



STUDENT HAND BOOK



B.Tech 1st year (2019-20)

Name :

Branch :

Section :

Roll No. :



NALLA NARASIMHA REDDY EDUCATION SOCIETY'S GROUP OF INSTITUTIONS

ENGINEERING | PHARMACY | MBA

EAMCET, ICET, PGCET & ECET CODE: **NNRG**



STUDENT HANDBOOK

For

B.Tech-I Year (2019-2020)

**NALLA NARASIMHA REDDY
EDUCATION SOCIETY'S GROUP OF INSTITUTIONS**

INTEGRATED CAMPUS

(Engineering, Pharmacy & MBA)

Near Narapally, Chowdariguda(Vill.), Korremula 'X' road,
Ghatkesar(M), Medchal – Malkajgiri(Dist.),
Hyderabad – 500088, Telangana State
Contact: 040 – 29705282, Fax:040 - 29705284
Mob: 9985311103, 9885311107

www.nnrg.edu.in



Name	
Reg. 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							

JNTUH MID EXAMINATIONS TIME TABLE

Timing: **FN:** 10.00 AM to 11.30 AM **AN:** 2.00PM to 3.30PM

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
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FUNCTIONAL HEADS

<i>NAME</i>	<i>DESIGNATION</i>
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
Mr. T. Sampath Reddy	Corporate Relations Officer

Hallmarks of NNRG
<ul style="list-style-type: none">▪ DISCIPLINE▪ HARD WORK▪ RESPECT AND VALUES

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ACADEMIC CALENDER FOR 2019-20

I SEMSETER

S.NO.	Event	Date	Duration
1	Induction Program		
2	Commencement of Instruction		
3	First Mid-Term Examinations		
4	Submission of First Mid Term Exam marks to University on or before		
5	Parent-Teacher Meeting		
6	Dussehra Recess		
7	Last Date Of Instruction		
8	Second Mid Term Examinations		
9	Preparation Holidays and Practical Examinations		
10	Submission of Second Mid Term Exam marks to University on or before		
11	End Semester / Supplementary Examinations		
12	Semester Break		

II SEMESTER

S.NO.	Event	Date	Duration
1	Commencement of Instruction		
2	First Mid-Term Examinations		
3	Submission of First Mid Term Exam marks to University on or before		
4	Parent-Teacher Meeting		
5	Last Date Of Instruction		
6	Second Mid Term Examinations		
7	Preparation Holidays and Practical Examinations		
8	Submission of Second Mid Term Exam marks to University on or before		
9	End Semester / Supplementary Examinations		
10	Summer Vacation		

ACADEMIC REGULATIONS (R18)

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, 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 in the fortnightly upload of attendance to the University
- 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 towards 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 student was detained, by seeking re-admission into that semester as and when offered; in case 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 chosen from 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

Minimum Academic Requirements

- The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in above item
- 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% marks (26 out of 75 marks) in the semester end examination, and a minimum of 40%(40 marks out of total 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 UG mini-project and seminar, if student secures not less than 40% marks (i.e. 40 out of 100 allotted marks) in each of them. The student would be treated as failed, if student (i) does not submit a report on UG mini-project, or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) does not

present the seminar as required in the IV year I Semester, or (iii) secures less than 40% marks in UG mini-project/ seminar evaluations

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

S.No	Promotion	Conditions to be fulfilled
1.	First year first semester to first year second semester	➤ Regular course of study of first year first semester.
2.	First year second semester to second year first semester	<ul style="list-style-type: none"> ➤ (i)Regular course of study of first year second semester. ➤ (ii)Must have secured at least 18 credits out of 37 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	<ul style="list-style-type: none"> ➤ (i)Regular course of study of second year second semester. ➤ (ii)Must have secured at least 47 credits out of 79 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 third year second semester	➤ Regular course of study of third year first semester.
6.	Third year second semester to fourth year first semester	<ul style="list-style-type: none"> ➤ (i)Regular course of study of third year second semester. ➤ (ii)Must have secured at least 73 credits out of 123 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 ≥ 5.0 (in each semester), and CGPA (at the end of each successive semester) ≥ 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 Engg.) 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 above points.
- 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 readmitted 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 practicals and Project Stage – I & II) will be evaluated for 100 marks each, with 25 marks allotted for CIE (Continuous Internal Evaluation) and 75 marks for SEE (Semester End-Examination)
- For theory subjects, during a semester, there shall be two mid-term examinations. Each mid-term examination consists of one objective paper, one descriptive paper and one assignment.
- The objective paper and the descriptive paper shall be for 10 marks each with a total duration of 1 hour 20 minutes (20 minutes for objective and 60 minutes for descriptive paper).
- The objective paper is set with 20 multiple choice, fill in the blanks and matching type of questions for a total of 10 marks.
- The descriptive paper shall contain 4 questions out of which, the student has to answer 2 questions, each carrying 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 marks are allocated for assignments (as specified by the subject teacher concerned). The first assignment should be submitted before the conduct of the first mid-term examination, and the second assignment should be submitted before the conduct of the second mid-term examination.
- The total marks secured by the student in each mid-term examination are evaluated for 25 marks, and the average of the two mid-term examinations shall be taken as the final marks secured by each student in Continuous Internal Evaluation. If any student is absent from any subject of a mid-term examination, an on-line test will be conducted for him by the University.
- The details of the end semester question paper pattern are as follows:
 - ✓ The semester end examinations (SEE) will be conducted for 75 marks consisting of two parts viz.
 - i) Part- A for 25 marks
 - ii) Part - B for 50 marks
 - ✓ Part-A is a compulsory question consisting of ten sub-questions. The first five sub-questions are from each unit and carry 2 marks each. The next five sub-questions are one from each unit and carry 3 marks 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
 - ✓ For subjects like Engineering Graphics/Engineering Drawing, 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 practical subjects there shall be a continuous internal evaluation during the semester for 25 marks and 75 marks for semester end examination. Out of the 25 marks for internal evaluation, day-to-day work in the laboratory shall be evaluated for 15 marks and internal practical examination shall be evaluated for 10 marks conducted by the laboratory teacher concerned. The semester end examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed from the clusters of colleges which are decided by the examination branch of the University.

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.

II. 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 the state of the art infrastructure and innovative research facilities.
3. To practice and promote high standards of professional ethics, transparency and accountability

III. 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 group of Institutions believes in self evaluation and continuous improvement.

IV. GENERAL INFORMATION

Nalla Narisimha Reddy Education Society's Integrated campus was established in the year 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 graduates.

LOCATION AND 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, 10 Kms from Uppal Ring road on Warangal Highway. The campus is accessible by public transport system and it takes just 15 minutes drive from Uppal to reach the campus. RTC also runs city buses frequently to Ghatkesar, Korremula and Narapally. The Institute provides college buses in various routes for faculty, staff and students. **Free Transport facility is provided to all students from Narapally 'X' road to the campus and back.**

V. COURSES@NNRG

SCHOOL OF ENGINEERING	
UG - B.Tech	PG - M.Tech
<ul style="list-style-type: none">• Computer Science & Engineering(CSE)• Electrical and Electronics Engineering (EEE)• Mechanical Engineering(ME)• Electronics and Communication Engineering(ECE)• Civil Engineering(CE)	<ul style="list-style-type: none">• Computer Science Engineering(CSE)• VLSI Design &Embedded Systems(ECE)• Machine Design(ME)

SCHOOL OF PHARMACY
<ul style="list-style-type: none">• B.Pharmacy• M. Pharmacy :*Pharmaceutics *Pharmaceutical Analysis and Quality Assurance

SCHOOL OF MANAGEMENT SCIENCES
<ul style="list-style-type: none">• MBA

VI. 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 and wide spread basketball and football courts. The college has a well maintained canteen, Readers: a stationery shop, RO purifying water plants, hygienic washrooms and other amenities.

2. Internet Facility

The campus systems are connected with 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 etc. A conducive learning atmosphere is promoted through the college Local Area Network (LAN), internet facility with 80Mbps connection during college hours in the Digital Library.

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 endeavours to foster overall development of students both in academic and sports fields and included 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 with subsidized rates. The canteen is amidst a large and vibrant area, with a beautiful view of greenery all around. The authorities take personal care in maintaining the quality of food served in the canteen. The canteen tends to be the most popular place on campus, not only for food but also for student bonding and informal discussions.

6. Pure & Hygienic Drinking Water

The NNRG campus has erected RO water purifying systems, to cater to the needs of 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

NNRG exclusive girls' hostel is built in a 2 acre campus. The hostel serves as a home away from home for students who come from city outskirts and distant places. It provides a secure environment to excel in studies, 24 hours security and emergency medical services are provided. The institution has an ambulance exclusively for the benefit of the students in case of emergency. The students develop a sense of responsibility and learn to manage their lives independently staying in hostels.

8. Transport

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

NNRG Local bus facility

College Provides one campus bus as a Local bus at free of cost from Narapally to college and vice versa to facilitate easy conveyance to the students coming through RTC Buses.

9. Seminar Halls

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, Oral/PowerPoint Presentations, Group Discussions, and Mock Interviews etc are conducted.

10. Center for online exams

NNRG with its International standards in maintenance of computer technology has become 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 nnrngians.

12. Readers

A stationary store is opened in the college campus from where students can purchase all stationary items for their day to day requirement with affordable prices.

13. ATM

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

VII. 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 Communication Skills Laboratories
- Department - wise Seminar Halls
- 800 LAN connected high Configuration
- Central Seminar Hall & Auditorium
- Internet with 100 mbps bandwidth
- Well stacked, spacious library with thousands 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
- Robotic Centre
- Professional Societies & Clubs
- WiFi enabled Campus
- Sports and Games
- NCC & NSS units
- Cafeteria
- Girls Hostel
- Dispensary
- Provision stores (READERS)
- Transportation
- Medicinal Garden

VIII. 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 dealt gravely imposing severe punishments. All senior students of the college are aware of the consequences

of ragging. Students who misbehave with staff or other students will also be dealt critically. 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 to 1:00 noon. Students must strictly adhere to the timings of the college. They should not linger in the college premises outside their classrooms when the classes are in progress.

4. Bonafide Certificates

The Academic branch will issue bonafide certificates for bus passes and other purposes to the college students.

5. Bus Passes

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

6. Notices/Notice Boards

Students are expected to read the College, Department and 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 be returned 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 / Phone number immediately if any, to the academic branch through their Class Mentor or HOD.

10. Wearing ID cards

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 the classes the next day, until proper explanation is provided by the student or the parent / guardian to the concerned Head of the Department. In case of emergency, student can 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 the 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 for a valid reason.

14. SMS service

If a student is absent, SMS will be sent to the parent's mobile (Registered Mobile) by the afternoon of the same day. Parents and students are advised to download the "UOLO" app for the 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 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 should 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 to their concerned HOD, for being absent and submit the medical certificate on 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

The 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.

B. 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 or an 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.
- Student's parent/guardian will also 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 fear or 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 upto 6 months or fine up to Rs.1,000/-
2	Assaulting or using criminal force or criminal intimidation	Imprisonment up to 1 Year or fine up to Rs.2000/- or both.
3	Wrongly restraining or confining or causing hurt	Imprisonment up to 2 years or fine up to 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 up to 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 be admitted in any other college.
- If a student commits suicide due to or in consequence of ragging, the person who commits such ragging shall be deemed to have abetted such suicide.
- The full text of Act 26 is placed in the college library.

C. Examinations:

Students are advised to refer the copy of regulations (R18) issued by the university/JNTUH website to be aware of the rules and regulations.

D. Malpractice:

Students must not indulge in any malpractice in the Internal/External examinations. Malpractice cases are dealt with as per the rules / guidelines of the JNT University Hyderabad.

E. Laboratory Guidelines:

- Students are expected to be punctual and regular to the lab classes and follow the lab dress 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 on 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.
- 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 should be reported immediately to the lab in-charge.
- Students are advised to clear all dues to the lab before taking end practical examinations to 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 should use the waste material baskets kept for the purpose.
- Experiments should be carried out following all the instructions meticulously and observing all the precautions to avoid personal injuries and damage to equipment.

F. Undertaking from Students and Parents:

Students and their parents / guardians should execute an undertaking, in the prescribed format, that they shall abide by all the rules and regulations of the college. Even before executing an undertaking, a 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 this handbook and also those that may be framed from time to time.

G. Class Review Committee (CRC):

The Class Review Committee is constituted for each class. The Class in-charge nominates three students (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.

H. Letters to Parents:

Parents will be intimated about their son/daughter/ward's performance and attendance via SMS and examination results through letters from time to time. Parents can also 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. In case of poor academic performance and/or attendance, the student and the parent/guardian should promptly respond to and comply with the reports and suggestions for improvement as and when informed.

I. Girls Hostel:

Rules of Admission:

- Students who join the hostel should pay the prescribed admission fee and caution deposit at 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 hostler. Suspension/dismissal of a hostler from the college will automatically result in his/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 on production of the identity card at 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 entertained.
- No inmate will be permitted to go home except during vacation.
- Hostellers are not allowed to stay in the hostel rooms during the college timings.
- Collective gatherings of any kind are prohibited within the hostel premises.
- Hostellers should not indulge in any act or activity that is unacceptable and detrimental for the smooth and proper running of the hostel.
- Hostellers shall be held responsible for any damage caused to hostel property and the loss to the property shall be recovered from them.
- Hostellers are prohibited from using any electronic or power consuming appliances without the permission of the warden.

IX. 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 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 e – Journals. Through 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 10 mbps internet connection exclusively.

• Books	35,000
• CD/DVDs	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 online e-journals through DELNET, IEEE, ASME and Sage Publications.
- The reference section in 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 internet with 10 mbps band width. It has a complete collection of NPTEL video lectures of IIT experts.
- Print and replication related stationery assistance is made available.

Note: The detailed Rules and Regulations of the Library are displayed on the library Notice Board.

X. 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 in students. It trains them in team building, group activities, mock interview sessions and leadership abilities.

We furnish 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, preparing them for future challenges not only in 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. The Cell instills confidence in students to face Interviews and come out with flying colours.

INCUBATION CENTRE:

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

ROBOTICS DEVELOPMENT CENTRE:

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

MAJOR RESEARCH FACILITIES:

- Cadence Tools
- DSP development boards on floating point TMS320C6713
- MATLAB
- ProE and ANSYA software tools
- CNC Milling Machine
- IOT Labs
- 3D Printing

Training Programs and Facilities

- 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
- Group discussion and Interview rooms
- Aptitude and Technical Skills Training

The institute has maintained excellent consistency in the placement of students backed by exceptional placement infrastructure. NNRG has been consistently improving its placement record by placing students in various reputed organizations. The Placement Cell at NNRG 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 recruiters



XI. STUDENT ACTIVITIES

NNRG's ANNUAL TECHNICAL FESTS – Tech Samprathi is the annual technology festival of Nalla Narisimha Reddy education Society's Group of Institutions. It's a Two Day National Level Student Symposium organized every year in January. 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 **Techfest** is on technology and its applications rather than just engineering know—how. It offers a conducive 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-2k18 has nine 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

Elite Gathering:

The Assembly 'ELITE GATHERING' is conducted in the campus every fortnight. During the club activity all the students and the staff of NNRG gather at the Assembly Point of the campus. Students deliver speeches on various topics prescribed. 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. The activities are carefully planned to raise the confidence of the students. It gives them a platform where they can practice and communicate without any inhibitions, and to impart industry-specific skills needed. All the interested students exhibit their talent irrespective of their academic performance. Dr I Sirisha is the coordinator of Elite Gathering.

Center for Human Excellence:

NNRG 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 and values or in the words of Swami Vivekananda, 'life-building, man-making, character-making and nation-building', education and training. 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 Speakers from the industry and monks from VIHE instill the young minds.

E-Plus Club:

The E-Plus club activity is an initiative of The Hindu group. It was inaugurated in the year 2012. The club aims at recognizing the importance of clear excellent communication skills, sound reasoning, and the confidence to present one's ideas and opinions clearly.. E-Plus club undertakes group activities that help them practice English, 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.

The event was conducted with 50 participants from NNRG & other institutions under two committees-

- DISEC-1. Formulating a feasible global counter- terrorism policy
- ARTICLE-70. Sanctioning Mercy death

The best 3 delegates of each committee were certified & awarded with mementos, rest were certified for participation.

Photography Club:

The Club –started its journey in the year 2012. It is a student-led organization 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.

Meditation Club:

The Meditation 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 Meditation Club is to go beyond the mind and experience our essential nature—which is described as peace, happiness and bliss, bursting the stress attained due to the highly competitive and stressful life and discovering the mental & physical energy generators, wonderful abilities, peace and bliss lying nowhere else but 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 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 & applications in engineering.

C-Wizard Club:

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

Fresher's 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 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, 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 on Sports Day such as Cricket, Football, Volleyball, Throw ball, Tennikoit and Indoor events like Chess, Table Tennis, and Caroms, 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. Alumni from 2015-16 were invited and all the old students attended the gathering. The Alumni Association plays an important role in informing the current students about opportunities available in the industry.

Student Seminars:

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.

Art /Culture Club :

Apart from the regular academic curriculum it is also very important for the students to get involved into the various cultural and other activities which will bring out the hidden talents in him/her. Art and Culture Club is established in the institute to encourage students to take part in these activities. These activities will help the student to have holistic growth of his/her career. Through this students are given opportunity to collaborate with various media, to exhibit the inherent talents. Some of the programs that our students participated in recently are MAA –TV (Meelo Evaru Koteeswarudu), ETV+ (JilJilJiga), and MAA Music (Young Minds). Saakshi T.V -Nenu Sakthi. These kinds of programs give them the societal exposure for public interaction. Dr. I. Sirisha Assoc. Prof. H&S is the Convener of the club.

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 capacity building. To develop women students as self-motivated, self-esteemed and self-disciplined persons, who can realize their aspirations. Dr. Rashmi Trivedi, Prof. H&S is the Convener of the cell.

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

Industrial Visits:

NNRG 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 organized by the departments of the institute are-

- TCS
- Infosys
- RCL
- BHEL
- ECIL
- Tech Mahindra
- RTTC-BSNL
- Nuclear Fuel Complex
- Doordarshan Kendra
- Roshni Microsystems
- Mana TV

- Astra Microwave Product Limited (AMPL)
- Primary Radar and Sensory Radar Stations
- 400KV Sub Station & many more
- Diesel Loco Shed
- Analogics Tech India Limited

Memorandum of Understanding (MOU)

NNRG has signed MOUs with various organizations and industries to train the students, 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.

MOUs signed by NNRG:

- TASK
- Oracle Academy
- Vmware
- Vedic Systems
- CI smart connect technologies
- 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 / half-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 a part of Corporate Social Responsibility (CSR) being conducted include:

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

NNRG-IEEE Women in Engineering

NNRG'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. Ms. A. Prashanthi, Asst. Prof. – CSE Dept. is the coordinator of NNRG - IEEE Women in Engineering Chapter.

NCC Wing:

NCC at NNRG 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 get trained in various fields. And they actively participate in social service. Mr. S. Raj Kumar, Ex- Employee (Air force), Mech- Dept. is the coordinator of the NCC Unit – NNRG.

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, through empowerment, is the main focus of NSS activity. Mr. E. Sai Krishna Reddy, Asst. Prof. of Mathematics, is the coordinator of the NSS Wing.

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. Mr. T. Pavan Kumar, Associate Professor, Department of Mechanical Engineering, is the In-charge for the EDC.

Industry Institute Interaction Cell (IIIC)

The Institute has placed emphasis on the cultivation of strong links with industry and promotion of 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, Mr. T. Pavan Kumar, Associate Professor, Department of Mechanical Engineering, is the In-charge for the IIIC.

INDUCTION PROGRAMME(18 JULY - 28 JULY 2018)

NNRESGI organized a ten day induction programme from 18 -07-2018 to 28-07-2018 . More than 200 students accompanied by their parents descended from all parts of the state attended the first day programme which acclimatized the students and the parents with the fundamentals of the institute. All the ten days had sessions by motivational speakers, writers, soft skills trainers, yoga & meditation trainers, language trainers and entrepreneurs. The final day of the induction programme also had literary and cultural competitions for students.

1.	18.07.18 (WED)	Inauguration Induction Program - Dr. NRK Reddy(Chief Guest), Mr. Akella Raghavendra (Guest of Honour)	Personality development Communication skills Career goal setting How to achieve success
2	19.07.18 (THU)	HOD, H&S presentation & Students visit to concern dept.	Introduction to H&S Department and its aims Faculty Introduction
3	20.07.18 (FRI)	Mr. Raghu Dutt - Soft skills trainer	Soft skills training Importance of positive attitude Persistence and focus
4	21.07.18 (SAT)	Dr. Vivek Modi - Motivational Speaker	Career guidance Negotiation skills
5	23.07.18 (MON)	Dr. V K Swamy (Director , TASK)	Leadership skills Proactiveness Industry expectations from students
6	24.07.18 (TUE)	Mr. Gampa Nageswara Rao - Motivational speaker	SMART Goal Personality development Time management
7	25.07.18 (WED)	Mr. Narender Reddy G -Language Trainer	Effective communication skills English as a Skill & not as a Subject
8	26.07.18 (THU)	Cultural Programme	Dance(solo & group) Songs(solo & group) Mimicry Instrumental music
		Session by Harsha Bandaru, WIELabs Entrepreneur	Web designing Start up companies Student projects
9	27.07.18 (FRI)	Dr. Ch. Eshwara Reddy Yoga Trainer	Yoga & Meditation
10	28.07.18 (SAT)	Mr. Nivas (Head Soft skills Infosys Hyderabad), Mr. Abhinav Kumar (Senior systems engineer, Infosys Hyderabad)	Soft skills training Career guidance Overview of the IT Sector

DECENNIAL CELEBRATIONS :(Ten years of successful completion)

Institute had its Decennial Celebrations on 8 and 9 March 2019. Esteemed guests from distinguished fields were invited. The Honourable Minister for Medical health & Family welfare Shri Eetala Rajendar, Professor Thummala Papi Reddy Chairman Telangana State Council of Higher Education, Professor A.Venu Gopal Reddy Vice Chancellor of JNTUH and Professor N.V.RamanaRao, Director NIT Warangal and Shri Goreti Venkanna Telangana Poet and singer graced the occasion. All the dignitaries congratulated the college management on the rapid progress in the very short duration.

XII. CONTACT INFORMATION

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

For any administrative issues and information, please contact:

Designation	Name	Mobile No.
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. A. Mahender Reddy	9492440035
Security Officer	Mr. K. Ramana Reddy	9573118125

Designation	Name	Mobile No.
HOD, H&S	Prof. E. Chandra Shekar	9515874896
HOD, Civil	Dr. G. Subba Rao	9494413053
HOD, CSE	Dr. K. Rameshwaraiah	9553977907
HOD, ECE	Dr. M.A. Kadar Baba	9493402668
HOD, EEE	Dr. P. Ramesh	9502941951
HOD, ME	Dr. G. Janardhana Raju	9885294437
TPO	Mr. K. Sreekanth	9985930301
I/C of Examinations	Mr. T. Pavan Kumar (Faculty In-charge)	9866754820
	Mr. P. Shylender (Exam Superintendent)	9885294439

*** Contact in case of urgency only**

XIII. 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.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.TECH. COURSE STRUCTURE (2018-19)
ECE

I YEAR I SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	MA101BS	Mathematics-I	3	1	0	4
2	AP102BS	Applied Physics	3	1	0	4
3	CS103ES	Programming for Problem Solving	3	1	0	4
4	ME104ES	Engineering Graphics	1	0	4	3
5	AP105BS	Applied Physics Lab	0	0	3	1.5
6	CS106ES	Programming for Problem Solving Lab	0	0	3	1.5
7	*MC109ES	Environmental Science	3	0	0	0
		Induction Programme				
		Total Credits	13	3	10	18

I YEAR II SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	MA201BS	Mathematics-II	3	1	0	4
2	CH202BS	Chemistry	3	1	0	4
3	EE203ES	Basic Electrical Engineering	3	0	0	3
4	ME205ES	Engineering Workshop	1	0	3	2.5
5	EN205HS	English	2	0	0	2
6	CH206BS	Engineering Chemistry Lab	0	0	3	1.5
7	EN207HS	English Language and Communication Skills Lab	0	0	2	1
8	EE208ES	Basic Electrical Engineering Lab	0	0	2	1
		Total Credits	12	2	10	19

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech COURSE STRUCTURE (2018-19)

(Common for CSE & EEE)

I YEAR I SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	MA101BS	Mathematics-I	3	1	0	4
2	CH102BS	Chemistry	3	1	0	4
3	EE103ES	Basic Electrical Engineering	3	0	0	3
4	ME105ES	Engineering Workshop	1	0	3	2.5
5	EN105HS	English	2	0	0	2
6	CH106BS	Engineering Chemistry Lab	0	0	3	1.5
7	EN107HS	English Language Communication Skills Lab	0	0	2	1
8	EE108ES	Basic Electrical Engineering Lab	0	0	2	1
9	MC109ES	Environmental Science	3	0	0	0
		Induction Programme				
Total Credits			15	2	10	19

I YEAR II SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	MA201BS	Mathematics-II	3	1	0	4
2	AP202BS	Applied Physics	3	1	0	4
3	CS203ES	Programming for Problem Solving	3	1	0	4
4	ME204ES	Engineering Graphics	1	0	4	3
5	AP205BS	Applied Physics Lab	0	0	3	1.5
6	CS206ES	Programming for Problem Solving Lab	0	0	3	1.5
		Total Credits	10	3	10	18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech COURSE STRUCTURE (2018-19)

(Common for Civil & Mech)

I YEAR I SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	MA101BS	Mathematics-I	3	1	0	4
2	PH102BS	Engineering Physics	3	1	0	4
3	CS103ES	Programming for Problem Solving	3	1	0	4
4	ME104ES	Engineering Graphics	1	0	4	3
5	PH105BS	Engineering Physics Lab	0	0	3	1.5
6	CS106ES	Programming for Problem Solving Lab	0	0	3	1.5
7	*MC109ES	Environmental Science	3	0	0	0
		Induction Programme				
		Total Credits	13	3	10	18

I YEAR II SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	MA201BS	Mathematics-II	3	1	0	4
2	CH202BS	Chemistry	3	1	0	4
3	ME203ES	Engineering Mechanics	3	1	0	4
4	ME205ES	Engineering Workshop	1	0	3	2.5
5	EN205HS	English	2	0	0	2
6	CH206BS	Engineering Chemistry Lab	0	0	3	1.5
7	EN207HS	English Language and Communication Skills Lab	0	0	2	1
		Total Credits	12	3	8	19

MATHEMATICS - I

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.
- Concept of Sequence.
- Concept of nature of the series.
- 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.

