



# MAHAVEER INSTITUTE OF SCIENCE AND TECHNOLOGY

(AN UGC AUTONOMOUS INSTITUTE)

ACADEMIC CALENDER 2024-2025

B.TECH I YEAR I & II SEMESTERS

ESTD : 2001

## I B. Tech I SEM

S.No	Description	Duration	
		From	To
1	<b>Commencement of I Sem Class work</b>	<b>20.08.2024</b>	
2	Induction Programme	20.08.2024	31.08.2024 (2 weeks)
3	1 <sup>st</sup> spell of instructions (Including Dussehra Holidays)	02.09.2024	02.11.2024 (9 Weeks)
4	<b>Dussehra Holidays</b>	<b>07.10.2024</b>	<b>11.10.2024</b> <b>(1 week)</b>
5	First Mid Term Examinations	04.11.2024	08.11.2024 (1 week)
6	2 <sup>nd</sup> Spell of Instructions	11.11.2024	04.01.2025 (8 weeks)
7	Second Mid Term Examination	06.01.2025	11.01.2025 (1 week)
8	Preparation & Practical Examinations	13.01.2025	25.01.2025 (2 weeks)
9	End Semester Examination	27.01.2025	08.02.2025 (2 weeks)

Note: - Number of Working/instructional Dates: 90.

## I B. Tech II SEM

S.NO	Description	Duration	
		From	To
1	<b>Commencement of II Sem Class work</b>	<b>10.02.2025</b>	
2	1st spell of instructions	10.02.2025	05.04.2025 (8 weeks)
3	First Mid Term Examinations	07.04.2025	12.04.2025 (1 Weeks)
4	2nd Spell of Instructions (Including Summer Vacation)	14.04.2025	21.06.2025 (10 weeks)
5	<b>Summer Vacation</b>	<b>12.05.2025</b>	<b>24.05.2025</b> <b>(2 weeks)</b>
6	Second Mid Term Examination	23.06.2025	28.06.2025 (1 week)
7	Preparation & Practical Examinations	30.06.2025	12.07.2025 (2 weeks)
8	End Semester Examinations	14.07.2025	26.07.2025(2 weeks)
9	Commencement of Class for II yr I Sem	14.08.2025	

Note: - Number of Working/instructional Dates: 90.

PRINCIPAL

**ACADEMIC REGULATIONS (R24) FOR B.TECH REGULAR**  
**STUDENTS WITH EFFECT FROM THE ACADEMIC**  
**YEAR 2024-25**

**1.0 Under-Graduate Degree Programme in Engineering & Technology (UGP I E&T)**

Jawaharlal Nehru Technological University Hyderabad (JNTUH) offers a 4-year (8 semesters) **Bachelor of Technology (B.Tech.)** degree programme, under Choice Based Credit System (CBCS) at its non-autonomous constituent and affiliated colleges with effect from the academic year **2024-25**.

**Eligibility for Admission**

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

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

**B.Tech. Programme Structure**

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

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

**Semester Scheme**

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

## Credit Courses

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

- One credit for one hour/ week/ semester for Theory/ Lecture (L) courses or Tutorials.
- One credit for two hours/ week/ semester for Laboratory/ Practical (P) courses.

Courses like Environmental Science, Constitution of India, Intellectual Property Rights, and Gender Sensitization Lab are mandatory courses. These courses will not carry any credits.

## Subject Course Classification

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

S. No.	Broad Course Classification	Course Group/ Category	Course Description
1	Foundation Courses (FnC)	BS – Basic Sciences	Includes Mathematics, Physics and Chemistry subjects
2		ES - Engineering Sciences	Includes Fundamental Engineering Subjects
3		HS – Humanities and Social Sciences	Includes subjects related to Humanities, Social Sciences and Management
4	Core Courses (CoC)	PC – Professional Core	Includes core subjects related to the parent discipline/ department/ branch of Engineering.
5	Elective Courses (ElC)	PE – Professional Electives	Includes elective subjects related to the parent discipline/ department/ branch of Engineering.
6		OE – Open Electives	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering.
7	Core Courses	Project Work	B.Tech. Project or UG Project or UG Major Project or Project Stage I & II

8		Industry Training/ Internship/ Industry Oriented Mini- project/ Mini- Project/ Skill Development Courses	Industry Training/ Internship/ Industry Oriented Mini-Project/ Mini-Project/ Skill Development Courses
9		Seminar	Seminar/ Colloquium based on core contents related to parent discipline/ department/ branch of Engineering.
10	Minor Courses	-	1 or 2 Credit Courses (subset of HS)
11	Mandatory Courses (MC)	-	Mandatory Courses (non-credit)

### Course Registration

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

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

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

A student may be permitted to register for all the subjects/ courses in a semester as specified in the course structure with maximum additional subject(s)/course(s) limited to 6 Credits (any 2 elective subjects), based on **progress** and SGPA/ CGPA, and completion of the '**pre-requisites**' as indicated for various subjects/ courses, in the department course structure and syllabus contents.

Choice for '**additional subjects/courses**', not more than any 2 elective subjects in any Semester, must be clearly indicated, which needs the specific approval and signature of the Faculty Advisor/Mentor/HOD.

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

Subject/ course options exercised through **on-line** registration are final and **cannot** be changed or inter-changed; further, alternate choices also will not be considered.

However, if the subject/ course that has already been listed for registration by the Head of the Department in a semester could not be offered due to any inevitable or unexpected reasons, then the student shall be allowed to have alternate choice either for a new subject (subject to offering of such a subject), or for another existing subject (subject to availability of seats). Such alternate arrangements will be made by the Head of the Department, with due notification and time-framed schedule, within **a week** after the commencement of class-work for that semester.

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

**Open Electives:** The students have to choose three Open Electives (OE-I, II & III) from the list of Open Electives given by other departments. However, the student can opt for an Open Elective subject offered by his own (parent) department, if the student has not registered and not studied that subject under any category (Professional Core, Professional Electives, Mandatory Courses etc.) offered by parent department in any semester. Open Elective subjects already studied should not repeat/should not match with any category (Professional Core, Professional Electives, Mandatory Courses etc.) of subjects even in the forthcoming semesters.

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

#### **Subjects/ courses to be offered**

A subject/ course may be offered to the students, **only if** a minimum of 15 students opt for it.

More than **one faculty member** may offer the **same subject** (lab/ practical may be included with the corresponding theory subject in the same semester) in any semester. However, selection of choice for students will be based on - '**first come first serve** basis and CGPA criterion' (i.e. the first focus shall be on early **on-line entry** from the student for registration in that semester, and the second focus, if needed, will be on CGPA of the student).

