example?
4. What are the file I/O functions in C. Give a brief note about the task performed by eachfunction?
5. Explain about random access to files with example?(fseek(), ftell(), rewind())

6. Explain about error handling in files?
7. Write a c program for the following .there are two input files named “first.dat” and “second.dat” .The files are to be merged. That is, copy the contents of first.dat and then second.dat to a new file named result.dat?
8. Explain the concept of streams and their significance in I/O operations.
9. Explain about predefined macros along with a program?
10. Write a program to read five student information into a file. The student information must consists of student name, roll number, branch and section

UNIT -4

1. What is a function? Why we use functions in C language? Give an example.
2. Distinguish between Library functions and User defined functions in C and Explain withexamples.
3. Explain the various categories of user defined functions in C with examples?
4. Explain the Parameter Passing Mechanisms in C-Language with examples.
5. Differentiate actual parameters and formal parameters.
6. How can we pass the Whole Array to Functions? Explain with example program.
7. Explain how pointers are used as function arguments? Write a C function using pointers toexchange the values stored in two locations in the memory.
8. What is recursive function? Write a c program to find factorial of a given number usingrecursion?
9. Explain about dynamic memory management functions with an example.
10. Write a c program to create an array dynamically and search an element from created array?

UNIT-5

1. Define algorithm and write algorithm to generate prime number series between m and n,where m and n are integers.
2. What is meant by searching? Explain the linear search algorithm with example and program?
3. Explain the Binary search algorithm with example? Write a c program to implement BinarySearch Algorithm using Recursive and Non-Recursive(Iteartive) approach?
4. Distinguish between Linear Search and Binary Search?
5. Explain the Bubble Sort Algorithm with an example and write a C Program to implementBubble Sort Algorithm.
6. Explain the Selection Sort Algorithm with an example and write a C Program to implementSelection Sort Algorithm.
7. Explain the Insertion Sort Algorithm with an example and write a C Program to implementInsertion Sort Algorithm.
8. Differentiate the bubble sort, insertion sort and selection sort techniques
9. Give a brief note on asymptotic notations.
10. Define the Performance of algorithm ?
    Define the terms a) Time b) Space Complexities c) order of complexity?

BASIC ELECTRICAL ENGINEERING

Course Objectives:

- To understand DC and Single & Three phase AC circuits
- To study and understand the different types of DC, AC machines and Transformers.
- To import the knowledge of various electrical installations and the concept of power,powerfactor and its improvement.

Course Outcomes: After learning the contents of this paper the student must be able to

- Understand and analyze basic Electrical circuits
- Study the working principles of Electrical Machines and Transformers
- Introduce components of Low Voltage Electrical Installations.

UNIT-I:

D.C. Circuits: Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysisof simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time- domain analysis of first-order RL and RC circuits.

UNIT-II:

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

UNIT-III:

Transformers: Ideal and practical transformer, equivalent circuit, losses in transformers, regulationand efficiency. Auto-transformer and three-phase transformer connections.

UNIT-IV:

Electrical Machines: Construction and working principle of dc machine, performance characteristics of dc shunt machine. Generation of rotating magnetic field, Construction and working of a three-phase induction motor, Significance of torque-slip characteristics. Single-phase induction motor, Construction and working. Construction and working of synchronous generator.

UNIT-V:

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

TEXT BOOKS:

1. D.P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 4th Edition,2019.
2. MS Naidu and S Kamakshaiah, “Basic Electrical Engineering”, Tata McGraw Hill, 2nd Edition,2008.

REFERENCE BOOKS:

1. P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, “Basic Electrical Engineering”, S.Chand,2nd Edition, 2019.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, “Basic Electrical and Electronics Engineering”, Oxford,1st Edition, 2012.
4. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, “Basic Electrical Engineering”, 2nd Edition, McGraw Hill, 2021.
5. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
6. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
7. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989

ASSIGNMENT QUESTIONS

UNIT-I

Short Answer Questions

1. Define Ohm‘s Law? State its limitations.
2. State Kirchhoff‘s Voltage law and current law. Give examples for both.
3. State Superposition theorem?
4. State Maximum power transfer theorem?
5. State Thevenin‘s theorem?

Long Answer Questions

1. What are the different passive elements and explain their V-I characteristics?
2. Write a short note on Dependent and independents sources.
3. Three resistors R_1=5 Ω, R_2=10 Ω, R_3=15Ω are connected in parallel across a DC voltage source=100V. Find the currents I_1, I_2, I_3 through R_1, R_2, R_3 and the total current supplied by 100V voltage source.
4. Find the current flowing through 5Ω resistor for the circuit as shown in fig by using
   Thevenin‘s Theorem.

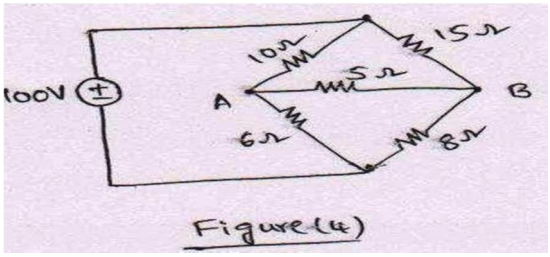
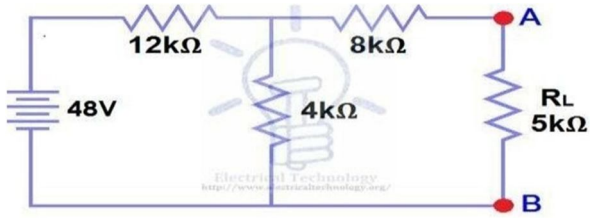
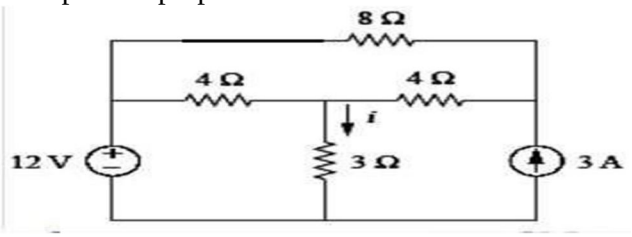


Figure (4)

5. State and Explain Norton‘s theorem in detail and determine voltage across load by using Norton‘s theorem?



6. State and Explain superposition theorem and find i?



UNIT-II
Short Answer Questions

1. Define RMS and Average values of a sinusoidal ac waveform.
2. Define Reactance, Impedance, Susceptance and Admittance.
3. Define active power, reactive power and apparent power.
4. Explain the concept of power factor?
5. Define Resonance in series RLC circuit?
6. Define Bandwidth and Q factor?
7. Write voltage and current relations in star connection?
8. What is meant by capacitor charging current, obtain its expression in terms of its time constant in case of R-C circuit?
9. An alternative voltage of $e_1 = 300 \sin(\omega t+\pi/3)$, what is its instantaneous voltage att=5msand 10ms for 50Hz frequency.

Long Answer Questions

1. Define the following terms

a) Average value b) RMS value c) Form factor d) Peak factor

2. Obtain an expression for the Average value, RMS value, peak factor and form factor ofsinusoidal waveform.
3. Define and derive resonant frequency, quality factor and band width of series resonancecircuit.
4. Illustrate the following terms a) Impedance b) reactance c) phase difference d) powerfactor e) Real power f) Reactive power and g) Apparent power.
5. Show that the resonant frequency ω_0 of an RLC series circuit is the geometric mean of ω_1 and ω_2, the lower and upper half power frequencies respectively.
6. A circuit consisting of 3 impedances Z_2 in parallel with Z_3 the combination is in series with Z_1 having the values $Z_1 = 10+j30$, $Z_2 = 5+j10$, $Z_3 = 4-j16$ connected across single phase 100V, 50Hz supply. Find i) I_1, I_2 and I_3 ii) V_1 and V_2.
7. A coil takes a current of 1A at 0.6 lagging power factor from a 220V, 60Hz single phase source. If the coil is modeled by a series RL circuit. Find i) the complex power in the coil ii) The values of R and L.
8. Describe phasor representation of RL series circuit? If the admittance of a series circuit is (0.010+j0.004)S. determine the values of the circuit components for the frequency valueof 50Hz.
9. Balanced Y-connected load of 10kW at 0.8 power factor lagging supplied by a 50Hz, 300V three phase system. Find the line current delivered by the source. Draw the phasor diagram.
10. A coil is connected in series with a capacitor of 20µ F to a 200v variable frequency supply. The current is maximum at 50A, when the frequency is set to 50Hz. Determine the resistance and inductance of the coil.

UNIT-III

Short Answer Questions

1. Discuss the purpose of oil used in transformers
2. Discuss various losses in a transformer.
3. Define voltage regulation of a transformer
4. What is auto-transformer? Distinguish it with transformer?
5. Differentiate between ideal transformer and practical transformer?
6. What are the advantages of Three-phase Transformers?
7. Write about star-star connection in a three a phase transformer.
8. Write about delta-star connection in a three a phase transformer

Long Answer Questions

1. Draw the exact equivalent circuit of a transformer and describe briefly the various parameters involved in it?
2. Define voltage regulation of a transformer & enumerate the factors which influence themagnitude of this change?
3. Discuss the different losses taking place in the transformer and their variation with the load current.
4. Describe the principle of auto-transformer, what is the saving of copper in this transformer compared to two winding transformer.
5. Describe the two possible ways of connections of 3-phase transformers with relevant relations amongst voltage and currents
6. A 50 kVA, 1000/10000V 50Hz single phase transformer has iron loss of 1200W. the copper loss with a 5A in the high voltage is 500W. calculate the efficiency at i) 25% ii) 50% iii)100% of normal load at power factor of 0.8.
7. A 30 KVA, 2400/120V, 50Hz transformer has a high voltage winding resistance of 22Ω. The low voltage winding resistance is 0.035Ω and leakage reactance is 0.012Ω. Find the equivalent circuit parameters when referred to the low voltage side.
8. The iron loss in a transformer core at normal flux density was measured at frequency of 30 Hz and 50 Hz, the results being 30 W and 54 W respectively. Calculate (i)The hysteresis loss and (ii) The eddy current loss at 50 Hz
9. A 100 kVA, 1000/10000V 50Hz single phase transformer has iron loss of 1100W. The copper loss with a 5A in the high voltage is 400W. calculate the efficiency at 25%, 0.8 pf. The output terminal voltage is maintained at 10000V.
10. A single phase transformer working at unity pf has an efficiency of 90% at both one halfload and full load of 500W. Determine the efficiency at 75% of full load.

UNIT-IV
Short Answer Questions

1. Define starting torque and running torque of induction motor?
2. State the principle of operation of induction motor?
3. What is the necessity of rotating magnetic field in induction motor?
4. Discuss about slip in an Induction motor.
5. What is the significance of back emf in dc motor?
6. List the different types of dc motors.

Long Answer Questions

1. Describe how rotating magnetic field is developed in induction motor.
2. Describe the principle construction and operation of slip-ring Induction motor.
3. Describe the various speed control methods of induction motor.
4. Describe the principle construction and operation of synchronous generator
5. Describe the torque-slip characteristics of 3-phase induction motor.
6. Describe the principle operation of 1-phase induction motor.
7. A 6-pole 3-phase induction motor runs at 1140rpm on full load when supplied froma60Hzsupply. Determine the synchronous speed and slip at full load?
8. What are the various losses occurs in 3-phase induction motor while in operation?
9. Describe the torque speed characteristics of separately excited dc motor.

UNIT-V

Short Answer Questions

1. Explain the material used for cables?
2. What are the characteristics of batteries for longer life?
3. What do you meant by battery backup?
4. What is the significance of earthing?
5. What is the difference between fuse unit and switch fuse unit?
6. List the different types of wires.

Long Answer Questions

1. What is the difference between MCB and MCCB, describe their schematic diagrams?
2. Describe the operation of ELCB with its schematic diagram.
3. What are the drawbacks of low power factor, describe how it is improved?
4. Explain different types of batteries and their characteristics.
5. Explain the components of LT switch gear in detail.
6. Calculate total energy consumed per day by the use of following loads:
   - i) 5 number 40W lights operated 5 hours per day
   - ii) 1 h.p. motor is operated 2 hours per day
   - iii) 1 k.W heater is operated 1 hour per day
   - iv) 1 computer is used for 6 hours per day with printer about 30 minutes.

COMPUTER AIDED ENGINEERING GRAPHICS

Course Objectives:

- To develop the ability of visualization of different objects through technical drawings
- To acquire computer drafting skill for communication of concepts, ideas in thedesign of engineering products

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

- Apply computer aided drafting tools to create 2D and 3D objects
- sketch conics and different types of solids
- Appreciate the need of Sectional views of solids and Development of surfaces of solids
- Read and interpret engineering drawings
- Conversion of orthographic projection into isometric view and vice versa manually and byusing computer aided drafting

UNIT – I:

Introduction to Engineering Graphics: Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting – views, commands and conics

UNIT- II:

Orthographic Projections: Principles of Orthographic Projections – Conventions – Projectionsof Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections – points, lines and planes

UNIT – III:

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids –Prism, Cylinder, Pyramid, Cone – Auxiliary views, Computer aided projections of solids – sectional views

UNIT – IV:

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting

UNIT – V:

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions. Conversion of orthographic projection into isometric view using computer aided drafting.

TEXT BOOKS:

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas: S.Chand and company Ltd.

REFERENCE BOOKS:

1. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill
2. Engineering Graphics and Design, WILEY, Edition 2020
3. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford
5. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

Note: - External examination is conducted in conventional mode and internal evaluation to be done by both conventional as well as using computer aided drafting.

ASSIGNMENT QUESTIONS

UNIT-I

PART-A

1. Define Conics?
2. List out the types of Conic Sections?
3. What is the eccentricity of a conic section?
4. List out the applications of Conic Sections?
5. What are some applications of cycloids
6. What are cycloid, epicycloid & hypocycloid?
7. Differentiate between a Plain Scale & a Digonal Scale?
8. What is a representative fraction (RF)
9. List out the various types of scales?
10. Why is it important to use scales in engineering drawing?

PART-B

11. Construct a diagonal scale 1/50, showing meters, decimeters and centimeters, to measure up to 5 meters. Mark a length 4. 68 m on it.
12. Construct a diagonal scale showing yards, feet and inches in which 2 inches long line represents 1.25 yards and is long enough to measure up to 5 yards. Find R.F and mark a distance of 4 yards 2 feet 8 inches.
13. Construct a diagonal scale of RF = 1/6250 to read up to 1 km and to read meters on it. Show a length of 653 meters on it.
14. A coin of 40 mm diameter rolls over a horizontal table without slipping. A point on the circumference of the coin is in contact with the table surface in the beginning and after one complete revolution. Draw the path traced by the point. Draw a tangent and normal at a point 25 mm from the table.
15. Construct an ellipse when the distance between the focus and the directrix is 50 mm andthe eccentricity is 3/4. Draw tangent and normal at any point on the curve.
16. Show by means of a drawing that when the diameter of the directing circle is twice thatof the generating circle, the hypo-cycloid is a straight line. Take the diameter of the generating circle equal to 40 mm.