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 analyse the solution of the system of equations
- Find the Eigen values and Eigen vectors
- Reduce the quadratic form to canonical form using orthogonal transformations.
- Analyse the nature of sequence and series.
- 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.

UNIT-I: Matrices

Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; orthogonal matrices; Unitary 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. Gauss elimination method; Gauss Seidel Iteration Method.

UNIT-II: Eigen values and Eigen vectors

Linear Transformation and Orthogonal Transformation: Eigen values and 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: Sequences & Series

Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences. Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test; Raabe's test; Cauchy's Integral test; Cauchy's root test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

UNIT-IV: 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. 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-V: Multivariable calculus (Partial Differentiation and applications)

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

TEXTBOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

REFERENCES:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

ASSIGNMENT QUESTIONS

UNIT-I MATRICES

Short Answer Questions:-

1. Define orthogonal matrix and give example.
2. Prove that inverse of an orthogonal matrix is orthogonal.
3. If A,B are orthogonal matrices, each of order 'n' then AB and BA are orthogonal matrices.
4. Find the value of k such that rank of $\begin{bmatrix} 1 & 2 & 3 \\ 2 & k & 7 \\ 3 & 6 & 10 \end{bmatrix}$ is '2'.
5. Define HERMITIAN and SKEW- HERMITIAN matrices.
6. Define UNITARY matrix and give example.
7. Prove that $\frac{1}{2} \begin{pmatrix} 1+i & -1+i \\ 1+i & 1-i \end{pmatrix}$ is a unitary matrix.
8. If 'A' is Hermitian matrix prove that 'iA' is a Skew- Hermitian matrix
9. What do you mean by system of consistency and inconsistency.
10. Find the value of x such that A is singular where $A = \begin{bmatrix} 3-x & 2 & 32 \\ 2 & 4-x & 1 \\ -2 & -4 & -(1+x) \end{bmatrix}$
11. Prove that the matrix $\frac{1}{3} \begin{bmatrix} -1 & 2 & 2 \\ 2 & -1 & 2 \\ 2 & 6 & -1 \end{bmatrix}$ is orthogonal.
12. If A is Hermitian matrix and B is a Skew Hermitian matrix, prove that (B+IA) is Skew-Hermitian. DEC-2018
13. If A is orthogonal matrix, prove that A^T and A^{-1} are also orthogonal. MAY-2019
14. State the conditions when the system of non homogenous equations $AX=B$ will have
i) unique solution ii) infinite solution iii) no solution MAY-2019
15. Prove that the transpose of unitary matrix is unitary DEC-2018

Long Answer Questions:-

1. Reduce the matrix 'A' to its normal form where $A = \begin{bmatrix} 0 & 1 & 2-2 \\ 4 & 0 & 2 & 6 \\ 2 & 1 & 3 & 1 \end{bmatrix}$ and hence find its Rank.
2. Find the rank of the matrix $A = \begin{bmatrix} 2 & -2 & 0 & 6 \\ 4 & 2 & 0 & 2 \\ 1 & -1 & 0 & 3 \\ 1 & -2 & 1 & 2 \end{bmatrix}$ by reducing into Echelon form and hence find its Rank.
3. Express the matrix $\begin{bmatrix} 1+i & 2 & 5-5i \\ 2i & 2+i & 4+2i \\ -1+i & -4 & 7 \end{bmatrix}$ as the sum of Hermitian and skew- Hermitian Matrices.

4. Find the inverse of a matrix by using Gauss-Jordan method $\begin{bmatrix} -1 & -3 & 3 & 1 \\ 1 & 1 & -1 & 0 \\ 2 & -5 & 2 & -3 \\ -1 & 1 & 0 & 1 \end{bmatrix}$
- 5.. Using Gauss-Jordan method, solve the system of non-homogeneous linear equations $x+y+z=9$, $2x-3y+4z=13$ and $3x+4y+5z=40$.
6. 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.
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. Test whether the equations are consistent, and if so solve them by Gauss- elimination method. $x + y + z + t = 0$, $x + y + z - t = 4$, $x + y - z + t = -4$, $x - y + z + t = 2$.
9. Solve the system of equations, using Gauss- seidal method.
 $5x + 3y + 7z = 4$, $3x + 26y + 2z = 9$, $7x + 2y + 10z = 5$.
10. Solve the equations $x + 2y + 3z = 0$, $3x + 4y + 4z = 0$, $7x + 10y + 12z = 0$ for non-trivial solutions.
11. Using Gauss Seidel method solve $25x+2y+2z=69, 2x+10y+z=63, x+y+z=43$ MAY-2019
12. Solve the system of equations $x-y+2z=4, 3x+y+4z=6, x+y+z=1$ using Gauss elimination method.
MAY-2019
13. Solve the equations $x+y+z=6; 3x+3y+4z=20; 2x+y+3z=13$ using Gauss elimination method
DEC-2018.
14. Solve the system of equations $20x+y-2z=17; 3x+20y-z=-18; 2x-3y+20z=25$ DEC-2018
15. Find the rank of the matrix $\begin{bmatrix} -1 & -3 & 3 & 1 \\ 1 & 1 & -1 & 0 \\ 2 & -5 & 2 & -3 \\ -1 & 1 & 0 & 1 \end{bmatrix}$ by reducing it to Normal form. DEC2018

UNIT-II

EIGEN VALUES AND EIGEN VECTORS

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. Define modal and spectral matrices.
5. Explain Algebraic and Geometric multiplicity of a characteristic root.
6. The Eigen values of areal symmetric matrix are real.
7. Prove that if 'λ' is an Eigen value of a non-singular matrix A, then $\frac{|A|}{\lambda}$ IS an Eigen value of matrix Adj A.
8. Show that the Eigen values of a unitary matrix are of unit modulus.
9. Prove that if λ is an Eigen value of the matrix A then λ +K is an Eigen value of the matrix A+KI.
10. Prove that a square matrix 'A' and its transpose A^T have the same Eigen values.
11. Prove that if $\lambda_1, \lambda_2, \lambda_3, \dots, \lambda_n$ are the latent roots of 'A' then $\lambda_1^n, \lambda_2^n, \lambda_3^n, \dots, \lambda_n^n$ are the latent roots of A^n
12. Prove that for a real symmetric matrix, the Eigen vectors corresponding to two distinct Eigen values are orthogonal.
13. State Cayley- Hamilton theorem.
14. Find the sum and product of the Eigen values of $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 3 \\ 3 & 1 & 1 \end{bmatrix}$
15. Explain Linear transformation and orthogonal transformation of a quadratic form.
16. Prove that the sum of the Eigen values of a matrix is equal to its trace and product of the Eigen values is equal to its determinant.
17. Find the Eigen values of the matrix $\begin{bmatrix} 3i & 2 + 3i \\ -2 + i & -i \end{bmatrix}$.
18. Suppose A and P are the square matrices of order n such that P is non-singular. Then show that A and $P^{-1}AP$ have the same Eigen values.
19. Let A be a square matrix of order 3 with Eigen values 2,2, and 3 and A is diagonalizable Then find rank of (A-2I). DEC-2018
20. Find the Eigen values of A^2 if $A = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$ MAY-2019
21. Find the Eigen values of the matrix $A = \begin{bmatrix} 1 & 2 & 2 \\ 0 & 2 & 1 \\ -1 & 2 & 2 \end{bmatrix}$ DEC-2018
22. Prove that Eigen values of a Skew- Hermitian matrix are either zero or purely imaginary.

Long Answer Questions:-

1. Determine the Eigen values and Eigen vectors of the matrix $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$
2. Verify Cayley Hamilton theorem for the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}$

3. By Cayley Hamilton theorem, find the inverse of the matrix $\begin{bmatrix} 3 & 1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$
4. Determine the eigen values and eigen vectors of $B = 2A^2 - \frac{1}{2}A + 3I$ where $A = \begin{bmatrix} 8 & -4 \\ 2 & 2 \end{bmatrix}$
5. Obtain the Eigen values and their corresponding linearly independent Eigen vectors of the matrix $\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$
6. Reduce the quadratic form $2x_1x_2 + 2x_1x_3 + 2x_2x_3$ to canonical form and find its signature and nature.
7. Determine a non-singular matrix P such that P^TAP is a diagonal matrix, where $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 0 & 3 \\ 2 & 3 & 0 \end{bmatrix}$
8. Explain the method to reduce the Quadratic to canonical form by (i).Diagonalization (ii) Orthogonal Transformation.
9. Reduce the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ to diagonal form and interpret the result in terms of quadratic form.
10. Find the nature of the quadratic form, index, signature and rank of $10x^2 + 2y^2 + 5z^2 - 4xy - 10xz + 6yz$.
11. Determine the modal matrix for $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ and hence diagonalize the matrix.
12. Determine the Eigen values and Eigen vectors of $B = 2A^2 - \frac{1}{2}A + 3I$ where $A = \begin{bmatrix} 8 & -4 \\ 2 & 2 \end{bmatrix}$
13. Find the characteristic polynomial of the matrix 'A' verify Cayley-Hamilton theorem and hence find A^{-1} and A^4 . Where $A = \begin{bmatrix} 3 & 1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$
14. Diagonalize the matrix $\begin{bmatrix} 2 & 2 & -7 \\ 2 & 1 & 2 \\ 2 & -1 & 3 \end{bmatrix}$ by similarity transformation and hence find A^4
15. Reduce the Quadratic form $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2xy$ to the canonical form by orthogonal transformation.
16. Find the Eigen values and Eigen vectors of $\begin{bmatrix} 2 & 1 & -1 \\ 1 & 1 & -2 \\ -1 & -2 & 1 \end{bmatrix}$ MAY-2019

17. Find the Eigen values and Eigen vectors of $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ MAY-2019

18. Find the nature of the quadratic form $10x^2 + 2y^2 + 5z^2 - 4xy - 10xz + 6yz$ DEC-2018

19. Reduce the quadratic form $5x^2 + 26y^2 + 10z^2 + 4yz + 14zx + 6xy$ DEC-2018

20. Let A be a 3x3 matrix over R such that $\det(A)=6$ and $\text{tr}(A)=0$. If $\det(A+I)=0$ where I is the identity matrix of order 3, then find the Eigen values of A. DEC-2018

Unit-III: Sequences and Series

SAQ

1. Define limit, convergence, divergence of a Sequence.
2. Define Oscillatory sequence.
3. Define convergence, divergence of a Series.
4. Define Alternating series.
5. Define conditional and absolute convergence of a series.
6. State Cauchy's root test. DEC-2018
7. Test for convergence $\sum_{n=1}^{\infty} \frac{\sqrt{n}}{n^2+1}$ DEC-2018
8. State Leibnitz's test .MAY-2019
9. State Cauchy's integral test. MAY-2019

LAQ:

1. Test whether the series $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}+\sqrt{n+1}}$ is convergent.
2. Determine the convergence or divergence of series $\frac{1}{1.2.3} + \frac{x}{4.5.6} + \frac{x^2}{7.8.9} + \dots$
3. Examine the convergence of the series $1 + \frac{3}{7}x + \frac{3.6}{7.10}x^2 + \frac{3.6.9}{7.10.13}x^3 + \dots; x > 0$
4. Examine the convergence of the series $\sum_{n=1}^{\infty} \frac{[(n+1)x]^n}{n^{n+1}}$
5. Apply integral test to test the convergence of the series $\sum_{n=2}^{\infty} \frac{1}{n^2} \sin\left(\frac{\pi}{n}\right)$
6. Test for convergence $\sum_{n=2}^{\infty} \frac{(-1)^{n-1}}{\sqrt{n(n+1)(n+2)}}$
7. Show that $1 - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots$ is absolutely convergent.
8. Discuss the convergence of the series $\frac{1}{2\sqrt{1}} + \frac{x^2}{3\sqrt{2}} + \frac{x^4}{4\sqrt{3}} + \frac{x^6}{5\sqrt{4}} + \dots$
9. Test the convergence of the series $\sum \frac{(2n+1)}{n^3+1} x^n, x > 0$
10. Find the interval of convergence of the series $x + \frac{1}{2} \cdot \frac{x^3}{3} + \frac{1}{2} \cdot \frac{3x^5}{4} + \frac{1}{2} \cdot \frac{3}{4} \cdot \frac{5}{6} \cdot \frac{x^7}{7} + \dots$
11. Does the series $\sum_0^{\infty} \frac{(-1)^n}{\sqrt{n^2+1}}$ converge absolutely, conditionally or diverge? MAY-2019
12. Find the radius of convergence of the series $\sum_{n=0}^{\infty} \frac{n^3 x^3}{n^4+1}$ MAY-2019
13. Test the convergence of the series $1 + \frac{x}{2} + \frac{2!}{3^2} x^2 + \frac{3!}{4^3} x^3 + \dots$ DEC-2018
14. Examine the following series for convergence $\sum \frac{(-1)^{n-1} \sin nx}{n^3}$ DEC-2018

15. Test for the convergence of the series $\sum \frac{x^n}{(2n)!}$ DEC-2018
16. Examine for absolute convergence the series $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots$ DEC-2018

UNIT-IV: CALCULUS

SAQ:

1. State Rolle's Theorem and its geometrical interpretation. (may2019)
2. State Lagrange's Mean value theorem and its geometrical interpretation.
3. State Cauchy's Mean value theorem and its geometrical interpretation.
4. Find the value of $\Gamma(-\frac{1}{2})$. (dec2018)
5. Prove that $B(m, n) = B(n, m)$.
6. $B(m, n) = 2 \int_0^{\frac{\pi}{2}} \sin^{2m-1} \theta \cos^{2n-1} \theta d\theta$
7. Show that $\int_0^{\infty} e^{-x^3} x^7 dx$. (may2019)
8. Evaluate $\int_0^1 \frac{dx}{\sqrt{-\log x}}$
9. Evaluate $\int_0^1 x^5 (1-x)^3 dx$
10. Evaluate the improper integral $\int_0^{\infty} \sqrt{x} e^{-x^2} dx$ using Gamma function.

LAQ

1. Verify the Rolle's theorem for the function $f(x) = \frac{\sin x}{e^x} \ln(0, \pi)$
2. 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.
3. Verify Cauchy's mean value theorem for the function e^x and e^{-x} in the interval (a,b). (may2018).
4. Find the surface area of the solid generated by revolving the loop of the curve $9y^2 = x(x-3)^2$ (dec 2018)
5. Show that $\frac{\tan x}{x} > \frac{x}{\sin x}$, $0 < x < \frac{\pi}{2}$. (Dec 2018)
6. Find the volume of the solid that results when the region enclosed by the curves $xy=1$ x-axis and $x=1$ rotated about x-axis. (Dec 2018)
7. Expand $\tan^{-1} x$ in powers of $(x-1)$ using Maclaurin's theorem. (May 2019)
8. Show that $|\cos b - \cos a| \leq |b-a|$. (may2019)
9. Using Beta and Gamma functions, evaluate the integral $\int_0^{\infty} x^4 e^{-x^2} dx$. (Dec 2018)
10. If m and n are positive integers then prove that $B(m, n) = \frac{(m-1)!(n-1)!}{(m+n-1)!}$.
11. Evaluate $\int_0^{\pi} x \sin^7 x \cos^4 x dx$ using Beta and Gamma functions.
12. Prove that $\int_0^{\frac{\pi}{2}} \frac{d\theta}{\sqrt{1-\frac{1}{2}\sin^2 \theta}} = \frac{[\Gamma(\frac{1}{4})]^2}{4\sqrt{\pi}}$

UNIT-V: Multivariable calculus (Partial Differentiation and applications)

SAQ:

1. Define and limit and continuity of a function of two variables.
2. State Euler's theorem for function of two variables. (may 2019)
3. Verify Euler's theorem for $z = ax^2 + 2hxy + by^2$
4. Verify Euler's theorem for the function $xy + yz + zx$. (dec 2018)
5. If $u^3 + xv^2 - uy = 0$, $u^2 + xyv + v^2 = 0$ find $\frac{\partial u}{\partial x}$, $\frac{\partial v}{\partial x}$.
6. State the three properties of Jacobian.
7. If $x = u(1+v)$, $y = v(1+u)$ then prove that $\frac{\partial(x,y)}{\partial(u,v)} = 1+u+v$.
8. If $u = x^2 - y^2$, $v = 2xy$ where $x = r\cos\theta$, $y = r\sin\theta$ show that $\frac{\partial(u,v)}{\partial(r,\theta)} = 4r^3$.
9. Find $\frac{\partial(u,v)}{\partial(x,y)}$ if $u = e^x$, $v = e^y$
10. Verify $u=2x-y+3z$, $v=2x-y-z$, $w=2x-y+z$ are functionally dependent and if so, find the relation between them.

LAQ:

1. If $\sin^{-1} \frac{x}{y} + \cos^{-1} \frac{y}{x}$, show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 0$. (dec 2018)
2. If $u=f(r)$ and $x = r\cos\theta$, $y = r\sin\theta$ prove that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = f''(r) + \frac{1}{r} f'(r)$
3. If $x + y + z = u$, $y + z = uv$, $z = uvw$ show that $\frac{\partial(x,y,z)}{\partial(u,v,w)}$. (may 2019)
4. If $x = uv$, $y = \frac{u+v}{u-v}$ determine $\frac{\partial(u,v)}{\partial(x,y)}$. (dec 2018)
5. Show that the following functions are functionally dependent and hence find the relation between them $u = \sin^{-1} x + \sin^{-1} y$, $v = x\sqrt{1-y^2} + y\sqrt{1-x^2}$.
6. A rectangular box open at the top is to have volume of 32 cubic ft. Find the dimensions of the box requiring least material for its construction.
7. If $u = x + y + z$, $v = x - y + z$, $w = x^2 + y^2 + z^2 - 2yz$, show that Functions are functionally dependent. (dec 2018)
8. 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 $x^2+y^2+z^2=1$. (dec 2018)
9. Find the maximum value of $u = x^2y^3z^4$ if $2x + 3y + 4z = a$.
10. Find the dimensions of the rectangular parallelepiped box open at the top of maximum capacity whose surface area is 256 sq.cm.
11. If $u = \log \left(\frac{x^2+y^2}{x+y} \right)$ then prove that $xu_x + yu_y = 1$. (may 2019)
12. Find the maximum $x^2 + y^2 + z^2$ such that $2x+3y+z=14$ using Lagrange's multiplier method. (may 2019)

R18

Code No: 151AA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year I Semester Examinations, May/June - 2019

MATHEMATICS-I

(Common to CE, EEE, ME, ECE, CSE, EIE, IT MCT, MMT, AE, MIE, PTM)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

- 1.a) If A is orthogonal matrix, prove that A^T and A^{-1} are also orthogonal. [2]
- b) Find the Eigen values of A^2 , if $A = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$. [2]
- c) State Cauchy's integral test. [2]
- d) State Rolle's theorem. [2]
- e) State Euler's theorem for homogeneous function in x and y . [2]
- f) State the conditions when the system of non homogenous equations $AX=B$ will have
i) unique solution ii) Infinite no of solutions iii) No solution. [3]
- g) Prove that the Eigen values of a skew- Hermitian matrix are purely imaginary or zero. [3]
- h) State Leibnitz test. [3]
- i) Evaluate $\int_0^1 e^{x^2} x^7 dx$. [3]
- j) Find $\frac{\partial(u, v, w)}{\partial(x, y, z)}$, if $u = x + y + z, v = x + y$ and $z = z$. [3]

PART- B

(50 Marks)

2. Using Gauss Seidel method solve $25x + 2y + 2z = 69, 2x + 10y + z = 63, x + y + z = 43$. [10]

OR

3. Solve the system of equations $x - y + 2z = 4, 3x + y + 4z = 6, x + y + z = 1$ using Gauss elimination method. [10]

4. Find Eigen values and Eigen vectors of $\begin{bmatrix} 2 & 1 & -1 \\ 1 & 1 & -2 \\ -1 & -2 & 1 \end{bmatrix}$. [10]

OR

5. Find Eigen values and Eigen vectors of $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$. [10]

6.a) Test the convergence of the series $\sum_{n=0}^{\infty} \frac{n!(n+1)!}{(3n)!}$.

b) Find the radius of convergence of the series $\sum_{n=0}^{\infty} \frac{n^3 x^{3n}}{n^4 + 1}$. [5+5]

OR

7. Does the series $\sum_{n=0}^{\infty} \frac{(-1)^n}{\sqrt{n^2 + 1}}$ converge absolutely, conditionally or diverge? [10]

8.a) Expand $\tan^{-1} x$ in powers of $(x-1)$ using Maclaurin's theorem.

b) Find the volume of the solid that results when the region enclosed by the curves $xy = 1$, x -axis and $x = 1$ rotated about x -axis. [5+5]

OR

9.a) Verify Cauchy mean value theorem for the functions e^x and e^{-x} in the interval (a, b) .

b) Evaluate $\int_0^{\infty} x^4 e^{-x^2} dx$ Beta and Gamma. [5+5]

10.a) If $u = \log\left(\frac{x^2 + y^2}{x + y}\right)$ prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 1$.

b) If $x + y + z = u$, $y + z = uv$, $z = uvw$, then evaluate $\frac{\partial(x, y, z)}{\partial(u, v, w)}$. [5+5]

OR

11.a) Show that $U = x^2 e^{-y} \cosh z$, $V = x^2 e^{-y} \sinh z$, $w = x^2 + y^2 + z^2 - xy - yz - zx$ are functionally dependent. If dependent find the relationship between them.

b) Find the maximum of $x^2 + y^2 + z^2$ such that $2x + 3y + z = 14$ using Lagrange's multiplier method. [5+5]

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CHEMISTRY

Course Objectives:

- To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.
- To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.
- To acquire the knowledge of electrochemistry, corrosion and water treatment which are essential for the Engineers and in industry.
- To acquire the skills pertaining to spectroscopy and to apply them for medical and other fields.
- To impart the knowledge of stereochemistry and synthetic aspects useful for understanding reaction pathways

Course Outcomes: The basic concepts included in this course will help the student to gain:

- The knowledge of atomic, molecular and electronic changes, band theory related to conductivity.
- The required principles and concepts of electrochemistry, corrosion and in understanding the problem of water and its treatments.
- The required skills to get clear concepts on basic spectroscopy and application to medical and other fields.
- The knowledge of configurational and conformational analysis of molecules and reaction mechanisms.

Syllabus:

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 N₂, O₂ and F₂ 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, Octahedral and square planar geometries. Band structure of solids and effect of doping on conductance.

Unit - II: Water and its treatment: Introduction – hardness of water – Causes of hardness - Types of hardness: temporary and permanent – expression and units of hardness – Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination and ozonation. Boiler feed water and its treatment – Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water – Ion exchange process. Desalination of water – Reverse osmosis. Numerical problems.

Unit - III: Electrochemistry and corrosion: Electro chemical cells – electrode potential, standard electrode potential, types of electrodes – calomel, Quinhydrone and glass electrode. Nernst equation Determination of pH of a solution by using quinhydrone and glass electrode. Electrochemical series and its applications. Numerical problems. Potentiometric titrations. Batteries – Primary (Lithium cell) and secondary batteries (Lead – acid storage battery and

Lithium ion battery).

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 cathodic methods. Surface coatings – metallic coatings – methods of application. Electroless plating of Nickel.

Unit - IV: Stereochemistry, Reaction Mechanism and synthesis of drug molecules: Introduction to representation of 3-dimensional structures, Structural and stereoisomers, configurations, symmetry and chirality. Enantiomers, diastereomers, optical activity and Absolute configuration. Conformation analysis of n-butane. Substitution reactions: Nucleophilic substitution reactions: Mechanism of SN₁, SN₂ reactions. Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff and anti Markownikoff's additions. Grignard additions on carbonyl compounds. Elimination reactions: Dehydro halogenation of alkylhalides. Saytzeff rule. Oxidation reactions: Oxidation of alcohols using KMnO₄ and chromic acid. Reduction reactions: reduction of carbonyl compounds using LiAlH₄ & NaBH₄. Hydroboration of olefins. Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

Unit - V: Spectroscopic techniques and applications: Principles of spectroscopy, selection rules and applications of electronic spectroscopy. vibrational and rotational spectroscopy. Basic concepts of Nuclear magnetic resonance Spectroscopy, chemical shift. Introduction to Magnetic resonance imaging.

Suggested Text Books:

1. Physical Chemistry, by P.W. Atkins
2. Engineering Chemistry by P.C.Jain & M.Jain; Dhanpat Rai Publishing Company (P) Ltd., New Delhi.
3. Fundamentals of Molecular Spectroscopy, by C.N. Banwell
4. Organic Chemistry: Structure and Function by K.P.C. Volhardt and N.E.Schore, 5th Edition.
5. University Chemistry, by B.M. Mahan, Pearson IV Edition.
6. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishnan

ASSIGNMENT QUESTIONS

CHEMISTRY	
UNIT – I	
LONG ANSWER QUESTIONS	
1	a) Explain the bond order of Nitrogen Molecule. (May/June 2019) b) Discuss briefly Molecular Orbital Theory. (May/June 2019) c) Mention the difference between Atomic & Molecular orbitals. .(Dec 2018)
2	Explain energy level diagram of F ₂ molecule.