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

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

#### **Attendance requirements:**

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

(including 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 attendance uploaded every fortnight in the University Website.**

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

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

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

#### **Academic Requirements**

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

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

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

same before the evaluation committee as per schedule, or (iii) secures less than 40% marks in Real-time Research

Project (or) Field Based Research Project (or) Industry Oriented Mini Project (or) Internship evaluations.

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

### Promotion Rules

S. No.	Promotion	Conditions to be fulfilled
1	First year first semester to first year second semester	Regular course of study of first year first semester.
2	First year second semester to Second year first semester	(i) Regular course of study of first year second semester. (ii) Must have secured at least 20 credits out of 40 credits i.e., 50% credits up to first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Second year first semester to Second year second semester	Regular course of study of second year first semester.
4	Second year second semester to Third year first semester	(i) Regular course of study of second year second semester. (ii) Must have secured at least 48 credits out of 80 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Third year first semester to Third year second semester	Regular course of study of third year first semester.
6	Third year second semester to Fourth year first semester	(i) Regular course of study of third year second semester. (ii) Must have secured at least 72 credits out of 120 credits i.e., 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7	Fourth year first semester to Fourth year second semester	Regular course of study of fourth year first semester.

A student (i) shall register for all courses/subjects covering 160 credits as specified and listed in the course structure, (ii) fulfills all the attendance and academic requirements for 160 credits, (iii) earn all 160 credits by securing SGPA  $\geq 5.0$  (in each semester), and CGPA  $\geq 5$  (at the end of 8 semesters), (iv) **passes all the mandatory courses**, to successfully complete the undergraduate programme. The performance of the student in these 160 credits shall be considered for the calculation of the final CGPA (**at the end of undergraduate programme**), and shall be indicated in the grade card / marks memo 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 considered 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 / marks memo as a performance measure, subject to completion of the attendance and academic requirements as stated in regulations Items 6 and 7.1 – 7.4 above.

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

A student **detained in a semester due to shortage of attendance may be re-admitted in the same semester in the next academic year for fulfillment of academic requirements**. The academic regulations under which a student has been re-admitted shall be applicable. Further, 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 number of 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 40 marks allotted for CIE (Continuous Internal Evaluation) and 60 marks for SEE (Semester End-Examination).

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

1. Mid Term Examination for 30 marks:
  - a. Part - A : Objective/quiz paper for 10 marks.
  - b. Part - B : Descriptive paper for 20 marks.

The objective/quiz paper is set with multiple choice, fill-in the blanks and match the following type of questions for a total of 10 marks. The descriptive paper shall contain 6 full questions out of which, the student has to answer 4 questions, each carrying 5 marks. The **average of the two Mid Term Examinations** shall be taken as the final marks for Mid Term Examination (for 30 marks).

The remaining 10 marks of Continuous Internal Evaluation are distributed as:

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

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

Five (5) marks are allocated for assignments (as specified by the subject teacher concerned). The 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 average of the two assignments shall be taken as the final marks for assignment (for 5 marks).

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

- The Student, in each subject, shall have to earn 35% of marks (i.e. 14 marks out of 40 marks) in CIE, 35% of marks (i.e. 21 marks out of 60) in SEE and Over all 40% of marks (i.e. 40 marks out of 100 marks) both CIE and SEE marks put together.

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

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

There is NO Computer Based Test (CBT) for R25 regulations.

The details of the end semester question paper pattern are as follows:

The semester end examinations (SEE), for theory subjects, will be conducted for 60 marks consisting of two parts viz. i) **Part- A** for 10 marks, ii) **Part - B** for 50 marks.

- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
- Part-B consists of five questions (numbered from 2 to 6) carrying 10 marks each. Each of these questions is from each unit and may contain sub-questions. For each question there will be an “either” “or” choice, which means that there will be two questions from each unit and the student should answer either of the two questions.
- The duration of Semester End Examination is 3 hours.

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

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

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

The Semester End Examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed from the cluster / other colleges which will be decided by the examination branch of the University.

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

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

- The Student, in each subject, shall have to earn 35% of marks (i.e. 14 marks out of 40 marks) in CIE, 35% of marks (i.e. 21 marks out of 60) in SEE and Over all

40% of marks (i.e. 40 marks out of 100 marks) both CIE and SEE marks put together.

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

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

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

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

**For CSE/IT and allied branches and Mining Engineering**, the Continuous Internal Evaluation (CIE) will be for 50 marks. Each Mid-Term examination consists of two parts i) **Part – A** for 20 marks, ii) **Part – B** for 20 marks with a total duration of 2 hours.

**Part A:** Objective/quiz paper is set with multiple choice, fill-in the blanks and match the following type of questions for a total of 20 marks. **Part B:** Descriptive paper shall contain 6 full questions out of which, the student has to answer 4 questions, each carrying 5 marks.

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

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

- a) A write-up on day-to-day experiment in the laboratory (in terms of aim, components/procedure, expected outcome) which shall be evaluated for 10 marks
- b) **10 marks for viva-voce** (or) tutorial (or) case study (or) application (or) poster presentation of the course concerned.
- c) Internal practical examination conducted by the laboratory teacher concerned

shall be evaluated for 15 marks.

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

2. II Year II Semester *Real-Time (or) Field-based Research Project* course: The internal evaluation is for 50 marks and it shall take place during I Mid-Term examination and II Mid-Term examination. The average marks of two Mid-Term examinations is the final for 50 marks. Student shall have to earn 40%, i.e 20 marks out of 50 marks from average of the two examinations. There shall be NO external evaluation. The student is deemed to have failed, if he (i) does not submit a report on the Project, or (ii) does not make a presentation of the same before the internal committee as per schedule, or (ii) secures less than 40% marks in this course.

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

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

UG project work shall be carried out in two stages: Project Stage – I for approval of project before Mid-II examinations in IV Year I Semester and Project Stage – II during IV Year II Semester. Student has to submit project work report at the end of IV Year II Semester. The project shall be evaluated for 100 marks before commencement of SEE Theory examinations.

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

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

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

For conducting viva-voce of project, University selects an external examiner from the list of experts in the relevant branch submitted by the Principal of the College.

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

A student can re-register for subjects in a semester:

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

They may seek re-registration for all those subjects registered in that semester in which the student is failed. The student has to re-appear for CIE and SEE as and when offered.

A student must re-register for the failed subject(s) for 40 marks within four weeks of commencement of the class work in next academic year. His Continuous Internal Evaluation marks for 40 obtained in the previous attempt stand cancelled. The student has to obtain fresh set of marks for 40 allotted for CIE (Sum of average of two mid-term examinations consisting of Objective & descriptive parts, Average of two Assignments & Subject Viva-voce/PPT/ Poster presentation/ Case Study on a topic in the concerned

subject). Head of the Dept. will take care of this.