17. A rectangular plot of land measuring 1.08 hectares is represented on a map by a similar rectangle of 10 sq.cm. Calculate R.F. of the scale. Draw a diagonal scale to read 1 m and long enough to measure 500 m. Show a distance of 438 m on it.
18. Construct an Hyperbola when the distance between the focus and the directrix is 30 mm and the eccentricity is 4/3. Draw tangent and normal at any point on the curve.
19. Draw a rectangular hyperbola using the 'orthogonal asymptotes ' method when the position of a point P on the curve is at a distance of 35 mm and 50 mm from two asymptotes.
20. Draw a parabola with the distance between directrix and focus as 60 mm. Draw normal and tangent at any point on the curve.

UNIT-2

PART-A

1. A point P is 30 mm above HP and 40 mm in front of VP. Draw its projections.
2. A point R lies on HP and 20 mm in front of VP. Draw its projections.
3. What is the condition for getting a straight line to its true length in the side view.
4. Explain the concept of quadrants in projection
5. Define the terms**:** true length, apparent length, inclination, trace.
6. What are Orthographic Projections?
7. How do you represent a line parallel to both HP and VP?
8. What is the relationship between the true length and the projections of a line?
9. What are the different positions a plane can occupy with respect to the HP and VP?
10. What is the difference between regular plane and irregular plane?

PART-B

11. A point is 30 mm from the H.P and 50 mm from the V.P. draw the projections of point A,in all possible positions keeping the projectors 40 mm apart.
12. A point A is 50 mm away from both the reference planes. Draw the projections of pointA, in all possible positions keeping the projectors 40 mm apart.
13. A straight Line PQ has its end P 20 mm above the H.P and 30 mm in front of V.P and the end Q is 80 mm above H.P and 70 mm in front of V.P If end projectors are 60 mm apart. Draw the projections of line. Determine its True Inclinations.
14. A 100 mm long PQ is inclined at 30^0 to the H.P and 45^0 to the V.P. Its mid point is 35 above H.P and 50 mm in front of the V.P., Draw its projections.
15. A line AB 75 mm long makes 45^0 inclination with V.P while its F.V makes 55^0 end A is 10 mm above H.P and 15 mm in front of V.P. Draw its projections and find its inclination with H.P.
16. A Circular plate of negligible thickness and 50 mm diameter appears as an ellipse in thefront view, having major axis 50 mm and minor axis 30 mm long. Draw its top view when the major axis of the ellipse is horizontal.
17. A pentagonal lamina of 30 mm side rests on the H.P. on the one of its corners with its surface inclined at 30^0 to the H.P. Draw its projections when the side opposite to the corner in the H.P.is parallel to the V.P.
18. A hexagonal plane of side 30 mm rests on the V.P. on an edge such that the surface is inclined at 45^0 to the V.P. and edge on which it rests is inclined at 30^0 to the H.P. Drawits projections.
19. A semicircular plate of 80 mm diameter has its straight edge on the V.P. and inclined at30^0 to the H.P., while the surface of the plate is inclined at 45^0 to the V.P. Draw the projection of the plate.

20. A plate having shape of an isosceles triangle has 50 mm long base and 70 mm altitude .Itis so placed that in the front view it is seen as an equilateral triangle of 50 mm side and one side inclined at 45^0 to XY. Draw its top view.

UNIT-3

PART-A

1. When do we get the true length of the axis of a solid in side view?
2. What is the difference between true shape and sectional view?
3. What are the common types of solids used in engineering graphics?
4. What is the significance of the axis of a solid?
5. Explain the difference between a prism and a pyramid.
6. What is a section plane?
7. If a cone is cut parallel to one of its generators what is the shape of the section that is obtained
8. How is a section line represented in an engineering drawing?
9. What is the purpose of sectioning of the solid in engineering drawing?
10. Why cylinder is a solid of revolution?

PART-B

11. A square pyramid 40 mm bade side and 60 mm axis is freely suspended from one of its corners of its base. Draw its projections, when the axis as a vertical plane is inclined at 45^0 to the V.P.
12. A cylinder of 50 mm base diameter and 65 mm long axis rests on a point of its base circle on the H.P. Draw its projections when the axis is making an angle of 30^0 with H.P and Top view of the axis is perpendicular to V.P.
13. A Pentagonal Prism of 35 mm base side and 70 mm long axis has its axis inclined at $30^0$to the V.P. An edge of its base is in the V.P and inclined at 45^0 to the H.P Draw its projections.
14. A Hexagonal pyramid of 25 mm base side and 55 mm long axis has one of its slant edgeson the ground. A Plane containing that edge and the axis is perpendicular to H.P. and inclined at 45^0 to V.P. Draw its projections, when the apex is near to V.P. then the base.
15. A right circular cone of diameter 70 mm and axis height 80 mm is resting on one of its generators in H.P. The top View of the axis is inclined at 45^0 to V.P. Draw the projectionof the cone
16. A hexagonal pyramid of 30 mm side of base and 60 mm long axis rests with its base on
    H.P. and one of the edges of the base is parallel to V.P. It is cut by a horizontal section plane at a distance 30 mm above the base .Draw the F.V and Sectional T.V.
17. A cone with 60 mm base diameter and 70 mm long axis is resting on its base on the H.P. It is cut by a section plane whose H.T. is inclined at 60^0 to the reference line and passes through a point that is 20 mm away from the axis. Draw its sectional F.V and obtain true shape of the section.
18. A Cylinder of 50 mm base diameter and 70 mm long is resting on one of its bases on H.P.It is cut by a section plane inclined at 60^0 with H.P. and passing through a point on the axis at 15 mm from one end. Draw the two views of the solid. Also obtain the true shape of the section.

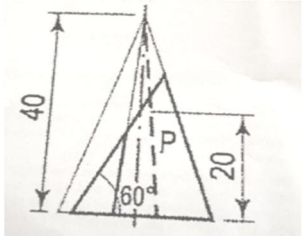
UNIT-4

PART-A

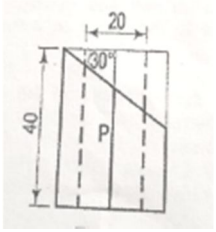
1. What type of solids can be accurately developed?
2. In development of surfaces, we have to take all dimensions as true lengths – why?
3. What is the significance of development of surfaces in industries?
4. Write about the development of lateral surface of prism
5. Differentiate between parallel line and radial line development methods
6. What is the importance of true lengths in development?
7. How do you determine the development length of a pyramid's slant edge?
8. What is the shape of the development of a cylinder?
9. List out various methods of development of solids.
10. What is the shape of the development when a cone is developed?

PART-B

11. Draw the development of lateral surface of a square pyramid with a 40 mm base side and a 60 mm long axis, resting on its base in the H.P. such that a side of the base is parallel to the V.P.
12. A cylinder of 40 mm diameter of base and 55 mm long axis is resting on its base on H.P.It is cut by a section plane perpendicular to V.P. and inclined at 45^0 to H.P. The section plane is passing through the top end of an extreme generator of the cylinder. Draw the development of the lateral surface of the cut cylinder.
13. A pentagonal prism, having a base with a 30 mm side and a 70 mm long axis , is resting on its base on the H.P. such that one of the rectangular faces is parallel to the V.P. It is cut by an auxiliary inclined plane whose V.T. is inclined at 45^0 with the reference line and passes through the mid-point of the axis. Draw the development of the lateral surfaceof the truncated prism.
14. Draw the development of the lateral surface of the part P of the pyramid, the FV of which is shown in figure .A square pyramid, side of the base 20 mm long and one side of the base inclined at 30^0 to the V.P. All the dimensions are in mm.



15. Draw the development of the lateral surface of the part P of the solid, the FVs of which is shown in fig. A pentagonal prism, a side of the base parallel to the V.P. All the dimensions are in mm.



16. A cone of base diameter 40 mm and slant height 60 mm is kept on the ground on its base. An AIP inclined at 45° to the HP cuts the cone through the midpoint of the axis, and the top portion is removed. Draw the development of the remaining portion of cone.
17. A square hole of 25 mm side is cut in a cylindrical drum of 50 mm diameter and 70 mm height. The faces of the hole are inclined at 45^0 to the H.P and axis intersects with that of the drum at right angles. Draw the development of its lateral surface.
18. A cone of 60 mm base diameter and 75 mm long axis is resting on its base on the H.P. A square hole of 20 mm side is made in it such that axis of the hole intersect the axis of the cone at a height of 25 mm from the base and the faces of hole are equally inclined to the
H.P. Draw the development of its lateral surface.
19. A pentagonal pyramid of 30 mm base side and 60 mm axis, rests on its base in the H.P. Itis cut by two section plane while meet at a height of 20 mm from the base .One of the section planes is horizontal, while the other is an auxiliary inclined plane whose V.T. makes 45^0 with H.P. Draw the development of the lateral surface of the solid when apexis removed

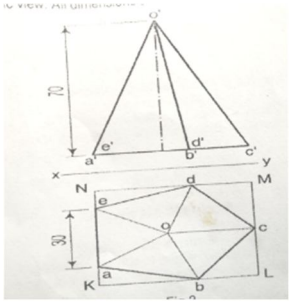
UNIT-5

PART-A

1. Distinguish between isometric view and isometric projection
2. What is non-isometric plane?
3. Draw the isometric view of square with side 30 mm .
4. What is the significance of isometric views in industries?
5. What is isometric projection? How does it differ from orthographic projection?
6. Explain the concept of isometric axes and isometric scale.
7. How are lines and points represented in isometric projection?
8. What are the advantages and limitations of isometric projection?
9. Draw the isometric view of a cube of side 40 mm.
10. Relate true length and its isometric length mathematically.

PART-B

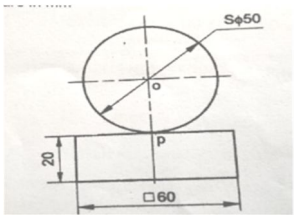
11. Draw isometric view of a cylinder of 50 mm base diameter and 70 mm long axis when the axis is perpendicular to the (a) H.P., (b) V.P.
12. Draw isometric view of a Cone of 50 mm base diameter and 70 mm long axis when the axis is perpendicular to the (a) H.P., (b) V.P.
13. The projection of pentagonal pyramid is shown in fig. Draw its isometric view. All the dimensions are in mm.



14. Draw an isometric projection of the frustum of a hexagonal pyramid having 40 mm base side, 25 mm long top side and 60 mm height

15. Draw an isometric projection of the frustum of a cone of 50 mm base diameter, 25 mm top diameter and 60 mm height

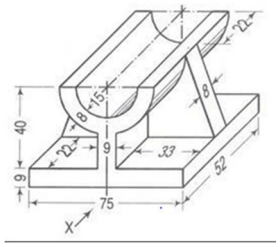
16. Draw the isometric projection of a sphere resting centrally on the top of a square prism, the front view of which is shown in fig. All the dimensions are in mm

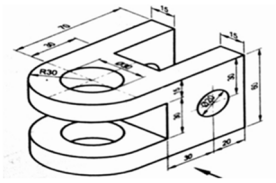


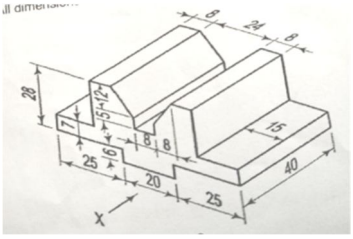
17. A cube of 25 mm edge is placed centrally on the top of another square block of 40mm edge and 15 mm thickness. Draw the isometric drawing of two solids.

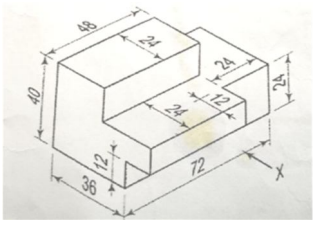
18. A square pyramid rests centrally over a cylindrical block. Draw the isometric projection of the arrangement. Consider the pyramid has a base with 25 mm side 40 mm long axis whereas the cylindrical block has a base 50 mm diameter and 20 mm thickness.

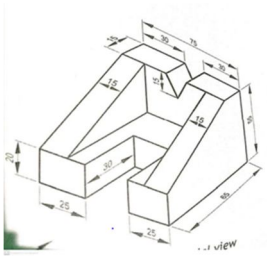
19. Pictorial View of an object is shown in figure using fist angle projection, Draw its (i)Front view (ii) top view and (iii) side views. use the direction X for the front view.

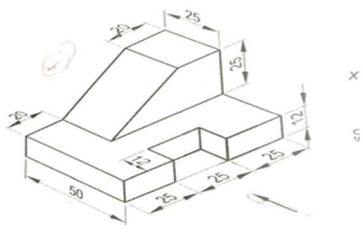












ENGLISH FOR SKILL ENHANCEMENT

Course Objectives: This course will enable the students to:

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Develop study skills and communication skills in various professional situations.
3. Equip students to study engineering subjects more effectively and critically using thetheoretical and practical components of the syllabus.

Course Outcomes: Students will be able to:

1. Understand the importance of vocabulary and sentence structures.
2. Choose appropriate vocabulary and sentence structures for their oral and written communication.
3. Demonstrate their understanding of the rules of functional grammar.
4. Develop comprehension skills from the known and unknown passages.
5. Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reportsinvarious contexts.
6. Acquire basic proficiency in reading and writing modules of English.

UNIT - I

Chapter entitled '***Toasted English'* by R.K.Narayan** from ***"English: Language, Context and Culture"*** published by Orient BlackSwan, Hyderabad.

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes - Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and Its Importance- Techniques for Effective Reading.

Writing: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for Writing precisely – Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence- Organizing Principles of Paragraphs in Documents.

UNIT - II

Chapter entitled **'Appro JRD' by Sudha Murthy** from ***"English: Language, Context and Culture"published*** by Orient BlackSwan, Hyderabad.

Vocabulary: Words Often Misspelt - Homophones, Homonyms and Homographs

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement andSubject-verb Agreement.

Reading: Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice

Writing: Nature and Style of Writing- Defining /Describing People, Objects, Places andEvents– Classifying- Providing Examples or Evidence.

UNIT - III

Chapter entitled **'Lessons from Online Learning' by F.Haider Alvi, Deborah Hurst et al** from ***"English: Language, Context and Culture"*** published by Orient BlackSwan, Hyderabad.

Vocabulary: Words Often Confused - Words from Foreign Languages and their Use in English

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiersand Tenses.

Reading: Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercisesfor Practice.

Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter ofRequisition, Email Etiquette, Job Application with CV/Resume.

UNIT - IV

Chapter entitled **'Art and Literature' by Abdul Kalam** from ***"English: Language, Context andCulture"*** published by Orient BlackSwan, Hyderabad.

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice

Writing: Writing Practices- Essay Writing-Writing Introduction and Conclusion -Précis Writing.