3	a) Explain about Crystal field theory. (Dec 2018) b) Give the crystal field splitting pattern of d orbitals in Octahedral geometry. (May/June 2019)
4	a) Explain band theory of solids. b) Explain the effect of doping on conductance.
5	Draw neatly the pi molecular orbitals of butadiene and benzene. (May 2019)
SHORT ANSWER QUESTIONS	
1	Differentiate bonding and antibonding molecular orbitals.
2	Write the molecular orbital electronic configuration of N ₂ molecule.
3	Define CFSE. Calculate CFSE for the following complexes: Ni(CO) ₄ , [Fe(CN) ₆] ⁴⁻ , [CoF ₆] ³⁻ and [CuCl ₄] ²⁻ .
4	Draw the Crystal field splitting diagram for [FeF ₆] ³⁻ and [Fe(CN) ₆] ³⁻
5	What is meant by Linear Combination of Atomic Orbitals?
6	What is Band structure of solids.
7	The complex ion [Co(NH ₃) ₆] ³⁺ is octahedral but diamagnetic, while complex ion [CoF ₆] ³⁻ is also octahedral but paramagnetic. Give reason
8	Draw the crystal field splitting diagram in square planar complexes.
UNIT – II	
LONG ANSWER QUESTIONS	
1	Calculate the temporary, permanent and total hardness of a water sample containing the following impurities in mg/lit: Ca(HCO ₃) ₂ = 4.86, Mg(HCO ₃) ₂ = 5.84, MgSO ₄ = 8.4, CaSO ₄ = 6.8. (Dec 2017)
2	a) Explain ion exchange method of purification of hard water. (Dec 2017, June 2017, Aug 2017, May 2019) b) Give the steps involved in treatment of Domestic water. (May 2019)
3	What are the types of hardness? Explain the estimation of hardness of water by EDTA complexometric method.
4	a) Illustrate the break point chlorination. b) Describe how water is softened by internal treatment.
5	a) Explain how Brackish water can be desalinated by Reverse Osmosis Method with the help of Diagram. (May 2019) b) Explain the treatment of water by Chlorination and ozonisation. (May 2017)
SHORT ANSWER QUESTIONS	
1	Describe Calgon conditioning method shortly. (Aug 2017)
2	Why do you express hardness of water in CaCO ₃ equivalence. (December 2018)
3	Write the structure of EDTA and mention the importance of Buffer solution.
4	Briefly explain the ozonisation of water.
5	What is hard water? What are the salts that cause hardness? (June 2017)
6	What are the specifications of potable water? (Aug 2017)
7	How are the salts from sea water removed?

8	Differentiate temporary and permanent hardness.
UNIT- III	
LONG ANSWER QUESTIONS	
1	a) What is electrochemical series? Give its five applications.(May/June 2019) b) Define electrode Potential. What is Nernst Equation? What are its applications?(Dec 2017, May 2017)
2	a) Describe the construction and working of standard calomel electrode. .(May/June 2019) b) What is Corrosion? Explain the theory of Chemical corrosion. .(May/June 2019)
3	a) Describe the working principle of lead acid battery with discharging, recharging cell reactions. b) What are ion selective electrodes? Write the working principle and application of glass electrode.
4	Define corrosion of metals. What are different types of corrosion? Explain the mechanism of electrochemical theory of wet corrosion.
5	Explain how corrosion can be minimized by cathodic protection, hot dipping, metal cladding and electro less plating.
SHORT ANSWER QUESTIONS	
1	Write the Nernst equation and mention its importance. (May 2017)
2	Differentiate primary and secondary cells. (May 2017)
3	Salt bridge is not required in lead acid storage cell explain.(Dec 2018)
4	Write the reactions in the working of Li ion primary and secondary battery.
5	What is the role of salt bridge in the constitution of an electrochemical cell?(Dec 2017)
6	What are the various factors affecting the rate of corrosion. Explain in brief.
7	What is dry corrosion? State Pilling-Bedworth rule.
8	Corrosion of water filled steel tanks occur below the waterline. Give reason.
9	Give reasons for the following. a) Wire mesh corrodes faster at the joints. b) Impure metal corrodes faster than pure metal under identical conditions. c) Why Small anodic areas undergoes corrosion. (May/June 2019)
UNIT –IV	
LONG ANSWER QUESTIONS	
1	a) Explain the Nucleophilic substitution reaction mechanism. (May/June 2019) b) Write the possible Optical isomers in Tartaric acid. c) Discuss oxidation mechanism of alcohols using KMnO_4
2	Explain the following reactions of Carbonyl compounds: i) Grignards Addition, ii) Reduction using LiAlH_4 and NaBH_4 .
3	Explain the mechanism of dehydro halogenation of alkyl halides.(May/June 2019)

	b) Describe the conformational isomers of n-butane.
4	What is Isomerism? How it is classified? Explain with suitable examples.(Dec.2018)
5	Explain the synthesis and applications of Paracetamol.
SHORT ANSWER QUESTIONS	
1	How enantiomers differs from diastereomers.(Dec.2018)
2	What are elimination reactions?
3	What is optical activity and how it is measured? Write the optical isomers of Lactic acid.
4	Define electrophile, nucleophile, carbonium ion, carbanion and free radical.
5	What are the different types of organic reactions in organic chemistry? Give one example for each.
6	State Markownikoff and anti-Markownikoff rule.
7	What is specific rotation? .(May/June 2019)
8	Differentiate Electrophilic and Nucleophilic addition reactions.
9	Write the reaction involved in the addition of HBr to Propene in presence of Peroxide.
UNIT- V	
LONG ANSWER QUESTIONS	
1	a)Describe various modes of electronic transitions when a molecule absorbes in UV/Visible region. (May 2019) b)Explain the principle involved in NMR spectroscopy. (May 2019) c) Why Methane does not absorbs IR energy (May 2019)
2	Write a note on chemical shift. (May 2019) b)Give an account of various fundamental vibrations. (May 2019)
3	a)What is ment by shielding & deshielding of a proton nucleous. b) Explain the principles of UV spectroscopy. . (May/June 2019) c) Explain the applications of IR spectroscopy. (May/June 2019)
4	What is magnetic resonance imaging? Explain the procedure for getting an image in MRI and list out its applications.
SHORT ANSWER QUESTIONS	
1	Give reason why O ₁₆ ,O ₁₈ ,C ₁₂ do not exhibit NMR Spectrum. (Dec.2018)
2	How many fundamental vibrations are possible in HCN,CH ₄
3	What is Nuclear Magnetic Resonance? .(May/June 2019)
4	List out various rules in the interpretation of H ¹ NMR spectra
5	What is meant by electronic spectroscopy? List out its applications.
6	What are various types of energy present in molecules?

Code No: 152AB

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year II Semester Examinations, May - 2019

CHEMISTRY

(Common to CE, ME, ECE, EIE, MCT, MMT, AE, MIE, PTM)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

(25 Marks)

- 1.a) What are the differences between atomic and molecular orbitals? [2]
- b) What is Calgon? Write the reaction involved in Calgon conditioning. [2]
- c) Define standard electrode potentials. [2]
- d) Write the reaction involved in the addition of HBr to Propene in the presence of peroxide. [2]
- e) Explain why CO₂ is IR active. [2]
- f) What do you understand by Linear combination of atomic orbitals? [3]
- g) What is the significance of breakpoint chlorination in the treatment of municipal water? [3]
- h) Why galvanised sheets are not advised in making utensils? [3]
- i) Define Enantiomers, and give example. [3]
- j) Give any two selection rules for rotational spectroscopy. [3]

PART-B

(50 Marks)

- 2.a) Draw the molecular orbital diagram O₂ molecule and predict the magnetic behaviour of it.
 - b) Discuss the salient features of Crystal field theory and explain the crystal field splitting of transition metal ion d-orbitals in square planar geometries. [5+5]
- OR
- 3.a) Explain the band structure of solids. Discuss how the doping influences the conductance of them.
 - b) Draw neatly, the molecular orbital diagrams of Butadiens and Benzene. [5+5]
- 4.a) Explain how brackish water can be desalinated by reverse osmosis method with the help of a diagram.
 - b) A sample of water on analysis contains 4.2 mg/L of magnesium bicarbonate, 12.0 mg/L of magnesium sulphate, 16.2 mg/L of calcium bicarbonate, 22 mg/L of calcium chloride and 13.6 mg/L of calcium sulphate. Calculate the total, permanent and temporary hardness of the sample and express them in degree Clark and degree French. [5+5]
- OR
- 5.a) Explain Ion exchange method for softening water.
 - b) What are the specifications of potable water? [5+5]

- 6.a) What is electrochemical series? Explain its applications with suitable examples.
b) What is Cathodic protection? Explain sacrificial anode method? [5+5]
- OR**
- 7.a) How pH of a solution is determined by Glass electrode? Discuss.
b) Write a detailed note on electroless plating of Nickel. [5+5]
- 8.a) Explain the Markownikoff's rule with suitable example. Why this rule is failed during the addition of HBr in the presence of a peroxide?
b) Write the synthetic methods for Paracetamol and Aspirin. Give their pharmaceutical applications. [5+5]
- OR**
- 9.a) What are Conformational isomers? Discuss them with special reference to n-Butane. Give the potential energy diagram for the conformers.
b) Explain the mechanism of S_N1 and S_N2 reactions. [5+5]
- 10.a) Describe various modes of electronic transitions when a molecule absorbs in UV-Visible region.
b) Explain the principle involved in NMR spectroscopy. [5+5]
- OR**
- 11.a) Write a note on Chemical Shift.
b) Give an account of various fundamental vibrations. [5+5]

ENGINEERING PHYSICS

Course Objectives:

- The course aims at making students to understand the basic concepts of Principles of Physics in a broader sense with a view to lay foundation for the various engineering courses.
- Students will be able to demonstrate competency and understanding of the concepts found in Mechanics, Harmonic Oscillations, Waves in one dimension, wave Optics, Lasers, Fiber Optics and a broad base of knowledge in physics.
- The main purpose of this course is to equip engineering undergraduates with an understanding of the scientific method, so that they may use the training beneficially in their higher pursuits.
- Today the need is to stress principles rather than specific procedures, to select areas of contemporary interest rather than of past interest, and to condition the student to the atmosphere of change he will encounter during his carrier.

Course outcomes: Upon graduation, the graduates will have:

- The knowledge of Physics relevant to engineering is critical for converting ideas into technology.
- An understanding of Physics also helps engineers understand the working and limitations of existing devices and techniques, which eventually leads to new innovations and improvements.
- In the present course, the students can gain knowledge on the mechanism of physical bodies upon the action of forces on them, the generation, transmission and the detection of the waves, Optical Phenomena like Interference, diffraction, the principles of lasers and Fibre Optics.
- Various chapters establish a strong foundation on the different kinds of characters of several materials and pave a way for them to use in at various technical and engineering applications.

UNIT-I: Introduction to Mechanics

Transformation of scalars and vectors under Rotation transformation, Forces in Nature, Newton's laws and its completeness in describing particle motion, Form invariance of Newton's second law, Solving Newton's equations of motion in polar coordinates, Problems including constraints and friction, Extension to cylindrical and spherical coordinates.

UNIT-II: Harmonic Oscillations

Mechanical and electrical simple harmonic oscillators, Complex number notation and phasor representation of simple harmonic motion, Damped harmonic oscillator: heavy, critical and light damping, Energy decay in a damped harmonic oscillator, Quality factor, Mechanical and electrical oscillators, Mechanical and electrical impedance, Steady state motion of forced damped harmonic oscillator, Power observed by oscillator.

UNIT-III: Waves in one dimension

Transverse wave on a string , The wave equation on a string , Harmonic waves, Reflection and transmission of waves at a boundary, Impedance matching , Standing waves and their Eigen frequencies , Longitudinal waves and the wave equations for them, Acoustic waves and speed of sound, Standing sound waves.

UNIT-IV: Wave Optics

Huygen's principle, Superposition of waves and interference of light by wave front splitting and amplitude splitting, Young's double slit experiment, Newton's rings, Michelson's interferometer, Mach-Zehnder interferometer, Frunhofer diffraction from a single slit and circular aperture, Diffraction grating- resolving power.

UNIT-V: Lasers and Fibre Optics

Lasers: Introduction to interaction of radiation with matter, Coherence, Principle and working of Laser, Population inversion, Pumping, Types of Lasers: Ruby laser, Carbon dioxide (CO₂) laser, He-Ne laser, Applications of laser. Fibre Optics: Introduction, Optical fibre as a dielectric wave guide, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, Applications of optical fibres.

TEXT BOOKS:

1. Engineering Mechanics, 2nd ed.- MK Harbola, Cengage Learning
2. I. G. Main, "Vibrations and waves in physics", 3rd Edn, Cambridge University Press, 2018.
3. Ajoy Ghatak, "Optics", McGraw Hill Education, 2012

REFERENCES:

1. H. J. Pain, "The physics of vibrations and waves", Wiley, 2006
2. O. Svelto, "Principles of Lasers"
3. "Introduction to Mechanics", M.K. Verma, Universities Press

ASSIGNMENT QUESTIONS

Unit – I(Introduction to mechanics)			
Short Answer Questions			
1.	a) Write a short note on friction	(Dec-2018)	(2M)
	b) Explain the transformation of scalars.	(Dec-2018)	(3M)
	c) Define scalar under rotation with example.	(may 2019)	(3M)
	d) What difficulty you will get if you would like to derive the Newton equations of motion in polar coordinates ?	(may 2019)	(2M)
	e) What are the inertial and non-inertial frame of references? Explain.		(3M)
	f) Write a short note on forces in nature.		(3M)
	g) Two bodies 50 N and 30N are connected to the ends of a light inextensible string. The string is passing over a smooth pulley. Determine (i) acceleration (ii) tension		(2M)
	h) Write a short note on Newton laws of motion.		(3M)

Long Answer Questions	
2	a) Explain Newton's laws and their completeness in describing particle motion. b) Give an account of forces in nature. (Dec-2018) (5+5)
3	a) Explain the method of solving Newton's equations in polar coordinates b) Write a short note on cylindrical coordinates. (Dec-2018) (5+5)
4	a) Show the Newton's second law is invariant under Galilean transformation. b) A body of weight 200 N is just on the point of moving up the plane by a force of 40 N acting parallel and up the plane. Find co-efficient of friction if inclination of the plane is 15 degrees to horizontal. (May-2019) (5+5)
5	a) Explain transformation of scalar & vector under rotation transformation. b) Explain in detail about spherical polar coordinates.
6	a) Two blocks of masses m_1 and m_2 connected by a string are hanging on the sides of a frictionless pulley. Calculate their acceleration. The pulley and the string are considered to be mass less. b) A block of 5kg is put at the top of a 10kg block. They are then attached through a mass less and frictionless pulley to a mass M. The coefficient of friction between all surfaces for both static and dynamic friction is 0.5. What is the acceleration of mass M for $M=20\text{kg}$ and $M=40\text{kg}$ ($g=9.8\text{m/s}^2$)?
Unit – II(Harmonic oscillations)	
Short Answer Questions	
1.	a) Discuss about quality factor. (Dec-2018) (2M) b) Write the properties of Damped harmonic oscillator. (Dec-2018) (3M) c) What is angular S.H.M and give two examples of angular S.H.M. (May-2019) (2M) d) Represent the S.H.M in terms of complex number. (May-2019) (3M) e) What is the forced harmonic oscillator? Explain its characteristics. (3M) f) When the E string of a guitar of frequency 330 HZ is plucked, the sound intensity is decreased by a factor of 2 after 4 sec. Determine (i) the time decay, (ii) the quality factor and (iii) fractional energy loss per cycle. (3M) g) Explain the types of Damped harmonic oscillator (2M)
Long Answer Questions	
2	a) Compare working of mechanical and electrical harmonic oscillators. b) Discuss about the energy decay in damped harmonic oscillator. (Dec-2018) (5+5)
3	Explain working of damped harmonic oscillator in various conditions like heavy, critical and light damping. (Dec-2018) (10)
4	a) Give the theory of oscillations in an electrical oscillator with small resistance. Deduce expression for frequency of oscillation. b) Differentiate an electrical oscillator from mechanical oscillator. (May-2019) (7+ 3)
5	a) What is power absorbed by an oscillator? Derive the relation between the power absorbed and quality factor.

	b)Discuss the applications of forced oscillations with the help of a series LCR circuit.(6+4)		
6	a)Discuss in detail the complex notation and phasor representation for physical quantities b)Deduce the complex notation for forced oscillations		(5+5)
Unit – III(Waves in one Dimension)			
Short Answer Questions			
1.	a) Write any four properties of standing waves. b) Explain reflection and transmission process. c) What is transverse wave? Explain the laws of transverse vibration of a string. d)Calculate the speed of transverse wave in a wire of 1 mm ² cross-section under the tension produced by 0.1 kg weight. (where $\rho=9.81 \text{ gr/cm}^3$) e) If the frequency of stretched string of length 1 m is 258 HZ , find the frequency of string of half the length under identical conditions.	(Dec-2018) (Dec-2018)	(2M) (3M) (3M) (3M)
2	a) Give an account of standing waves and their Eigen frequencies. b) Write any four properties of transverse waves.	(Dec-2018)	(5+5)
3	a) Explain reflection and transmission of waves at a boundary. b) Derive the expression for longitudinal wave equation and also write the properties of longitudinal waves.	(Dec-2018)	(5+5)
4	a) Obtain an expression for the velocity of longitudinal wave in fluid medium interms of volume elasticity and density. b) Deduce the formula for characteristic impedance of a continuous stretched string.	(Dec-2018)	(5+5)
5	Two media of characteristic impendence Z_1 and Z_2 coupled through an element of impendence Z and length L . The boundaries of coupling element are located at $x=0$ and $x= L$. The wave enters the coupling medium at $x =0$ and leaves at $x=L$. Show that $Z=(Z_1*Z_2)^{1/2}$	(May- 2019)	(10)
6	a)Obtain the velocity of a transverse wave in stretched string b) Describe the formation of stationary waves in open and closed pipes. Explain how nodes and anti nodes are formed.		(5+5)

Unit – IV(Wave Optics)		
Short Answer Questions		
1.	a) Why the rings are circular in Newton's rings experiment. (Dec-2018) (2M) b) Write a short note on diffraction grating. (Dec-2018) (3M) c) Give importance of resolving power of an optical instrument. (May-2019) (2M) d) State the superposition theorem. (May-2019) (3M) e) Explain the phenomenon of interference. What are the conditions to get the interference of light? (3M) f) In Newton's rings experiment, the diameter of 5 th dark ring is 0.3 cm and the diameter of 15 th dark ring is 0.9 cm. If the radius of curvature of planoconvex lens is 80 cm, find the wavelength of light used. (3M) g) The grating consisting of 6000 lines per cm and length of grating is 10 cm. What is the resolving power of grating? (2M) h) Distinguish between the Fresnel and Fraunhofer diffraction. (2M) i) What are the differences between interference and diffraction? (3M)	
2	a) Explain Fraunhofer diffraction at single slit. b) Discuss about interference of light by wave front splitting. (Dec-2018) (5+5)	
3	a) Explain principle, theory and working of Michelson interferometer. b) Write short note on resolving power of a grating. (Dec-2018) (5+5)	
4	a) Describe Newton's rings method measuring the wavelength of monochromatic light and the refractive index of a liquid. Give the necessary theory.	
5	a) Explain how the wavelength of the light is determined with Mach-Zehnder interferometer. b) In Michelson interferometer, the movable mirror is moved through a distance of 0.05 cm and 150 fringes are crossed the field of view. Find the wavelength of light used.	
Unit – V(Laser and Optical Fibers)		
Short Answer Questions		
1.	a) How laser beam achieves coherence? (Dec.2018) (2M) b) Differentiate graded index fibers from step index fibers. (Dec.2018) (3M) c) Explain the losses associated with optical fiber? (May 2019) (2M) d) What is laser? Explain its principle. (May 2019) (3M) e) Explain population inversion and how is it achieved? (May 2019) (2M) f) Explain the construction of optical fiber. (May 2019) (3M) g) Distinguish between spontaneous emission and stimulated emission. (2M) h) Explain the characteristics of lasers? (2M) i) Define the numerical aperture, acceptance angle & acceptance cone (3M) j) Discuss about the principle of an Optical fiber (or) Explain the phenomenon total internal reflection. (3M)	

Long Answer Questions	
1.	a) Describe the construction and working of ruby laser? b) He-Ne gas laser of wavelength 6328\AA has an output power of 2.3mW. How many photons are emitted each minute when it is operated? (May 2019) (7+3)
2.	a) Derive the relation between the Einstein's coefficients and explain their physical significance. b) Explain various applications of LASERS in medicine and military. (Dec.2018) (7+3)
3.	a) Describe the construction and working of He-Ne laser b) Distinguish between the spontaneous and stimulated emission process of light. (May 2019) (7+3)
4.	a) Explain the transmission of signal in Step index and graded index fibers b) The numerical aperture of an optical fiber is 0.5 and core refractive index 1.54. i) Find refractive index of cladding, ii) calculate the change in core cladding refractive index per unit refractive index of the core. (May 2019) (7+3)
5	a) Derive an expression for acceptance angle for an optical fiber. How is it related to numerical aperture? b) Find the numerical aperture and acceptance angle of a fiber of core index 1.4 and fractional refractive indices 0.002. (Dec.2018) (7+3)
6	a) Describe the construction and working of CO ₂ laser b) Write applications of lasers in various fields. (5+5)

Code No: 151AB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year I Semester Examinations, May/June - 2019

ENGINEERING PHYSICS

(Common to CE, ME, MCT, MMT, AE, MIE, PTM)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

- 1.a) What difficulty you will encounter if you would like to derive the Newton equations of motion in polar coordinates? [2]
- b) What is angular simple harmonic motion and give two examples of angular S.H.M. [2]
- c) Define quality factor of a damped oscillator. [2]
- d) Give importance of resolving power of an optical instrument. [2]
- e) Why population inversion is necessary for lasing action? [2]
- f) Define scalar under rotation with example. [3]
- g) Represent the simple harmonic motion in terms of complex number. [3]
- h) A particle of mass 100 gm is placed in a field of potential $U = 5x^2 + 10$ erg/gm. Find the frequency. [3]
- i) State the superposition theorem. [3]
- j) Explain total internal refraction. [3]

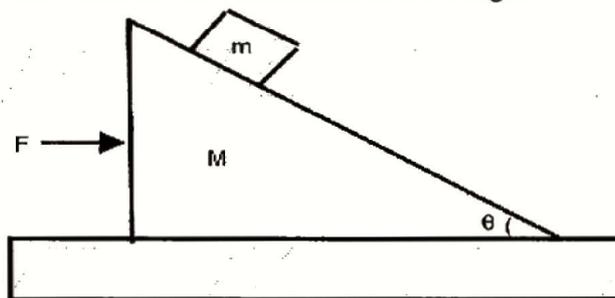
PART - B

(50 Marks)

- 2.a) Show that Newton's second law is invariant under Galilean transformation.
- b) A body weighing 200 N is just on the point of moving up the plane by a force of 40 N acting parallel and up the plane. Find co-efficient of friction if inclination of the plane is 15° to horizontal. [5+5]

OR

- 3.a) With the help of a neat diagram deduce the equation for velocity of a body in terms of polar coordinate system.
- b) A wedge with mass M rests on a frictionless horizontal tabletop. A block with mass m is placed on the wedge. There is no friction between the block and the wedge. The system is released from rest. Calculate the acceleration of the wedge. [7+3]



- 4.a) Solve the differential equation of a damped harmonic oscillator. Investigate the conditions under which the oscillations are said to be light, heavy and critically damped.
 b) Considering quality factor of sonometer wire of frequency 260 Hz as 2000, calculate the time in which the amplitude decreases to $1/e^2$ of its initial value. [7+3]

OR

- 5.a) Give the theory of oscillations in an electrical oscillator with small resistance. Deduce expression for frequency of oscillation.
 b) Differentiate an electrical oscillator from a mechanical oscillator. [7+3]

6. Two media of characteristic impedance Z_1 and Z_2 coupled through an element of impedance Z and length l . The boundaries of coupling element are located at $x = 0$ and $x = l$. The wave enters the coupling medium at $x = 0$ and leaves at $x = l$. Show that $Z = \sqrt{Z_1 Z_2}$. [10]

OR

- 7.a) Obtain an expression for the velocity of longitudinal wave in fluid medium in terms of volume elasticity and density.
 b) Deduce the formula for characteristic impedance of a continuous stretched string. [5+5]

- 8.a) Explain the working of Michelson interferometer and describe how refractive index of a material is determined.
 b) When a thin film of a transparent material of $\mu = 1.45$ and $\lambda = 5890 \text{ \AA}$ is inserted in one of the arms of a Michelson's interferometer, a shift of 65 circular fringes is observed. Calculate the thickness of the film. [7+3]

OR

- 9.a) Obtain conditions for maxima and minima in Fraunhofer diffraction due to a single slit. Calculate width of the central maxima.
 b) A plane wave of light with wavelength 500 nm falls on a slit of width 10^{-5} cm at an angle 30° to its normal. Find the angular position of first minima located on both sides of central maximum. [7+3]

- 10.a) Explain Acceptance angle for an optical fibre and derive expression for it.
 b) For an optical fibre fractional index change is 0.14 and refractive index of cladding is 1.3. Calculate refractive index of core. [7+3]

OR

- 11.a) Describe the construction and working of a CO₂ laser with suitable neat diagram.
 b) Distinguish between ordinary light and laser light. [7+3]

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APPLIED PHYSICS

Course Objectives:

- Students will demonstrate skills in scientific inquiry, problem solving and laboratory techniques.
- Students will be able to demonstrate competency and understanding of the concepts found in Quantum Mechanics, Fiber optics and lasers, Semiconductor physics and Electromagnetic theory and a broad base of knowledge in physics.
- The graduates will be able to solve non-traditional problems that potentially draw on knowledge in multiple areas of physics.
- To study applications in engineering like memory devices, transformer core and electromagnetic machinery.

Course Outcomes: Upon graduation:

- The student would be able to learn the fundamental concepts on Quantum behaviour of matter in its micro state.
- The knowledge of fundamentals of Semiconductor physics, Optoelectronics, Lasers and fibre optics enable the students to apply to various systems like communications, solar cell, photo cells and so on.
- Design, characterization and study of properties of material help the students to prepare new materials for various engineering applications.
- The course also helps the students to be exposed to the phenomena of electromagnetism and also to have exposure on magnetic materials and dielectric materials.

UNIT-I: Quantum Mechanics

Introduction to quantum physics, Black body radiation, Planck's law, Photoelectric effect, Compton effect, de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box.

UNIT-II: Semiconductor Physics

Intrinsic and Extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, Hall effect, p-n junction diode, Zener diode and their V-I Characteristics, Bipolar Junction Transistor (BJT): Construction, Principle of operation.

UNIT-III: Optoelectronics

Radiative and non-radiative recombination mechanisms in semiconductors, LED and semiconductor lasers: Device structure, Materials, Characteristics and figures of merit, Semiconductor photodetectors: Solar cell, PIN and Avalanche and their structure, Materials, working principle and Characteristics.