For mandatory courses of Environmental Science, Constitution of India, Intellectual Property Rights, and Gender Sensitization lab, a student has to secure 40 marks out of 100 marks (i.e. 40% of the 100 marks allotted) in the Continuous Internal Evaluation

for passing the subject/course. These marks should also be uploaded along with the internal marks of other subjects.

No marks or letter grades shall be allotted for mandatory/non-credit courses. Only Pass/Fail shall be indicated in Grade Card.

### Grading Procedure

Grades will be awarded to indicate the performance of students in each Theory Subject, Laboratory/Practicals/ Industry-Oriented Mini Project/Internship/SDC and Project Stage. 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 <sup>+</sup> (Excellent)	9
70 and less than 80%	A (Very Good)	8
60 and less than 70%	B <sup>+</sup> (Good)	7
50 and less than 60%	B (Average)	6
40 and less than 50%	C (Pass)	5
Below 40%	F (FAIL)	0
Absent	Ab	0

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

To a student who has not appeared for an examination in any subject, 'Ab' grade will be

allocated in that subject, and he is deemed to have '**Failed**'. A student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered next. In this case also, the internal marks in those subjects will remain the same as those obtained earlier.

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

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

**Credit Points (CP) = Grade Point (GP) x Credits .... For a course**

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

The Semester Grade Point Average (SGPA) is calculated by dividing the sum of credit points ( $\Sigma CP$ ) secured from all subjects/ courses registered in a semester, by the total number of credits registered during that semester. SGPA is rounded off to **two** decimal places. SGPA is thus computed as

$$\text{SGPA} = \left\{ \sum_{i=1}^N C_{ii} G_{ii} \right\} / \left\{ \sum_{i=1}^N C_{ii} \right\} \dots \text{For each semester,}$$

where 'i' is the subject indicator index (considering all subjects in a semester), 'N' is the no. of subjects '**registered**' for the semester (as specifically required and listed under the course structure of the parent department),  $C_i$  is the no. of credits allotted to the  $i^{\text{th}}$  subject, and  $G_i$  represents the grade points (GP) corresponding to the letter grade awarded for that  $i^{\text{th}}$  subject.

The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student in all semesters considered for registration. The CGPA is the ratio of the total credit points secured by a student in **all** registered courses (of 160) in **all** semesters, and the total number of credits registered in **all** the semesters. CGPA is rounded off to **two** decimal places. CGPA is thus computed from the I year II semester onwards at the end of each semester as per the formula

$$\text{CGPA} = \left\{ \sum_{j=1}^M C_{jj} G_{jj} \right\} / \left\{ \sum_{j=1}^M C_{jj} \right\} \dots \text{for all S semesters registered}$$

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

#### Illustration of calculation of SGPA:

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

$$SGPA = 152/21 = 7.24$$

#### Illustration of Calculation of CGPA up to 3<sup>rd</sup> Semester:

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

II	Course 14	3	O	10	30
III	Course 15	2	A	8	16
III	Course 16	1	C	5	5
III	Course 17	4	O	10	40
III	Course 18	3	B+	7	21
III	Course 19	4	B	6	24
III	Course 20	4	A	8	32
III	Course 21	3	B+	7	21
	<b>Total Credits</b>	<b>69</b>		<b>Total Credit Points</b>	<b>518</b>

$$\text{CGPA} = 518/69 = 7.51$$

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

For merit ranking or comparison purposes or any other listing, **only** the ‘**rounded off**’ values of the CGPAs will be used.

SGPA and CGPA of a semester will be mentioned in the semester Memorandum of Grades if all subjects of that semester are passed in first attempt. Otherwise the SGPA and CGPA shall be mentioned only on the Memorandum of Grades in which sittinghe passed his last exam in that semester. However, mandatory courses will not be taken into consideration.

### Passing Standards

A student shall be declared successful or ‘passed’ in a semester, if he secures a  $GP \geq 5$  (‘C’ grade or above) in every subject/course in that semester (i.e. when the student gets an  $SGPA \geq 5.0$  at the end of that particular semester); and he shall be declared successful or ‘passed’ in the entire undergraduate programme, only when gets a  $CGPA \geq 5.00$  (‘C’ grade or above) for the award of the degree as required.

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

### Declaration of results

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

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

$$\% \text{ of Marks} = (\text{final CGPA} - 0.5) \times 10$$

## Award of Degree

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

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

A student with final CGPA (at the end of the undergraduate programme)  $> 8.00$ , and fulfilling the following conditions - shall be placed in '**First Class with Distinction**'.

However, he

- (i) Should have passed all the subjects/courses in '**First Appearance**' within the first 4 academic years (or 8 sequential semesters) from the date of commencement of first year first semester.
- (ii) Should not have been detained or prevented from writing the semester end examinations in any semester due to shortage of attendance or any other reason.

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

Students with final CGPA (at the end of the undergraduate programme)  $\geq 7.0$  but  $< 8.00$  shall be placed in '**First Class**'.

Students with final CGPA (at the end of the undergraduate programme)  $\geq 6.00$  but  $< 7.00$ , shall be placed in '**Second Class**'.

All other students who qualify for the award of the degree (as per item 12.1), with final CGPA (at the end of the undergraduate programme)  $\geq 5.00$  but  $< 6$ , shall be placed in '**pass class**'.

A student with final CGPA (at the end of the undergraduate programme)  $< 5.00$  will not be eligible for the award of the degree.

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

## Award of 2-Year B.Tech. Diploma Certificate

1. A student is awarded 2-Year UG Diploma Certificate in the concerned engineering branch on completion of all the academic requirements and earned all the 80 credits (within 4 years from the date of admission) upto B.Tech. II Year II Semester, if the student want to exit the 4-Year B.Tech. program and *requests for the 2 -Year B. Tech. (UG) Diploma Certificate*.
2. The student **once opted and awarded 2-Year UG Diploma Certificate, the**

**student will be permitted to join** in B. Tech. III Year I Semester and continue for completion of remaining years of study for 4-Year B. Tech. Degree ONLY in the next academic year along with next batch students. *However, if any student wishes to continue the study after opting for exit, he/she should register for the subjects/courses in III Year I Semester before commencement of class work for that semester.*

3. *The students, who exit the 4-Year B. Tech. program after II Year of study and wish to re-join the B.Tech. program, must submit the 2 -Year B. Tech. (UG) Diploma Certificate awarded to him, subject to the eligibility for completion of Course/Degree.*
4. A student may be permitted to take one year break after completion of II Year II Semester or B. Tech. III Year II Semester (with university permission through the principal of the college well in advance) and can re-enter the course in **next Academic Year in the same college** and complete the course on fulfilling all the academic credentials within a stipulated duration i.e. double the duration of the course (Ex. within 8 Years for 4-Year program).