UNIT - V

Chapter entitled **'Go, Kiss the World' by Subroto Bagchi** from ***"English: Language, Context andCulture"*** published by Orient BlackSwan, Hyderabad.

Vocabulary: Technical Vocabulary and their Usage

Grammar: Common Errors in English (*Covering all the other aspects of grammar which were notcovered in the previous units*)

Reading: Reading Comprehension-Exercises for Practice

Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

Note: Listening and Speaking Skills which are given under Unit-6 in AICTE Model Curriculum arecovered in the syllabus of ELCS Lab Course.

- **Note: 1**. As the syllabus of English given in AICTE *Model Curriculum-2018 for B.Tech First Year is* ***Open-ended***, besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.
- **Note**: **2**.Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents .They are advised to teach40 percent of each topic from the syllabus in blended mode.

TEXT BOOK:

1. "English: Language, Context and Culture" by Orient BlackSwan Pvt. Ltd, Hyderabad. 2022. Print.

REFERENCE BOOKS:

1. Effective Academic Writing by Liss and Davis (OUP)
2. Richards, Jack C. (2022) Interchange Series. Introduction, 1,2,3. Cambridge UniversityPress
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language,Grammar and Vocabulary. (2nd ed.,). Sage Publications India Pvt. Ltd.
5. (2019). Technical Communication. Wiley India Pvt. Ltd.
6. Vishwamohan, Aysha. (2013). English for Technical Communication for EngineeringStudents.Mc Graw-Hill Education India Pvt. Ltd.
7. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition.

ASSIGNMENT QUESTIONS

UNIT-1

1. What has happened to English in America through the process of 'toasting'? What haslanguage gained and what has its lost through such toasting?
2. What does the author mean by saying that there should be a 'Bharat brand of English'?Has English in India developed unique expressions and usages?
3. Describe R.K. Narayan's attitude in the essay? Comment on the tone and style of theessay.
4. Explain the strategies for effective reading and the importance of reading.
5. `Write a paragraph on 'The impact of English as a course in B.Tech first year'.
6. Write a paragraph of about 150-200 words on ' Practice makes perfect'.
7. Make three words each by using the following prefixes.
   a. Contra- (against) b. milli- (thousandth part) c. mega –(large) d. mono- (one)
8. What is the process of toasting of language, according to R. K. Narayan?
9. Why does the author label the word' check' as the American Nation Expression.
10. Write a paragraph on E-SEVA centre in the society.
11. Write a paragraph on the following topics.
12. a)Role of Citizens in Democracy b)Impact of Covid on College Education
13. Write a paragraph on the characteristics of a good friend.
14. Write a paragraph on the incident which made you change your views about parents/friends/teachers.

UNIT-2

1. Draw a character sketch of Sudha Murthy as seen in the text 'Appro JRD'.
2. Why does Sudha Murthy have such great respect for JRD Tata?
3. What did Sudha Murthy's encounters with JRD Tata reveal about latter.
4. Illustrate the ethical thought and principles of JRD Tata.
5. Explain skimming and scanning methods of reading.
6. Write a short passage describing a house. Describe the outside of the house, the roomsinside , and the garden, if any in 250- 300 words.
7. Describe your favourite location in your own words.
8. Write a descriptive passage about your favourite celebrity.
9. Describe your smart phone using appropriate vocabulary.
10. What are the sub skills of reading?
11. Describe an electronic appliance used daily at home.
12. Describe Sudha Murthy's first experience of gender discrimination.
13. Summarise what happened during Sudha Murhy's interview at TELCO.
14. Write about homonyms, homophones and homographs with three examples each.
15. Write any five sentences about Noun- Pronoun Agreement from the page number 45 ofthe text.
16. Write a brief descriptive passage about your mobile phone.

UNIT-3

1. What are four takeaways related to online learning that should be retained post-pandemic?
2. According to the essay Digital Learning write about the issues that need to be tackled toimprove online learning.
3. With reference to the essay, Digital Learning mention two ways in which online learningcan aid students and teachers.
4. Write a letter to the editor of The Hindu about the poor civic amenities in your area
5. Write a letter to the editor of The Hindu about the poor civic amenities in your area.
6. What do the authors mean by the phrase 'learning to learn online?'
7. What should be kept in mind to design a meaningful and effective online course
8. What was the virtual co-operative programme started by Athabasca University.
9. What are the different styles of letter writing? Explain briefly with examples.
10. Write a letter of requisition to seek scholarship.
11. You purchased a mobile phone from an e-commerce website during a discount sale. However, you received a damaged phone. Write a letter to the website asking for a replacement or refund.
12. Prepare your resume for the post of software engineer job at Infosys.
13. What is the importance of writing a job application letter (cover letter) while sending your resume?

UNIT-4

1. What is the importance of art and literature in one's life, according to A.P.J Abdul Kalam?
2. Kalam believed that ' students of art and literature are important contributors to transforming India into a developed nation. Do you agree with the statement? Elaborate your answer.
3. How do the different arts influence Human civilization.
4. Write an expository essay on Social media: a curse or boon?
5. Write a narrative essay on the topic ' The proudest moment of your life'.
6. Write an argumentative essay on the topic' Technology is ruining our ability to communicate'.
7. How has Indian civilization managed to survive the different forces of change?
8. What are Kalam's favourite books, and how have these influenced him?
9. Why should children be encouraged to read books?
10. What is the power of drama and films on human lives?
11. What are the steps involved in writing a précis? Explain the dos and don'ts of an effectiveprécis.
12. Make Precis of the following passage and give suitable Title.

    Teaching is the noblest of professions. A teacher has a scared duty to perform. It is he on whom rests the responsibility of moulding the character of young children. Apart from developing their intellect, he can inculcate in them qualities of good citizenship, remaining neat and clean, talking decently and sitting properly. These virtues are not easy to be imbibed. Only he who himself leads a life of simplicity, purity and rigid disciplinecan successfully cultivate these habits in his pupils.

    Besides a teacher always remain young. He may grow old in age, but not in spite. Perpetual contact with budding youths keeps him happy and cheerful. There are moments when domestic worries weigh heavily on his mind, but the delightful company of innocent children makes him overcome his transient moods of despair.
13. What is the difference between extensive and intensive reading?
14. Re write the sentences below avoiding the clichés used.
    i) Well practice during the examinations will not be tolerated in any way, shape orform
    ii) In the present day and age, people are increasingly sharing recipes for healthyfood on the internet.
    iii) She summarized the report briefly.
    iv) We must encourage new innovation.

UNIT-5

1. What created in Bagchi a sense of interconnectedness with a larger world.
2. Describe the morning ritual in Bagchi's house and bring out its importance.
3. Describe the last days of Bagchi's father in the hospital.
4. Imagine you organized sports day at your institute. Draft the highlights of the programmeand prepare a report of the same. Assume relevant data.
5. What are the elements of a good report?
6. Write a report on the college day celebrations in your college.
7. Discuss the main elements of a good report.
8. Present the annual report of your college's cultural association in about 400-500 words. The report could mention its purpose, the members of its organizing committee, its activities, and plans for the coming year.
9. Why did Bagchi's father never let them ride in the office jeep?
10. Why did Bagchi's mother plant gardens even though they would move often?
11. What was Bagchi's first lesson in success?
12. How does Bagchi relate imagination to success?
13. Describe the political outlook of Bagchi's parents.
14. Write a report on the feasibility of establishing Sports Complex in your college.
15. What are the different parts of a report in manuscript format? Explain.
16. Define the term technical vocabulary with examples.

ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

Pre-requisites: Mathematical Knowledge at pre-university level.
Course Objectives: To learn

- Methods of solving the differential equations of first and higher order.
- Concept, properties of Laplace transforms
- Solving ordinary differential equations using Laplace transforms techniques.
- The physical quantities involved in engineering field related to vector valued functions
- The basic properties of vector valued functions and their applications to line, surfaceandvolume integrals

Course outcomes: After learning the contents of this paper the student must be able to

- Identify whether the given differential equation of first order is exact or not
- Solve higher differential equation and apply the concept of differential equation to real world problems.
- Use the Laplace transforms techniques for solving ODE's.
- Evaluate the line, surface and volume integrals and converting them from one to another

UNIT-I: First Order ODE

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

UNIT-II: Ordinary Differential Equations of Higher Order

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax}, sin ax, cos ax, polynomials in x, (x) and xV(x), method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Cauchy-Euler equation, Legendre's equation.

UNIT-III: Laplace transforms

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, Second shifting theorem, Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

UNIT-IV: Vector Differentiation

Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Vector Identities, Scalar potential functions, Solenoidal and Irrotationalvectors.

UNIT-V: Vector Integration

Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stokes (without proofs) and their applications.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. R.K.Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, NarosaPublications,5th Edition, 2016.

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson,Reprint,2002.
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and CompanyLimited, New Delhi.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, L axmi Publications,Reprint, 2008.

ASSIGNMENT QUESTIONS

UNIT-I

Short Answer Questions

1. Find the I.F of $\frac{dy}{dx} + 2xy = e^{-x^2}$
2. State Newton's law of cooling.
3. Solve the D.E $(x^2 + 2siny)\,dx + (2xcosy + y)dy=0$.
4. Write the general solution of Bernoull's Equation.
5. A bacterial culture growing exponentially, increases from 200 to 500gm in the period from 6a.m to 9a.m. How many grams will be present at noon.
6. Solve the following differential equation $(2y-x^3)dx+xdy=0$.
7. Find the integral factor of the differential equation $\frac{dy}{dx} - ysin2x = cotx$

Long Answer Questions

1. If the air is maintained at 25^0c and the temperature of the body cools from 140^0c to 80^0c in 20 minutes , find when the temperature will be 35^0c.
2. If 30% of radioactive substance disappears in 10 days, how long will it take for 90% of it to disappear.
3. The number N of bacteria in a culture grew at a rate proportional to N, the value of N was initially 100 and increased to 332 in one hour. What was the value of N after 3/2 hour?
4. Solve $(x^2 y-2xy^2)\,dx - (x^3-3x^2y)\,dy =0$.
5. $(1 + x^2)\frac{dy}{dx} + 2xy = 4x^2, y(0) = 0$.
6. The temperature of the surrounding air is 20^oC. The temperature of a hot body reduces from 100^oC to 70^oC in 1 hr. Find the temperature of the body after 2 hrs.
7. Solve $\frac{dy}{dx} + ytanx = y^2secx$
8. Find the orthogonal trajectories of the family of curves$x^3y-xy^3=c$ where c is constant.

UNIT-II

Short Answer Questions

1. Solve $(D^2 - 5D + 6)y = 0$
2. Find the complete solution of $(D^4 + 16)y = 0$
3. Solve $(D^2 - 4D + 13)y = e^{2x}$
4. Find the P.I of $(D^2 + 1)y = x$
5. Find the P.I of $(D^2 + 2)y = e^x cosx$
6. Solve $(D^2 + 4)y = sin2x$
7. Solve $(x^2D^2 - 4xD + 6)y = 0$.

Long Answer Questions

1. Solve the differential equation $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = 8e^{2x}sin2x$
2. Solve the differential equation $x^2\frac{d^2y}{dx^2} - x\frac{dy}{dx} + y = \log x$
3. Solve $\left(x^3\frac{d^3y}{dx^3} + 3x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + 8\right)y = 65cos(logx)$
4. Solve $(D^2 - 1)y = xsinx$
5. Solve $(D^2 - 2D - 3)y = x^3e^{-3x}$
6. Solve by the method of variation of parameters $(D^2 + 1)y = sec x$
7. Solve $(D^2 + 4)y = tan2x$ by variation of parameters.
8. Solve $(D^3 + 2D^2 + D)y = e^{2x} + x^2 + x + sin2x$
9. Solve $(D^2 + 5D - 6)y = sin4xcosx$

UNIT-III

Short Answer Questions

1. Find L{3cos3tcos4t}
2. Find L$\{e^{-t}(2cos5t - 3sin5t)\}$
3. Find L$\{\int_0^{-t} e^{-t}costdt\}$
4. Find L$\{te^{-t}sint\}$
5. Find L$\{\frac{sin3tcost}{t}\}$
6. Find L$\{e^{t-3}u(t-3)\}$

Long Answer Questions

1. Using Laplace transform solve$(D^2 + 9)y=Cos2t$; given that y (0) =1; $y\left(\frac{\pi}{2}\right)$= -1
2. Define periodic function find Laplace transform of
$$f(t) = \begin{cases} t, 0 < t < a \\ 2a - t, \wedge\ a < t < 2a \end{cases}$$
3. Using Laplace transform solve$\frac{dx^2}{dx^2} + 2\frac{dx}{dx} + 2x=e^{-t}$sint; given that x (0) =0 ,$x'(0)$=1
4. Using Laplace transform, solve the differential equation
$\frac{d^2y}{dt^2} + 2\frac{dy}{dt} + 5y = e^{-t}sint$,given that y(0)=0, $y^1(0)$=1.
5. Find $L^{-1}\{cot^{-1}\left(\frac{s+a}{b}\right)\}$
6. Using convolution theorem find $L^{-1}\left\{\frac{s^2}{(s^2+a^2)(s^2+b^2)}\right\}$
7. Use Convolution theorem to evaluate $L^{-1}\left[\frac{1}{(S-2)(S+2)^2}\right]$

UNIT-IV

Short Answer Questions

1. Find the angle between the normals to the surface $x^2 = yz$ at the points $(1,1,1)$and $(2,4,1)$.
2. Find the directional derivative of $\phi = x^2yz + 4xz^2$ at $(1,-2,-1)$ in the direction of .
3. Find a unit normal vector to the surface $z = x^2 + y^2$at $(-1,-2,5)$.
4. Find div $\acute{f}$when $\acute{f} = grad(x^3 + y^3 + z^3 - 3xyz)$.
5. If $\acute{F} = y(ax^2 + z)\acute{\imath} + x(y^2 - z^2)\acute{\jmath} + 2xy(z - xy)\acute{k}$ is solenoidal then find a.
6. Find $\nabla(x^2 - yz + z^2)$.
7. Find curlF at the point $(1,2,3)$ given that $F = grad(x^3y + y^3z + z^3x - x^2y^2z^2)$.
8. In what direction from the point $(-1,1,2)$ is the directional derivative of $\phi = xy^2z^3$ a maximum. What is magnitude of this maximum?