UNIT-IV: Lasers and Fibre Optics

Lasers: Introduction to interaction of radiation with matter, Coherence, Principle and working of Laser, Population inversion, Pumping, Types of Lasers: Ruby laser, Carbon dioxide (CO₂) laser, He-Ne laser, Applications of laser. Fibre Optics: Introduction, Optical fibre as a dielectric wave guide, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, Applications of optical fibres.

UNIT-V: Electromagnetism and Magnetic Properties of Materials

Laws of electrostatics, Electric current and the continuity equation, Ampere's and Faraday's laws, Maxwell's equations, Polarisation, Permittivity and Dielectric constant, Internal fields in a solid, Clausius-Mossotti equation, Ferroelectrics and Piezoelectrics. Magnetisation, permeability and susceptibility, Classification of magnetic materials, Ferromagnetism and ferromagnetic domains, Hysteresis, Applications of magnetic materials.

TEXT BOOKS:

1. Engineering Physics, B.K. Pandey, S. Chaturvedi - Cengage Learning.
2. Halliday and Resnick, Physics - Wiley.
3. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand

REFERENCES:

1. Richard Robinett, Quantum Mechanics
2. J. Singh, Semiconductor Optoelectronics: Physics and Technology, Mc Graw-Hill inc. (1995).
3. Online Course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Guptha on NPTEL

ASSIGNMENT QUESTIONS

Unit – I			
Short Answer Questions			
1.	a) State Heisenberg's Uncertainty principle.	(Dec.2018)	(2M)
	b) State Planck's hypothesis.	(Dec.2018)	(3M)
	c) What is the concept of black body radiation?	(May 2019 Sup.)	(2M)
	d) Explain wave-particle duality?	(May 2019 Sup.)	(3M)
	e) What is photoelectric effect? Give the Einstein's equation.	(May 2019 Reg.)	(2M)
	f) Give the Born's interpretation of wave function.	(May 2019 Reg.)	(3M)
	g) What are Matter waves?		(2M)
	h) Explain the properties of matter waves.		(3M)
	i) Derive an expression for the de-Broglie wavelength of an electron.		(3M)
	j) Using the Heisenberg's Uncertainty principle explain why electron cannot exist in the nucleus of radius 10^{-14} m.		
Long Answer Questions			
1.	a) Derive 1-D time independent Schrodinger's wave equation for an electron. b) Calculate the velocity and kinetic energy of an electron of wavelength 1.66 \AA	(Dec.2018)	(7+3M)
2.	a) Explain Compton effect and derive expression for Compton shift. b) X-ray photon wavelength 0.3 \AA is scattered through an angle 45° by a loosely bound electron. Find the wavelength of scattered photon.	(Dec.2018)	(7+3M)
3.	a) What are essential physical assumptions needed to explain the characteristics of photoelectric effect? b) Calculate the de-Broglie wavelength of the neutron of energy 28.85 eV .	(May 2019 Sup.)	(10M)
4.	a) Show that the particle trapped in a potential box possesses discrete energy levels. b) Find the lowest energy of an electron confined in a box of side 0.1 nm each.	(May 2019 Sup.)	(7+3M)
5	a) Derive an expression for the wavelength of matter waves. b) Describe an experiment to verify the dual nature of matter. c) For an electron in a 1-D infinite potential well of width 1 \AA , calculate the energy separation between the two lowest energy levels and also calculate the frequency and wavelength of the photon corresponding to a transition between these two levels.	(May 2019 Reg.)	(10M)
Unit – II			
Short Answer Questions			
1.	a) What is reverse saturation current?	(Dec.2018)	(2M)
	b) Explain Fermi level dependence on carrier concentration.	(Dec.2018)	(3M)
	c) What is the importance of Fermi level?	(May 2019 Sup.)	(2M)
	d) What is Hall effect	(May 2019 Sup.)	(3M)
	e) What are donors and acceptors? Give two examples of each.	(May 2019 Reg.)	(2M)
	f) Explain the energy diagram of a p-n junction diode.	(MAY 2017)	(3M)
	g) A rectangular plate of a semiconductor has dimensions 2 cm along y direction, 1 mm along z-direction. Hall probes are attached on its 2 surfaces parallel to xz plane and a magnetic field of		

	<p>1T is applied along z-direction. A current 3mA is set up along the x direction. Calculate the hall voltage measured by the probes, if the hall coefficient of the material is $3.66 \times 10^{-4} \text{ m}^3/\text{C}$. Also, calculate the charge carrier concentration. (May 2019 Reg.) (3M)</p> <p>h) The conductivity of N-type Germanium semiconductor is $39 \Omega^{-1} \text{ m}^{-1}$. If the mobility of electrons in Ge is $0.39 \text{ m}^2 \text{ V}^{-1} \text{ S}^{-1}$, then find the concentration of the donor atoms. (May 2019 Reg.) (2M)</p>
Long Answer Questions	
1	<p>a) Distinguish between intrinsic and extrinsic semiconductors.</p> <p>b) Derive an expression for density of holes in intrinsic semiconductors. (May 2019 Sup.) (10M)</p>
2	<p>a) Explain the variation of Fermi Level with respect to temperature in case of intrinsic semiconductor, P-type semiconductor and n-type semiconductors.</p> <p>b) Distinguish between p-type and n-type semiconductors with an example. (May2019Reg.) (10M)</p>
3	<p>a) Derive an expression for the hole concentration in p-type semiconductors. (May2008) (6M)</p> <p>b) Explain the working of a common base PNP transistor with a suitable circuit diagram. (May 2019 Reg.) (4M)</p>
4	<p>a) Describe the V-I Characteristics of Zener Diode in both biasing conditions.</p> <p>b) Explain the formation of Potential barrier across the p-n junction. (Dec.2018) (7+3M)</p>
5	<p>a) Explain the construction and operation of BJT.</p> <p>b) Write any three applications of the Hall effect. (Dec.2018) (7+3M)</p>
UNIT-III	
Short Answer Questions	
1.	<p>a) What is the basic Principle of LED? (May 2019 Sup.) (2M)</p> <p>b) What is the recombination mechanism in Semi Conductors? (May 2019 Sup.) (3M)</p> <p>c) What are direct and indirect band gap Semi Conductors? (May 2019 Reg.) (2M)</p> <p>d) Give 3 differences between Semi Conductor LASER and LED (May 2019 Reg.) (3M)</p> <p>e) Write any two characteristics of PIN Photo Diode. (Dec.2018) (2M)</p> <p>f) A LED is made up of GaAsP having a band gap of 1.9eV determine the wavelength of the radiation emitted. (Dec.2018) (3M)</p> <p>g) what are the applications of Solar cell (3M)</p> <p>h) When 3×10^{11} photons each with wavelength of $0.85 \mu\text{m}$ are incident on a photodiode, on average 1.2×10^{11} electrons are generated. Determine the quantum efficiency and responsivity. (May 2019 Reg.) (3M)</p>
Long Answer Questions	
1.	<p>a) Explain the construction and working of Solar cell. State few disadvantages of Solar Cell</p> <p>b) Describe the I-V characteristics of a solar cell. (Dec.2018) (7M+3M)</p>
2.	<p>a) Explain the construction and working of LED.</p> <p>b) What are the major differences between PIN and Avalanche photodiode?</p> <p>c) A Si photodiode has quantum efficiency of 65% with photon energy $1.5 \times 10^{-19} \text{ J}$. Its band gap energy is 0.67eV. Calculate i) Responsivity (R) ii) incident power required to obtain a photo current $2.5 \mu\text{A} (P_0)$? (May 2019 Reg.) (10M)</p>

3.	a) Explain the construction and working of Semiconductor Laser with neat sketch. b) What are the advantages and disadvantages of LED in electronic display? (May 2019 Sup.) (5M+5M)
4.	a) What are Photo diodes explain working principle and structure of Avalanched photo diode b) Explain the construction and working principle of PIN Photodiode. (May 2019 Sup.) (5M+5M)
Unit-IV	
Short Answer Questions	
1.	a) How laser beam achieves coherence? (Dec.2018) (2M) b) Differentiate graded index fibers from step index fibers. (Dec.2018) (3M) c) Explain the dispersion losses in optical fiber? (May 2019 Sup.) (2M) d) What is laser? Explain its principle. (May 2019 Sup.) (3M) e) Explain population inversion and how is it achieved? (May 2019 Reg.) (2M) f) Explain the construction of optical fiber. (May 2019 Reg.) (3M) g) Distinguish between spontaneous emission and stimulated emission. (2M) h) Explain the characteristics of lasers? (2M) i) Define the numerical aperture, acceptance angle & acceptance cone (3M) j) Discuss about the principle of an Optical fiber. (3M)
Long Answer Questions	
1.	a) Describe the construction and working of ruby laser? b) A He-Ne gas laser of wavelength 6328\AA has an output power of 2.3mW. How many photons are emitted each minute when it is operated? (May 2019 Reg.) (7+3M)
2.	a) Derive the relation between the Einstein's coefficients and explain their physical significance. b) Explain various applications of LASERS in medicine and military. (Dec.2018) (7+3M)
3.	a) Describe the construction and working of He-Ne laser b) Distinguish between the spontaneous and stimulated emission process of light.
4.	a) Explain the transmission of signal in Step index and graded index fibers b) The numerical aperture of an optical fiber is 0.5 and core refractive index 1.54. i) Find refractive index of cladding, ii) calculate the change in core cladding refractive index per unit refractive index of the core. (May 2019 Sup.) (7+3M)
5.	a) Derive an expression for acceptance angle for an optical fiber. How is it related to numerical aperture? b) Find the numerical aperture and acceptance angle of a fiber of core index 1.4 and fractional refractive indices 0.002. (Dec.2018) (7+3M)

Unit-V	
Short Answer Questions	
1.	a) Why susceptibility of diamagnetic materials is negative. (Dec.2018) (2M) b) Write a short note on Piezoelectric materials. (Dec.2018) (3M) c) What are the differences between polar and non polar dielectrics? (May 2019 Sup.)(2M) d) State Ampere's law in differential and integral forms? (May 2019 Sup.)(2M) e) State Faraday's laws (May 2019 Reg.)(2M) f) Derive the relation between B,H and M. (May 2019 Reg.)(3M) g) Define electric dipole moment, dielectric constant, electric susceptibility. (3M) h) Define Magnetic permeability, Magnetization & Magnetic susceptibility. (3M)
Long Answer Questions	
1.	a) Write the Maxwell's equations integral and differential forms. Explain the physical significance of each. b) The dielectric constant of He gas at NTD is 10000684. Calculate the electronic polarizability of He atoms if the gas contains 2.7×10^{25} atoms per m^3 ? c) What is Bohr magneton? How it is related to magnetic moment of electron. (May 2019 Sup.) (10M)
2.	a) What is electric current? Derive an expression for the continuity equation. b) Explain how the ferrites superior to ferromagnetic materials. Write a note on Ferro electricity. (May 2019 Sup.) (5+5M)
3.	a) What is meant by a local field in a solid dielectric? Derive an expression for the Local field in the case of one dimensional array of atoms in dielectric solids.. b)) Derive classius-mosotti relation for dielectrics. (Dec.2018) (7+3M)
4	a) Classify the magnetic materials based on atomic point of view. b) State and Explain Ampere's circuital law. (Dec.2018) (7+3M)
5	a) What is dielectric polarization? Describe briefly types of polarizations. b) Write notes on ferroelectricity and Piezoelectricity. (May 2019 Reg.) (5+5M)
6	a) Derive a relation between electric polarization and electric susceptibility of the dielectric medium. b) Describe dielectric displacement, dielectric loss, and dielectric strength. c) Describe the Hysteresis loop of ferromagnets. How can it be used to distinguish between hard and soft magnetic materials? (May 2019 Reg.) (10M)

R18

Code No: 152AE

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year II Semester Examinations, May - 2019

APPLIED PHYSICS

(Common to EEE, CSE, IT)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

(25 Marks)

- 1.a) What is Photo-electric effect. Give the Einstein's equation. [2]
- b) What are donors and acceptors? Give two examples of each. [2]
- c) What are direct and Indirect band gap semiconductors [2]
- d) Explain Population Inversion and how is it achieved? [2]
- e) State the Faraday's Law. [2]
- f) Give the Born's interpretation of wave function. [3]
- g) Explain the concept of Hall effect. [3]
- h) Give three differences between semiconductor laser and LED. [3]
- i) Explain the construction of optical fiber. [3]
- j) Derive the relation between \vec{B} , \vec{H} and \vec{M} [3]

PART-B

(50 Marks)

- 2.a) Derive an expression for the wavelength λ of the matter waves.
- b) Describe a experiment to verify the existence of matter waves.
- c) For an electron in a one-dimensional infinite potential well of width 1 \AA , calculate the energy separation between the two lowest energy levels and also calculate the frequency and wavelength of the photon corresponding to a transition between these two levels. [10]

OR

- 3.a) Explain Heisenberg's Uncertainty principle.
 - b) Using the Heisenberg's Uncertainty principle explain why electron cannot exist in the nucleus of radius 10^{-14} m .
 - c) Show that the particle trapped in a potential box possesses discrete energy levels. [10]
- 4.a) What are intrinsic and extrinsic semiconductors?
 - b) Distinguish between N-type and P-type semiconductors with an example.
 - c) A rectangular plate of a semiconductor has dimensions 2.0 cm along y direction, 1.0 mm along z-direction. Hall probes are attached on its two surfaces parallel to x z plane and a magnetic field of 1.0 tesla is applied along z-direction. A current of 3.0 mA is set up along the x direction. Calculate the hall voltage measured by the probes, if the hall coefficient of the material is $3.66 \times 10^{-4}\text{ m}^3/\text{C}$. Also, calculate the charge carrier concentration. [10]

OR

- 5.a) The conductivity of N-type Germanium semiconductor is $39 \Omega^{-1} \text{m}^{-1}$. If the mobility of electrons in Germanium is $0.39 \text{m}^2 \text{V}^{-1} \text{s}^{-1}$, then find the concentration of the donor atoms.
- b) Define Fermi level. Where does a Fermi level exist in a Intrinsic semiconductor, P-type semiconductor and N-type semiconductor at moderate temperature?
- c) Explain the working for a Common Base PNP transistor with a suitable circuit diagram. [10]

- 6.a) What is a photodetector? Explain the principle of photodetection in semiconductors.
- b) When 3×10^{11} photons each with wavelength of $0.85 \mu\text{m}$ are incident on a photodiode, on average 1.2×10^{11} electrons are generated. Determine the quantum efficiency and responsivity.
- c) What is a solar cell? Explain with a neat diagram. Define the efficiency and fill factor. [10]

OR

- 7.a) Explain the construction and working of a LED.
- b) What are the major differences between PIN and Avalanche photodiode?
- c) A silicon photodiode has quantum efficiency of 65% with photon energy $1.5 \times 10^{-19} \text{J}$. Its band gap energy is 0.67eV . Calculate:
i) Responsivity (R)
ii) Incident power required to obtain a photo current $2.5 \mu\text{A}$ (P_0)?. [10]

- 8.a) Explain the construction, principle and working of Ruby laser.
- b) A He-Ne gas laser of wavelength 6328Å has an output power of 2.3mW . How many photons are emitted each minute when it is operated?
- c) Explain about the different modes that are propagated through step-index and graded-index fiber? [10]

OR

- 9.a) Elaborate the various applications of laser in the field of medicine and military.
- b) Discuss the concept of Acceptance angle and Acceptance cone of a fiber. Derive a relation between acceptance angle and the refractive indices of core and cladding materials.
- c) The numerical aperture of an optical fiber is 0.5 and core refractive index 1.54 . i) Find refractive index of cladding; ii) Calculate the change in core cladding refractive index per unit refractive index of the core. [10]

- 10.a) What is dielectric polarization? Describe briefly types of polarizations.
- b) Derive Clausius-Mosotti relation for a cubic dielectric structure.
- c) Write notes on ferroelectricity and piezoelectricity. [10]

OR

- 11.a) Derive a relation between electric polarization and electric susceptibility of the dielectric medium.
- b) Describe dielectric displacement, dielectric loss, dielectric strength.
- c) Describe the Hysteresis loop of ferromagnets. How can it be used to distinguish between hard and soft magnetic materials? [10]

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ENGINEERING MECHANICS

Course Objectives:

- Explain the resolution of a system of forces, compute their resultant and solve problems using 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 of inertia of standard and composite sections
- Explain kinetics and kinematics of particles, projectiles, curvilinear motion, centroidal motion and plane motion of rigid bodies.
- Explain the concepts of work-energy method and its applications to translation, rotation and plane 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 subjected to 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, rotatory motion and rigid body motion.
- Solve problems using work energy equations for translation, fixed axis rotation and plane motion and solve problems of vibration.

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, wedge friction, screw jack & differential screw jack; 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:

Review of particle dynamics- Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique).

UNIT-V:

Kinetics of Rigid Bodies -Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D'Alembert's principle and its applications in plane motion and connected bodies; Work Energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation

TEXT BOOKS:

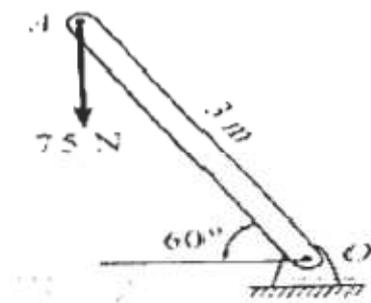
1. Shames and Rao (2006) , Engineering Mechanics, Pearson Education
2. Reddy Vijay Kumar K. and J. Suresh Kumar (2010), Singer's Engineering Mechanics – Statics & Dynamics

REFERENCE BOOKS:

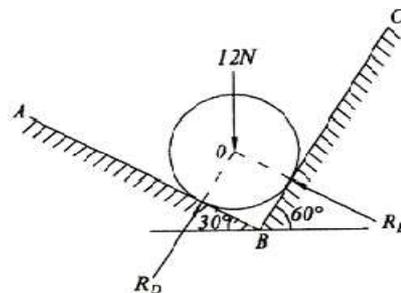
1. Timoshenko S.P and Young D.H., "Engineering Mechanics", McGraw Hill International Edition, 1983.
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3. Beer F.P & Johnston E.R Jr. Vector, "Mechanics for Engineers", TMH, 2004.
4. Hibbeler R.C & Ashok Gupta, "Engineering Mechanics", Pearson Education, 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.

ASSIGNMENT QUESTIONS

1. a) Find the magnitude of force F_1 and F_2 if they act at right angle their resultant is $\sqrt{34}N$ if they act 60° their resultant is $7N$.
 b) A $75 N$ vertical force is applied to the end of pole $3 m$ long which is attached to shaft at O as shown fig .
 determine (i) the moment of the $75N$ force about O
 (ii) the magnitude of the horizontal force applied at A which creates the same moment about O
 (iii) The smallest force applied at A which creates the same moment about O
 (iv) how far from the shaft at O a $200N$ vertical force must act create the same moment about O (MAY-2019)



2. Classify different types of system forces (2017)
3. A force $F = (10 i + 8 j - 5 k) N$ acts at point $A (2, 5, 6) m$. What is the moment of the force about the point $B (3, 1, 4)$. (2017)
4. A bracket is constructed by attaching member ABC to wall CD with a frictionless hinge at C and a horizontal cable at A . A smooth cylinder of weight $1.2KN$ is placed in the bracket. Determine the force acting on the cylinder at contact points B and D and the tension in the cable and reactions at support C . (2017)
5. Ball of weight $Q = 12 N$ rests in a right - angled trough, as shown in fig 1. Determine the forces exerted on the sides of the trough at $D (R_D)$ and $E (R_E)$ if all surfaces are perfectly smooth. (2017)



6. Two forces are applied to an eye bolt fastened to a beam. Determine the magnitude and direction of their resultant using (a) the parallelogram law, (b) the triangle rule. (2016)
7. Two Identical rollers each of weight 50N, are supported by an inclined plane and a vertical wall as shown in figure. Assuming smooth surfaces, find the reactions induced at the points of support A,B and C [June 20 13]

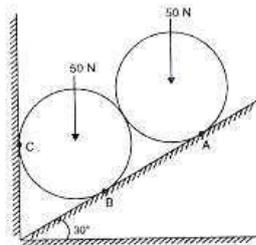
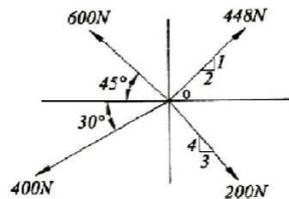
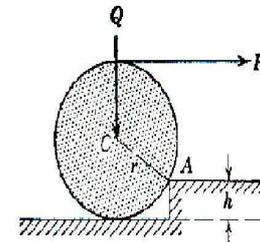


Fig. 2.86

8. a) What is Lami's theorem? Explain for a simple case.
b) Find resultant of the forces acting as shown in fig.2

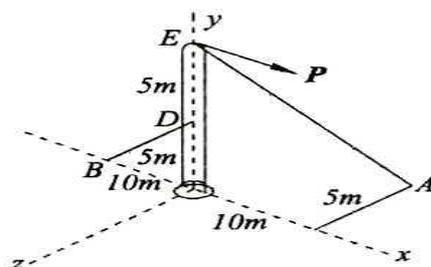


9. a) Explain various systems of forces with neat sketches.
b) A roller of radius $r = 0.3$ m. and weight $Q = 2000$ N is to be pulled over a curb of height $h = 0.15$ m. by a horizontal force P applied to the end of a string wound around the circumference of the roller (Ref. Figure 1). Find the magnitude of P required to start the roller over the curb



10. a) State and explain the Parallelogram law of forces. From this, derive the triangle and polygonal laws of forces.
b) Two spheres, A and B rest in a vertical channel with their centers in a vertical plane. If weight of sphere A is 1000 N and that of sphere B is 400N, radius of sphere A is 1m and that of sphere B is 0.6 m, width of channel is 2.4 m, find the contact forces assuming all surfaces to be smooth.
11. Four forces of magnitude 10 kN, 15kN, 20kN, and 40 kN are acting at a point O. The angles made by 10 kN, 15kN, 20kN, and 40 kN with x-axis are 30° , 45° , 60° and 90° respectively. Find the magnitude and direction of the resultant force.

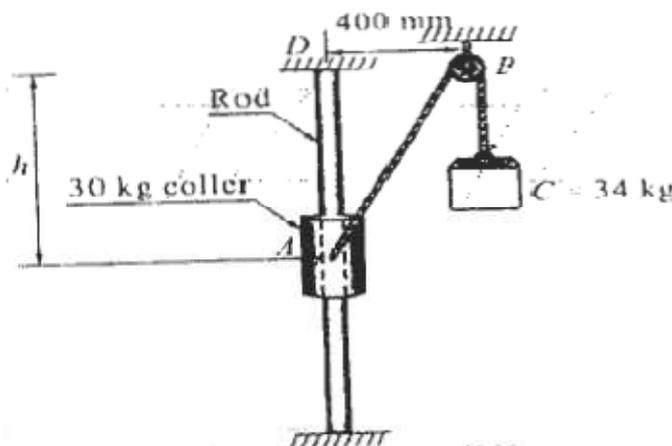
12. (a) Write the equilibrium equations for a body in space.
 (b) A vertical mast CE is supported in a ball and socket joint at C by cables BD and AE as shown in figure 7b. A pull $P (=400i+ 300k)$ N acts at top of the mast. Find components of reaction at C. Jan2



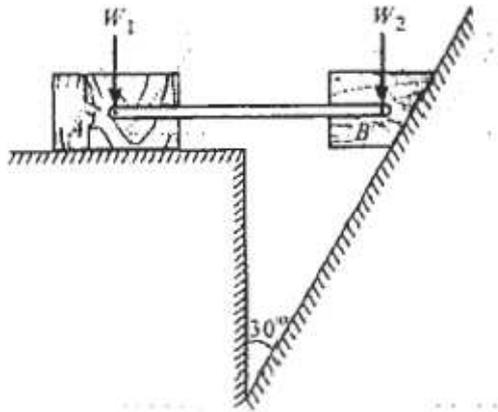
13. (a) What is resultant force? Explain with an example.
 (b) Determine the resultant of a system of concurrent forces having the following magnitudes and Passing through the origin and the indicated points.
 $P = 3000 \text{ N } (+12, +6, -4)$, $Q = 5000 \text{ N } (-3, -4, +12)$, $F = 28000 \text{ N } (+6, -3, -6)$.

UNIT – II

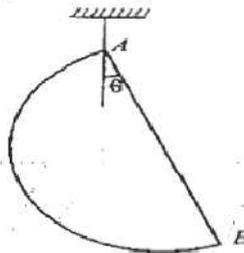
1. A 30kg collar may slide on friction less vertical rod and is connected to a 34kg counter weight as shown fig .find the value of H for the system is in equilibrium (MAY-2019)



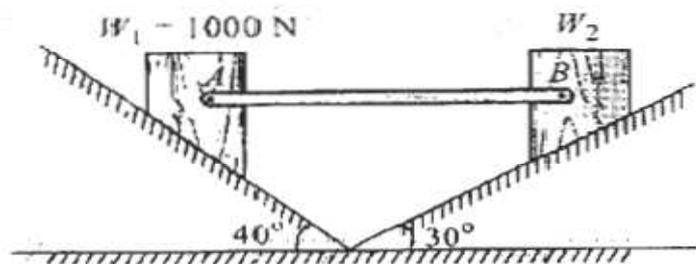
2. Two block W_1 and W_2 which are connected by a horizontal bar AB are supported on rough planes as shown in fig . the coefficient of friction for the block A=0.4 the angle of friction for the block B is 20° . find the smallest weight W_1 of the block a for which the equilibrium can exist if $w_2 = 2250 \text{ N}$ (MAY-2019)



3. Thin homogeneous semi circular plate of radius r is suspended from its corner A as shown in fig .find the angle made by its straight edges AB with the vertical.(MAY-2019)



4. Two block w_1 and w_2 resting on two inclined planes are connected by horizontal bar AB as shown in fig . if w_1 equals 1000N determine the maximum value of W_2 for which the equilibrium can exist .the angle of limiting friction is 20° at all rubbing faces (MAY-2019)



5. A ladder 5 m long rests on a horizontal ground and leans against a smooth vertical wall at an angle of 70° with the horizontal. The weight of the ladder is 300 N . The ladder is on the verge of sliding when a man weighing 750 N stands on a rung 1.5 m along the ladder. Calculate the coefficient of friction between the ladder and the floor (2017)

6. A body weighing 50N is just pulled upon inclined plane of 30° by a force of 40N applied at 30° above the plane. Find the coefficient of friction (2017)

7. The following are the specifications for a differential screw jack:

- i) Pitch of the smaller screw is 5mm
- ii) Pitch of the larger screw is 10mm
- iii) Lever arm length from center of screw is 500mm

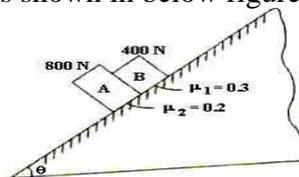
The screw jack raises a load of 15kN with an effort of 185N. Determine the efficiency of the differential screw jack at this load (2017)

8.(a) Explain the types of friction with examples.