### **Withholding of results**

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

### **Transitory Regulations**

A. For students detained due to shortage of attendance:

1. A student who has been detained in any semester of I, II, III and IV years of R18 regulations for want of attendance, shall be permitted to join the corresponding semester of R25 Regulations and is required to complete the study of B.Tech. within the stipulated period of eight academic years from the date of first admission in I Year. The R25 Academic Regulations under which a student has been readmitted shall be applicable to that student from that semester. See rule (C) for further Transitory Regulations.

B. For students detained due to shortage of credits:

1. A student of R18 Regulations, who has been detained due to lack of credits, shall be promoted to the next semester of R25 Regulations only after acquiring the required number of credits as per the corresponding regulations of his/her first admission. The total credits required are 160 including both R18 & R25 regulations. The student is required to complete the study of B.Tech. within the stipulated period of eight academic years from the year of first admission. The R25 Academic Regulations are applicable to a student from the year of

readmission. See rule (C) for further Transitory Regulations.

C. For readmitted students in R25 Regulations:

1. A student who has failed in any subject under any regulation has to pass those subjects in the same regulations.
2. The maximum credits that a student acquires for the award of degree, shall be the sum of the total number of credits secured in all the regulations of his/her study including R25 Regulations. **There is NO exemption of credits in any case.**
3. If a student is readmitted to R25 Regulations and has any subject with 80% of syllabus common with his/her previous regulations, that particular subject in R22 Regulations will be substituted by another subject to be suggested by the University.

Note: If a student readmitted to R25 Regulations and has not studied any subjects/topics in his/her earlier regulations of study which is prerequisite for further subjects in R25

Regulations, the College Principals concerned shall conduct remedial classes to cover those subjects/topics for the benefit of the students.

### **Student Transfers**

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

There shall be no transfers from one college/stream to another within the constituent colleges and units of Jawaharlal Nehru Technological University Hyderabad.

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

The transferred students from other Universities/Institutions to JNTUH affiliated colleges who are on rolls are to be provided one chance to write the CBT (for internal marks) in the **equivalent subject(s)** as per the clearance letter issued by the University.

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

## Scope

The academic regulations should be read as a whole, for the purpose of any interpretation.

In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.

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

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

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**B.Tech. in ELECTRICAL AND ELECTRONICS ENGINEERING**  
**COURSE STRUCTURE & SYLLABUS (R24 Regulations)**  
**Applicable from AY 2024-25 Batch**

**I Year I Semester**

S. No.	Course Code	Course Title	L	T	P	Credits
1	MH24MA101BS	Matrices and Calculus	3	1	0	4
2	MH24CH102BS	Engineering Chemistry	3	1	0	4
3	MH24EE103ES	C Programming and Data Structures	3	0	0	3
4	MH24EE105ES	Electrical Circuit Analysis - I	3	0	0	3
5	MH24ME105ES	Computer Aided Engineering Graphics	1	0	4	3
6	MH24EE106ES	Elements of Electrical and Electronics Engineering	0	0	2	1
7	MH24CH107BS	Engineering Chemistry Laboratory	0	0	2	1
8	MH24EE108ES	C Programming and Data Structures Laboratory	0	0	2	1
		Induction Program				
		<b>Total Credits</b>	<b>13</b>	<b>2</b>	<b>10</b>	<b>20</b>

**I Year II Semester**

S. No.	Course Code	Course Title	L	T	P	Credits
1	MH24MA201BS	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2	MH24PH202BS	Applied Physics	3	1	0	4
3	MH24ME203ES	Engineering Workshop	0	1	3	2.5
4	MH24EN204HS	English for Skill Enhancement	2	0	0	2
5	MH24EE205ES	Electrical Circuit Analysis - II	2	0	0	2
6	MH24EE206ES	Applied Python Programming Laboratory	0	1	2	2
7	MH24PH207BS	Applied Physics Laboratory	0	0	3	1.5
8	MH24EN208HS	English Language and Communication Skills Laboratory	0	0	2	1
9	MH24EE209ES	Electrical Circuit Analysis Laboratory	0	0	2	1
10	*MH24MC210	Environmental Science	3	0	0	0
		<b>Total Credits</b>	<b>13</b>	<b>2</b>	<b>14</b>	<b>20</b>

## MH24MA101BS: MATRICES AND CALCULUS

B.Tech. I Year I Sem.

L T P C  
3 1 0 4

**Pre-requisites:** Mathematical Knowledge at pre-university level

**Course Objectives:** To learn

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

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

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

### UNIT-I: Matrices

10 L

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

### UNIT-II: Eigen values and Eigen vectors

10 L

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

### UNIT-III: Calculus

10 L

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-IV: Multivariable Calculus (Partial Differentiation and applications)

10 L

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

**UNIT-V: Multivariable Calculus (Integration)**

**8 L**

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).

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

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

## MH24CH102BS: ENGINEERING CHEMISTRY

B.Tech. I Year I Sem.

L T P C  
3 1 0 4

### Course Objectives:

1. To bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
2. To include the importance of water in industrial usage, fundamental aspects of battery chemistry, significance of corrosion it's control to protect the structures.
3. To imbibe the basic concepts of petroleum and its products.
4. To acquire required knowledge about engineering materials like cement, smart materials and Lubricants.

### Course Outcomes:

1. Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
2. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
3. They can learn the fundamentals and general properties of polymers and other engineering materials.
4. They can predict potential applications of chemistry and practical utility in order to become good engineers and entrepreneurs.

### UNIT - I: Water and its treatment: [8]

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and break - point chlorination. Defluoridation

- Determination of F<sup>-</sup> ion by ion- selective electrode method.

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

### UNIT – II Battery Chemistry & Corrosion [8]

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

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

### UNIT - III: Polymeric materials: [8]

Definition - Classification of polymers with examples - Types of polymerization - addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene **Plastics:** Definition and characteristics- thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP). **Rubbers:** Natural rubber and its vulcanization.

**Elastomers:** Characteristics -preparation - properties and applications of Buna-S, Butyl and Thiokol rubber.

**Conducting polymers:** Characteristics and Classification with examples-mechanism of conduction in

trans-polyacetylene and applications of conducting polymers.

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

#### **UNIT - IV: Energy Sources: [8]**

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

#### **UNIT - V: Engineering Materials: [8]**

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

#### **Smart materials and their engineering applications**

Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinyl amides

**Lubricants:** Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

#### **TEXT BOOKS:**

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016
3. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021.
4. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.