Long Answer Questions

1. Find the directional derivative of $xyz^2 + xz$ at $(1,1,1)$ in a direction of the normal to the surface $3xy^2 + y = z$at $(0,1,1)$.
2. Find the directional derivative of $\phi(x,y,z) = x^2yz + 4xz^2$ at the point $(1,-2,-1)$ in the direction of the normal to the surface $f(x,y,z) = xlog\,z - y^2$at $(-1,2,1)$.
3. Find the value of a and b so that the surfaces $ax^2 - byz = (a + 2)x$ and $4x^2y + z^3 = 4$ may intersect orthogonally at the point $(1,-1,2)$.
4. Find the angle between the the surfaces $x^2 + y^2 + z^2 = 9$ and $z = x^3 + y^3 - 3$ at the point $(2,-1,2)$.
5. Prove that $F = 2xysin\,z\acute{\imath} + x^2sin\,z\acute{\jmath} + x^2ycos\,z\acute{k}$ is irrotional and find its scalar potential.
6. Find constants a,b,c so that the vectors $\acute{A} = (x + 2y + az)\acute{\imath} + (bx - 3y - z)\acute{\jmath} + (4x + cy + 2z)\acute{k}$ is irrotational. Also find ϕ such that $\acute{A} = \nabla\phi$.
7. If the vector field $\acute{F} = (2xyz^2)\acute{\imath} + (x^2z^2 + zcos\,yz)\acute{\jmath} + (2x^2yz + y$ cosyz $\acute{k}$ is conservative then find its scalar potential function.
8. Show that $\nabla^2[f(r)] = \frac{d^2f}{q^2} + \frac{2}{r}\frac{df}{dr} = f''(r) + \frac{2}{r}f'(r)$where $r = \vec{r} \vee$.
9. Prove that $grad(\acute{a} \cdot \acute{b}) = (\acute{b} \cdot \nabla)\acute{a} + (\acute{a} \cdot \nabla)\acute{b} + \acute{b}$ curl $\acute{a} + \acute{a}$curl $\acute{b}$.

UNIT-V

Short Answer Questions

1. State Gauss divergence theorem.
2. State Green's theorem.
3. State Stoke's theorem.
4. If$\acute{F} = (4xy - 3x^2z^2)i + 2x^2j - 2x^3zk$ prove that work done is independent of the curve joining two points.

Long Answer Questions

1. Evaluate $\int_c F \cdot dr$ where $\acute{F} = x^2y^2i + yj$ and the curve $y^2 = x$ in the xy-plane from (0,0) to (4,4)
2. Find the work done by the force $\acute{F} = (2y + 3)i + xzj + (yz - x)k$ when it moves a particle from the point (0,0,0) to (2,1,1) along the curve $x = 2t^2, y = t, andz = t^3$.
3. If $\acute{F} = (x^2 + y^2)i - 2xyj$ evaluate $\int_c F \cdot dr$ where 'c' is the rectangle in xy- plane bounded by $y = 0, y = b, x = 0, x = a$
4. Evaluate $\int \acute{F} \cdot \acute{n} ds$ where $\acute{F} = zi + xj - 3y^2zk$ and 'S' is the surface $x^2 + y^2 = 16$included in the first octant between $z = 0andz = 5$.
5. If $\acute{F} = 4xzi - y^2j + yzk$ evaluate $\int \acute{F} \cdot \acute{n} ds$where 'S' is the surface of the cube bounded by$x = 0, x = a, y = o, y = aandz = 0, z = a$

6. Use divergence theorem to evaluate $\iint (xi + yj + z^2k).nds$ where 'S' is the surface bounded by the cone $x^2 + y^2 = z^2$ in the plane$z = 4$.

7. Verify gauss divergence theorem for $\acute{F} = x^2i + y^2j + z^2k$,over the cube bounded by the planes$x = 0, x = a, y = o, y = aandz = 0, z = a$.

8. Using green's theorem, evaluate$\int_c (2xy - x^2)dx + (x^2 + y^2)dy$,where 'C' is the closed curve of the region bounded by $y = x^2$ and $y^2 = x$.

9. Verify green's theorem in the plane for $\oint (x^2 - xy^3)dx + (y^2 - 2xy)dy$ where" is the square with vertices $(0,0), (2,0), (2,2)$and $(0,2)$.

10. Evaluate by stoke's theorem $\int_c (e^x dx + 2ydy - dz)$ where 'C' is the curve $x^2 + y^z = 9$and 2 .

11. Verify Stoke's theorem for $\acute{F} = y^2i - 2xyj$taken round the rectangular bounded by $x = \pm b, y = 0, y = a$.

APPLIED PHYSICS

Course Objectives: The objectives of this course for the student are to:

1. Understand the basic principles of quantum physics and band theory of solids.
2. Understand the underlying mechanism involved in construction and workingprinciples of various semiconductor devices.
3. Study the fundamental concepts related to the dielectric, magnetic and energy materials.
4. Identify the importance of nanoscale, quantum confinement and various fabrications techniques.
5. Study the characteristics of lasers and optical fibres.

Course Outcomes: At the end of the course the student will be able to:

1. Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids.
2. Identify the role of semiconductor devices in science and engineering Applications.
3. Explore the fundamental properties of dielectric, magnetic materials and energy for their applications.
4. Appreciate the features and applications of Nanomaterials.
5. Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.

UNIT - I: QUANTUM PHYSICS

Quantum Mechanics: Introduction to quantum physics, blackbody radiation – Planck's law - photoelectric effect – Wave Particle Duality, de-Broglie Hypothesis, Davisson and Germer's experiment, Heisenberg uncertainty principle - Born interpretation of the wave function, time independent Schrodinger wave equation, particle in one dimensional potential box.

UNIT - II: SEMICONDUCTOR DEVICES

Intrinsic and extrinsic semiconductors (Qualitative) – Drift and Diffusion Current - Hall effect - direct and indirect band gap semiconductors - construction, working principle and characteristics of P-N Junction diode, Zener diode, bipolar junction transistor (BJT), LED, PIN diode, avalanche photo diode (APD) and solar cell.

UNIT - III: DIELECTRIC, MAGNETIC & SUPER CONDUCTING MATERIALS

Dielectric Materials: Basic definitions - types of polarizations (qualitative), ferroelectric, piezoelectric and pyroelectric materials – applications.
Magnetic Materials: Basic definitions – Classification of Magnetic Materials – Domain Theory of Magnetism – Hysteresis - soft and hard magnetic materials - applications
Super Conductors: Introduction, Properties of Super Conductors, Meissner Effect, Type – I & Type – II Super Conductors – Applications.

UNIT - IV: NANOTECHNOLOGY

Nano scale, types of nano materials, quantum confinement, surface to volume ratio, bottom-up fabrication: sol-gel, top-down fabrication: ball milling, physical vapor deposition (PVD) – chemical vapor deposition (CVD) - characterization techniques - XRD, SEM & TEM - applications of nano materials.

UNIT - V: LASERS AND FIBER OPTICS

Lasers: characteristics of laser light, absorption, spontaneous and stimulated emission - Einstein coefficients and their relations – population inversion, pumping mechanisms, lasing action – physical construction and components - ruby laser, He-Ne laser, semi conductor laser - applications of lasers.

Fiber Optics: Introduction to optical fibers - advantages of optical fibers - total internal reflection - construction of optical fiber - acceptance angle - numerical aperture - classification of optical fibers - losses in optical fibers - optical fibers for communication system - applications.

TEXT BOOKS:

1. B.K. Pandey and S. Chaturvedi, Applied Physics, Cengage Learning, 2nd Edition,2022.
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication,2019
3. Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc GrawHill,4th Edition,2021.
4. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy" A Text book of EngineeringPhysics"- S. Chand Publications, 11th Edition 2019.
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1st Edition, 2021.

REFERENCE BOOKS:

1. Quantum Physics, H.C. Verma, TBS Publication, 2nd Edition 2012.
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons,11th Edition,2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019.
5. A.K. Bhandhopadhya - Nano Materials, New Age International, 1stEdition, 2007.

ASSIGNMENT QUESTIONS

UNIT-I

1. a) Explain de Broglie hypothesis and derive the equation for de Broglie Wavelength.
   b) Write the properties of matter waves.
2. a) Describe Davisson & Germer's experiment to verify the dual nature of matter.
   b) Explain Photoelectric effect with a neat diagram
3. a) Deduce the 1-Dimensional time independent Schrodinger's wave equation for an electron.
   b) Explain the physical significance of wave function.
4. a) Derive an expressions for eigen energies and eigen functions of a particle in one-dimensional potential box.
   b) Find the lowest energy of an electron confined in a box of side 0.1nm each.
5. a) Derive the Planck's law of black body radiation
   b) Deduce wein's law & Rayleigh-Jeans law

UNIT-II

1. a) Distinguish between p-type and n-type semiconductors with examples
   b) Discuss the V-I Characteristics of Zener Diode.
2. a) Distinguish between intrinsic and extrinsic semiconductors.
   b) Explain the V-I Characteristics of PN Junction Diode in forward and reverse bias conditions.
3. a) Explain the construction and working of Solar cell.
   b) State few applications of Solar Cell.
4. a) Explain the Hall Effect. Derive the Equation for Hall coefficient.
   b) Write any three applications of Hall Effect.
5. a) Explain drift and diffusion mechanism in semiconductors.
   b) Explain the construction and operation of NPN and PNP transistors.
6. a) Explain the construction and working of LED
   b) A light emitting diode is made of GaAsP having a band gap of 1.9Ev Determine the wavelength of the emitted radiation.
7. a) Explain the construction and operation of NPN transistor.
   b) Write difference between direct band gap and indirect band gap materials
8. a) What are Photo diodes?
   b) Explain working principle and structure of Avalanche photodiode

UNIT-III

1. a) Define Electric dipole, dipole moment and dielectric constant.
   Electric polarizability, electric susceptibility.
   b) Explain various polarisation mechanisms in dielectrics.
2. a) Write a short note on ferro & piezo electricity
   b) Explain Hysteresis loop of ferroelectric materials.
3. Classify the magnetic materials based on atomic point of view and write their properties.

4. a) Describe the Hysteresis loop of ferromagnets
   b) Distinguish between hard and soft magnetic materials?
5. a) Explain the Domain theory of ferromagnetism.
   b) Write the applications of magnetic materials.
6. a) Explain about type-I and type-II superconductors.
   b) What is Meissner effect? Show that superconductors exhibit diamagnetic property.
7. a) Write the properties of superconductors
   b) Write the applications of superconductors

UNIT-IV

1. a) Explain Surface to Volume ratio in case of Nano Technology
   b) Describe the process of fabrication of nano materials in ball milling method
2. a) Describe the process of "sol-gel" in the fabrication of nano materials
   b) Discuss in detail the applications of nano materials in various fields
3. a) Explain different types of nano materials with examples
   b) Describe the process of "Physical Vapour Deposition" technique for the fabrication of nano materials
4. a) Describe the process of "Chemical Vapour Deposition" technique for the fabrication of nano materials
   b) Discuss in detail about the characterisation of Nano particles using XRD
5. a) Explain in detail about the characterisation of nano particles by using SEM
   b) Explain in detail about the characterisation of nano particles by using TEM

UNIT-V

1. a) Discuss the various pumping mechanisms in lasers
   b) Describe the construction and working of He-Ne laser
2. a) Explain the structure of an optical fiber with a neat sketch
   b) Derive an expression for Numerical aperture and acceptance angle of an optical fiber
3. a) Define Absorption, Spontaneous emission and Stimulated emission of radiation
   b) Derive the relation between the probabilities of spontaneous emission and stimulated emission in terms of Einstein's coefficients
4. a) Explain light propagation in step index and graded index optical fiber
   b) List any five applications of lasers in different fields
5. a) What do you understand by population inversion
   b) Describe the construction and working of ruby laser with a neat labelled diagram
6. a) Mention the advantages of optical fibers
   b) Draw the block diagram of fiber optic communication system and explain the function of each block
7. a) Explain about the various components of a laser system
   b) Describe the construction and working of semi conductor laser

ELECTRONIC DEVICES AND CIRCUITS

Course Objectives:

1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of devices.
3. To know the switching characteristics of devices.

Course Outcomes: Upon completion of the Course, the students will be able to:

1. Acquire the knowledge of various electronic devices and their use on real life.
2. Know the applications of various devices.
3. Acquire the knowledge about the role of special purpose devices and their applications.

UNIT - I

Diodes: Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, V-I Characteristics, Diode as a switch- switching times.

UNIT - II

Diode Applications: Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

UNIT - III

Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times,

UNIT - IV

Junction Field Effect Transistor (FET): Construction, Principle of Operation, Pinch-Off Voltage, Volt- Ampere Characteristic, Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET, MOSTET as a capacitor.

UNIT – V

Special Purpose Devices: Zener Diode - Characteristics, Zener diode as Voltage Regulator, Principle ofOperation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED,Schottky diode.

TEXT BOOKS:

1. Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education
2. Robert L. Boylestead, Louis Nashelsky- Electronic Devices and Circuits theory, 11th Edition, 2009,Pearson**.**

REFERENCE BOOKS:

1. Horowitz -Electronic Devices and Circuits, David A. Bell – 5thEdition, Oxford.
2. Chinmoy Saha, Arindam Halder, Debaati Ganguly - Basic Electronics-Principles and Applications, Cambridge, 2018.

ASSIGNMENT QUESTIONS

UNIT - I

1. Differentiate between drift and diffusion currents.
2. What is depletion region in PN junction?
3. What is barrier potential?
4. What is Reverse saturation current?
5. Give the diode current equation?
6. Draw V-I characteristics of PN diode.
7. Write the application of PN diode.
8. Explain about transition capacitance with necessary equations .

UNIT - II

1. Define ripple factor, TUF and PIV.
2. Describe Half wave rectifier with necessary output wave forms.
3. Describe Full wave Bridge Rectifier wit it's analysis.
4. A half wave rectifier uses a diode with a forward resistance of 100 Ω. If the input a.c. voltage is 220 V (r.m.s.) and load resistance is of 2 K Ω. Determine (i) Idc and Irms (ii)PIV when diode is ideal. (iii) DC output power and a.c. input power. (iv) Ripple factor
   (v) Transformer utilization factor
5. Describe the operation of full wave rectifier with capacitive filter
6. List the differences between different filters
7. Explain about different kinds of clippers and clampers?
8. Write about series clipper?

UNIT - III

1. Explain the working of PNP transistor.
2. Write the differences between CB, CE, and CC Amplifier Configurations.
3. Derive the relation between α and β.
4. Explain the base width modulation.
5. With circuit diagram and characteristics, explain input and output characteristics of transistor in common base mode.
6. Explain CE configuration with the help of input and output characteristics.
7. A transistor is operated at a forward current of 2μA and with the collector open circuited.Calculate the junction voltages VC and VE, the collector to emitter voltage VCE assuming ICO = 2μA, IEO = 1.6μA and $\alpha = 0.98$.
8. Write about transistor working as a switch.

UNIT - IV

1. Explain the construction and operation of n-channel JFET.
2. What is Pinch off Voltage?
3. Define trans conductance gm and drain resistance of a FET.
4. Explain the working of a depletion type MOSFET with a neat construction diagram andits characteristics
5. Establish relation between rd, gm and μ.
6. Draw and explain drain and transfer characteristics of depletion type MOSFET.
7. Explain, how FET is working as Voltage Variable Resistor?
8. A JFET has the following parameters: IDSS = 32 mA ; VGS (off) = – 8V ; VGS = – 4.5
   V. Find the value of drain current.