(b) Two equal bodies A and B of weight 'W' each are placed on a rough inclined plane. The bodies are connected by a light string. If $\mu_A = 1/2$ and $\mu_B = 1/3$, show that the bodies will be both on the point of motion when the plane is inclined at $\tan^{-1}(5/12)$.

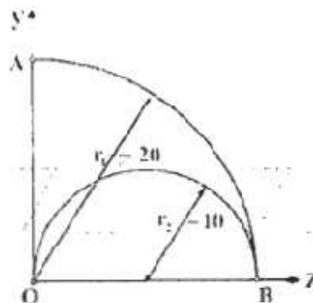
9. Find the least horizontal force 'P' to start motion of any part of the system of three blocks resting upon one another as shown in figure 2a. The weights of the blocks are A = 3000N, B = 1000N, C = 2000N. Between A and B $\mu = 0.3$, between B and C, $\mu = 0.2$ and between C and the ground $\mu = 0.1$.

10. Two blocks A and B are placed on a plane. The weights of A and B are 800N and 400N respectively. The coefficient of friction between block A and plane is 0.3 and that between block B and plane is 0.2. To what angle θ the plane should be raised so that bodies start slipping down the plane as shown in below figure.

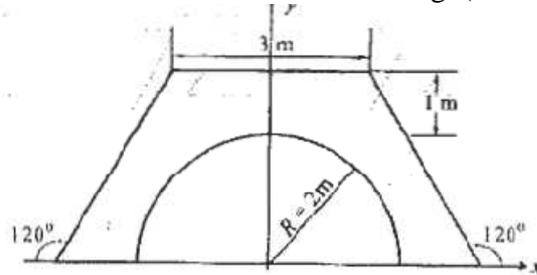


UNIT-III

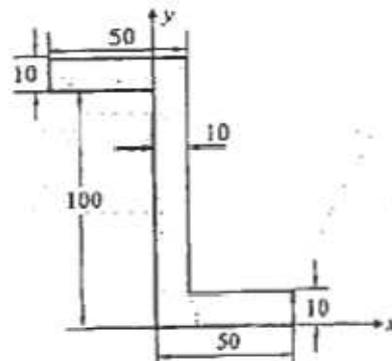
1. Find the coordinates of centroid of the area shown in fig. (MAY-2019)



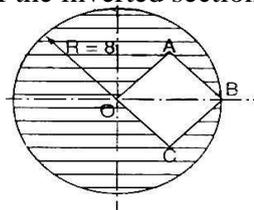
2. Find the MI about the centroidal axis in fig. (MAY-2019)



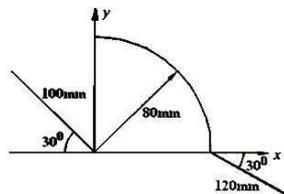
3. Find the MI about the centroidal axis and about xy axis for fig (MAY-2019)



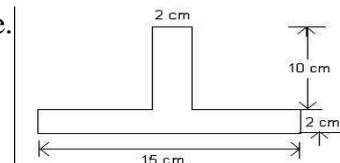
4. Define and Explain centre of gravity and Distinguish between centre of gravity and centroid Find the centroid of the inverted section shown in Figure.



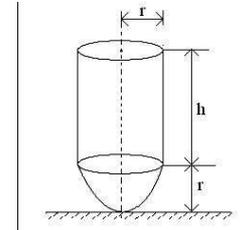
5. Locate the centroid of the wire bent as shown in figure.2



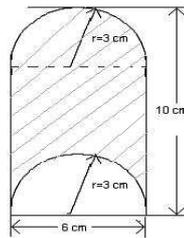
6. a) Find the centroid of the inverted T section shown in Figure.



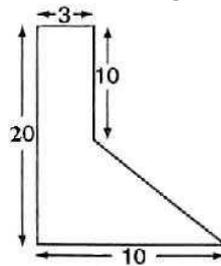
b) Determine the centre of gravity of the composite body consisting of a cylinder of radius 'r' attached to a hemisphere of radius 'r' as shown in figure.



7. Find the centroid of the plane area shown in figure.



8. Locate the centroid of plane areas shown in the figure 2. All dimensions are in cm.

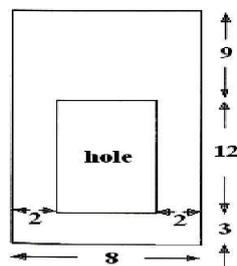


3

9. a) State theorem of pappus.

b) What are the applications of theorems of pappus?

c) Under what situation centre of gravity is coincident with centroid of volume.

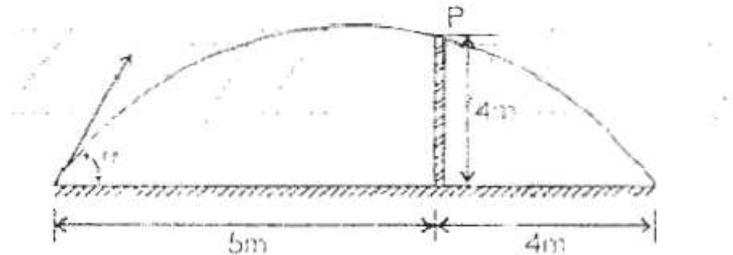


UNIT-IV

1. A railway car is moving with a velocity of 20m/s .the diameter of wheel is 1M the wheel is running on straight rail without slipping . find the velocity of the point on the circumference at 600 in the clock wise direction from the top at any instant (MAY-2019)
2. A 600 mm diameter fly wheel is brought uniformly from the rest to a speed 350rpm in 20sec determine the velocity and acceleration of a point on the rim 2 sec after starting from rest. (MAY-2019)
3. The motion of a particle in rectilinear motion is defined by the relation where s is in meters and t in seconds. Find (a) Acceleration of particle when the velocity is zero
4. (b) the position and the total distance travelled when acceleration is zero.(2016)
5. 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(2016)
6. 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(2015)
7. A projectile is aimed at a target on the horizontal plane and falls 12 m short when the angle of projection is 15° , while it overshoots by 24m when the angle is 45° . Find the, angle of Projection to hit the target.
8. Define the following terms:
 - (i) Work
 - ii)Energy
 - iii)Impulse and momentum
9. 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
10. A car weighing 18kn rounds a curve of 60mts radius banked at an angle of 30° find the frictional force acting on the tires when the is travelling at 96.54kmph.the coefficient of friction between tires and road is 0.6.

UNIT-V

1. find the least initial velocity with which a projectile is to be projected so that it clear a wall 4m height located at a distance of 5m and strikes the ground at a distance 4m beyond the wall as shown in fig . the projection is at the same level as the foot of the wall . (may-2019)



2. A ball drops from the ceiling of a room and after rebounding twice from the reaches a height equal to one-fourth of the height of the ceiling .show that the coefficient of restitution is 0.707. (may-2019)
3. A body weight 20N is projected up on a 20° inclined plane with a velocity of 12m/sec coefficient of friction is 0.15 .find the maximum distance the body will move up the inclined plane . (may-2019)
4. Explain D'Alembert's principle.
5. Two stations P and Q are 5.2km apart. An automobile starts from rest from the station P and accelerates uniformly to attain a speed of 48 kmph in 30 seconds. This speed is maintained until the brakes are applied. The automobile comes to rest at the station Q with a uniform retardation of one metre per second. Determine the total time required to cover the distance between these two stations.
6. Derive an expression for kinetic energy of a body rotating about a fixed axis
7. Two particles of masses 10kg and 20kg are moving along a straight line towards each other at velocities of 4m/s and 1m/s respectively. Determine the velocities of the particles immediately after their collision. Also find the loss of kinetic energy.
8. The bullet weighing 0.3 N and moving at 660m/s penetrates the 45 N body emerges with a velocity of 180m/s as shown. How far and How long the body moves? Take coefficient of friction as 0.4.
9. A block weighing 2500N rests on a level horizontal plane for which coefficient of friction is 0.20. This block is pulled by a force of 1000N acting at an angle of 30° to the horizontal. Find the velocity of the block after it moves 30m starting from rest. If the force of 1000 N is then removed, how much further will it move? Use work energy method.

Code No: 152AH

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year II Semester Examinations, May - 2019

ENGINEERING MECHANICS

(Common to CE, ME, MCT, MMT, AE, MIE, PTM)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

- | | | |
|------|---|-----|
| 1.a) | State varignon's theorem. | [2] |
| b) | Distinguish types of friction. | [2] |
| c) | What is product of inertia illustrate with example. | [2] |
| d) | State the principle of impulse-momentum. | [2] |
| e) | Write work energy equation for rotating bodies. | [2] |
| f) | Discuss the equations of equilibrium for coplanar system of forces. | [3] |
| g) | State and explain pappus theorem II. | [3] |
| h) | What is perpendicular axis theorem? | [3] |
| i) | Define normal and tangential accelerations of a particle. | [3] |
| j) | Explain D'Alembert's principle in plane motion. | [3] |

PART-B

(50 Marks)

- 2.a) Find the magnitude of forces F_1 and F_2 if they act at right angle, their resultant is $\sqrt{34}$ N. If they act at 60° , their resultant is 7 N.
- b) A 75 N vertical force is applied to the end of a pole 3 m long which is attached to a shaft at O as shown in figure 1. Determine:
- The moment of the 75N force about O,
 - The magnitude of the horizontal force applied at A which creates the same moment about O and
 - The smallest force applied at A which creates the same moment about O,
 - How far from the shaft at O a 200 N vertical force must act to create the same moment about O?
- [10]

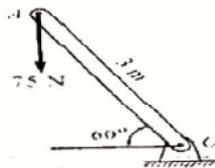


Figure: 1

OR

- 3.a) To move a boat uniformly along the river at a given speed, a resultant force $R = 520\text{N}$ is required. Two men pull with force P and Q, by means of ropes, to do this. The ropes makes an angle of 30° and 40° respectively with the sides of the river as shown in figure 2. Determine the force P and Q. If $\theta_1 = 30^\circ$, find the value of θ_2 such that the force in the rope Q is minimum. What is the minimum force Q?

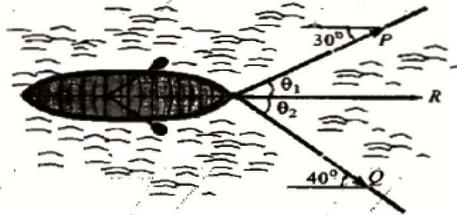


Figure: 2

- b) A 30 kg collar may slide on frictionless vertical rod and is connected to a 34 kg counter weight as shown in figure 3. Find the value of h for which the system is in equilibrium. [5+5]

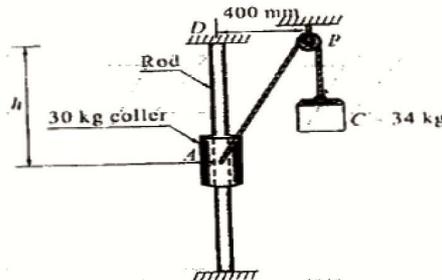


Figure: 3

- 4.a) Two blocks W_1 and W_2 which are connected by a horizontal bar AB are supported on rough planes as shown in figure 4. The coefficient of friction for the block A = 0.4. The angle of friction for the block B is 20° . Find the smallest weight W_1 of the block A for which the equilibrium can exist, if $W_2 = 2250$ N.

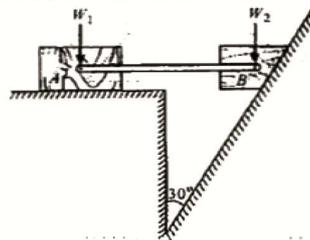


Figure: 4

- b) A thin homogeneous semi circular plate of radius r is suspended from its corner A as shown in figure 5. Find the angle made by its straight edge AB with the vertical. [5+5]

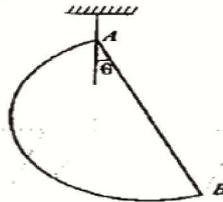


Figure: 5

OR

- 5.a) Two blocks W_1 and W_2 resting on two inclined planes, are connected by a horizontal bar AB as shown in figure 6. If W_1 equals 1000 N, determine the maximum value of W_2 for which the equilibrium can exist. The angle of limiting friction is 20° at all rubbing faces.

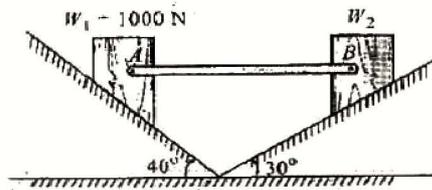


Figure: 6

- b) Find the coordinates of the centroid of the area shown in figure 7. All dimensions are in mm. [5+5]

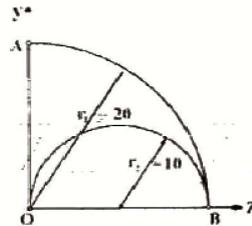


Figure: 7

- 6.a) Find the MI about the centroidal axis in figure 8.

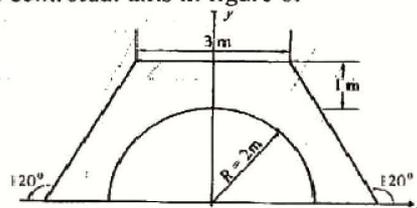


Figure: 8

- b) Determine the mass moment of inertia of a circular plate of uniform thickness, about centroidal axes. [5+5]

OR

7. Find the MI about the centroidal axis and about xy axis for figure 9 shown. All dimensions are in mm. [10]

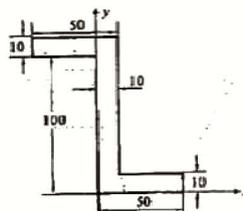


Figure: 9

- 8.a) A railway car is moving with a velocity of 20m/s. The diameter of the wheel is 1m. The wheel is running on a straight rail without slipping. Find the velocity of the point on the circumference at 60° in the clockwise direction from the top at any instant.
- b) A 600mm diameter flywheel is brought uniformly from rest to a speed of 350 rpm in 20 seconds. Determine the velocity and acceleration of a point on the rim 2 seconds after starting from rest. [5+5]

OR

- 9.a) Find the least initial velocity with which a projectile is to be projected so that it clears a wall 4m height located at a distance of 5m, and strikes the ground at a distance 4m beyond the wall as shown in figure 10. The point of projection is at the same level as the foot of the wall.

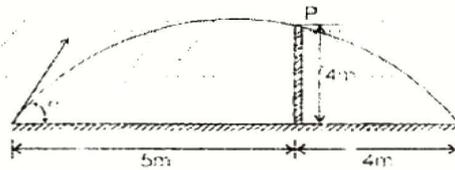


Figure: 10

- b) A ball drops from the ceiling of a room and after rebounding twice from the floor reaches a height equal to one-fourth of the height of the ceiling. Show that the coefficient of restitution is 0.707. [5+5]
- 10.a) A body weighing 20 N is projected up a 20° inclined plane with a velocity of 12 m/s, coefficient of friction is 0.15. Find the maximum distance the body will move up the inclined plane.
- b) Two blocks of weights P and Q are connected by a flexible but inextensible cord and supported as shown in figure 11. If the coefficient of friction between the block P and the horizontal surface is μ and all other friction is negligible, find (i) the acceleration of the system and (ii) the tensile force S in the cord. The following numerical data are given: P = 54 N ; Q = 25 N; $\mu = 1/3$. [5+5]

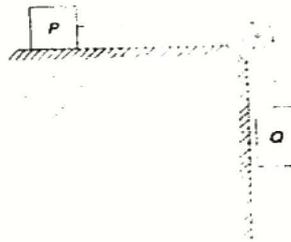


Figure: 11
OR

11. Determine the constant force P that will give the system of bodies shown in Figure 12. A velocity of 3m/sec after moving 4.5m from rest. Coefficient of friction between the blocks and the plane is 0.3. Pulleys are smooth. [10]

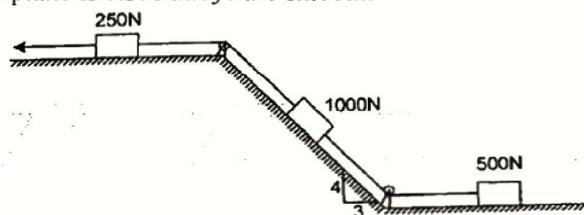


Figure: 12

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BASIC ELECTRICAL ENGINEERING

Course Objectives:

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To impart the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.

Course Outcomes:

- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To 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, analysis of 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-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series RL-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, regulation and efficiency. Auto Transformer and three-phase transformer connections.

UNIT-IV: Electrical Machines

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

UNIT-V: Electrical Installations

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

Suggested Text-Books/Reference-Books:

1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata McGraw Hill.
2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. L.S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011

4. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010
5. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India, 1989.

ASSIGNMENT QUESTIONS

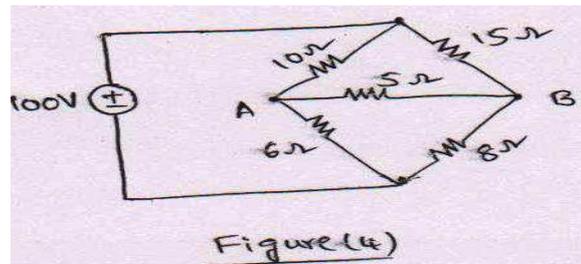
UNIT-I

Short Answer Questions

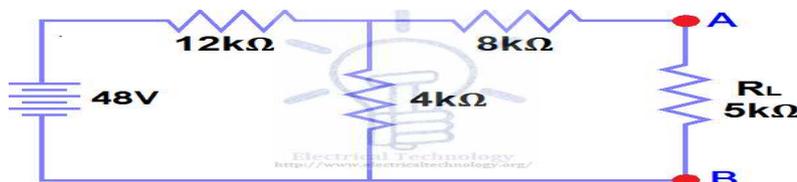
1. Define Ohm's Law? State its limitations.
2. State Kirchhoff's Voltage law and current law. Give examples for both.
3. State Superposition theorem?
4. State Maximum power transfer theorem?
5. State Thevenin's theorem?

Long Answer Questions

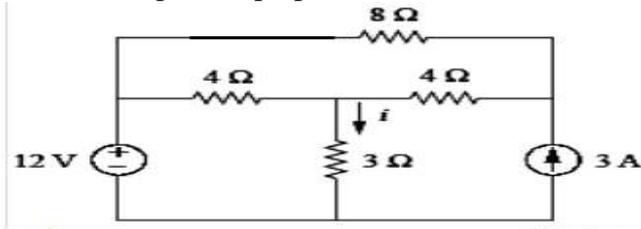
1. What are the different passive elements and explain their V-I characteristics?
2. Write a short note on Dependent and independent sources.
3. Three resistors $R_1=5\ \Omega$, $R_2=10\ \Omega$, $R_3=15\ \Omega$ are connected in parallel across a DC voltage source=100V. Find the currents I_1 , I_2 ,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



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 at $t=5\text{ms}$ and 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 of sinusoidal waveform.
3. Define and derive resonant frequency, quality factor and band width of series resonance circuit.
4. Illustrate the following terms a) Impedance b) reactance c) phase difference d) power factor 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 value of 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 $20\mu F$ 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 the magnitude 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 half load 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 from a60Hz supply. 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 mean 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.

Code No: 152AC

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year II Semester Examinations, May - 2019

BASIC ELECTRICAL ENGINEERING

(Common to ECE, EIE)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

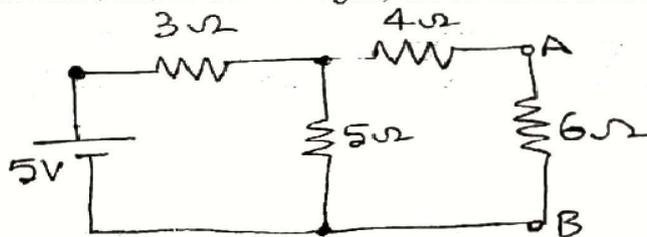
(25 Marks)

- 1.a) Write short notes on voltage source and current source. [2]
- b) Define average value of a sinusoidal quantity. [2]
- c) What is practical transformer? [2]
- d) Define slip. [2]
- e) List out the types of wires. [2]
- f) State Norton's theorem. [3]
- g) Show that power dissipated by a pure capacitor excited by a sinusoidal source is zero. [3]
- h) Write short notes on auto transformer. [3]
- i) Write short notes on salient pole rotor of a 3- ϕ synchronous generator. [3]
- j) What is the significance of earthing? [3]

PART-B

(50 Marks)

- 2.a) Explain in detail the passive elements.
- b) By using Thevenin's theorem shown in figure, find the current in 6Ω resistor. [5+5]



OR

- 3.a) State and explain Superposition theorem by taking one example.
- b) Three resistors: $R_1=5\Omega$, $R_2=10\Omega$, $R_3=15\Omega$ 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 source. [5+5]

- 4.a) 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.
- b) A circuit consisting of three branches, Z_2 is in parallel with Z_3 the combination is in series with Z_1 having the values $Z_1=10+j30$, $Z_2 =5+j10$ and $Z_3=4-j16$ connected across single phase, 100 V, 50 Hz supply. Find i) I_1 , I_2 and I_3 ii) V_1 and V_2 [5+5]

OR

- 5.a) Derive the expression for RMS value of alternating current wave $i = I_m \sin \omega t$.
- b) A coil takes a current of 1 A at 0.6 lagging power factor from a 220 V, 60 Hz single phase source. If the coil is modeled by a series RL circuit find i) The complex power in the coil and ii) The values of R and L. [5+5]
- 6.a) Draw and derive the equivalent circuit parameters of single phase transformers.
- b) A single phase transformer working at unity power factor has an efficiency of 90% at both one half load and at the full load of 500 W. Determine the efficiency at 75% of full load. [5+5]

OR

- 7.a) Define and explain efficiency and regulation of a transformer.
- b) A 100 kVA, 1000/10000 V, 50 Hz, Single phase transformer has an iron loss of 1100 W. The copper loss with 5 A in the high voltage winding is 400 W. Calculate the efficiency at 25 %, 0.8 Power factor. The output terminal voltage being maintained at 10000 V. [5+5]

- 8.a) Explain the slip-torque characteristics of 3-phase induction motor.
- b) Explain the principle and operation of 1-phase induction motor. [5+5]

OR

- 9.a) Explain the working principles of Synchronous generator.
- b) A 6 pole, 3- ϕ induction motor runs at 1140 rpm on full load when supplied from a 60Hz supply. Determine the synchronous speed and slip at full load. [5+5]

10. Explain the components of LT switch gear in detail. [10]

OR

11. Explain the types of batteries and its important characteristics. [10]

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MATHEMATICS- II

Course Objectives: To learn

- Methods of solving the differential equations of first and higher order.
- Evaluation of multiple integrals and their applications
- The physical quantities involved in engineering field related to vector valued functions
- The basic properties of vector valued functions and their applications to line, surface and volume 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
- Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelepiped
- Evaluate the line, surface and volume integrals and converting them from one to another

SYLLABS:

UNIT-I: First Order ODE Exact, linear and Bernoulli's equations; Applications : Newton's law of cooling, Law of natural growth and decay; Equations not of first degree: equations solvable for p , equations solvable for y , equations solvable for x and Clairaut's type.

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 , $e^{ax}V(x)$ and $xV(x)$; method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

UNIT-III: 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 (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallelepiped).

UNIT-IV: Vector Differentiation Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

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. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006

3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

REFERENCES:

1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

Assignment Questions

UNIT-I:

SHORT ANSWER QUESTIONS

1. Solve $y = a\sqrt{1 + p^2}$.
2. Find the I.F of $\frac{dy}{dx} + 2xy = e^{-x^2}$
3. State Newton's law of cooling.
4. Find the I.F of $\frac{dy}{dx} + xy = x$
5. Solve $y = px + p^2$
6. Verify $y(2x^2 - xy + 1)dx + (x - y)dy = 0$ is an exact differential equation or not?
7. Write the general solution of Bernoulli's Equation.
8. 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.
9. The equation $e^x dx + (xe^y + 2y)dy = 0$ is of which type?
10. Solve the following differential equation $(2y - x^3)dx + xdy = 0$.

LONG ANSWER QUESTIONS

1. If the air is maintained at 25°C and the temperature of the body cools from 140°C to 80°C in 20 minutes, find when the temperature will be 35°C .
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 1 hour?
4. In a culture of yeast, the active ferment doubles itself in 3 hours. Determine the number of times it multiplies itself in 15 hours.
5. Solve $(x^2 y - 2xy^2) dx - (x^3 - 3xy) dy = 0$.
6. $(1 + x^2) \frac{dy}{dx} + 2xy = 4x^2, y(0) = 0$.
7. Solve $(y + y^2)dx + xydy = 0$.
8. Solve $(x + 2y^3) \frac{dy}{dx} = y$.