#### **REFERENCE BOOKS:**

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

## MH24EE103ES: C PROGRAMMING AND DATA STRUCTURES

B.Tech. I Year I Sem.

L T P C  
3 0 0 3

**Course Objectives:** Introduce the importance of programming, C language constructs, program development, data structures, searching and sorting.

**Course Outcomes:**

1. Understand the various steps in Program development.
2. Explore the basic concepts in C Programming Language.
3. Develop modular and readable C Programs
4. Understand the basic concepts such as Abstract Data Types, Linear and Non-Linear Data structures.
5. Apply data structures such as stacks, queues in problem solving
6. To understand and analyze various searching and sorting algorithms.

### UNIT - I

**Introduction to Computers** - Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development

**Introduction to C Language** – Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output

**Structure of a C Program** – Operators, Bit-wise operators, Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Statements.

### UNIT - II

**Statements** - if and switch statements, Repetition statements - while, for, do-while statements, Loop examples, other statements related to looping - break, continue, go to, Recursion.

**Designing Structured Programs-** Functions, basics, user defined functions, inter function communication, standard functions.

**Arrays** - Concepts, using arrays in C, inter function communication, array applications, two - dimensional arrays, multidimensional arrays.

### UNIT - III

**Pointers** - Introduction, Pointers for inter function communication, pointers to pointers, compatibility, **Pointer Applications** - Passing an array to a function, Memory allocation functions, array of pointers **Strings** - Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion.

### UNIT - IV

**Derived types** - The Typedef, enumerated types, Structures - Declaration, definition and initialization of structures, accessing structures, operations on structures, complex structures. Unions - Referencing unions, initializers, unions and structures.

**Input and Output** - Text vs Binary streams, standard library functions for files, converting file types, File programs – copy, merge files.

### UNIT – V

**Sorting**- selection sort, bubble sort, insertion sort,

**Searching**-linear and binary search methods.

**Data Structures** – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

**TEXT BOOKS:**

1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Fifth Edition, Pearson Education.
3. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

**REFERENCE BOOKS:**

1. C & Data structures - P. Padmanabham, 3<sup>rd</sup> Edition, B.S. Publications.
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
3. Programming in C - Stephen G. Kochan, III Edition, Pearson Education.
4. C for Engineers and Scientists, H. Cheng, McGraw-Hill International Edition
5. Data Structures using C – A. M. Tanenbaum, Y. Langsam, and M.J. Augenstein, Pearson Education / PHI
6. C Programming & Data Structures, E. Balagurusamy, TMH24.
7. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
8. C & Data structures - E V Prasad and N B Venkateswarlu, S. Chand & Co.

**MH24EE105ES: ELECTRICAL CIRCUIT ANALYSIS –I**

**B.Tech. I Year I Sem.**

**L T P C**  
**3 0 0 3**

**Prerequisites:** Mathematics

**Course Objectives:**

- To gain knowledge in circuits and to understand the fundamentals of derived circuit laws.
- To learn steady state and transient analysis of single phase and 3-phase circuits.
- To understand Theorems and concepts of coupled circuits.

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

- Understand network analysis, techniques using mesh and node analysis.
- Evaluate steady state and transient behavior of circuits for DC and AC excitations.
- Analyze electric circuits using network theorems and concepts of coupled circuits.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To gain knowledge in circuits and to understand the fundamentals of derived circuit laws.	3	3	3	3	3	3	1	1	2	2	1	3
To learn steady state and transient analysis of single and three phase circuits.	3	2	3	2	3	3	2	2	2	3	2	3
To understand Theorems and concepts of coupled circuits.	3	2	3	1	3	3	1	1	2	2	2	3

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Understand network analysis, techniques using mesh and node analysis.	3	3	3	3	3	3	3	1	2	1	1	2
Evaluate steady state and transient behaviour of circuits for DC and AC excitations.	3	3	3	3	3	3	3	3	3	3	2	3
Analyse electric circuits using network theorems and concepts of coupled circuits.	3	2	2	2	3	3	3	2	1	3	3	2

**UNIT-I:**

**Network Elements & Laws:** Active elements, Independent and dependent sources. Passive elements — R, L and C, Energy stored in inductance and capacitance, Kirchhoff's laws, Source transformations, Star-delta transformations, Node voltage method, Mesh current method including super node and super mesh analysis.

**UNIT-II:**

**Single-Phase Circuits:** RMS and average values of periodic sinusoidal and non- sinusoidal waveforms, Phasor representation, Steady-state response of series, parallel and series-parallel circuits. Impedance, Admittance, Current locus diagrams of RL and RC series and parallel circuits with variation of various parameters. Resonance: Series and parallel circuits, Bandwidth and Q-factor.

**UNIT-III:**

**Network theorems:** Superposition theorem, Thevinin's theorem, Norton's theorems, Maximum power transfer theorem, Tellegen's theorem, Compensation theorem, Milliman's theorem and Reciprocity theorem. (AC & DC).

**UNIT-IV:**

**Poly-phase Circuits:** Analysis of balanced and unbalanced 3-phase circuits, Star and delta connections, Measurement of three-phase power for balanced and unbalanced loads.

**UNIT-V:**

**Coupled circuits:** Concept of self and mutual inductance, Dot convention, Coefficient of coupling, Analysis of circuits with mutual inductance.

**Topological Description of Networks:** Graph, tree, chord, cut-set, incident matrix, circuit matrix and cut-set matrix,

**TEXTBOOKS:**

1. Van Valkenburg M.E, "Network Analysis", Prentice Hall of India, 3<sup>rd</sup> Edition, 2000.
2. Ravish R Singh, "Network Analysis and Synthesis", McGrawHill, 2<sup>nd</sup> Edition, 2019.

**REFERENCE BOOKS:**

1. B. Subramanyam, "Electric Circuit Analysis", Dreamtech Press & Wiley, 2021.
2. James W.Nilsson, Susan A.Riedel, "Electric Circuits", Pearson, 11<sup>th</sup> Edition, 2020.
3. A Sudhakar, Shyammohan S Palli, "Circuits and Networks: Analysis and Synthesis", McGraw Hill, 5<sup>th</sup> Edition, 2017.
4. Jagan N.C, Lakshrninarayana C., "Network Analysis", B.S. Publications, 3<sup>rd</sup> Edition, 2014.
5. William Hayt H, Kimmerly Jack E. and Steven Durbin M, "Engineering Circuit Analysis", McGraw Hill, 6<sup>th</sup> Edition, 2002.
6. Chakravarthy A., "Circuit Theory", Dhanpat Rai & Co., First Edition, 1999.