UNIT - V

1. Explain Zener diode as voltage regulator.
2. Explain Varactor Diode and its application.
3. Describe the principle of operation of tunnel diode.
4. Explain the working of semiconductor photo diode
5. Explain LED construction and applications.
6. Write the advantages and disadvantages of photo diode
7. Explain the operation SCR in detail.
8. Explain the working of UJT.

APPLIED MECHANICS

Course Objectives: The objectives of this course are to

- Explain the resolution of a system of forces, compute their resultant and solve problemsusing equations of equilibrium
- Perform analysis of bodies lying on rough surfaces.
- Locate the centroid of a body and compute the area moment of inertia and mass moment ofinertia of standard and composite sections
- Explain kinetics and kinematics of particles, projectiles, curvilinear motion, centroidalmotionand plane motion of rigid bodies.
- Explain the concepts of work-energy method and its applications to translation, rotationandplane motion and the concept of vibrations

Course Outcomes: At the end of the course, students will be able to

- Determine resultant of forces acting on a body and analyse equilibrium of a body subjectedto a system of forces.
- Solve problem of bodies subjected to friction.
- Find the location of centroid and calculate moment of inertia of a given section.
- Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatorymotion and rigid body motion.

UNIT – I

Introduction to Engineering Mechanics - Force Systems: Basic concepts, Particle equilibrium in 2-D& 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy.

UNIT – II

Friction: Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, ladder friction Centroid and Centre of Gravity -Centroid of Lines, Areas and Volumes from first principle, centroid of composite sections; Centre of Gravity and its implications. – Theorem of Pappus.

UNIT – III

Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Product of Inertia,Parallel Axis Theorem, Perpendicular Axis Theorem. Mass Moment of Inertia: Moment of Inertia of Masses - Transfer Formula for Mass Moments of Inertia
– Mass moment of inertia of composite bodies.

UNIT – IV

Kinematics of Particles: Kinematics of particles – Rectilinear motion – Curvilinear motion – Projectiles. Kinetics of Particles: Kinetics of particles – Newton's Second Law – Differential equations of rectilinear and curvilinear motion – Dynamic equilibrium – Inertia force – D. Alembert's Principle applied for rectilinear and curvilinear motion.

UNIT – V

Work - Energy Principle: Equation of translation, principle of conservation of energy, work - energy principle applied to particle motion and connected systems, fixed axis rotation. Impulse – Momentum

Principle: Introduction, linear impulse momentum, principle of conservation of linear momentum, elasticimpact and types of impact, loss of kinetic energy, co efficient of restitution.

TEXT BOOKS:

1. Shames and Rao (2006), Engineering Mechanics, Pearson Education
2. Reddy Vijay Kumar K. and J. Suresh Kumar (2010), Singer's Engineering Mechanics –Statics & Dynamics

REFERENCE BOOKS:

1. Timoshenko S.P and Young D.H., "Engineering Mechanics", McGraw Hill InternationalEdition,1983.
2. Andrew Pytel, Jaan Kiusalaas, "Engineering Mechanics", Cengage Learning, 2014.
3. Beer F.P& Johnston E.R Jr. Vector, "Mechanics for Engineers", TMH, 2004.
4. Hibbeler R. C & Ashok Gupta, "Engineering Mechanics", Pearson Education, 2010.
5. Tayal A.K., "Engineering Mechanics – Statics & Dynamics", Umesh Publications, 2011.
6. Basudeb Bhattacharyya, "Engineering Mechanics", Oxford University Press, 2008.
7. Meriam. J. L., "Engineering Mechanics", Volume-II Dynamics, John Wiley & Sons, 2008.
8. P.C Dumir et al. "Engineering Mechanics", University press

ASSIGNMENT QUESTIONS

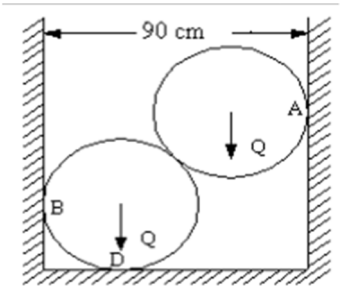
UNIT-1

Short Answer Questions

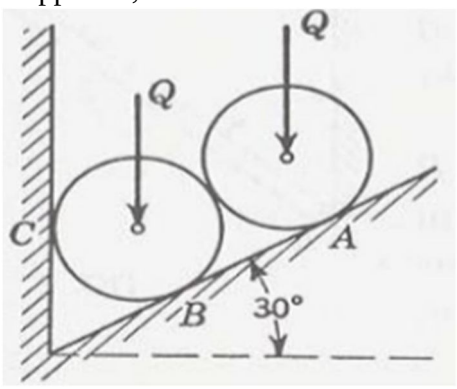
1. State and explain Newton law of gravitation
2. Explain the terms - concurrent and non concurrent force system planar and non planarsystem of forces
3. Define the term resultant and equilibrant
4. Define the term moment of a force
5. Explain the procedure to find the resultant of several forces acting at a point
6. What is a couple? State its characteristics
7. Explain the terms 1)unit vector 2) position vector
8. Explain dot product of vectors
9. Explain the characteristics of the cross products
10. Define the moment of a force about a point write an expression in
11. Define parallelogram law of forces and give mathematical formulae
12. Explain in brief free body diagrams.
13. State triangle law and explain Lami's theorem.
14. Define the law of polygon of forces.
15. Define moment of a couple. Give at least five examples where effect of couple is realized.
16. Define equilibrium of a body and give conditions of equilibrium when subjected to forces.

Long Answer Questions

1. a) Define Lami's theorem
2. b) A machine weighing 5KN is supported by two chains attached to some points on the machine. One chain goes to hook in the ceiling and has an inclination of 45 degrees with horizontal. The other chain goes to eye bolt in the wall and is inclined at 30 degrees to the horizontal. Find tensions induced in the chains
3. a) Derive an equation for resultant using parallelogram law of forces
4. b) Find the magnitude of the two forces such that if they act at right angles their resultantis sq. root 10N. But if they act at 60 degrees their resultant is sq. root 13N
5. a) State and explain the theorem of Varignon
   b) Two spheres, of each of weight 1000 N and radius of 25 cm rest in horizontal channelof width 90 cm as shown in fig 1. Find the reactions on the points of contact A, B and D



6. Write the equations of equilibrium when the body is in space
7. a) Explain the classification of different system of forces
   b) Determine the magnitude and the direction of the resultant of two forces 7 N and 8 N acting at a point with an included angle of 60^o with between them. The force of 7 N being horizontal
8. Two identical rollers, each of weight 100 N, are supported by an inclined plane and a vertical wall as shown in figure below. Assuming smooth surfaces, find the reactions induced at the points of support A, B and C.



9. A particle is acted upon by forces equal to P, 2P, 3 3P and 4P. The angle between the first and second, the second and third and fourth are 60^0 , 90^0 and 150^0 respectively. Find the magnitude and direction of the resultant force.
10. The five forces 20N, 30N, 40N, 50N and 60N are acting at one of the angular points of a regular hexagon, towards the other five angular points taken in order. Find the direction and magnitude of the resultant force.
11. The following forces act at a point
    a. 30kN inclined at 35^0 towards North to East.
    b. 22kN towards North
    c. 30kN inclined at 30^0 towards North to West
    d. 35kN inclined at 25^0 towards South to West.Find the magnitude and direction of the resultant force.

UNIT-II

Short Answer Questions

1. Explain the types of friction with examples?
2. Define the following i) Friction ii) Angle of friction iii) Limiting friction
3. Define the following (i)Angle of Repose (ii)Coefficient of frictions
4. Differentiate between static and dynamic friction?
5. Define coefficient of friction and limiting friction
6. Define friction and how can we appreciate the use of friction in practice?
7. What are the effects of friction?
8. Define Ladder friction and coefficient of friction and angle of friction. How these arerelated to each other?
9. What do you understand by the limiting friction? And define angle of repose.
10. Derive the least inclined force required to drag body resting on a horizontal plane interms of weight of the Body, angle of the inclined force and angle of friction.
11. State and prove first theorem of Pappus.
12. State and prove second theorem of Pappus.

Long Answer Questions

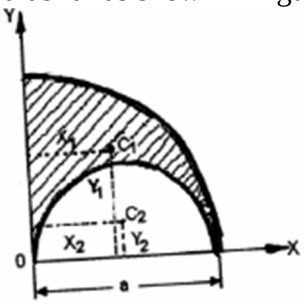
1. A body weighing 50N is just pulled upon inclined plane of 30 ^{0} by a force of 40N applied at 30 ^{0} above the plane. Find the coefficient of friction.

2. What is a wedge? Explain how wedge is used to raise

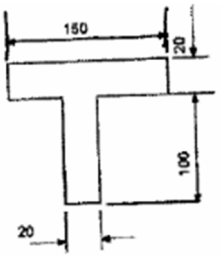
3. A block over lying a 10 ^{0} wedge on a horizontal floor and leaning against a vertical wall and weighing 1500N is to be raised by applying horizontal force to the wedge. Assume the coefficient of friction between all the surfaces in contact to be 0.3. Determine the minimum horizontal force to be applied to raise the block.

4. A weight 500N just starts moving down a rough inclined plane support by a force of 200N acting parallel to the plane and it is at the point of moving up the plane when pulled by a force of 300N parallel to the plane. Find the inclination of the plane and the coefficient of friction between the inclined plane and the weight

5. a) Locate the centroid of shaded area obtained by removing a semicircle of diameter 'a' from a quadrant of a circle of radius 'a' as shown in figure.

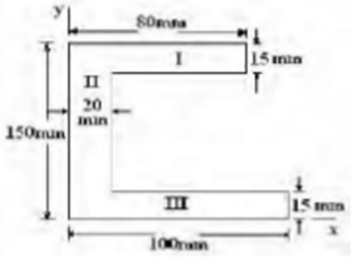


b. Find the centre of gravity of the "T "lamina as shown in figure.

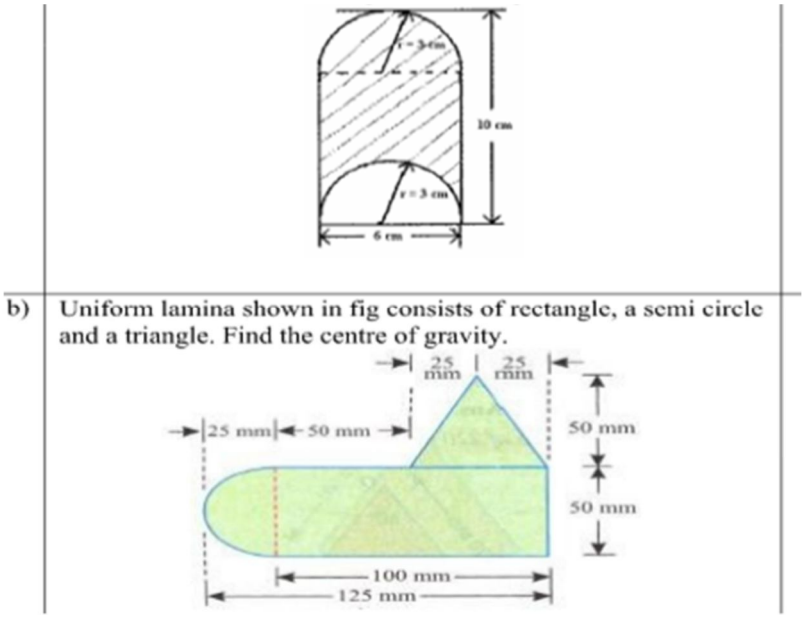


All dimensions are in mm

6. Find the centroid of the plane lamina shown in _Figure

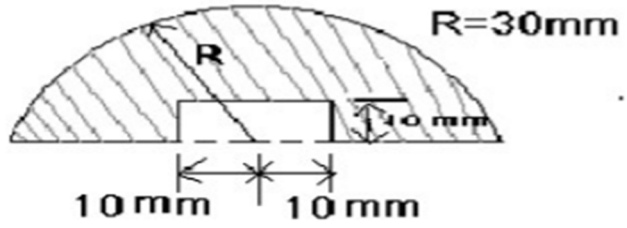


7. a) Find the centroid of the shaded plane area shown in figure.



b) Uniform lamina shown in fig consists of rectangle, a semi circle and a triangle. Find the centre of gravity.

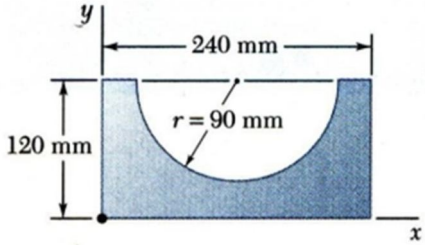
8. Find the moment of inertia about the horizontal centroidal axis of shaded portion for theFigure



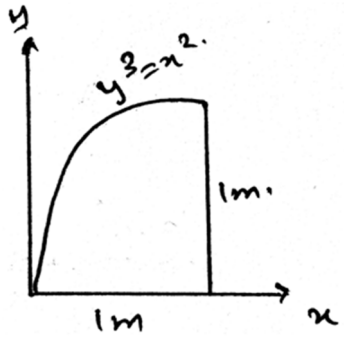
UNIT-III

Short Answer Questions

1. Define Area Moments of Inertia
2. Determine the moment of inertia of the shaded area with respect to the x axis.



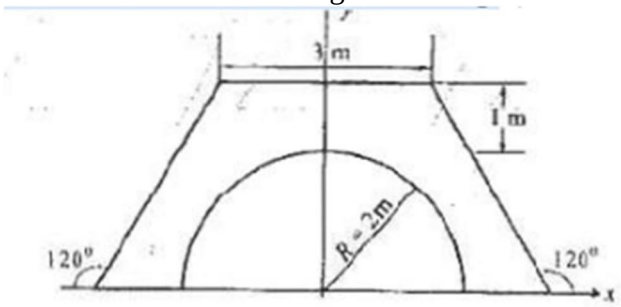
3. Determine the moment of inertia of the area about the y-axis.



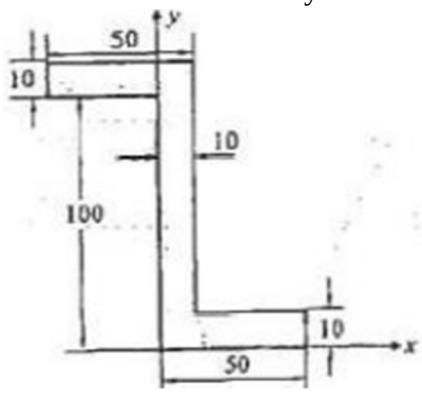
4. Define the following (i)parallel axis (ii) perpendicular axis
5. What are Area Moments of Inertia of standard sections?

Long Answer Questions

1. *Determine the po*lar mass moment of inertia of a circular ring of mean radius R and massM.
2. Find the MI about the centroidal axis in fig.



3. Find the MI about the centroidal axis and about xy axis for fig.



4. Explain transfer formula (or) parallel axis theorem for mass moment of inertia.
5. Explain transfer formula (or) perpendicular axis theorem for mass moment of inertia.
6. Determine the mass moment of inertia of cone of base radius R, height h, and mass
density ρ about its geometric axis.