UNIT-II

SHORT ANSWER QUESTIONS

1. Solve $(D^2 - 5D + 6)y = 0$

2. Solve $(D^4 - 2D^3 - 3D^2 + 4D + 4)y = 0$
3. Solve $(D^2 - 2D + 1)y = 0$
4. Solve $y'' + 6y' + 9y = 0$, $y(0) = -3$.
5. Solve $\frac{1}{D^2}x^4$
6. Solve $(D^3 - 4D^2)y = 5$.
7. Find the P.I of $(D^2 + 1)y = x$
8. Find the P.I of $(D^2 + 2)y = e^x \cos x$
9. Write the general form of Legendre's linear equation.
10. If the characteristic equation of differential equation $\frac{d^2y}{dx^2} + 2\alpha \frac{dy}{dx} + y = 0$ has two equal roots, then the value of α are:

LONG ANSWER QUESTIONS

1. By the method of variation of parameters, solve $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = e^x \log x$.
2. Solve the differential equation $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = 8x^2 e^{2x} \sin 2x$.
3. Solve the differential equation $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + y = \log x$
4. Solve $y'' - 2y' + y = x e^x \sin x$
5. Solve $(D^2 + 5D + 6)y = e^x \cos 2x$.
6. Solve by the method of variation of parameters $y'' + y = \sec x$.
7. Solve $(D^2 + 4)y = \tan 2x$ by variation of parameters.
8. Solve $(D^3 + 4D)y = 5 + \sin 2x$
9. Solve $(D^2 + 4D + 3)y = e^{e^x}$
10. Solve $(D^2 + 1)y = x^2 \sin 2x$

UNIT-III

SHORT ANSWER QUESTIONS

1. Evaluate $\int_0^a \int_0^{\sqrt{a^2 - b^2}} (x^2 + y^2) dy dx$ by changing into polar coordinates.
2. Show that the area between the parabolas $y^2 = 4ax$ and $x^2 = 4ay$ is $\frac{16}{3} a^2$.
3. Find the area enclosed between the parabola $y = x^2$ and the line $y = x$
4. Evaluate $\int_0^{\frac{\pi}{4}} \cos^2 x dx$
5. Evaluate $\int_0^1 \int_x^{\sqrt{x}} (x^2 + y^2) dx dy$
6. Evaluate $\iint y dx dy$ where R is the region bounded by the parabolas $y^2 = 4x$ and $x^2 = 4y$.
7. Evaluate $\iint (x^2 + y^2) dx dy$ in the positive quadrant for which $x + y \leq 1$.
8. Evaluate $\iint r^3 dr d\theta$ over area the included between the circles $r = 2\sin\theta$ and $r = 4\sin\theta$.
9. Evaluate the triple integral $\int_0^1 \int_y^1 \int_0^{1-x} x dz dx dy$.
10. Evaluate $\int_{x=1}^3 \int_{y=0}^1 xy^2 dy dx$

LAQ

1. The plane $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$ meets the axes in A,B and C. Find the volume of the tetrahedron OABC.
2. Change the order of integration and solve $\int_0^a \int_{\frac{x^2}{a}}^{2a-x} xy^2 dy dx$.
3. Evaluate $\iiint xyz dx dy dz$ over the positive octant of the sphere $x^2+y^2+z^2=a^2$.
4. By double integration, calculate the area bounded by the curve $a^2x^2=y^3(2a-y)$.
5. Change the order of integration in $\int_0^1 \int_{x^2}^{2-x} xy dy dx$ and integrate it.
6. Evaluate $\int_0^1 \int_0^x \frac{x^3 dx dy}{\sqrt{x^2+y^2}}$ by changing into polar coordinates.
7. Evaluate $\int_0^\pi \int_0^{a(1+\cos\theta)} r^2 \cos\theta dr d\theta$.
8. Evaluate $\int_0^{\log 2} \int_0^x \int_0^{x+\log y} e^{x+y+z} dz dy dx$
9. Change into polar coordinates and evaluate $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dy dx$

UNIT-IV

SHORT ANSWER QUESTIONS

1. Find a unit normal vector to the surface $x^2 + y^2 + 2z^2 = 26$ at the point (2,2,3)
2. Find a vector normal to the surface $xyz^2=20$ at the point (1,1,2).
3. If $u\vec{F} = \nabla u$, where u,v are scalar fields and \vec{F} is a vector field show that $\vec{F} \cdot \text{curl } \vec{F} = 0$.
4. Find the magnitude of the gradient of the function $f(x, y, z) = xyz^3$ at (1,0,2).
5. The velocity vector in 2-dimensional is $\vec{V} = 2xy\vec{i} + (2y^2 - x^2)\vec{j}$. Find the $\text{curl } \vec{V}$.
6. Find the directional derivative of $\phi = x^2yz + 4xz^2$ at (1,-2,-1) in the direction $2\vec{i} - \vec{j} - 2\vec{k}$.
7. Evaluate the angle between the normals to the surface $xy = z^2$ at the points (4,1,2) and (3,3,-3).
8. Find the angle between the surfaces $x^2+y^2+z^2=9$ and $z=x^2+y^2-3$ at the point (2,-1,2)
9. Find $\text{curl } \vec{F}$ where $\vec{F} = \text{grad}(x^3 + y^3 + z^3 - 3xyz)$
10. Prove that $\text{div}(\vec{a} \times \vec{b}) = \vec{b} \cdot \text{curl } \vec{a} - \vec{a} \cdot \text{curl } \vec{b}$
11. Prove that $F = yz\vec{i} + zx\vec{j} + yx\vec{k}$ is irrotational.
12. If $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$ then evaluate $\nabla^2(r^2)$
13. Find a unit vector normal to the surface $x^3+y^3+3xyz=3$.

LAQ

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. Prove that $\text{curl}(\vec{a} \times \vec{b}) = \vec{a} \text{div } \vec{b} - \vec{b} \text{div } \vec{a} + (\vec{b} \cdot \nabla)\vec{a} - (\vec{a} \cdot \nabla)\vec{b}$
3. Prove that if \vec{r} is the position vector of any point in space then $r^n \vec{r}$ is irrotational and is solenoidal if $n=-3$.
4. Show that $\nabla^2(r^n) = n(n+1)r^{n-2}$.
5. If $f = (x^2 + y^2 + z^2)^{-n}$, find $\text{div grad } f$ and determine n if $\text{div grad } f=0$.
6. Show that the vector $\vec{F} = (x - 3y)\vec{i} + (y - 3z)\vec{j} + (x - 2z)\vec{k}$ is solenoidal and also find $\vec{F} \cdot \text{curl } \vec{F}$.

7. In what direction from (3,1,-2) is the directional derivative of $\phi = x^3y^2 + yz$ maximum? Find also the magnitude of this maximum.
8. If $\bar{u} = \frac{1}{r}\bar{r}$, find $\text{grad}(\text{div}\bar{u})$.
9. Find the gradient of the Scalar function $f(x,y,z) = x^2y^2 + xy^2 - z^2$ at (3,1,1).
10. Find the angle between the normal to the surface $xy = z^2$ at the points (4,1,2) and (3,3,-3).
11. Prove that $\nabla \cdot (\bar{A} \times \bar{B}) = \bar{B} \cdot (\nabla \times \bar{A}) - \bar{A} \cdot (\nabla \times \bar{B})$.
12. Find the angle of intersection of the spheres $x^2 + y^2 + z^2 = 39$ and $x^2 + y^2 + z^2 + 4x - 6y - 8z + 52 = 0$ at the point (4,-3,2).
13. A vector field is given by $\bar{A} = (x^2 + xy^2)\bar{i} + (y^2 + yx^2)\bar{j}$. Show that the field is irrotational and find the scalar potential.
14. Find the curl of the gradient of the scalar field $\bar{V} = 2x^2y + 3y^2z + 4z^2x$
15. Find the divergence of the vector field \bar{A} at (1,-1,1) $\bar{A} = x^2z\bar{i} + xy\bar{j} - yz^2\bar{k}$

UNIT-V

SHORT ANSWER QUESTIONS

1. Find the work done by the force $\vec{F} = 3x^2\bar{i} + (2xz - y)\bar{j} + z\bar{k}$ along the straight line joining the points (0,0,1) and (2,1,3).
2. Find the circulation of \vec{F} round the curve c where $\vec{F} = (e^x \sin y)\bar{i} + (e^x \cos y)\bar{j}$ and C is the rectangle whose vertices are (0,0), (1,0), $(1, \frac{\pi}{2})$, $(0, \frac{\pi}{2})$.
3. State Greens theorem.
4. Find the work done by a force $y\bar{i} + x\bar{j}$ which displaces a particle from origin to a point $(\bar{i} + \bar{j})$ along the line $y = x$.
5. Evaluate $\int F \cdot d\vec{r}$ where $F = x^2\bar{i} + y^2\bar{j}$ and C is the curve $y = x^2$ in the xy plane from (0,0) to (1,1).
6. Using Greens theorem evaluate $\int (2xy - x^2)dx + (x^2 + y^2)dy$, where C is a close curve of the region bounded by $y = x^2$ and $x = y^2$.
7. Evaluate $\int [(x^2 + xy)dx + (x^2 + y^2)dy]$ where C is the boundary of the region bounded by the lines $x=0$, $x=1$, $y=0$ and $y=1$.
8. State Gauss divergence theorem.

LAQ

1. If $\vec{f} = 3x^2yz^2\bar{i} + x^2z^2\bar{j} + 2x^3yz\bar{k}$. show that $\int \vec{f} \cdot d\vec{r}$ is independent of the path of integration. Hence evaluate the integral when C is any path joining (0,0,0) to (1,2,3).
2. State Stokes theorem. Verify it for the vector field $\vec{F} = (2x - y)\bar{i} - yz^2\bar{j} - y^2z\bar{k}$ over the upper half surface of the sphere $x^2 + y^2 + z^2 = 1$, bounded by its projection on the xy -plane.
3. Using Greens theorem find the area of the region in the first quadrant bounded by the curves $y = x$, $y = \frac{1}{x}$, $y = \frac{x}{4}$.
4. Evaluate $\iiint \text{div}\vec{F}dV$, where $\vec{F} = y\bar{i} + x\bar{j} + z^2\bar{k}$ over the surface of the cylinder $x^2 + y^2 = a^2$, $z=0$, $z=h$.
5. Evaluate $\oint_C x^2dx + 2ydy - dz$ by Stoke's theorem where C is the curve $x^2 + y^2 = 4$, and 9. If $\vec{F} = (3x^2 - 2z)\bar{i} - 4xy\bar{j} - 5x\bar{k}$, Evaluate $\int_V \text{curl}\vec{F} \cdot d\vec{v}$, where v is the volume bounded by planes $x=0$, $y=0$, $z=0$ and $3x+2y-3z=6$.

Code No: 152AA

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year II Semester Examinations, May - 2019

MATHEMATICS-II

(Common to CE, EEE, ME, ECE, CSE, EIE, IT, MCT, MMT, AE, MIE, PTM)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

(25 Marks)

- 1.a) Solve $y = a\sqrt{1+p^2}$. [2]
b) Solve $\frac{1}{D^2}x^4$. [2]
c) Evaluate $\int_{x=1, y=0}^3 \int_1^3 xy^2 dy dx$. [2]
d) If $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$ then evaluate $\nabla^2(x^2)$. [2]
e) Find the value of $\int_V (\vec{i} + \vec{j} + \vec{k}) dV$. [2]
f) Find the integrating factor of $\frac{dy}{dx} + 2xy = e^{-x^2}$. [3]
g) Solve $(D^3 - 4D^2)y = 5$. [3]
h) Find the limits after changing the order of integration for $\int_0^b \int_0^{\sqrt{b^2-y^2}} f(xy) dy dx$. [3]
i) Find a unit vector normal to the surface $x^3 + y^3 + 3xyz = 3$. [3]
j) If $\vec{F}(t) = x\vec{i} + 2y\vec{j} + z\vec{k}$ then evaluate $\int_1^2 \text{curl } \vec{F}(t) dt$. [3]

PART-B

(50 Marks)

- 2.a) Solve $(1+x^2)\frac{dy}{dx} + 2xy = 4x^2, y(0) = 0$.
b) If 30% of a radioactive substance disappears in 10 days, how long will it take for 90% of it to disappear? [5+5]
- OR
- 3.a) Solve $(y + y^2)dx + xy dy = 0$.
b) Solve $(x + 2y^3)\frac{dy}{dx} = y$. [5+5]
- 4.a) Solve $(D^2 + 4)y = \tan 2x$ by variation of parameters.
b) Solve $(D^3 + 4D)y = 5 + \sin 2x$. [5+5]
- OR
- 5.a) Solve $(D^2 + 4D + 3)y = e^{e^x}$.
b) Solve $(D^2 + 1)y = x^2 \sin 2x$. [5+5]

- 6.a) Evaluate $\int_0^\pi \int_0^a (1+\cos \theta) r^2 \cos \theta dr d\theta$.
 b) Evaluate $\int_0^{\log 2} \int_0^x \int_0^{x+\log y} e^{x+y+z} dz dy dx$. [5+5]

OR

- 7.a) Change into polar co-ordinates and evaluate $\int_0^{\pi/4} \int_0^{\cos \theta} e^{-(x^2+y^2)} dy dx$.
 b) Show that the area between the parabolas $y^2 = 4ax$ and $x^2 = 4ay$ is $\frac{16}{3}a^2$. [5+5]

- 8.a) Find the angle between the normal to the surface $xy = z^2$ at the points (4, 1, 2) and (3, 3, -3).

b) Prove that $\nabla \cdot (\vec{A} \times \vec{B}) = \vec{B} \cdot (\nabla \times \vec{A}) - \vec{A} \cdot (\nabla \times \vec{B})$. [5+5]

OR

- 9.a) Find the angle of intersection of the spheres $x^2 + y^2 + z^2 = 39$ and $x^2 + y^2 + z^2 + 4x - 6y - 8z + 52 = 0$ at the point (4, -3, 2).

- b) A vector field is given by $\vec{A} = (x^2 + xy^2)\vec{i} + (y^2 + x^2y)\vec{j}$. Show that the field is irrotational and find the scalar potential. [5+5]

10. Find the work done in moving a particle in the force field $\vec{F} = 3x^2\vec{i} + (2xz - y)\vec{j} + z\vec{k}$ along the straight line from (0, 0, 0) to (2, 1, 3). [10]

OR

- 11.a) Evaluate $\iint_S \vec{F} \cdot \hat{n} ds$ if $\vec{F} = 2xy\vec{i} + yz^2\vec{j} + xz\vec{k}$ over the parallelepiped $x = 0, y = 0, z = 0, x = 2, y = 1, z = 3$.

- b) If $\vec{F} = (3x^2 - 2z)\vec{i} - 4xy\vec{j} - 5x\vec{k}$, Evaluate $\int_V \text{curl } \vec{F} dv$, where v is volume bounded by planes $x = 0, y = 0, z = 0$ and $3x + 2y - 3z = 6$. [5+5]

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PROGRAMMING FOR PROBLEM SOLVING SYLLABUS

Course Objectives:

- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the syntax and semantics of C programming language.
- To learn the usage of structured programming approach 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 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 - 1: Introduction to Programming

Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program etc., Number systems

Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, 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 to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind 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: Introduction to Algorithms:

Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number, etc.

Basic searching in an array of elements (linear and binary search techniques),

Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms),

Basic concept of order of complexity through the example programs

TEXT BOOKS:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

Assignment Questions(SAQ's)

Unit-I	
1	Give the list of basic data types in “C” language and explain. (May/June 2019 R15)
2	Distinguish between keyword and reserved word. (May/June 2019 R15)
3	Explain about identifiers and types in C. (May/June 2019 R16)
4	How real numbers and integers are stored(May/June 2019 R16)
5	What is flowchart? How is it different from an algorithm? (May/June 2019 R18 supp)
6	Name any two secondary storage devices and mention their characteristics(May 2019 –R18 Reg)
7	What is an operating system? List out its goals and functions. (May 2019 –R18 Reg)
8	Distinguish between variables and constants.(2015-May,2017-May)
9	Define the term algorithm and how it is different from the flow chart(2016-Dec)
10	Explain various logical operators that are used in C(2016-Dec)
11	Distinguish between if and switch statement(2016-December)
12	Explain auto and register storage class.(2016-Dec)
13	Differentiate between break, continue and goto statement with an example(2016-Dec,2017-may)
14	List different types of computer languages(2014 June)
15	What is the difference between compiler and interpreter(2014 June)
16	Give the list of bitwise operators.
17	Explain about shift operators.
18	What is Ternary operator? Explain
19	What is typecasting List different types of type casting.
20	Define storage class and list different types of storage classes available in C.
Unit-2	
1.	Why is it necessary to give the size of an array in an array declaration. (May 2019 –R18 Reg)
2.	Mention advantages and disadvantages of arrays. (May 2019 –R18 Reg)
3	Write an algorithm to find the maximum number in a given set. (May 2019 –R18 Reg)
4.	Why is void pointer useful? When would you use it? (May/June 2019 –R15 Sup)

5	What are self-referential structures? Give an example. (May/June 2019 –R15 Sup) What is meant by self referential structures. (May/June 2019 –R16 Sup)
6	Distinguish between structure and union (May/June 2019 –R16 Sup) Give a note on Unions(May 2019 –R18 Sup)
7	What are string output functions. (May/June 2019 –R16 Sup)
8	What are the applications of an array?(2017-Apr,2015 - Apr)
9	How one dimensional arrays are initialized? Give example(2017-May)
10	Define an array? Write the syntax and give example for declaring single, two and multi dimensional arrays(2017-may)
11	Define a pointer. List advantages and disadvantages of using pointers.(2016-dec)
12	What is null pointer? What is void pointer? Explain when null pointer and void pointer are used(2017-May)
13	What is pointer to function give an example.(2017-May)
14	Explain the array of pointers with example(2017-May)
15	Explain various string manipulation functions in ‘C’ Programming(2015,2017-May)
16	Distinguish between String and character(2016-Dec)
17	Define String . Write down the syntax of declaring a String.
18	Distinguish between structure and union(2016-dec)
19	Give brief information about self referential structures.(2017-May)
20	What is nested structure give an example(2015-May)
21	Explain enumerated type, structure and Union types with examples(2017-May)
22	Explain how to define a Union(2016-Dec) Write brief notes on union(2014-May)
23	Explain how does enum is differ from type def in ‘C’(2016-Dec)
Unit-3	
1	Explain about preprocessor command (2016-Dec) Give the list of preprocessor directives in “C” language (May/June – 2019 sup)
2	What is Macro. How is it different from function (2016-Dec)
3	Define the terms: Binary file and Text file. (May - 2019 Reg) Define File list different types of Files.
4	Give the difference between Text file and Binary File(2017-May)
5	List the advantages of using files.(2017-May)

6	Write the syntax for opening a file. Give example(2017-May)
7	Explain about different modes available for opening a file.(2017-Dec)
8	Write a C program to read a binary file and print it on console(May – 2019 Reg)
9	Discuss about rewind function(2017-May)
10	Explain about fseek()(2016-Dec)
11	What is the purpose of feof() function?(May – 2019 Reg) Explain about feof() and ferror() functions
Unit-4	
1	Define function and list the advantages of functions.
2	What is a function? Why do we use functions in ‘C’ language? Give an example. (2017-May)
3	Distinguish between function declaration and definition. (May 2019 –R15 Sup)
4	Distinguish between built – in and user – defined functions.
5	Define Recursive functions. List out the limitations of recursive functions(May 2019-R16Sup)
6	How does a recursive function differ from an iterative function? (May 2019 –R18 Reg)
7	Explain how to define pointer to a function (May/June 2019 –R16 Sup) Give Syntax to create a pointer to function. (May 2019 –R18 Sup)
8	Write a Short note on dynamic memory allocation(May 2019 –R18 Sup)
9	Write the syntax and purpose of malloc() function. (May 2019 –R18 Reg)
10	Distinguish between malloc() and Calloc() functions in C language(May 2019 –R13 Sup)
11	Write the difference between call by value and call by reference
12	What is dynamic memory allocation. List various dynamic memory allocation functions
13	Write the difference between dynamic and static memory allocation
14	Give brief note on storage classes(May 2019 –R18 Sup)
Unit-5	
1	Explain Binary Search.
2	How linear search is different from binary search? (May 2019 –R18 Reg) Give the difference between Linear and Binary search.
3	What are uses of binary search compared with the linear search.

4	Write short notes on bubble sorting technique.
	Write and explain the time complexity of bubble sort (May 2019 –R18 Sup)
5	Explain insertion sort.
6	Discuss selection sort merits and demerits
	Differentiate between selection sort and insertion sort. (May 2019 –R18 Reg)
7	Which sorting is effective explain?
8	What is time complexity.
9	Define space complexity.

ASSIGNMENT QUESTIONS(LAQ'S)

UNIT I	
1	a) Explain and specify the interactions between various components that support the basic functionality of a computer? (May/June – 2015) b) Discuss in detail the program execution steps? (2015) (OR) Write and explain the steps in writing a 'C' program (May/June-2017) (OR) Explain typical steps for entering, compiling and executing 'C' program(May/June-2018 sup)
2	a) What is programming language? Briefly explain the classification of programming language. b) Define Algorithm? What are the characteristics that any algorithm should satisfy? c) Write an algorithm to find roots of quadratic equation considering all cases(May/June-2018)
3	a) Define Flowchart? List and explain different symbols used for drawing a flowchart. b) Draw a flow chart for finding the roots of quadratic equation.(May/June – 2017)
4	a) Discuss the concept of type conversion in C. (May/June-2018 Reg) b) What is precedence and associativity in an expression? What is their need?
5	a) List the basic data types, their sizes and range of values supported by 'C' language?(May/June- 2017) b) Describe the purpose of commonly used conversion characters in scanf() function?
6	a) What are the C operators? Explain their usage with suitable examples to each of them (May/June – 2017)
7	a) Differentiate between if-else-if ladder and switch statement? b) Distinguish between while and do while statement in C. (May/June-2017)

8	<p>a) Explain with a sample program about while, for, do-while and switch statements in c programming?</p> <p style="text-align: center;">Or</p> <p>Distinguish between all loop statements along with a flowchart and with an example program (May-2019 sup)</p> <p>b) Write down the significance of break statement inside a switch statement. (May-2019 Reg)</p>
9	<p>a) Explain the significance of 'break' and 'continue' with statement with a sample program (May-2019 sup)</p> <p>Demonstrate the usage of break and continue statements using an example (May-2019 R15sup)</p> <p>b) Write a program to demonstrate 'goto' statement (May-2019 R16sup)</p> <p>C) Demonstrate nested if else stmt in "C" language using an example (May-2019 R15sup)</p>
10	<p>a) Write a C program to find factorial of a given number using "while" and do..while" (May/June-2017)</p> <p>b) Write a C program to print the Fibonacci Sequence (May/June-2017)</p> <p>c) Write a C program to print prime numbers between 1 to 100 (May/June-2015)</p> <p>Write a C program to print prime numbers between 1 to N using while loop (May-2019 R16 sup)</p> <p>d) Write a C program to read a set of n single digits and converts them into single decimal integer. For example the program should convert the set of 5 digits [1,2,3,4,5] to integer 12345. (May/June-2015)</p> <p>e) Write a C program to print digits in reverse order for given number.</p> <p>f) Write a program that prints the binary equivalent of a decimal number. (May-2019 R15sup)</p>
11	<p>a) What are command line arguments? Explain briefly.</p> <p>b) List and explain various storage classes available in C and state the reason why register storage classes are less frequently used. (May-2019 Reg)</p>
UNIT II	
1	<p>a) What is an array? Explain the declaration and initialization of one and two dimensional arrays with example. Write down the application of array (2016,2019)</p> <p>b) Write a c program to find sum and product of two m*n matrices? (2015,2016,2017)</p> <p>Write a "C" program to multiply two non square matrices and explain it with a suitable example (May 2019 R16 sup)</p> <p>c) Write a program to print transpose of given matrix. (Dec-2016)</p>
2	<p>a) Write a 'C' program to search an element by using Linear Search. (2017)</p> <p>b) Explain the binary search method (Dec-2016, May/June-2017)</p>
3	<p>a) Perform the bubble sort for the following numbers 20, 5, 30, 10, 65, 3, 90 (Dec-2016)</p> <p>b) Write a program to sort the elements using bubble sort (May/June-2017)</p>
4	<p>a) State and explain with a sample program various string manipulation functions?</p> <p>b) Describe arrays of strings? Write a C program to accept a set of names and display them by using array of pointers (May/June-2017)</p> <p>c) What is meant by arrays of strings? when it will be used? Explain with a suitable example (May/June-2019 R16 Sup)</p>

5	<p>a) Write a C Program that would accept a string of any number of characters. Provide the function to count the number of vowels in the given string? (2015)</p> <p>b) Write a program which will read a string and rewrite it in the alphabetical order. For example the word STRING should be written as GINRST? (2015)</p> <p>c) Write a “C” program to find length of a string and concatenation of two strings without using string handling functions(May 2019,R15reg)</p> <p>d) Write a “C” program to read a string from keyboard and print the number of uppercase letters, lower case letters, digits, spaces and special characters (May 2019 R16 sup)</p>
6	Define Structure and write the general format for declaring and accessing members of a structure.(May 2019,R18reg)
7	<p>a) What is an enumerated type? How it can be declared? What are the different ways one can initialize enumerations?</p> <p>b) Differentiate between structures and unions? (2014,2015,Dec-2016,May 2019,R18reg)</p>
8	Explain the following with examples: Nested structures b) Array of structures c) Unions (May-2017)
9	<p>a) Define pointers. Explain how a pointer is declared, initialized and accessed</p> <p>b) What are the advantages drawbacks of pointers? (May/June-2017)</p> <p>c) Distinguish between a constant pointer and a pointer to constant (May 2019,R15 sup)</p>
9	<p>a) Explain pointer arithmetic. (Dec-2016)</p> <p>b) Write a C program using pointers to compute sum of all elements stored in array (May2017)</p>
10	<p>a) How pointers can be used for declaring multi dimensional arrays. (May/June-2017)</p> <p>b) How to use pointers as arguments in a function? Explain with a program(May 2019,R18reg)</p> <p>c) What is function pointer? Give the syntax and applications of a function pointer. Demonstrate how to initialize function pointers and use them in the program(May 2019 R15 sup)</p>
11	<p>a) Explain the following with examples: a) Pointers to structures b) Self referential structures (May-2017)</p> <p>b) With a sample “C” program explain the concept of passing structures through pointers (May 2019 R16 Sup)</p> <p>c) How we can define structure with in a structure? Explain with a sample program (May 2019 R16 Sup)</p> <p style="text-align: center;">Or</p> <p>Why structures are necessary ? Explain nested structures with a valid example. (May 2019 R18 Sup)</p>
12	<p>a) Write a C program to compute the monthly pay of 100 employees using each employee name and basic pay. The DA is computed as 2.5% of the basic pay, Gross sal(Basic pay+ DA) .Display the employees name and gross pay (May/June-2017)</p> <p>b) Write a C program to calculate grade, avg, total marks in a class of 60 students by using structure concept (May/June-2017)</p> <p>c) Create a structure called Student and the members of the structure are Stu_Name,Stu_Rno,M1,M2,M3. Create a pointer variable for the structure, store the values and fetch the values present in the structure Student.</p>