## MH24ME105ES: COMPUTER AIDED ENGINEERING GRAPHICS

B.Tech. I Year I Sem.

L T P C  
1 0 4 3

**Pre-requisites:** Nil

**Course Objectives:**

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

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

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

**UNIT – I:**

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

**UNIT- II:**

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

**UNIT – III:**

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

**UNIT – IV:**

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

**UNIT – V:**

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

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

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

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

**MH24EE106ES: ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**B.Tech. I Year I Sem.**

**L T P C**  
**0 0 2 1**

**Prerequisites:** Elements of Electrical Engineering

**Course Objectives:**

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

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

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

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To measure the electrical parameters for different types of DC and AC circuits using conventional and theorems approach	3	2	1		2	0	0	1	2	0	1	2
To study the transient response of various R, L and C circuits using different excitations	3	2	1	1	3	0	0	0	2	0	1	1
To determine the performance of different types of DC machines and Transformers	3	2	0		3	0	0	0	1	2	1	1

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Verify the basic Electrical circuits through different experiments	3	2	1	0	1	0	0	0	2	0	2	2
Evaluate the performance calculations of Electrical Machines and Transformers through various testing methods	3	2	1	0	3	1	0	1	1	2	1	2
Analyse the transient responses of R, L and C circuits for different input conditions	3	2	1	1	3	2	0	0	1	0	2	2

**List of experiments/demonstrations:**

**PART-A (compulsory)**

1. Verification Ohm's Law
2. Verification of KVL and KCL
3. Verification of Thevenin's and Norton's theorem

4. Verification of Superposition theorem
5. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
7. Performance Characteristics of a DC Shunt Motor
8. Open Circuit and Short Circuit Tests on 1-phase Transformer

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

1. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
2. Verification of Reciprocity and Milliman's Theorem.
3. Verification of Maximum Power Transfer Theorem.
4. Determination of form factor for non-sinusoidal waveform
5. Transient Response of Series RL and RC circuits for DC excitation

**TEXTBOOKS:**

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

**REFERENCE BOOKS:**

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

## MH24CH107BS: ENGINEERING CHEMISTRY LABORATORY

B.Tech. I Year I Sem.

L T P C  
0 0 2 1

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

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

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

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

**List of Experiments:**

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

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

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

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

**V. Preparations:**

1. Preparation of Bakelite.
2. Preparation Nylon - 6.

**VI. Lubricants:**

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

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

**VIII. Virtual lab experiments**

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

**REFERENCE BOOKS:**

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition
3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

**MH24EE108ES: C PROGRAMMING AND DATA STRUCTURES LABORATORY**

**B.Tech. I Year I Sem.**

**L T P C**  
**0 0 2 1**

**Course Objectives:** Introduce the importance of programming, C language constructs, program development, data structures, searching and sorting.

**Course Outcomes:**

1. Develop modular and readable C Programs
2. Solve problems using strings, functions
3. Handle data in files
4. Implement stacks, queues using arrays, linked lists.
5. To understand and analyze various searching and sorting algorithms.

**List of Experiments:**

1. Write a C program to find the sum of individual digits of a positive integer.
2. 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.
3. Write a C program to generate the first n terms of the sequence.
4. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
5. Write a C program to find the roots of a quadratic equation.
6. Write a C program to find the factorial of a given integer.
7. Write a C program to find the GCD (greatest common divisor) of two given integers.
8. Write a C program to solve Towers of Hanoi problem.
9. 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)
10. Write a C program to find both the largest and smallest number in a list of integers.
11. Write a C program that uses functions to perform the following:
  - i) Addition of Two Matrices
  - ii) Multiplication of Two Matrices
12. 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.
13. Write a C program to determine if the given string is a palindrome or not
14. Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn't contain T.
15. Write a C program to count the lines, words and characters in a given text.
16. Write a C program to generate Pascal's triangle.
17. Write a C program to construct a pyramid of numbers.
18. Write a C program that uses functions to perform the following operations:
  - i) Reading a complex number
  - ii) Writing a complex number
  - iii) Addition of two complex numbers
  - iv) Multiplication of two complex numbers(Note: represent complex number using a structure.)
19.
  - i. Write a C program which copies one file to another.
  - ii. Write a C program to reverse the first n characters in a file. (Note: The file name and n are specified on the command line.)

19.
  - i. Write a C program to display the contents of a file.
  - ii. 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)
  
20. Write a C program that uses functions to perform the following operations on singly linked list :
  - i) Creation
  - ii) Insertion
  - iii) Deletion
  - iv) Traversal
  
21. Write C programs that implement stack (its operations) using
  - i) Arrays
  - ii) Pointers
  
22. Write C programs that implement Queue (its operations) using
  - i) Arrays
  - ii) Pointers
  
23. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
  - i) Bubble sort
  - ii) Selection sort
  - iii) Insertion sort
  
24. Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:
  - i) Linear search
  - ii) Binary search

**TEXT BOOKS:**

1. C Programming & Data Structures, B.A. Forouzan and R. F. Gilberg, Third Edition, Cengage Learning.
2. Let us C, Yeswanth Kanitkar
3. C Programming, Balaguruswamy.

## MH24MA201BS: ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

B.Tech. I Year II Sem.

L T P C  
3 1 0 4

**Pre-requisites:** Mathematical Knowledge at pre-university level

**Course Objectives:** To learn

- Methods of solving the differential equations of first and higher order.
- Concept, properties of Laplace transforms
- Solving ordinary differential equations using Laplace transforms techniques.
- The physical quantities involved in engineering field related to vector valued functions
- The basic properties of vector valued functions and their applications to line, 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.
- Use the Laplace transforms techniques for solving ODE's.
- Evaluate the line, surface and volume integrals and converting them from one to another

### UNIT-I: First Order ODE

8 L

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

### UNIT-II: Ordinary Differential Equations of Higher Order

10 L 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  $x V(x)$ , method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation. Applications: Electric Circuits

### UNIT-III: Laplace transforms

10 L

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

### UNIT-IV: Vector Differentiation

10 L

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

10 L

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, 36<sup>th</sup> Edition, 2010

2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5<sup>th</sup> Edition, 2016.

**REFERENCE BOOKS:**

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

## MH24PH202BS: APPLIED PHYSICS

B.Tech. I Year II Sem.

L T P C  
3 1 0 4

**Pre-requisites:** 10 + 2 Physics

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

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

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

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

### UNIT - I: QUANTUM PHYSICS AND SOLIDS

Quantum Mechanics: Introduction to quantum physics, blackbody radiation - Stefan-Boltzmann's law, Wein's and Rayleigh-Jean's law, Planck's radiation law - photoelectric effect - Davisson and Germer experiment -Heisenberg uncertainty principle - Born interpretation of the wave function - time independent Schrodinger wave equation - particle in one dimensional potential box.