UNIT – IV

Short Answer Questions

1. Define the terms velocity and acceleration
2. Define angular displacement angular velocity angular acceleration
3. Explain Differential equations of rectilinear and curvilinear motion
4. Define the terms i) velocity of projection ii) angle of projection iii) time of flight iv)range of a projectile
5. Explain law of conservation energy.
6. Explain D'Alembert's principle.
7. What are the types of motion?
8. Define kinetics of rigid body rotation

Long Answer Questions

1. The motion of a particle in rectilinear motion is defined by therelation where s is in meters and t in seconds. Find (a) Acceleration of particle when the velocity is zero (b) the position and the total distance travelled when acceleration is zero.

2. An auto is accelerated from rest to a speed of 100kmph and then immediately decelerated to a stop. If the total elapsed time is 20sec, determine the distance covered. The acceleration and deceleration are both constant but not necessarily of the same magnitude

3. A train travelling 96kmph has to slow down an amount of work being done on the line. Instead of continuing a constant speed it, therefore moves with a constant retardation of 1.6kmph/s until the speed is reduced of 24kmph. It is then travels at a constant speed for 400m and then accelerates at 0.8kmph/s until its speed is once more 90kmph. Find the delay Period

4. The distance covered by a freely falling body in the last one second of its motion and that covered in the last but one second are in the ratio 5:4. Calculate the height from which the body was dropped and the velocity with which it strikes the ground

5. A stone is thrown vertically upwards with a velocity of 19.6m/s from the top of a tower 24.5m height. Calculate the a) time required for the stone to reach the ground. b) velocity of the stone in its downward travel at the point in the same level as the point of projection. c) The maximum height to which the stone will rise in its flight

6. An aircraft is moving at a speed of 150kmph at an altitude of 750m towards a target on the ground, release a bomb which hits the target. Estimate the horizontal distance of the aircraft from the target when it releases the bomb. Calculate also the direction and velocity with which the bomb hits the ground

7. Two bodies of weight 20N and 10N are connected to ends of a light in extensible spring passing over a smooth pulley. The weight of 20N is placed on a horizontal surface while the weight of 10N is hanging free in air. The horizontal surface is a rough one, having coefficient of friction between the weight 20N and the plane surface equal to 0.3. Determine a) the acceleration of the system b) The tension in the string

8) State D'Alemberts Principle. Explain it for a rigid body in plane motion giving equations.

9. Explain the laws of motion for a body in rotational motion

10. A stone is dropped into a well while splash is heard after 4.5 seconds. Another stone is dropped with an initial velocity, v and the splash is heard after 4 seconds. If the velocityof the sound is 336m/s, determine the initial velocity of second stone

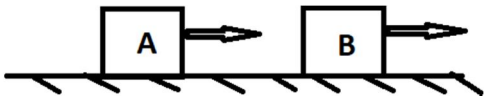
UNIT-V

Short Answer Questions

1. Define the following terms:
   (i) Work (ii) Energy (iii) Impulse and momentum
2. What are the units of work done? What is the relation between work done and power?
3. Explain the principle of conservation of energy.
4. State law of conservation of momentum.
5. Explain work-energy method and its applications
6. What are the important types of Impulse?

Long Answer Questions

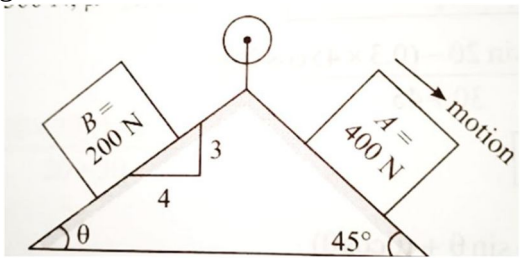
1. Body A and B is moving in the same direction with velocity of that 5m/s and 3m/s respectively .the mass of body A is 7kg while that body B is 5kg . if the coefficient restitution is 0.6 .Calculate velocity of two bodies after impact.



2. Explain in detail Work –Energy Principle.

3. A shell of 80kg mass in travelling with a velocity of 500 m/s .during its motion it splits into two equal which continue to travel in the same direction if can energy equivalent to $1.5*10^6$ NM. Determine the subsequent velocity of two portion

4. Find the tension and acceleration of block ‘A’ take value of μ=0.3 for the incline planesas shown in fig.



5. A golf ball having a mass of 40 g is struck such that it has an initial velocity of 200 m/s as shown. Determine the horizontal and vertical components of the impulse given to the ball.
6. Derive Imulse Momentum equation
7. Ball A of mass 0.5kg moving to right velocity of 5m/sec has direct central impact with Ball B of a mass 0.2kg moving to left with a velocity 2m/sec. If after impact the velocity of ball B is observed to be 4m/sec to the right. Determine the coefficient of restitution between two balls
8. A ball is droped from height of 10m on a smoth floor and it rebounds to a height of 7m. Determine the coefficient of restitution between the ball and floor and expected height of second rebounce.

SURVEYING

Course Objectives: The first step in engineering practice is surveying and the soundness of any civilengineering work is dependent on the reliability and accuracy of surveying. Therefore, it is imperative that a student of engineering should have good knowledge of surveying. To impart the knowledge of surveying and latest technologies in surveying it is necessary to introduce this subject in the curriculum.

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

- Calculate angles, distances and levels
- Identify data collection methods and prepare field notes
- Understand the working principles of survey instruments
- Estimate measurement errors and apply corrections
- Interpret survey data and compute areas and volumes

UNIT - I

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phasesof surveying.

Measurement of Distances and Directions

Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections,indirect methods- optical methods- E.D.M. method.

Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination and dip.

UNIT - II

Levelling and Contouring Leveling- Basics definitions, types of levels and levelling staves, temporaryadjustments, methods of levelling, booking and Determination of levels- HI Method- Rise and Fall method, Effect of Curvature of Earth and Refraction.

Contouring- Characteristics and uses of Contours, Direct & Indirect methods of contour surveying, interpolation and sketching of Contours.

Computation of Areas and Volumes

Areas - Determination of areas consisting of irregular boundary and regular boundary (coordinates, MDM, DMD methods), Planimeter.

Volumes - Computation of areas for level section and two level sections with and without transverse slopes, determination of volume of earth work in cutting and embankments, volume of borrow pits, capacity of reservoirs.

UNIT - III

Theodolite Surveying: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of verticalAngle, Trigonometrical levelling when base is accessible and inaccessible.

Traversing: Methods of traversing, traverse computations and adjustments, Gale's traverse table, Omitted measurements.

UNIT - IV

Tacheometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry.

Curves: Types of curves and their necessity, elements of simple curve, setting out of simple Curves,

UNIT - V

Modern Surveying Methods: Total Station and Global Positioning System: Basic principles, classifications, applications, comparison with conventional surveying. Electromagnetic wave theory - electromagnetic distance measuring system - principle of working and EDM instruments, Components of GPS – space segment, control segment and user segment, reference systems, satellite orbits, GPSobservations. Applications of GPS.

TEXT BOOKS:

1. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi.
2. Chandra A M, "Higher Surveying", New age International Pvt. Ltd., Publishers, NewDelhi, 2002.
3. Hoffman. B, H. Lichtenegga and J. Collins, Global Positioning System - Theory and Practice,Springer -Verlag Publishers, 2001.

REFERENCE BOOKS:

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill – 2000.
2. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004.
3. Surveying (Vol – 1, 2 & 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain -LaxmiPublications (P) ltd., New Delhi.
4. Chandra A M, "Plane Surveying", New Age International Pvt. Ltd., New Delhi, 2002.
5. Surveying by Bhavikatti; Vikas publishing house ltd.
6. Duggal S K, "Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.
7. Surveying and leveling by R. Agor Khanna Publishers 2015.

ASSIGNMENT QUESTIONS

UNIT - I

1. What i s chain surveying? Explain the required accessories f or chaining with neat sketches.
2. What are the different sources of error in chain surveying? Distinguish betweencumulative and compensating error?
3. Explain t he Principles of surveying?
4. A surveyl line ABC crossing a r iver at r ight angles cuts i ts banks at B and C. To determine t he width BC of a river, the following operation was carried out.A point E was established on t he perpendicular BE such t hat angle CEF i s a right angle where F isa point on the survey line. If the chainage of F and B are respectively 1200 m and 1320 m and t he distance EB i s 90 m. Calculate t he width of t he r iver and also t he chainage ofC.
5. Differentiate between Prismatic Compass and Surveyor Compass

UNIT - II

1. What are t he permanent adjustments of leveling instrument? 2.. Define line of collimation and change point
3. Following consecutive readings were t aken with a l evel along a sloping ground line AB at a r egular distance of 20 m by using 4m leveling staff as 0.352, 0.787, 1.832, 2.956, 3.758, 0.953, 1.766, 2.738, 3.872, 0.812, 2.325 and 3.137 . The RL of point A i s 320.288m. Rule out a page of f ield book apply usual check and calculate t he reduced levels of points. Also calculate t he gradient of l ine AB.
4. Explain in detail about Reciprocal Leveling.
5. What are the different source of error i n leveling and explain t hem i n detail?
6. Explain the Effects of Curvature and Refraction in leveling & t heir correction. 7.. Explain the Characteristics of Contours.

UNIT-III

1. Explain t he essential parts of transit thedolite with neat sketch
2. Explain the methods of measuring the horizontal angle using theodolite.
3. State what errors are eliminated by repetition method.
4. The tacheometer was set up at a station A and the readings on a Vertically held staff at B were 2.255, 2.605 and 2.955, the line of sight being at a inclination of +8º 24'. Another observation on the Vertically held staff at B.M gave the readings 1.640,1.920 and 2.200,the inclination of the line of sight being +1º 6'. Calculate the horizontal distance between A and B, the elevation of B if the R.L of B.M is 418.685 m. The constant of the instruments were 100 and 0.3

5. Derive an expression for the determination of horizontal and vertical distance using tangential method i) when both angles are angles of elevation BT-6 Create 3. To determine the multiplying constant of a tacheometer, the following Observations were taken on a staff held vertically at a distance measured from the instrument Observation Horizontal distance vertical angle Staff intercept 1 50m +3º 48' 0.500m 2 100m + 1º 06' 1.000m 3 150m + 0º 36' 1.500m The focal length of the object glass is 20 cm and the distance from the object glass to turnnion axis is 10 cm. The staff is held vertically at all these points.
6. Derive the distance and Elevation Formulae for Staff held vertical by tacheometry, when Both the observed angles are angle of elevation and angle of depression

UNIT - IV

1. The Following Reading were taken with a tacheometer on to a vertical staff, Calculate tacheometric constant 3Horizontal Distance Stadia Reading (m) 45 0.885 1.110 1.335 60 1.860 2.160 2.460
2. The stadia reading with horizontal sight at a vertical staff held 50 m away from the tacheometer were 1.385 and 2.380. the focal length of the object glass was 25cm. The distance between the object glass and trunionaxis of a tacheometer was 15 cm. Calculate the stadia interval.
3 A staff held vertically at a distance of 50 m and 100m from the centre of the theodolite with a stadia hair, the staff intercept with the telescope is 0.500 and 1.000 respectively. The instrument was then setup over a station P of RL 1850.95 m and the total height of instrument was 1.475m. The hair reading on a staff held vertically at station Q were 1.050, 1.900 and 2.750 with the line of sigth horizontal. Calculate the horizontal distance of PQ and RL of Q ppint.
4. The vertical angles to vanes fixed at 1m and 3m above the foot of the staff held verticallyat station Q were + 30 20' and 60 40' respectively from instrument station P. if the elevation of the instrument axis at station P is 101.520m calculate (1) the Horizontal distance between P & Q and (2) the elevation of the staff station Q)
5. The vertical angles to vanes fixed at 1m and 3m above the foot of the staff held verticallyat station Q were + 30 20' and - 60 40' respectively from instrument station P. if the elevation of the instrument axis at station P is 101.520m calculate (1) the Horizontal distance between P & Q and (2) the elevation of the staff station Q)

UNIT-V

1. What are the space, control and user segments of GPS and their functions?
2 List out the various measurements of GPS. Explain them.
3 Briefly explain the Characteristics of GPS Navigation and satellite navigation?
4 List out the features of total station and merits and demerits of total station
5 (i) What are the types of GPS receivers? ii) Explain the task of control segment in GPS
6. i)Describe briefly about sources of errors in GPS (ii)Explain the hand held receiver andgeodetic receiver of GPS.

ELEMENTS OF COMPUTER SCIENCE AND ENGINEERING

Course Objective: To provide an overview of the subjects of computer science and engineering.

Course Outcomes:

1. Know the working principles of functional units of a basic Computer
2. Understand program development, the use of data structures and algorithms in problem solving.
3. Know the need and types of operating system, database systems.
4. Understand the significance of networks, internet, WWW and cyber security.
5. Understand Autonomous systems, the application of artificial intelligence.

UNIT – I

Basics of a Computer – Hardware, Software, Generations of computers. Hardware - functional units, Components of CPU, Memory – hierarchy, types of memory, Input and output devices. Software – systems software, application software, packages, frameworks, IDEs.

UNIT – II

Software development – waterfall model, Agile, Types of computer languages – Programming, markup, scripting Program Development – steps in program development, flowcharts, algorithms, datastructures – definition, types of data structures

UNIT – III

Operating systems: Functions of operating systems, types of operating systems, Device & Resourcemanagement

Database Management Systems: Data models, RDBMS, SQL, Database Transactions, data centers,cloud services

UNIT – IV

Computer Networks: Advantages of computer networks, LAN, WAN, MAN, internet, WiFi,sensornetworks, vehicular networks, 5G communication.

World Wide Web – Basics, role of HTML, CSS, XML, Tools for web designing, Social media,Onlinesocial networks.

Security – information security, cyber security, cyber laws

UNIT – V

Autonomous Systems: IoT, Robotics, Drones, Artificial Intelligence – Learning, Game Development,natural language processing, image and video processing.

Cloud Basics

TEXT BOOK:

1. Invitation to Computer Science, G. Michael Schneider, Macalester College, Judith L. Gersting University of Hawaii, Hilo, Contributing author: Keith Miller University of Illinois, Springfield.

REFERENCE BOOKS:

1. Fundamentals of Computers, Reema Thareja, Oxford Higher Education, Oxford University Press.
2. Introduction to computers, Peter Norton, 8th Edition, Tata McGraw Hill.
3. Computer Fundamentals, Anita Goel, Pearson Education India, 2010.
4. Elements of computer science, Cengage.

APPLIED PHYSICS LABORATORY

Course Objectives: The objectives of this course for the student to

1. Capable of handling instruments related to the Hall effect and photoelectric effect experimentsand their measurements.
2. Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
3. Able to measure the characteristics of dielectric constant of a given material.
4. Study the behavior of B-H curve of ferromagnetic materials.
5. Understanding the method of least squares fitting.