UNIT – III	
1	What is the significance of preprocessor and explain different types of preprocessor commands with an example for each. (Dec-2016,May-2017) Explain about preprocessor commands define, undef.(May 2019 R18 Sup)
2	Explain what a text file is and what a binary file is?(2015)
3	Explain various standard library functions for handling file.(Dec-2016)
4	a)Explain the file input and output functions with example programs. Or Explain the concept of streams and their significance in I/O operations.(May-2019 R18 Reg) List and explain various file read/write functions available in C with examples illustrating their usage and implementation b)Distinguish between r, r+ and w, w+ modes of files.(May/June-2017) Explain steps for file operations and different modes of opening a file(May 2019 Sup)
5	Discuss in detail about the file positioning functions. What are the file status functions? Explain their usage with a sample C program(May 2019 R16 Supp) Write the syntax of fseek() function in C and explain the same.(May 2019 R18 Reg) Demonstrate the following operations using examples: (May 2019 R15 Supp) i)fwrite ii) fseek
6	a)Write a C program to copy the contents of one file to another file?(Dec-2017) b)Write a C program to count number of characters, words, lines in a file.(Dec-2017) c)Write a C program to create a file contains a series of integer numbers and then reads all numbers of this file and write all odd numbers to other file called odd and write all even numbers to a file called even.(May/June-2017) d)Write a C program to read a text file, covert all the lower characters into upper case and re – write the uppercase characters in the file(May 2019 R18 supp) e) Write a “C” program to find number of lines in a file. (May 2019 R15 supp)
UNIT – IV	
1	a) What is a function? What are its advantages? Explain various parameter passing techniques (May/June-2017) State the need of user defined functions (May-2019 R18 Reg) b) Distinguish between library function and user defined functions in C with relevant example (May/June-2017)
2	What is meant by user defined function? Explain with an example C program. (May/June-2017)
3	a) Explain various categories of user defined functions in ‘C’ with examples. b) Differentiate actual parameters and formal parameters. (May/June-2017)
4	a) Define recursion function and write recursive and iterative approaches programs to find factorial of given number. b) Distinguish between iterative and recursion. (May/June-2017) C)Write a C program to generate Fibonacci series using recursive functions.(May 2019 R18 Reg)

5	Why we need Storage classes? List and explain the various storage classes present in C language (May/June-2017)
6.	a) Explain how an array can be passed as parameter to function b) Explain how a structure can be passed as parameter to function How to pass the structure as an argument? Explain with a suitable example. (May/Jun 2019 R18 Supp)
7	a) Explain call by value and call by reference with an example. Explain call by value and call by reference parameter passing methods. (May 2019 R18 Reg) b) What is Dynamic memory allocation? Discuss with examples. (May/June-2017)
8	List and explain the functions used to allocate and free memory dynamically. (May 2019 R18 Reg) What are memory allocation functions? Explain them clearly (May/Jun 2019 R16 Supp) Explain about allocating memories for arrays of different data types. (May/Jun 2019 R18)
UNIT V	
1	a) Write an algorithm to implement binary search. (Nov-2016 R13, May 2016 R09) b) Give an algorithm to find biggest of given three numbers. (Nov-2016 R13) c) Devise an algorithm for linear search and explain with an illustration (May/Jun 2019 R18 Reg)
2	a) Devise an algorithm for selection sort and explain with an illustration (May/Jun 2019 R18 Reg) b) Give a note on asymptotic notations. (May/Jun 2019 R18 Reg) c) Mention the complexity of linear search and binary search algorithms (May/Jun 2019 R18 Reg)
3	a) Give a brief note on insertion sort with an example (May/Jun 2019 R18 Supp) b) Discuss the time complexity of the bubble sort (May/Jun 2019 R18 Supp) c) Write a program in C to print the list of integers in ascending order using bubble sort and selection sort techniques. (May/Jun 2019 R18 Supp)
3	a) Perform bubble sort on following numbers. 20, 5, 30, 10, 65, 3, 90. b) Write the algorithm to find the roots of the quadratic equation.
3	a) Explain the concept of selection sort using suitable example. (Nov-2016). b) Write the algorithm to find the minimum and maximum in a set of given elements.
4	Sort the following elements using insertion sort and analyze the process. 45, 78, 96, 35, 21, 19, 73, 29 (Nov-2016)
5	a) Write a C program to search for an element using linear search (May/June-2017). b) Write an algorithm to find whether the given number is prime or not.
6	a) Design the algorithm to reverse the given number and explain the process with an example. b) Write the algorithm to find whether the given number is palindrome or not.

R18

Code No: 152AF

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B.Tech I Year II Semester Examinations, May - 2019

PROGRAMMING FOR PROBLEM SOLVING

(Common to EEE, CSE, IT)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A**(25 Marks)**

- 1.a) Name any two secondary storage devices and mention their characteristics. [2]
- b) Why is it necessary to give the size of an array in an array declaration? [2]
- c) Define the terms: Binary file and text file. [2]
- d) How does a recursive function differ from an iterative function? [2]
- e) Differentiate between selection sort and insertion sort. [2]
- f) What is an operating system? List out its goals and functions. [3]
- g) Mention the advantages and disadvantages of arrays. [3]
- h) What is the purpose of feof() function? [3]
- i) Write the syntax and purpose of malloc() function. [3]
- j) Write an algorithm to find the maximum number in a given set. [3]

PART-B**(50 Marks)**

- 2.a) What is precedence and associativity in an expression? What is their need?
 - b) Write down the significance of break statement inside a switch statement.
 - c) Discuss the concept of type conversion in C. [10]
- OR**
- 3.a) What are command-line arguments? Explain briefly.
 - b) List and explain various storage classes available in C and state the reason why register storage classes are less frequently used. [5+5]
- 4.a) What is a multidimensional array? Explain how a multidimensional array is defined in terms of a pointer to a collection of contiguous arrays of lower dimensionality.
 - b) Differentiate between structure and union in C.
 - c) Write down the applications of using arrays. [10]
- OR**
- 5.a) Write and explain the general format for declaring and accessing members of a structure.
 - b) How to use pointers as arguments in a function? Explain with a program. [5+5]

6. List and explain various file read/write functions available in C with examples illustrating their usage and implementation. [10]
- OR**
- 7.a) Write the syntax of fseek() function in C and explain the same.
b) Explain the concept of streams and their significance in I/O operations. [5+5]
- 8.a) Explain the call-by-value and call-by-reference parameter passing methods.
b) Write a C program to generate Fibonacci series using recursive functions. [5+5]
- OR**
- 9.a) State the need for user-defined functions.
b) List and explain the functions used to allocate and free memory dynamically. [5+5]
- 10.a) Devise an algorithm for linear search and explain with an illustration.
b) Write a C program to determine whether a given number is prime or not. [5+5]
- OR**
- 11.a) Devise an algorithm for selection sort and explain with an illustration.
b) Give a brief note on asymptotic notations.
c) Mention the complexity of linear search and binary search algorithms. [10]

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ENGINEERING GRAPHICS

SYLLABUS

Course Objectives

- To provide basic concepts in engineering drawing.
- To impart knowledge about standard principles of orthographic projection of objects.
- To draw sectional views and pictorial views of solids.

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

- Preparing working drawings to communicate the ideas and information.
- Read, understand and interpret engineering drawings.

UNIT – I

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

UNIT- II

Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures.— Auxiliary Planes.

UNIT – III

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere

UNIT – IV

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Intersection of Solids: Intersection of – Prism vs Prism- Cylinder Vs Cylinder

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

Introduction to CAD: (For Internal Evaluation Weight age only):

Introduction to CAD Software Package Commands.- Free Hand Sketches of 2D - Creation of 2D Sketches by CAD Package

TEXTBOOKS:

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing / N. S. Parthasarathy and Vela Murali/ Oxford

REFERENCE BOOKS:

1. Engineering Drawing / Basant Agrawal and McAgrawal/ McGraw Hill
2. Engineering Drawing/ M. B. Shah, B.C. Rane / Pearson.
3. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

ASSIGNMENT QUESTIONS

Unit – I

1. The distance between the centers of two drilled holes which are 0.8 m apart is shown by a line of 2 cm on the drawing .Construct a scale to read up to 5 m .Show on the scale a length of 2.3 m (MAY 2019)
2. Draw a diagonal scale of 1:3 showing centimeters and millimeters to measure up to a length of 30 cm .Show the distance of 19.5 cm (MAY 2019)
3. Two straight lines OA and OB are at right angles to each other. A point Q is 40 mm from OA and 60 mm. from OB. Draw a rectangular parabola from Q with in 10 mm distance from each line (MAY/JUNE 2019)
4. A circle of 40 mm diameter rolls on a horizontal line for a half revolution and then on a vertical line for another half revolution .Draw the curve traced out by a point Q on the circumference of the circle (MAY/JUNE 2019)
5. A stone thrown from the ground level reaches a maximum height of 20 m and falls on the ground at a distance of 35 m from the point of projection .Trace the path of the stone (MAY 2019)
6. Draw a hypocycloid whose diameter of rolling circle is 60 mm and the diameter of the base circle is 180 mm. Draw a tangent and normal at any point on the curve. If the diameter base circle is reduced to 120mm .what will be the curve? Construct at least two points on the new curve. (MAY 2019)
7. Construct a diagonal scale to read up to 0.1 mm, and mark on a distance of 6.63 cm. and take the scale as 3:1 (dec-2017)
8. Inscribe an ellipse in a parallelogram of sides 150 x100 mm with a inclined angle of 120° (Dec-2017)
9. A circle of 40 mm diameter rolls along a straight line without slipping. Draw the curve traced by a point on the circumference ,for one complete revolution (May 2016)

10. On a building plan, a line 20 cm long represents a distance of 10 m. Device a diagonal Scale for the plan to read up to 12 m, showing meters, decimeters and centimeters. Show on scale the lengths of 6.48 m & 11.14 m.
11. Draw a parabola passing through three vertices of a triangle of sides 30,45 and 60 mm the corner of the triangle common to the 45 and 60 mm sides lies on the axis of parabola, Draw a tangent and normal at a point on the curve 20 mm from the axis (Dec 2017)
12. Construct a plain scale of RF=1:50,000 to show kilometers and hectometers and long enough to measure up to 7 km. mark a distance of 5.3 km on the scale (Dec 2017)
13. Construct an ellipse, with distance of the focus from the directrix as 50 mm and eccentricity as $\frac{2}{3}$. Also draw normal and tangent to the curve at a point 40 mm from the directrix.
14. Two fixed points A and B are 100mm apart. Trace the complete path of a point P moving (in the same plane as that of A and B) in such a way that, the sum of its distances from A and B is always the same and equal to 125mm. Name the curve. Draw another curve parallel to and 25mm away from this curve.
15. A stone is thrown from a height of 5 meter above the ground. It reaches a maximum height of 10 meter and covers a horizontal distance of 20 meter from the point of lift. Draw the curve traced by the stone. What is the eccentricity of this curve? Name and draw a new curve whose eccentricity is 1.5 times the eccentricity of the above curve.
16. A fountain jet discharges water from ground level at an inclination of 50° to the ground. The jet travels a horizontal distance of 9cm from the point of discharge and falls on the ground. Trace the path of the jet.
17. Construct a plain scale to compute time in minutes and distance covered by a train in km., when the train passes between two stations 240 km apart in four hours. The scale should have R.F. $\frac{1}{400000}$. Show the distance covered in 45 minutes on the scale.(2014 June
18. A circle of 50 diameter, rolls on the circumference of another circle of diameter 175mmDiameter and outside it .trace the locus of point on the circumference of the rolling circle for one complete revolution. Name the curve. Draw a tangent and a normal to the curve at a point 125 mm from the centre of directing circle. (2015

Unit – II

1. A line PQ is 70 mm long and its end P is 20 mm above the HP and 30 mm in front of the VP while its other end Q is 40 mm above the HP and 60 mm in front of the VP .Draw the

projections of PQ and determine the inclinations with the HP and the VP.(MAY/JUNE 2019)

2. A line AB, 80 mm long, makes an angle of 30° with the VP, and lies in a plain perpendicular to both the HP and VP. Its end A is in the HP, and the end B is in the VP. Draw its projections and show its traces(Dec 2017)
3. A line MN 50mm long is parallel to VP and inclined at 30° to HP. The end M is 20 mm above HP and 10 mm in front of VP .draw the projections of the line (May 2016)
4. A line AB is 30 mm long and inclined at 30° to VP and parallel to HP. The end A of the line is 15 mm above HP and 20mm in front of VP. Draw the projections.
5. Draw the projections of a line AB, 90mm long, its midpoint M being 50mm above the H.P. and 40mm in front of the V.P. The end A is 20mm above the H.P. and 10mm in front of the V.P. Show the inclinations of the line with the H.P. and the V.P.
6. (a) Draw the projections of a regular pentagon of 30 mm side, with its surface making an angle of 5° with H.P. One of the sides of the pentagon is parallel to H.P and 15 mm away from it.
(b) A pentagon of 30 mm sides, has one of its corners on HP and its plane is inclined at 65° to VP and perpendicular to HP. Draw its projections.
7. A regular pentagon of length of 30mm side has one of its corners on V.P. and its surface is inclined at 60° to V.P. The edge, opposite to the corner on V.P, makes an angle of 45° with H.P. Draw the projection of the plane
8. A semi-circular plane of diameter 70 mm has its straight edge on the HP and inclined at 45° to the VP. Draw the projection of the plane when its surface is inclined at 30° to the H.P (MAY-JUNE 2014)
9. The distance between the projectors of two points A and B is 70mm. Point A is 10mm above H.P and 15mm in-front of VP. Point B is 50mm above hp and 40mm in front of VP. Find the shortest distance between A and B. measure true inclination of the line AB with HP and VP.
10. A line PQ, inclined at 45° to the V.P has a 60mm long front view. The end P is 10mm from both the principal planes while the end Q is 45mm above the H.P Draw the projections of the line and determines its true length and inclinations with the projections of the line and determines its true length and inclinations with the principal planes. Also locate its traces.(2015 June)
11. Draw the projections of a circle of 50mm diameter resting in the H.P. on a point A on the circumference, its plane inclined at 45° to the H.P. and

- a) The top view of the diameter AB making 30° angles with the V.P.,
 b) The diameter AB making 30° angle with the V.P. (2015 June)

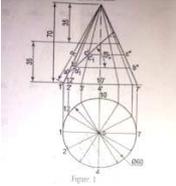
Unit – III

- 1) A Pentagonal pyramid of base side 30 mm long and height 80 mm has one of its triangular faces perpendicular to the horizontal plane and perpendicular to the vertical plane and intersects the axis at 20 mm above the base. Draw its FV and sectional top view. (MAY/JUNE-2019)
- 2) A hexagonal pyramid, with 25 mm edge of base and 60 mm long slant edges has one of its triangular faces inclined at 30° to the VP while the edge of the base with in that face is parallel to VP and inclined at 45° to the HP. Draw its projections (May 2016)
- 3) Hexagonal Pyramid side of base 30 mm and axis 50 mm long rests with one of the corners of its base on H.P. Its axis is inclined at 35° to H.P. and 45° to V.P. Draw Its projections
- 4) A cone of base 50 mm diameter and axis 80 mm long is lying on one of its generators with the axis parallel to VP. A horizontal section plane bisects the axis of the solid. Draw its projections showing its sectional top view.
- 5) A square pyramid, base 40 mm side and axis 90 mm long, has a triangular face on the ground and the vertical plane containing the axis makes an angle of 45° with the V.P. Draw its projections.
- 6) Draw the projections of a cone, base 45 mm diameter and axis 60 mm long, when it is resting on the ground on a point of its base circle with the axis making an angle 30° with the H.P. and 45° with the V.P.
- 7) A pentagonal pyramid with edge of base 25 and axis 65 long, is resting on H.P on its base with an edge nearer to the observer, parallel to V.P it is cut by a sectional plane, inclined at 60° to V.P and at a distance of 6 from the axis. Draw the projections and obtain the true shape of the section.
- 8) A pentagonal pyramid base 30 mm side and axis 60 mm long lying on one of its triangular faces on the HP with the axis parallel to VP. A vertical section plane whose H.T bisects the top view of the axis and makes an angle of 30 degrees with reference line cuts the pyramid removing its top part. Draw the top view sectional front-view and true shape of the section (2014 June)
- 9) A cube of 35 mm long edges is resting on the H.P. on one of its faces with a vertical face inclined at 30° to the V.P. is cut by a section plane, perpendicular to the V.P, inclined at 45° to the H.P. and passing through the top end of the axis. Draw its front view, sectional top view and true shape of the section. (MAY-JUNE 2014)

- 10) A cone with diameter of the base 45 and axis 55 long. is resting on its base on H.P it is cut by a section plane perpendicular to the both the H.P and the V.P and 6mm away from the axis .draw its front view ,top view and sectional side view (2015)
- 11) A square prism, base 40mm side and height 65mm,has its axis inclined at 45° to HP.and has an edge of its base, on the H.P and the V.P.and inclined at 30° to the V.P Draw the projections.(2015)

Unit – IV

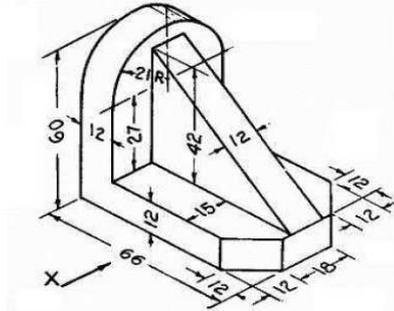
- 1) A lamp shaped is formed by cutting a cone of 70 mm diameter and 90mm height by a horizontal cutting plane at a distance of 36 mm from the apex and another cutting plane inclined at 30° to HP, passing through the lower left corner of the base .Draw the development of the shade (MAY 2019)
- 2) A square prism of base side 60 mm rests on one of its ends on the HP with the base sides equally inclined to the VP. It is penetrated fully by another square prism of base side .45 mm with the base side equally inclined to the HP The axes intersect at right angles. The axis of the penetrating prism is parallel to both the HP and the VP. Draw the projections of the prism and show the lines of intersection. (MAY 2019)
- 3) A hexagonal prism of side of base 30 and axis 75 long is resting on its base on H.P such that a rectangular face is parallel to V.P. It is cut by a section plane perpendicular to the V.P and inclined at 30° to the H.P the section plane is passing through the Top end of an extreme lateral at of the prism. Draw the development of lateral surface of cut prism
- 4) A vertical cylinder of diameter 120 mm is fully penetrated by a cylinder of diameter 90 mm their axes intersecting each other. The axis of the penetrating cylinder is inclined at 30° to the HP and is parallel to the VP. Draw the top and front views of the cylinders and curves of intersection.(May-2016)
- 5) A vertical cone diameter of base 75 mm and axis 100 mm long is completely penetrated by a cylinder of 45 mm diameter. The axis of the cylinder is parallel to the HP and the VP and intersects of the cone at a point 28 mm above the base. Draw the projections of the solids showing curves of intersection.(May 2016)
- 6) A pentagonal pyramid of base 30mm side and height 50mm stands on base on HP such that an edge of base is parallel to VP. It is cut by a plane at 45° to HP and cutting the axis at 30mm above the base. Draw its Development.
- 7) A hexagonal pyramid is lying on one of its triangular faces on HP with axis parallel to VP. side of the base 30 mm ,length of axis 70 mm. draw its projections (dec 2017)

- 8) A cone of base 50 and axis 60 long is resting on its base on H.P. It is cut by a section plane perpendicular to V.P and parallel to an extreme generator and passing through a point on the axis at a distance of 20 from apex. Draw the development of retained solid.
- 9) A cylinder of base 80 diameter and axis 110 long is resting on its base on H.P it has a circular hole 60 diameter drilled centrally through such that the axis of the hole is perpendicular to V.P and bisects the axis of the cylinder at right angle. Develop the lateral surface of the cylinder.
- 10) A vertical cylinder of 60 diameter is penetrated by another cylinder of 45 diameter the axes of the two cylinders are intersecting at right angle. Draw the projections of the two cylinders showing the lines of intersection
- 11) Draw the development of the lateral surface of truncated Cone following figure. All dimensions are in mm.
(MAY-JUNE 2014)
- 
- 12) A square pyramid, base 50 mm side and axis 75 mm long, is resting on H.P on one of its triangular faces, the top view of the axis making an angle of 30° with V.P. It is cut by a horizontal section plane, the V.T of which intersects the axis at a point 6 mm from the base. Draw the front view, sectional top view and the development of the sectioned pyramid.
(MAY-JUNE 2014)
- 13) A vertical cylinder of 80 diameters is completely penetrated by another cylinder of 60 diameter their axes bisecting each other at right angle. Draw their projections showing curves of penetration .Assuming the axis of the penetrating cylinder to the parallel to V.P
(2015)
- 14) Draw the development of a cylinder of 50 diameter and 75 height containing a square hole of 25 side. The sides of the hole are equally inclined to the base and axis of the hole bisects the axis of the cylinder

Unit – V

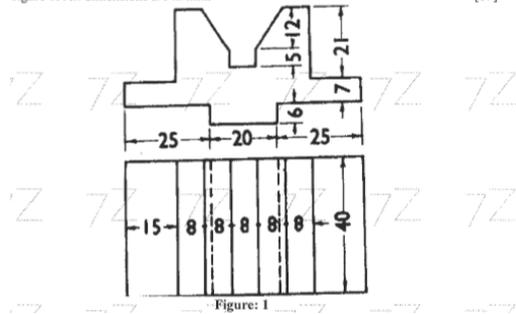
1. A waste paper is basket is in the form of a hollow inverted frustum of a square pyramid .the upper end is square of 100 mm side ; the lower end is a square of 70mm and the depth is 120 mm .Draw its isometric projection.(MAY- 2019)
2. Draw the isometric view of a square prism, with side of base 40 mm, and length of axis 70mm, when its axis is
 - a. Vertical
 - b. Horizontal

7. Draw front view ,top view and side view for the component shown in figure .all dimensions are in mm.(2015)

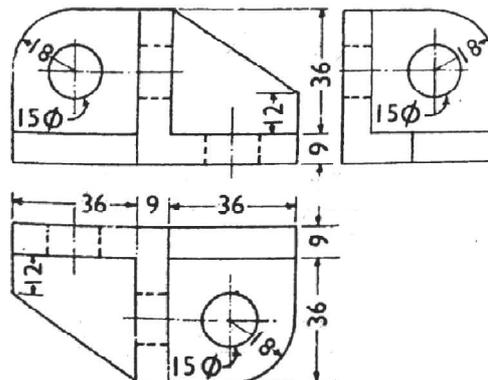


8. A point A is situated 60 mm behind picture plane and 65 mm above ground plane. The station point is 90 mm in front of picture plane, 45 mm above ground plane and lies in central plane 40mm to the left of the point A. Draw the perspective view of the point A (MAY-JUNE 2014) (Dec-2016)

Draw the isometric view of the object whose orthographic projections are given in figure 1. All dimensions are in mm. [15]



9. Draw the isometric view of the casting showing. All dimensions are in mm (MAY/JUNE 2019)



Code No: 152AG

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year II Semester Examinations, May - 2019

ENGINEERING GRAPHICS

(Computer Science and Engineering)

Time: 3 hours

Max Marks: 75

Answer all five questions
All questions carry equal marks

- 1.a) The distance between the centers of two drilled holes which are 0.8 m apart is shown by a line of 2 cm on the drawing. Construct a scale to read up to 5 m. Show on the scale a length of 2.3 m.
- b) A stone thrown from the ground level reaches a maximum height of 20 m and falls on the ground at a distance of 35 m from the point of projection. Trace the path of the stone. [7+8]

OR

2. Draw a hypocycloid whose diameter of rolling circle is 60 mm and the diameter of the base circle is 180 mm. Draw a tangent and normal at any point on the curve. If the diameter of the base circle is reduced to 120 mm what will be the curve? Construct at least two points on the new curve [15]
- 3.a) A point 40 mm above xy line is the plan view of three points A, B and C. The point A is 20 mm above, the point B is 30 mm below and the point C is on the HP. Determine the projections of A, B and C.
- b) Draw the projections of a line 70 mm long having one of its ends lying both in the HP and the VP. The other end is 40 mm above the HP and 35 mm in front of the VP. Find the inclinations of the line with the HP and the VP. [7+8]

OR

4. A triangular lamina having sides 40 mm, 60 mm and 80 mm is held in such a way that the smallest side is parallel to the HP and perpendicular to the VP. The plane of the lamina is inclined at 60° to the HP. Draw the projections of the lamina. [15]
5. A cylinder of base 30 mm diameter and axis 45 mm long is resting on a point of its base on HP so that the axis is inclined at 30° with HP. Draw the projections of the cylinder when the top view of the axis is inclined at 45° with xy. [15]

OR

6. A square pyramid base 40 mm side and axis 60 mm long has its base on the HP and base edges equally inclined to the VP. It is cut by a section plane inclined at 30° to the HP perpendicular to VP and bisecting the axis. Draw its sectional views and true shape of the section. [15]
7. A lamp shape is formed by cutting a cone of 70 mm diameter and 90 mm height by a horizontal cutting plane at a distance of 36 mm from the apex and another cutting plane inclined at 30 degree to HP, passing through the lower left corner of the base. Draw the development of the shade. [15]

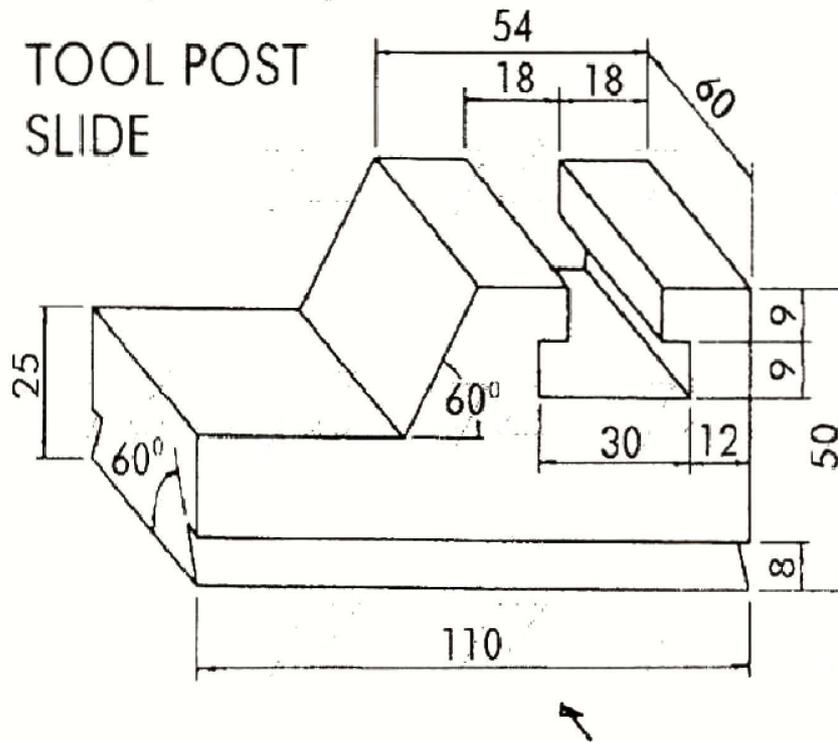
OR

8. A square prism of base side 60 mm rests on one of its ends on the HP with the base sides equally inclined to the VP. It is penetrated fully by another square prism of base side 45 mm with the base side equally inclined to the HP. The axes intersect at right angles. The axis of the penetrating prism is parallel to both the HP and the VP. Draw the projections of the prisms and show the lines of intersection. [15]

9. A waste paper basket is in the form of a hollow inverted frustum of a square pyramid. The upper end is a square of 100 mm side; the lower end is a square of 70 mm and the depth is 120 mm. Draw its isometric projection. [15]

OR

10. The following figure shows the tool post slide of a lathe machine. Draw the front view, side view and the top view of the object. All the dimensions are in mm only. [15]



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ENVIRONMENTAL STUDIES

SYLLABUS

COURSE OBJECTIVES:

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of development activities and mitigation measures.
3. Understanding the environmental policies and regulations.