Solids: Symmetry in solids, free electron theory (Drude& Lorentz, Sommerfeld) - Fermi-Dirac distribution - Bloch's theorem -Kronig-Penney model - E-K diagram- effective mass of electron-origin of energy bands- classification of solids.

### UNIT - II: SEMICONDUCTORS AND DEVICES

Intrinsic and extrinsic semiconductors - Hall effect - direct and indirect band gap semiconductors - construction, principle of operation and characteristics of P-N Junction diode, Zener diode and bipolar junction transistor (BJT)-LED, PIN diode, avalanche photo diode (APD) and solar cells, their structure, materials, working principle and characteristics.

### UNIT - III: DIELECTRIC, MAGNETIC AND ENERGY MATERIALS

Dielectric Materials: Basic definitions- types of polarizations (qualitative) - ferroelectric, piezoelectric, and pyroelectric materials - applications - liquid crystal displays (LCD) and crystal oscillators.

Magnetic Materials: Hysteresis - soft and hard magnetic materials - magnetostriction, magnetoresistance - applications - bubble memory devices, magnetic field sensors and multiferroics. Energy Materials: Conductivity of liquid and solid electrolytes- superionic conductors - materials and electrolytes for super capacitors - rechargeable ion batteries, solid fuel cells.

### UNIT - IV: NANOTECHNOLOGY

Nanoscale, quantum confinement, surface to volume ratio, bottom-up fabrication: sol-gel, precipitation, combustion methods - top-down fabrication: ball milling - physical vapor deposition (PVD) - chemical

vapor deposition (CVD) - characterization techniques - XRD, SEM &TEM - applications of nanomaterials.

#### **UNIT - V: LASER AND FIBER OPTICS**

Lasers: Laser beam characteristics-three quantum processes-Einstein coefficients and their relations- lasing action - pumping methods- ruby laser, He-Ne laser, CO<sub>2</sub> laser, Argon ion Laser, Nd:YAG laser- semiconductor laser-applications of laser.

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

#### **TEXT BOOKS:**

1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy" A Text book of Engineering Physics"- S. Chand Publications, 11<sup>th</sup> Edition 2019.
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication, 2019
3. Semiconductor Physics and Devices- Basic Principle - Donald A, Neamen, Mc Graw Hill, 4<sup>th</sup> Edition, 2021.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2<sup>nd</sup> Edition, 2022.
5. Essentials of Nanoscience & Nanotechnology by NarasiMH24a Reddy Katta, Typical Creatives NANO DIGEST, 1<sup>st</sup> Edition, 2021.

#### **REFERENCE BOOKS:**

1. Quantum Physics, H.C. Verma, TBS Publication, 2<sup>nd</sup> Edition 2012.
2. Fundamentals of Physics - Halliday, Resnick and Walker, John Wiley & Sons, 11<sup>th</sup> Edition, 2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid-State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019.
5. A.K. Bhandhopadhyaya - Nano Materials, New Age International, 1<sup>st</sup> Edition, 2007.
6. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group Energy Materials Taylor & Francis Group, 1<sup>st</sup> Edition, 2022.

## MH24ME203ES: ENGINEERING WORKSHOP

B.Tech. I Year II Sem.

L T P C  
1 0 3 2.5

**Pre-requisites:** Practical skill

### Course Objectives:

- To Study of different hand operated power tools, uses and their demonstration.
- To gain a good basic working knowledge required for the production of various 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.
- It explains the construction, function, use and application of different working tools, equipment and machines.
- To study commonly used carpentry joints.
- To have practical exposure to various welding and joining processes.
- Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

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

- CO 1: Study and practice on machine tools and their operations
- CO 2: Practice on manufacturing of components using workshop trades including plumbing, fitting, carpentry, foundry, house wiring and welding.
- CO 3: Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
- CO 4: Apply basic electrical engineering knowledge for house wiring practice.

### 1. TRADES FOR EXERCISES:

At least two exercises from each trade:

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

### 2. TRADES FOR DEMONSTRATION & EXPOSURE:

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

### TEXT BOOKS:

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

### REFERENCE BOOKS:

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

## MH24EN204HS: ENGLISH FOR SKILL ENHANCEMENT

B.Tech. I Year II Sem.

L T P C  
2 0 0 2

**Course Objectives:** This course will enable the students to:

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

**Course Outcomes:** Students will be able to:

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

### UNIT - I

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

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

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

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

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

### UNIT - II

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

**Vocabulary:** Words Often Misspelt - Homophones, Homonyms and Homographs

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

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

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

### UNIT - III

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

**Vocabulary:** Words Often Confused - Words from Foreign Languages and their Use in English. **Grammar:** Identifying Common Errors in Writing with Reference to Misplaced Modifiers and

Tenses.

**Reading:** Sub-Skills of Reading - Intensive Reading and Extensive Reading - Exercises for Practice.

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

#### UNIT - IV

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

**Vocabulary:** Standard Abbreviations in English

**Grammar:** Redundancies and Clichés in Oral and Written Communication.

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

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

#### UNIT - V

Chapter entitled '**Go, Kiss the World**' by **Subroto Bagchifrom** "**English: Language, Context and Culture**" published by Orient BlackSwan, Hyderabad.

**Vocabulary:** Technical Vocabulary and their Usage

**Grammar:** Common Errors in English (*Covering all the other aspects of grammar which were not covered in the previous units*)

**Reading:** Reading Comprehension-Exercises for Practice

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

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

- **Note:** 1. As the syllabus of English given in AICTE Model Curriculum-2018 for B.Tech First Year is **Open-ended**, besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.
- **Note:** 2. Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents. They are advised to teach 40 percent of each topic from the syllabus in blended mode.

#### TEXT BOOK:

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

#### REFERENCE BOOKS:

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

**MH24EE205ES: ELECTRICAL CIRCUIT ANALYSIS – II**

**B.Tech. I Year II Sem.**

**L T P C**  
**2 0 0 2**

**Prerequisites:** Mathematics

**Course Objectives:**

- To study the transient analysis of various R, L and C circuits for different inputs
- To understand the Fourier series and Laplace transformation.
- To learn about two-port networks and concept of filters.