Course Outcomes: The students will be able to:

1. Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
2. Appreciate quantum physics in semiconductor devices and optoelectronics.
3. Gain the knowledge of applications of dielectric constant.
4. Understand the variation of magnetic field and behavior of hysteresis curve.
5. Carried out data analysis.

LIST OF EXPERIMENTS:

1. Determination of work function and Planck's constant using photoelectric effect.
2. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
3. V-I characteristics of a p-n junction diode and Zener diode.
4. Input and output characteristics of BJT (CE, CB & CC configurations).
5. Solar Cell: To study the V-I Characteristics of solar cell.
6. a) V-I and L-I characteristics of light emitting diode (LED).
   b) LASER: To study the characteristics of LASER sources.
7. Determination of Energy gap of a semiconductor.
8. Determination of dielectric constant of a given material.
9. Study B-H curve of a magnetic material.
10. a) Optical fibre: To determine the bending losses of Optical fibres.
    b) Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
11. Characteristics of series and parallel LCR circuits.
12. Understanding the method of least squares – Torsional pendulum as an example.

Note: *Any 8 experiments are to be performed.*

REFERENCE BOOK:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers,2017.

PROGRAMMING FOR PROBLEM SOLVING LABORATORY

Course Objectives: The students will learn the following:

- To work with an IDE to create, edit, compile, run and debug programs
- To analyze the various steps in program development.
- To develop programs to solve basic problems by understanding basic concepts in C likeoperators, control statements etc.
- To develop modular, reusable and readable C Programs using the concepts like functions,arrays etc.
- To Write programs using the Dynamic Memory Allocation concept.
- To create, read from and write to text and binary files

Course Outcomes: The candidate is expected to be able to:

- formulate the algorithms for simple problems
- translate given algorithms to a working and correct program
- correct syntax errors as reported by the compilers
- identify and correct logical errors encountered during execution
- represent and manipulate data with arrays, strings and structures
- use pointers of different types
- create, read and write to and from simple text and binary files
- modularize the code with functions so that they can be reused

Practice sessions:

a. Write a simple program that prints the results of all the operators available in C (including pre/ post increment , bitwise and/or/not , etc.). Read required operand values from standard input.

b. Write a simple program that converts one given data type to another using auto conversion andcasting. Take the values from standard input.

Simple numeric problems:

a. Write a program for finding the max and min from the three numbers.

b. Write the program for the simple, compound interest.

c. Write a program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction.Read percentage from standard input.

d. Write a program that prints a multiplication table for a given number and the number of rows inthe table. For example, for a number 5 and rows = 3, the output should be:

e. 5 x 1 = 5

f. 5 x 2 = 10

g. 5 x 3 = 15

h. Write a program that shows the binary equivalent of a given positive number between 0 to255.

Expression Evaluation:

a. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula s = ut+(1/2)at^2 where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).
b. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
c. Write a program that finds if a given number is a prime number
d. Write a C program to find the sum of individual digits of a positive integer and test given numberis palindrome.
e. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Writea C program to generate the first n terms of the sequence.
f. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
g. Write a C program to find the roots of a Quadratic equation.
h. Write a C program to calculate the following, where x is a fractional value. i. 1-x/2
+x^2/4-x^3/6
i. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: 1+x+x^2+x^3 +x^n. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Arrays, Pointers and Functions:

a. Write a C program to find the minimum, maximum and average in an array of integers.
b. Write a function to compute mean, variance, Standard Deviation, sorting of n elementsin asingle dimension array.
c. Write a C program that uses functions to perform the following:
d. Addition of Two Matrices
e. Multiplication of Two Matrices
f. Transpose of a matrix with memory dynamically allocated for the new matrix as row andcolumncounts may not be the same.
g. Write C programs that use both recursive and non-recursive functions
h. To find the factorial of a given integer.
i. To find the GCD (greatest common divisor) of two given integers.
j. To find x^n
k. Write a program for reading elements using a pointer into an array and display the valuesusingthe array.
l. Write a program for display values reverse order from an array using a pointer.
m. Write a program through a pointer variable to sum of n elements from an array.

Files:

a. Write a C program to display the contents of a file to standard output device.
b. Write a C program which copies one file to another, replacing all lowercase characterswiththeir uppercase equivalents.
c. Write a C program to count the number of times a character occurs in a text file. The filenameand the character are supplied as command line arguments.
d. Write a C program that does the following:
It should first create a binary file and store 10 integers, where the file name and 10 valuesaregiven in the command line. (hint: convert the strings using atoi function)
Now the program asks for an index and a value from the user and the value at that index shouldbe changed to the new value in the file. (hint: use fseek function)
The program should then read all 10 values and print them back.
e. Write a C program to merge two files into a third file (i.e., the contents of the first file followedby those of the second are put in the third file).

Strings:

a. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
b. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
c. Write a C program that uses functions to perform the following operations:
d. To insert a sub-string into a given main string from a given position.
e. To delete n Characters from a given position in a given string.
f. Write a C program to determine if the given string is a palindrome or not (Spelled same inbothdirections with or without a meaning like madam, civic, noon, abcba, etc.)
g. Write a C program that displays the position of a character ch in the string S or – 1 if Sdoesn‘tcontain ch.
h. Write a C program to count the lines, words and characters in a given text.

Miscellaneous:

a. Write a menu driven C program that allows a user to enter n numbers and then choose betweenfinding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalidchoice is entered.
b. Write a C program to construct a pyramid of numbers as follows:

```
1          *          1          1          *
1 2        * *        2 3        2 2        *
                                             *
1 2        * * *      4 5 6      3 3 3      *
3                                            *
                                             *
                                4 4 4 4      *
                                             *
                                             *
```

Sorting and Searching:

a. Write a C program that uses non recursive function to search for a Key value in a given
b. list of integers using linear search method.
c. Write a C program that uses non recursive function to search for a Key value in a given
d. sorted list of integers using binary search method.
e. Write a C program that implements the Bubble sort method to sort a given list of
f. integers in ascending order.
g. Write a C program that sorts the given array of integers using selection sort in descendingorder
h. Write a C program that sorts the given array of integers using insertion sort in ascendingorder
i. Write a C program that sorts a given array of names

TEXT BOOKS:

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning,(3rdEdition)

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PHI
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY

The **English Language and Communication Skills (ELCS) Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives:

- ✓ To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
- ✓ To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
- ✓ To bring about a consistent accent and intelligibility in students' pronunciation ofEnglish by providing an opportunity for practice in speaking
- ✓ To improve the fluency of students in spoken English and neutralize the impact of dialects.
- ✓ To train students to use language appropriately for public speaking, group discussionsandinterviews

Course Outcomes: Students will be able to:

- ✓ Understand the nuances of English language through audio- visual experience and groupactivities
- ✓ Neutralise their accent for intelligibility
- ✓ Speak with clarity and confidence which in turn enhances their employability skills

Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:

a. Computer Assisted Language Learning (CALL) Lab
b. Interactive Communication Skills (ICS) Lab

Listening Skills:

Objectives

1. To enable students develop their listening skills so that they may appreciate the role in theLSRWskills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend thespeechof people of different backgrounds and regions

   Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

   - Listening for general content
   - Listening to fill up information
   - Intensive listening
   - Listening for specific information

Speaking Skills:

Objectives

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts
    - Oral practice
    - Describing objects/situations/people
    - Role play – Individual/Group activities
    - Just A Minute (JAM) Sessions

The following course content is prescribed for the **English Language and Communication SkillsLab**.

Exercise – I CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening. *Practice*: Introduction to Phonetics – Speech Sounds – Vowels and Consonants –Minimal Pairs-Consonant Clusters- Past Tense Marker and Plural Marker- *Testing Exercises* **ICS Lab**:

Understand: Spoken vs. Written language- Formal and Informal English.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – TakingLeave –Introducing Oneself and Others.

Exercise – II CALL Lab:

Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Stress pattern insentences – Intonation.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern insentences – Intonation - *Testing Exercises*

ICS Lab:

Understand: Features of Good Conversation – Strategies for Effective Communication.

Practice: Situational Dialogues – Role Play- Expressions in Various Situations –Making Requests andSeeking Permissions - Telephone Etiquette.

Exercise - III CALL Lab:

Understand: Errors in Pronunciation-Neutralising Mother Tongue Interference (MTI).

Practice: Common Indian Variants in Pronunciation – Differences between British and AmericanPronunciation -*Testing Exercises*

ICS Lab:

Understand: Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing

Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking andResponding – Agreeing and Disagreeing – Seeking and Giving Advice – MakingSuggestions.

Exercise – IV CALL Lab:
Understand: Listening for General Details.
Practice: Listening Comprehension Tests - *Testing Exercises*
ICS Lab:
Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication-Presentation Skills.
Practice: Making a Short Speech – Extempore- Making a Presentation.

Exercise – VCALL Lab:
Understand: Listening for Specific Details.
Practice: Listening Comprehension Tests -*Testing Exercises*
ICS Lab:
Understand: Group Discussion
Practice: Group Discussion

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:
The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.
System Requirement (Hardware component):
Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:
i) Computers with Suitable Configuration
ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS) Lab:
The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio- visual aids with a Public Address System, a T. V. or LCD, a digital stereo –audio & video system and camcorder etc.
Source of Material (Master Copy):
- *Exercises in Spoken English. Part 1, 2, 3*. CIEFL and Oxford University Press

Note: Teachers are requested to make use of the master copy and get it tailor-made to suit the contentsof the syllabus.

Suggested Software:

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10th Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge UniversityPress.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge UniversityPress.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- Digital All
- Orell Digital Language Lab (Licensed Version)

REFERENCE BOOKS:

1. (2022). *English Language Communication Skills – Lab Manual cum Workbook.* CengageLearning India Pvt. Ltd.
2. Shobha, KN & Rayen, J. Lourdes. (2019). *Communicative English – A workbook.* CambridgeUniversity Press
3. Kumar, Sanjay & Lata, Pushp. (2019). *Communication Skills: A Workbook.* Oxford UniversityPress
4. Board of Editors. (2016). *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities*. Orient Black Swan Pvt. Ltd.
5. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach.* CambridgeUniversity Press.

ENGINEERING CHEMISTRY LABORATORY

Course Objectives: The course consists of experiments related to the principles of chemistryrequiredfor engineering student. The student will learn:

- Estimation of hardness of water to check its suitability for drinking purpose.
- Students are able to perform estimations of acids and bases using conductometry, potentiometry and pH metry methods.
- Students will learn to prepare polymers such as Bakelite and nylon-6 in the laboratory.
- Students will learn skills related to the lubricant properties such as saponification value,surfacetension and viscosity of oils.

Course Outcomes: The experiments will make the student gain skills on:

- Determination of parameters like hardness of water and rate of corrosion of mild steel invarious conditions.
- Able to perform methods such as conductometry, potentiometry and pH metry in orderto findout the concentrations or equivalence points of acids and bases.
- Students are able to prepare polymers like bakelite and nylon-6.
- Estimations saponification value, surface tension and viscosity of lubricant oils.

List of Experiments:

I. **Volumetric Analysis:** Estimation of Hardness of water by EDTA Complexometry method.

II. **Conductometry:** Estimation of the concentration of an acid by Conductometry.

III. **Potentiometry:** Estimation of the amount of Fe^{+2} by Potentiomentry.

IV. **pH Metry:** Determination of an acid concentration using pH meter.

V. **Preparations:**
   1. Preparation of Bakelite.
   2. Preparation Nylon – 6.

VI. **Lubricants:**
   1. Estimation of acid value of given lubricant oil.
   2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.

VII. **Corrosion:** Determination of rate of corrosion of mild steel in the presence and absence ofinhibitor.

VIII. **Virtual lab experiments**
   1. Construction of Fuel cell and its working.
   2. Smart materials for Biomedical applications
   3. Batteries for electrical vehicles.
   4. Functioning of solar cell and its applications.

REFERENCE BOOKS:

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications,New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition
3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi.

BASIC ELECTRICAL ENGINEERING LABORATORY

Course Objectives:

- To measure the electrical parameters for different types of DC and AC circuits using conventional and theorems approach.
- To study the transient response of various R, L and C circuits using different excitations.
- To determine the performance of different types of DC, AC machines and Transformers.

Course Outcomes: After learning the contents of this paper the student must be able to

- Verify the basic Electrical circuits through different experiments.
- Evaluate the performance calculations of Electrical Machines and Transformers throughvarious testing methods.
- Analyze the transient responses of R, L and C circuits for different input conditions.

List of experiments/demonstrations:

PART- A (compulsory)

1. Verification of KVL and KCL
2. Verification of Thevenin's and Norton's theorem
3. Transient Response of Series RL and RC circuits for DC excitation
4. Resonance in series RLC circuit
5. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of aSingle-Phase Transformer
7. Performance Characteristics of a DC Shunt Motor
8. Torque-Speed Characteristics of a Three-phase Induction Motor.

PART-B (any two experiments from the given list)

1. Verification of Superposition theorem.
2. Three Phase Transformer: Verification of Relationship between Voltages and Currents(Star-Delta, Delta-Delta, Delta-star, Star-Star)
3. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
4. Measurement of Active and Reactive Power in a balanced Three-phase circuit
5. No-Load Characteristics of a Three-phase Alternator

TEXT BOOKS:

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition,2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition,2008.

ELEMENTS OF CIVIL ENGINEERING

Course objectives:

- To provide practical knowledge about physical properties of minerals and rocks.
- To determine the characteristics of cement**,** Coarse & Fine aggregates.

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

- Understands the method and ways of investigations required for Civil Engineering projects
- Identify the various rocks, minerals depending on geological classifications
- Evaluate the properties of cement, fine and coarse aggregates and determine its suitabilityforconstruction.

List of Experiments:

1. **Identification of Minerals** – Silica Group, Feldspar Group, Crystalline Group, CarbonateGroup, Pyroxene Group, Mica Group, Amphibole Group.
2. **Identification of Rocks –** Igneous Petrology, Sedimentary Petrology, Metamorphic Petrology.
3. a. Study of topographical features from Geological maps. Identification of symbols in maps.
   b. Simple structural Geology Problems (Folds, Faults & Unconformities)
4. **Tests on Cement**
   a. Fineness test & Normal Consistency test.
   b. Specific gravity test, Initial and Final setting time of cement.
5. **Tests on Fine Aggregates**
   a. Specific Gravity test.
   b. Bulking of sand & Fineness modulus of Fine aggregate.
6. **Tests on Coarse Aggregate**
   a. Specific Gravity test.
   b. Fineness modulus of Coarse aggregate.