COURSE OUTCOMES :

- Based on this course, the Engineering graduate will understand/evaluate/develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development.

UNIT-I:

Ecosystems: Definition, Scope and Importance of ecosystem. Classification, structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Bio-magnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II:

Natural Resources: Classification of Resources: Living and Non-Living resources,

Water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems.

Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources,

Land resources: Forest resources,

Energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT-III:

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV:

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution,

Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards.

Water pollution: Sources and types of pollution, drinking water quality standards.

Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil.

Noise Pollution: Sources and Health hazards, standards,

Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management.

Pollution control technologies: Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Problems and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol and Montreal Protocol.

UNIT-V:

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

Towards Sustainable Future: Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

SUGGESTED TEXT BOOKS:

- 1 extbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
- 2 Environmental Studies by R. Rajagopalan, Oxford University Press.
- 3 Environmental Studies by Anubha Kaushik and C.P Kaushik

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T.Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M.Masters and Wendell P. Ela .2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B.Botkin & Edward A.Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

UNIT-I

ECOSYSTEM

SHORTANSWER QUESTIONS

1. Define ecosystem and ecology.
2. Give the classification of ecosystems.
3. What are the various structural components of an ecosystem?
4. What are biotic and abiotic factors?
5. What is a food chain?
6. What are the various types of food chains?
7. What is a food web?
8. What is an ecological pyramid? What are various types of ecological pyramids?
9. Define bio-geochemical cycle.
10. Define bioaccumulation and biomagnifications.

LONG ANSWER QUESTIONS

1. Define and classify ecosystem. Write about the structural components of an ecosystem.
2. Explain briefly about a) Food chain b) Food web.
3. Write briefly about the ecological pyramids.
4. Discuss briefly any two biogeochemical cycles.
5. Write briefly about
 - a) Bio-magnification.
 - b) Primary and secondary production
6.
 - a) Define ecosystem and write about the scope and importance of ecosystems.
 - b) What are the values and services of ecosystems?

UNIT-II

NATURAL RESOURCES

SHORTANSWER QUESTIONS

1. Define a natural resource.
2. Give the classification of resources with examples.
3. Give the benefits of dams.
4. What is flood and what are the various types of floods?
5. What is a drought and what are the types of droughts?
6. What are minerals and give the various types minerals.

7. Write about nuclear fusion and fission reactions with examples.
8. Define landslide, soil erosion, land degradation
9. What are the causes of land degradation?
10. Write a brief note on renewable energy resources.

LONG ANSWER QUESTIONS

1. What are mineral resources? Classify mineral resources and explain in detail about the environmental effects of extracting and using mineral resources.
2. Explain in detail about floods and droughts.
3. Write about the benefits and problems of dams.
4. Write in detail about the energy resources. Also mention about the alternate energy sources.
5. Write about a) Land degradation b) Man induced landslides.
6. What are the causes and effects of land degradation?
7. Explain in detail about the following including applications
 - a) Solar energy.
 - b) Wind energy.
 - c) Tidal energy.

UNIT-III

BIODIVERSITY AND ITS CONSERVATION

SHORTANSWER QUESTIONS

1. Define biodiversity.
2. Give the classification of biodiversity.
3. What are the types of values of biodiversity?
4. What are endangered and endemic species? Give examples.
5. What are rare and extinct species?
6. What are hot spots of biodiversity?
7. What are the major threats to biodiversity?
8. What are the types of conservation of biodiversity?

LONG ANSWER QUESTIONS

1. Define a) Biodiversity b) Genetic diversity c) Species diversity d) Ecosystem diversity.
2. Write briefly about the values of biodiversity.
3. What are the threats to biodiversity?
4. Write short notes on Ex-situ conservation

5. Write short notes on In-situ conservation
6. Explain India as a mega biodiversity nation.
7. Write about the national biodiversity act.

UNIT-IV

ENVIRONMENTAL POLLUTION AND CONTROL TECHNOLOGIES

SHORTANSWER QUESTIONS

1. Define pollution. What are various types of pollution?
2. What are the major causes of air pollution?
3. What are the effects of air pollution on plants, human and animals?
4. Define water pollution and what are sources of water pollution?
5. Define noise pollution and give the reasons for noise pollution.
6. What are the effects and control methods of noise pollution?
7. What is solid waste management?
8. What is green house effect and global warming?
9. Write about ozone layer depletion.
10. Define deforestation and desertification.

LONG ANSWER QUESTIONS

1. Define air pollution. What are the sources and effects of air pollution?
2. Write in detail about the solid waste management.
3. Write briefly about a) Water pollution b) Noise pollution
4. Write short notes on the following: a) Global warming b) Green house effect c) Ozone depletion and ODS.
5. What are the problems with deforestation.
6. Explain a) Montreal protocol b) Kyoto protocol and c) Earth Summit
7. Write about water treatment methods.

UNIT – V

ENVIRONMENTAL POLICY, LEGISLATION AND EIA

SHORTANSWER QUESTIONS

1. Define EIA and EMP
2. What are the various steps involved in EIA methodology.
3. What are positive and negative impacts? Give examples.
4. What are the various methods of acquisition of base line data?

5. What is rain water harvesting?
6. What is biomedical waste management?
7. What is hazardous waste management
8. Define sustainability. What are the various threats to sustainable development?
9. What is population explosion? What are the problems of population explosion?
10. Write about the use of environmental education in protecting the environment.
11. What is urban sprawl and clean development mechanism?
12. What is a green building?

LONG ANSWER QUESTIONS

1. Explain about rain water harvesting methods.
2. Explain a) Environment Protection Act b) Forest conservation act
3. Write about water (prevention and control of pollution) Act – 1974 and Air Act.
4. Write about solid and biomedical waste management.
5. Discuss briefly about the concept of green building and clean development mechanism (CDM).
6. Explain about the threats to sustainable development.
7. Write the methodology of EIA.

ENGLISH SYLLABUS

INTRODUCTION

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students.

In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. *The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contexts and cultures.*

Learning Objectives: The course will help to

- a. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
- b. Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
- c. Develop study skills and communication skills in formal and informal situations.

Course Outcomes: Students should be able to

- Use English Language effectively in spoken and written forms.
- Comprehend the given texts and respond appropriately.
- Communicate confidently in various contexts and different cultures.
- Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

SYLLABUS

UNIT –I

‘The Raman Effect’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary Building: The Concept of Word Formation --The Use of Prefixes and Suffixes.

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

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

Basic Writing Skills: 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

‘Ancient Architecture in India’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Synonyms and Antonyms.

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

Reading: Improving Comprehension Skills – Techniques for Good Comprehension

Writing: Format of a Formal Letter-**Writing Formal Letters** E.g., Letter of Complaint, Letter of Requisition, Job Application with Resume.

UNIT –III

‘Blue Jeans’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English.

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

Reading: Sub-skills of Reading- Skimming and Scanning

Writing: Nature and Style of Sensible Writing- **Defining- Describing** Objects, Places and Events – **Classifying-** Providing Examples or Evidence

UNIT –IV

‘What Should You Be Eating’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Comprehension- Intensive Reading and Extensive Reading

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

UNIT –V

‘How a Chinese Billionaire Built Her Fortune’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Technical Vocabulary and their usage

Grammar: Common Errors in English

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 aReport.

Prescribed Textbook:

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.

References:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007).Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

Unit-1 The Raman Effect (10 MARKS QUESTIONS)

1. What qualities of Sir C.V.Raman are inspiring and worth emulating? Elucidate.
2. Which incident really struck C.V.Raman to explore the blue colour of the sea?
3. Discuss C.V.Raman’s discovery of scattering of light.
4. Give an account of C.V.Raman’s contribution to science.
(5 MARKS QUESTIONS)
5. Write a paragraph on E-SEVA centre in the society.
6. Write a paragraph on the characteristics of a good friend.
7. Write a paragraph on the incident which made you change your views about parents/friends/teachers.
8. Give an account of C.V.Raman’s discovery during his voyage across the Mediterranean.
(2 MARKS QUESTIONS)
9. Give the meaning of the Prefix ‘im’.
10. Give the meaning of the Prefix ‘pre’.
11. Complete the sentences with correct prepositions
 - a) We are sorry----- having disturbed you.
 - b) The woman ----- the car is my neighbour.

Unit-2 Ancient Architecture In India (10 MARKS QUESTIONS)

1. How did the Gandhara style emerge? Discuss its characteristics with illustrations.
2. Write a detailed note on the schools of art and architecture in India.
3. What is the significance of travel and tourism in our culture?
(5 MARKS QUESTIONS)
4. What is a Jataka story?
5. Name any two indigenous styles of architecture.
6. List out the places known for ancient architecture in Southern India.
7. What are the major dynasties in South India and name some places known for their cave architecture.
8. The architecture of India is rooted in its history, culture and religion. Explain briefly.

9. 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.
10. Prepare your resume for the post of software engineer job at Infosys.
(3 MARKS QUESTIONS)
11. What is the importance of writing a job application letter (cover letter) while sending your resume?
12. Write a letter of requisition to seek scholarship.
13. Write synonyms of the given words
i) Abate ii) meticulous
14. Choose the correct antonym for the word 'delineate' and use it in a sentence.
i) define ii) outline iii) demarcate iv) expand

Unit-3

Blue Jeans

(10 MARKS QUESTIONS)

1. How were the blue jeans invented? Discuss its manufacturing process in detail.
2. What were the steps denim went through before being used as pants?
3. Describe the evolution of blue jeans.
4. Explain skimming and scanning methods of reading.
5. Describe your favourite location in your own words.
(5 MARKS QUESTIONS)
6. What kind of raw materials are used in making denim? Who invented riveted pants?
7. What are the sub skills of reading?
8. What is the difference between pre washing and stone washing?
9. Explain the process and purpose of sanforising.

(3 MARKS QUESTIONS)

10. Identify the errors in the given sentences and correct them.
i) My mother is yet to recover with viral fever even after two weeks.
ii) Joseph is being a lecturer in an engineering college.
iii) I cannot cope up with this pressure.

Unit-4

WHAT SHOULD YOU BE EATING?

(10 MARKS QUESTIONS)

1. Write a detail note on the importance of personal hygiene and healthy food habits.
2. 'It's a myth that all fats should be avoided' Interpret.
3. Discuss the benefits of eating natural food.
4. Discuss the health effects of refined grains in your diet.
5. What is narrative essay? Write a narrative essay on the given topic. 'your experience on the day you joined B.Tech in your favourite college.'
(5 MARKS QUESTIONS)
6. What is the connection between whole grains and insulin?

7. According to you, what are the two main factors that change your body weight?
8. Précis writing.
(3 MARKS QUESTIONS)
9. How is body affected when you consume sugary drinks excessively?
10. List foods that contain high amounts of sodium.
11. Why should dairy products be consumed in moderation?
12. What is the difference between extensive and intensive reading?
13. Re write the sentences below avoiding the clichés used.
- i) Well practice during the examinations will not be tolerated in any way, shape or form
- ii) In the present day and age, people are increasingly sharing recipes for healthy food on the internet.

Unit-5

How a Chinese Billionaire Built Her Fortune

(10 MARKS QUESTIONS)

1. Bring out an assessment of Ms.Zhou's personality traits.
2. Reading Comprehension
3. Imagine you organized sports day at your institute. Draft the highlights of the programme and prepare a report of the same. Assume relevant data.
4. What are the elements of a good report?
5. Write a report on the college day celebrations in your college.
(5 MARKS QUESTIONS)
6. Discuss your views on Lens technology.
7. What are the processes that glass is put through in the factory?
8. Discuss in brief the success story of Ms.Zhou
(3 MARKS QUESTIONS)
9. Define the term technical vocabulary with examples.
10. Write the meaning of phrasal verbs and use them in a sentence.
- i) Paid off ii) drop in iii) break out

R18

Code No: 152AD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year II Semester Examinations, May - 2019

ENGLISH

(Common to CE, ME, ECE, EIE, MCT, MMT, AE, MIE, PTM)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

- 1.a) Fill in the blanks using correct preposition.
The earliest gunpowder invented _____ man exploded on contact _____ an open flame or a red-hot fire. [2]
- b) Write the synonyms to the given below. [2]
i) Abate ii) Meticulous
- c) Fill in the blanks using correct verbs given in brackets.
When my family and I _____ (go) to our village, I _____ (see) an accident. [2]
- d) Rewrite the sentences given below avoiding the Clichés used. [2]
i) Malpractice during the examinations will not be tolerated in any way, shape or form.
ii) In the present day and age, people are increasingly sharing recipies for healthy food on the internet.
- e) Identify the errors in the given below sentences and correct them. [2]
i) My mother is yet to recover with viral fever even after two weeks.
ii) Joseph is being a lecturer in an engineering college.
- f) Give an account of Rāman's discovery during his voyage across the Mediterranean. [3]
- g) What are the major dynasties in South India and name some places known for their cave architecture. [3]
- h) Explain the process and purpose of sanforising? [3]
- i) Are sugary drinks good for health or hazardous? Elaborate. [3]
- j) Discuss in brief the success story Ms Zhou. [3]

PART-B

(50 Marks)

2. What qualities of Sir C.V. Raman are inspiring and worth emulating? Elucidate. [10]

OR

3. Write an essay on Ethical Use of Digital Technology. [10]

4. How did the Gandhara style emerge? Discuss its characteristics with illustrations. [10]

OR

5. You purchased a mobile phone from an e-commerce website during a discount sale. However, you received a damage phone. Write a letter to the website asking for a replacément or-refund. [10]

6. How were the Blue Jeans invented? Discuss its manufacturing process in detail. [10]

OR

7. Write a descriptive paragraph on the given below topics in about 300 words.

a) Characteristics of a good friend

b) The incident which made me change my views about parents/friends/teachers. [5+5]

8. Write a detail note on the importance of personal hygiene and healthy food habits. [10]

OR

9. What is 'Narrative Essay'? Write a narrative essay on the given below topic. "Your Experience on the Day you Joined B.Tech in your Favourite College". [10]

10.a) Bring out an assessment of Ms Zhou's personality traits.

b) Read the passage and answer the questions that follow.

If a person suddenly encounters any terrible danger, the change of nature one undergoes is equally great. Sometimes fear numbs our senses. Like animals, one stands still, powerless to move a step in fright or to lift a hand in defense of our lives, and sometimes one is seized with panic, and again, act more like the inferior animals than rational beings. On the other hand, frequently in cases of sudden extreme peril, which cannot be escaped by flight, and must be instantly faced, even the most timid men at once as if by miracle, become possessed of the necessary courage, sharp quick apprehension and swift decision. This is a miracle very common in nature. Man and the inferior animals alike, when confronted with almost certain death gather resolution from despair but there can really be no trace of so debilitating a feeling in the person fighting, or prepared to fight for dear life. At such times the mind is clearer than it has ever been; the nerves are steel, there is nothing felt but a wonderful strength and daring. Looking back at certain perilous moments in my own life, I remember them with a kind of joy, not that there was any joyful excitement then, but because they broadened my horizon, lifted me for a time above myself.

a) The title that best suits the passage would be:

i) The Will to Fight

ii) The Miracle of Confronting Danger

iii) The Change of Nature

iv) Courage and Panic

b) A man may react to sudden danger in three different ways. What are they?

i) He may flee in panic, or fight back or stand still.

ii) He may be paralyzed with fear, seized with panic or act like an inferior animal.

iii) He may be paralyzed with fear, or seized with panic, or as if by miracle, become possessed of the necessary courage, and face the danger.

iv) He may be paralyzed with fear, run away or fight.

c) What is the meaning of the word debilitating?

i) enfeeble

ii) strengthen

iii) debase

iv) thriving

d) Explain the phrase 'gather resolution from danger'.

i) Find peace in times of difficulty.

ii) A state of utter hopelessness makes one determined to face the difficulty.

iii) To remain calm and not to lose hope.

iv) To be enthusiastic and brave the odds.

e) The author feels happy in the recollection of dangers faced and overcome because

- i) They brought him a new experience.
- ii) They added a new perspective and lifted him above himself for a time.
- iii) These experiences boosted his confidence.
- iv) He felt elated as he was alive.

[5+5]

OR

11. You are the District Education Officer for Hyderabad District in Telangana. You have been directed by the Secretary, Department of School Education (DSE) to study and evaluate the achievement of the objectives of the district's primary education for June 2017–May 2018. Write an official report with the help of points given below.

- Providing admissions to all children from the age of five.
- Making sure that children do not drop out from school.
- Providing lunch to children under the mid-day meal scheme in primary schools run by the government and aided managements.
- Supplying free textbooks to children of classes 1-5.
- Imparting in-service training to primary teachers.

[10]

---ooOoo---

ENGLISH LANGUAGE AND COMMUNICATION SKILLS (ELCS) LAB

The **Language 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 of English by providing an opportunity for practice in speaking
- To improve the fluency of students in spoken English and neutralize their mother tongue influence
- To train students to use language appropriately for public speaking, group discussions and interviews

Course Outcomes:

Students will be able to attain:

- Better understanding of nuances of English language through audio- visual experience and group activities
- Neutralization of accent for intelligibility
- Speaking skills with clarity and confidence which in turn enhances their employability skills.

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

- Computer Assisted Language Learning (CALL) Lab
- Interactive Communication Skills (ICS) Lab

Listening Skills:

Objectives

- To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
- To equip students with necessary training in listening, so that they can comprehend the speech of 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

- To involve students in speaking activities in various contexts
- 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 Communication Skills Lab**.

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 – Taking Leave – Introducing Oneself and Others.

EXERCISE – II

CALL Lab:

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

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Sentence Stress – 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 and Seeking Permissions - Telephone Etiquette.

EXERCISE - III

CALL Lab:

Understand: Errors in Pronunciation-the Influence of Mother Tongue (MTI).

Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation.

Testing Exercises

ICS Lab:

Understand: Descriptions- Narrations- Giving Directions and Guidelines.

Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

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 – V**CALL Lab:**

Understand: Listening for Specific Details. *Practice:* Listening Comprehension Tests.

Testing Exercises

ICS Lab:

Understand: Group Discussion- Interview Skills. *Practice:* Group Discussion- Mock Interviews.

ENGINEERING WORKSHOP

Course Objective:

- 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 engineering products.
- To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
- To develop a right attitude, team working, precision and safety at work place.
- 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 to prescribed tolerances.

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 plumbing, fitting, carpentry, foundry, house wiring and welding.
- Identify and apply suitable tools for different trades of Engineering processes including drilling, 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 and 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

ENGINEERING CHEMISTRY LAB

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

- Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
- To determine the rate constant of reactions from concentrations as a function of time.
- The measurement of physical properties like adsorption and viscosity.
- To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.

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

- Determination of parameters like hardness and chloride content in water.
- Estimation of rate constant of a reaction from concentration – time relationships.
- Determination of physical properties like adsorption and viscosity.
- Calculation of R_f values of some organic molecules by TLC technique.

List of Experiments:

1. Determination of total hardness of water by complexometric method using EDTA
2. Determination of chloride content of water by Argentometry
3. Estimation of an HCl by Conductometric titrations
4. Estimation of Acetic acid by Conductometric titrations
5. Estimation of HCl by Potentiometric titrations
6. Estimation of Fe^{2+} by Potentiometry using $KMnO_4$
7. Determination of rate constant of acid catalysed hydrolysis of methyl acetate
8. Synthesis of Aspirin and Paracetamol
9. Thin layer chromatography calculation of R_f values. eg ortho and para nitro phenols
10. Determination of acid value of coconut oil
11. Verification of Freundlich adsorption isotherm-adsorption of acetic acid on charcoal
12. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
13. Determination of partition coefficient of acetic acid between n-butanol and water.
14. Determination of surface tension of a given liquid using stalagmometer.

References

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co., Delhi)
2. Vogel's text book of practical organic chemistry 5th edition
3. Text book on Experiments and calculations in Engineering chemistry – S.S. Dara

ENGINEERING PHYSICS LAB

1. Melde's experiment: To determine the frequency of a vibrating bar or tuning fork using Melde's arrangement.
2. Torsional pendulum: To determine the rigidity modulus of the material of the given wire using torsional pendulum.
3. Newton's rings: To determine the radius of curvature of the lens by forming Newton's rings.
4. Diffraction grating: To determine the number of lines per inch of the grating.
5. Dispersive power: To determine the dispersive power of prism by using spectrometer.
6. Coupled Oscillator: To determine the spring constant by single coupled oscillator.
7. LCR Circuit: To determine quality factor and resonant frequency of LCR circuit.
8. LASER: To study the characteristics of LASER sources.
9. Optical fibre: To determine the bending losses of Optical fibres.
10. Optical fibre: To determine the Numerical aperture of a given fibre.

Note: Any 8 experiments are to be performed

PROGRAMMING FOR PROBLEM SOLVING LAB

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 like operators, 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 and casting. Take the values form standard input.

Simple numeric problems:

- a. Write a program for fiend the max and min from the three numbers.
- b. Write the program for the simple, compound interest.
- c. Write 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 in the table. For example, for a number 5 and rows = 3, the output should be:

$$5 \times 1 = 5$$

$$5 \times 2 = 10$$

$$5 \times 3 = 15$$

- e. Write a program that shows the binary equivalent of a given positive number between 0 to 255.

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 $s = ut + \frac{1}{2}at^2$ where u and a are the initial velocity in m/sec ($= 0$) and acceleration in m/sec^2 ($= 9.8 \text{ m/s}^2$)).
- 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 number is 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. Write a 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. $1 - \frac{x}{2} + \frac{x^2}{4} - \frac{x^3}{6}$
- i. Write a C program to read in two numbers, x and n , and then compute the sum of this geometric progression: $1 + x + x^2 + x^3 + \dots + x^n$. For example: if n is 3 and x is 5, then the program computes $1 + 5 + 25 + 125$.

Arrays and Pointers and Functions:

- a. Write a C program to find the minimum, maximum and average in an array of integers.
- b. Write a functions to compute mean, variance, Standard Deviation, sorting of n elements in single dimension array.
- c. Write a C program that uses functions to perform the following:
- Addition of Two Matrices
 - Multiplication of Two Matrices
 - Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.
- d. Write C programs that use both recursive and non-recursive functions
- To find the factorial of a given integer.
 - To find the GCD (greatest common divisor) of two given integers.

- iii. To find x^n
- e. Write a program for reading elements using pointer into array and display the values using array.
- f. Write a program for display values reverse order from array using pointer.
- g. Write a program through pointer variable to sum of n elements from 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 characters with their uppercase equivalents.
- c. Write a C program to count the number of times a character occurs in a text file. The file name and 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 values are given 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 should be 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 followed by 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:
 - i. To insert a sub-string in to a given main string from a given position.
 - ii. To delete n Characters from a given position in a given string.
- d. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
- e. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch.
- f. 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 between finding 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 invalid choice 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 3      ***        4 5 6      3 3 3      ***
                                     4 4 4 4      **
                                           *
```

Sorting and Searching:

- Write a C program that uses non recursive function to search for a Key value in a given list of integers using linear search method.
- Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers using binary search method.
- Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
- Write a C program that sorts the given array of integers using selection sort in descending order
- Write a C program that sorts the given array of integers using insertion sort in ascending order
- Write a C program that sorts a given array of names

Suggested Reference Books for solving the problems:

- Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
- B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
- R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
- Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
- Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

BASIC ELECTRICAL ENGINEERING LAB

Course Objectives:

- To analyze a given network by applying various electrical laws and network theorems
- To know the response of electrical circuits for different excitations
- To calculate, measure and know the relation between basic electrical parameters.
- To analyze the performance characteristics of DC and AC electrical machines

Course Outcomes:

- Get an exposure to basic electrical laws.
- Understand the response of different types of electrical circuits to different excitations.
- Understand the measurement, calculation and relation between the basic electrical parameters
- Understand the basic characteristics of transformers and electrical machines.

List of experiments/demonstrations:

1. Verification of Ohms Law
2. Verification of KVL and KCL
3. Transient Response of Series RL and RC circuits using DC excitation
4. Transient Response of RLC Series circuit using DC excitation
5. Resonance in series RLC circuit
6. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
7. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single Phase Transformer
8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
9. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
10. Measurement of Active and Reactive Power in a balanced Three-phase circuit
11. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
12. Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
13. Performance Characteristics of a Three-phase Induction Motor
14. Torque-Speed Characteristics of a Three-phase Induction Motor
15. No-Load Characteristics of a Three-phase Alternator



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