TEXT BOOK:

1. IS 383 :1993 “Specification for Coarse and Fine Aggregates from Natural Sources for Concrete”.

ELEMENTS OF ELECTRONICS AND COMMUNICATION ENGINEERING

Course outcomes: Students will be able to:

1. Identify the different components used for electronics applications
2. Measure different parameters using various measuring instruments
3. Distinguish various signal used for analog and digital communications

List of Experiments:

1. Understand the significance of Electronics and communications subjects
2. Identify the different passive and active components
3. Color code of resistors, finding the types and values of capacitors
4. Measure the voltage and current using voltmeter and ammeter
5. Measure the voltage, current with Multimeter and study the other measurements using Multimeter
6. Study the CRO and measure the frequency and phase of given signal
7. Draw the various Lissajous figures using CRO
8. Study the function generator for various signal generations
9. Study of Spectrum analyzer and measure the spectrum
10. Operate Regulated power supply for different supply voltages
11. Study the various gates module and write down the truth table of them
12. Identify various Digital and Analog ICs
13. Observe the various types of modulated signals.
14. Know the available Softwares for Electronics and communication applications

ENGINEERING WORKSHOP

Course Objectives:

- To Study of different hand operated power tools, uses and their demonstration.
- To gain a good basic working knowledge required for the production of various engineeringproducts.
- To provide hands on experience about use of different engineering materials, tools, equipmentsand processes those are common in the engineering field.
- To develop a right attitude, team working, precision and safety at work place.
- It explains the construction, function, use and application of different working tools, equipmentand machines.
- To study commonly used carpentry joints.
- To have practical exposure to various welding and joining processes.
- Identify and use marking out tools, hand tools, measuring equipment and to work toprescribedtolerances.

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

- Study and practice on machine tools and their operations
- Practice on manufacturing of components using workshop trades including pluming, fitting,carpentry, foundry, house wiring and welding.
- Identify and apply suitable tools for different trades of Engineering processes includingdrilling,material removing, measuring, chiseling.
- Apply basic electrical engineering knowledge for house wiring practice.

1. TRADES FOR EXERCISES:At least two exercises from each trade:

I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
V. Welding Practice – (Arc Welding & Gas Welding)
VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
VII. Black Smithy – (Round to Square, Fan Hook and S-Hook)

2. TRADES FOR DEMONSTRATION & EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working

TEXT BOOKS:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.

REFERENCE BOOKS:

1. Work shop Manual - P. Kannaiah/ K.L. Narayana/ Scitech
2. Workshop Manual / Venkat Reddy/ BSP

PYTHON PROGRAMMING LABORATORY

Course Objectives:

- To install and run the Python interpreter
- To learn control structures.
- To Understand Lists, Dictionaries in python
- To Handle Strings and Files in Python

Course Outcomes: After completion of the course, the student should be able to

- Develop the application specific codes using python.
- Understand Strings, Lists, Tuples and Dictionaries in Python
- Verify programs using modular approach, file I/O, Python standard library
- Implement Digital Systems using Python

Note: The lab experiments will be like the following experiment examples

Week -1:

1. i) Use a web browser to go to the Python website http://python.org. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.
   ii) Start the Python interpreter and type help() to start the online help utility.
2. Start a Python interpreter and use it as a Calculator.3.
   i) Write a program to calculate compound interest when principal, rate and number of periods aregiven.
   ii) Given coordinates (x1, y1), (x2, y2) find the distance between two points
3. Read name, address, email and phone number of a person through keyboard and print the details.

Week - 2:

1. Print the below triangle using for loop.54 4
   3 3 3
   2 2 2 2
   1 1 1 1 1
2. Write a program to check whether the given input is digit or lowercase character oruppercasecharacter or a special character (use 'if-else-if' ladder)
3. Python Program to Print the Fibonacci sequence using while loop
4. Python program to print all prime numbers in a given interval (use break)

Week - 3:

1. i) Write a program to convert a list and tuple into arrays.
   ii) Write a program to find common values between two arrays.
2. Write a function called gcd that takes parameters a and b and returns their greatest common divisor.
3. Write a function called palindrome that takes a string argument and returnsTrue if it is apalindromeand False otherwise. Remember that you can use the built-in function len to check the length of a string.

Week - 4:

1. Write a function called is_sorted that takes a list as a parameter and returns True if the list is sortedin ascending order and False otherwise.
2. Write a function called has_duplicates that takes a list and returns True if there is any element thatappears more than once. It should not modify the original list.
   i). Write a function called remove_duplicates that takes a list and returns a new list with only theunique elements from the original. Hint: they don't have to be in the same order.
   ii). The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add"I", "a", and the empty string.
   iii). Write a python code to read dictionary values from the user. Construct a function to invert itscontent. i.e., keys should be values and values should be keys.
3. i) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'
   ii) Remove the given word in all the places in a string?
   iii) Write a function that takes a sentence as an input parameter and replaces the first letter of everyword with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?
4. Writes a recursive function that generates all binary strings of n-bit length

Week - 5:

1. i) Write a python program that defines a matrix and prints
   ii) Write a python program to perform addition of two square matrices
   iii) Write a python program to perform multiplication of two square matrices
2. How do you make a module? Give an example of construction of a module using differentgeometricalshapes and operations on them as its functions.
3. Use the structure of exception handling all general purpose exceptions.

Week-6:

1. a. Write a function called draw_rectangle that takes a Canvas and a Rectangle as arguments anddraws a representation of the Rectangle on the Canvas.
   b. Add an attribute named color to your Rectangle objects and modify draw_rectangle so that ituses the color attribute as the fill color.
   c. Write a function called draw_point that takes a Canvas and a Point as arguments and draws are presentation of the Point on the Canvas.
   d. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw_circle that draws circles on the canvas.
2. Write a Python program to demonstrate the usage of Method Resolution Order (MRO)in multiple levels of Inheritances.
3. Write a python code to read a phone number and email-id from the user and validate it for correctness.

Week- 7

1. Write a Python code to merge two given file contents into a third file.
2. Write a Python code to open a given file and construct a function to check for given wordspresent init and display on found.
3. Write a Python code to Read text from a text file, find the word with most number ofoccurrences
4. Write a function that reads a file *file1* and displays the number of words, number ofvowels, blankspaces, lower case letters and uppercase letters.

Week - 8:

1. Import numpy, Plotpy and Scipy and explore their functionalities.
2. a) Install NumPy package with pip and explore it.
3. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR
4. Write a program to implement Half Adder, Full Adder, and Parallel Adder
5. Write a GUI program to create a window wizard having two text labels, two text fields andtwo buttonsas Submit and Reset.

TEXT BOOKS:

1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly

REFERENCE BOOKS:

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Python Programming A Modular Approach with Graphics, Database, Mobile, and WebApplications, Sheetal Taneja, Naveen Kumar, Pearson
3. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, IndiaEdition
4. Think Python, Allen Downey, Green Tea Press
5. Core Python Programming, W. Chun, Pearson
6. Introduction to Python, Kenneth A. Lambert, Cengage

SURVEYING LABORATORY - I

Course Objective: Student will be able to learn and understand the various basic concept and principles

1. used in surveying like Chain Surveying, Compass Surveying, Plane Table Surveying, and Levelling Surveying.
2. Student will be able to learn and understand various instrument used in surveying.
3. Student will learn and understand how to calculate Area of plot and Ground.
4. Student will learn and understand about Horizontal Angle, Vertical Angle, Horizontal distance and Vertical distance to study the ground profile.

Course Outcomes: At the end of the course student will be able to:

1. Student will be able to prepare Map and Plan for required site with suitable scale.
2. Student will be able to prepare contour Map and Estimate the Quantity of earthwork requiredfor formation level for Road and Railway Alignment.
3. Student will be able to judge which type of instrument to be used for carrying out surveyfor aParticular Area and estimate the area.
4. Student will be able to judge the profile of ground by observing the available existingcontourmap.

CYCLE - I

1. Chaining of a line using chain, measurements of area by cross staff survey.
2. Measurement of distance between two points when there is an obstacle for both chainingandranging. Compass survey
3. Traversing by compass and adjustments in included angles and measurement of area
   -graphical adjustments.
4. Distance between two inaccessible points by compass. Plane Table Surveying
5. Measurement & Plotting of the area by Radiation method.
6. Determination of Positions objects by Intersection Method – Plane Table Survey.
7. Traverse by Plane table Survey.

CYCLE – II

Leveling

8. Measurement of elevation of various given points.
9. Elevation difference between two given points by reciprocal leveling.
10. Longitudinal Leveling
11. Cross – section Leveling
12. Plotting of Contours by Indirect Method

IT WORKSHOP

Course Objectives: The IT Workshop for engineers is a training lab course spread over 60 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools includingWord, Excel, PowerPoint and Publisher.

Course Outcomes:

- Perform Hardware troubleshooting
- Understand Hardware components and inter dependencies
- Safeguard computer systems from viruses/worms
- Document/ Presentation preparation
- Perform calculations using spreadsheets

PC Hardware

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructorshould verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructorsshould verify the installation and follow it up with a Viva

Internet & World Wide Web

Task1: **Orientation & Connectivity Boot Camp:** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWWon the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxysettings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: **Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsersto block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

Task 1 – Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX and Word to create a project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors,Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphsand Mail Merge in word.

Excel

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

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation,auto fill,Formatting Text

Task 2 : Calculating GPA - .Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

Power point

Task 1: Students will be working on basic power point utilities and tools which help them create basic powerpoint presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

REFERENCE BOOKS:

1. Comdex Information Technology course tool kit Vikas Gupta, *WILEY Dreamtech*
2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, *WILEYDreamtech*
3. Introduction to Information Technology, ITL Education Solutions limited, *Pearson Education.*
4. PC Hardware - A Handbook – Kate J. Chase *PHI* (Microsoft)
5. LaTeX Companion – Leslie Lamport, *PHI/Pearson.*
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinsonand Ken Quamme. – *CISCO Press, Pearson Education.*
7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by PatrickRegan – CISCO Press, *Pearson Education*

ELECTRONIC DEVICES AND CIRCUITS LABORATORY

Course Outcomes: Students will be able to

1. Acquire the knowledge of various semiconductor devices and their use in real life.
2. Design aspects of biasing and keep them in active region of the device for functionalcircuits
3. Acquire the knowledge about the role of special purpose devices and their applications.

List of Experiments (Twelve experiments to be done):

Verify any twelve experiments in H/W Laboratory

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Full Wave Rectifier with & without filters
3. Types of Clippersat different reference voltages
4. Types of Clampers at different reference voltages
5. The steady state output waveform of clampers for a square wave input
6. Input and output characteristics of BJT in CB Configuration
7. Input and output characteristics of BJT in CE Configuration
8. Input and output characteristics of BJT in CC Configuration
9. Input and output characteristics of MOS FET in CS Configuration
10. Input and output characteristics of MOS FET in CD Configuration
11. Switching characteristics of a transistor
12. Zener diode characteristics and Zener as voltage Regulator
13. SCR Characteristics.
14. UJT Characteristics and identify negative region
15. Photo diode characteristics
16. Solar cell characteristics
17. LED Characteristics

***Design a circuit to switch on and off LED using diode/BJT/FET as a switch.**

Major Equipment required for Laboratories:

1. Regulated Power Suppliers, 0-30V
2. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
3. Functions Generators-Sine and Square wave signals
4. Multimeters, voltmeters and Ammeters
5. Electronic Components and devices

APPLIED PYTHON PROGRAMMING LABORATORY

Course Outcomes:

Upon completing this course, the students will be able to

1. Build basic programs using fundamental programming constructs
2. Write and execute python codes for different applications
3. Capable to implement on hardware boards

List of Experiments:

Cycle– 1

1. Downloading and Installing Python and Modules

a) Python3 on Linux
Follow the instructions given in the URLhttps://docs.python-guide.org/starting/install3/linux/

b) Python3 on Windows
Follow the instructions given in the URLhttps://docs.python.org/3/using/windows.html (Please remember that Windows installation of Python is harder!)

c) pip3 on Windows and Linux
Install the Python package installer by following the instructions given in the URLhttps://www.activestate.com/resources/quick-reads/how-to-install-and-use-pip3/

d) Installing numpy and scipy
You can install any python3 package using the command pip3 install <package name>

e) Installing jupyterlab
Install from pip using the command pip install jupyterlab

2. Introduction to Python3

a) Printing your bio data on the screen

b) Printing all the primes less than a given number

c) Finding all the factors of a number and show whether it is a *perfect* number, i.e., the sumo fall its factors(excluding the number itself) is equal to the number itself

3. Defining and Using Functions

a) Write a function to read data from a file and display it on the screen

b) Define a boolean function *is palindrome*(<input>)

c) Write a function *collatz (x)* which does the following: if x is odd, $x=3x + 1$; if x is even, then $x = x/2$. Return the number of steps it takes for $x=1$

d) Write a function $N(m,s)=exp(-(x-m)^2/(2s^2))/sqrt(2\pi)s$ that computes the Normal distribution

4. The package numpy

a) Creating a matrix of given order *m x n* containing *r and o m numbers* in the range1 to 99999

b) Write a program that adds, subtracts and multiplies two matrices. Provide an interface such that, based on the prompt, the function(addition, subtraction, multiplication) should be performed

c) Write a program to solve a system of *n* linear equations in *n* Variables using matrix inverse

5. The package scipy and pyplot

a) Finding if two sets of data have the same *mean* value

b) Plotting data read from a file

c) Fitting a function through a set a data points using *polyfit* function

d) Plotting a his to gram of a given data set

6. The strings package

a) Read text from a file and print the number of lines, words and characters

b) Read text from a file and return a list o fall *n* letter words beginning with a vowel

c) Finding a secret message hidden in a paragraph of text

d) Plot a histogram of words according to their length from text read from a file

Cycle-2

7. Installing OS on Raspberry Pi

a) Installation using Pi Imager

b) Installation using image file

- Downloading an Image
- Writing the image to an SD card
- Using Linux
- Using Windows
- Booting up

Follow the instructions given in the URLhttps://www.raspberrypi.com/documentation/computers/getting-started.html

8. Accessing GPIO pins using Python

a) Installing GPIO Zero library. First ,update your repositories list: *sudo apt update*

Then install the package for Python3: *Sudo apt install python3-gpiozero*

b) Blinking an LED connected to one of the GPIO pin

c) Adjusting the brightness of an LED

d) Adjust the brightness of an LED (0 to100, where 100 means maximum brightness) using the in-built PWM wavelength.

9. Collecting Sensor Data

a) DHT Sensor interface

- Connect the terminals of DHTGPIO pins of RaspberryPi.
- Import the DHT library using *import Adafruit_DHT*

Read sensor data and display it on screen

NOTE

NOTE

NOTE

NOTE

NOTE

NOTE

Student Handbook

B.Tech. 1st Year 2024–25

Nalla Narasimha Reddy Group of Institutions

NNRG
Integrated Campus
www.nnrg.edu.in

NALLA NARASIMHA REDDY

Education Society's Group of Institutions - Integrated Campus

(Approved by AICTE & PCI, New Delhi & Affiliated to JNTUH, Accredited by NAAC with A+ Grade)

Chowdariguda (V), Korremula 'X' Roads, Ghatkesar (M), Medchal-Malkajgiri Dist., Hyderabad, T.S. - 500 088.

UGC AUTONOMOUS INSTITUTION

Accredited by NAAC A+ | NBA CSE ECE