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

- Observe the response of various R, L and C circuits for different excitations.
- Examine the behavior of circuits using Fourier, Laplace transforms and transfer function of single port network.
- Obtain two port network parameters and applications and design of various filters.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To study the transient analysis of various R, L and C circuits for different inputs	3	3	3	3	3	3	1	1	2	2	1	3
To understand the Fourier series and Laplace transformation.	3	2	3	2	3	3	2	2	2	3	2	3
To learn about two-port networks and concept of filters.	3	2	3	1	3	3	1	1	2	2	2	3

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Observe the response of various R, L and C circuits for different excitations	3	3	3	3	3	3	3	1	2	1	1	2
Examine the behavior of circuits using Fourier, Laplace transforms and transfer function of single port network.	3	3	3	3	3	3	3	3	3	3	2	3
Obtain two port network parameters and applications and design of various filters.	3	2	2	2	3	3	3	2	1	3	3	2

**UNIT-I:**

**Transient analysis:** Transient response of R, L & C circuits, Formulation of integral differential equations, Initial conditions, Transient Response of RL, RC and RLC (series and parallel) networks subjected to internal energy, Response to impulse, step, and ramp, exponential and sinusoidal excitations.

**UNIT-II:**

**Electrical circuit Analysis using Laplace Transforms:** Application of Laplace Transforms to RL, RC and RLC (series and parallel) Networks for impulse, step, and ramp, exponential and sinusoidal excitations.

**UNIT-III:**

**Two port network parameters:** Open circuit impedance, short-circuit admittance, Transmission, Hybrid parameters & inter-relationships, Series, parallel and cascade connection of two port networks, System function, and Impedance and admittance functions.

**UNIT-IV:**

**Fourier Series and Integral:** Fourier series representation of periodic functions, Symmetry conditions, Exponential Fourier series, Discrete spectrum, Fourier integral and its properties, Continuous spectrum, Application to simple networks

**UNIT-V:**

**Filters:** Classification of filters – Low pass, High pass, Band pass and Band Elimination, Constant-k and M-derived filters-Low pass and High pass Filters and Band pass and Band elimination filters (Elementary treatment only)

**TEXTBOOKS:**

1. Van Valkenburg M.E, "Network Analysis", Prentice Hall of India, 3<sup>rd</sup> Edition, 2000.
2. Ravish R Singh, "Network Analysis and Synthesis", McGrawHill, 2<sup>nd</sup> Edition, 2019.

**REFERENCE BOOKS:**

1. B. Subramanyam, "Electric Circuit Analysis", Dreamtech Press & Wiley, 2021.
2. James W. Nilsson, Susan A.Riedel, "Electric Circuits", Pearson, 11<sup>th</sup> Edition, 2020.
3. A Sudhakar, Shyammohan S Palli, "Circuits and Networks: Analysis and Synthesis", McGraw Hill, 5<sup>th</sup> Edition, 2017.
4. Jagan N.C, Lakshrninarayana C., "Network Analysis", B.S. Publications, 3<sup>rd</sup> Edition, 2014.
5. William Hayt H, Kimmerly Jack E. and Steven Durbin M, "Engineering Circuit Analysis", McGraw Hill, 6<sup>th</sup> Edition, 2002.
6. Chakravarthy A., "Circuit Theory", Dhanpat Rai & Co., First Edition, 1999.

**MH24EE206ES: APPLIED PYTHON PROGRAMMING LABORATORY**

**B.Tech. I Year II Sem.**

**L T P C**  
**0 1 2 2**

**Course Outcomes:** Upon completing this course, the students will be able to

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

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	1	1	1	-	-	1	-	1	1
CO2	2	3	2	1	1	2	-	-	1	-	1	1
CO3	2	3	2	1	1	2	-	-	1	-	1	1

**LIST OF EXPERIMENTS:**

**Cycle - 1**

1. Downloading and Installing Python and Modules
  - a) Python 3 on Linux  
Follow the instructions given in the URL <https://docs.python-guide.org/starting/install3/linux/>
  - b) Python 3 on Windows  
Follow the instructions given in the URL <https://docs.python.org/3/using/windows.html>  
(Please remember that Windows installation of Python is harder!)
  - c) pip3 on Windows and Linux  
Install the Python package installer by following the instructions given in the URL <https://www.activestate.com/resources/quick-reads/how-to-install-and-use-pip3/>
  - d) Installing numpy and scipy  
You can install any python3 package using the command `pip3 install <packagename>`
  - e) Installing jupyterlab  
Install from pip using the command `pip install jupyterlab`
2. Introduction to Python3
  - a) Printing your biodata on the screen
  - b) Printing all the primes less than a given number
  - c) Finding all the factors of a number and show whether it is a *perfect* number, i.e., the sum of all its factors (excluding the number itself) is equal to the number itself
3. Defining and Using Functions
  - a) Write a function to read data from a file and display it on the screen
  - b) Define a boolean function *is palindrome*(<input>)
  - c) Write a function *collatz*(*x*) which does the following: if *x* is odd,  $x = 3x + 1$ ; if *x* is even, then  $x = x/2$ . Return the number of steps it takes for  $x = 1$
  - d) Write a function  $N(m, s) = \exp(-(x-m)^2/(2s^2))/\sqrt{2\pi}s$  that computes the Normal distribution
4. The package numpy
  - a) Creating a matrix of given order  $m \times n$  containing *random numbers* in the range 1 to 99999
  - b) Write a program that adds, subtracts and multiplies two matrices. Provide an interface such that, based on the prompt, the function (addition, subtraction, multiplication) should be performed
  - c) Write a program to solve a system of  $n$  linear equations in  $n$  variables using matrix inverse

5. The package scipy and pyplot
  - a) Finding if two sets of data have the same *mean* value
  - b) Plotting data read from a file
  - c) Fitting a function through a set a data points using *polyfit* function
  - d) Plotting a histogram of a given data set
6. The strings package
  - a) Read text from a file and print the number of lines, words and characters
  - b) Read text from a file and return a list of all *n* letter words beginning with a vowel
  - c) Finding a secret message hidden in a paragraph of text
  - d) Plot a histogram of words according to their length from text read from a file

### Cycle -2

7. Installing OS on Raspberry Pi
  - a) Installation using Pilmager
  - b) Installation using image file
    - Downloading an Image
      - Writing the image to an SD card
        - using Linux
        - using Windows
      - Booting up

Follow the instructions given in the URL  
<https://www.raspberrypi.com/documentation/computers/getting-started.html>
8. Accessing GPIO pins using Python
  - a) Installing GPIO Zero library.  
First, update your repositories list:  
`sudo apt update`  
Then install the package for Python 3:  
`sudo apt install python3-gpiozero`
  - b) Blinking an LED connected to one of the GPIO pin
  - c) Adjusting the brightness of an LED  
Adjust the brightness of an LED (0 to 100, where 100 means maximum brightness) using the in-built PWM wavelength.
9. Collecting Sensor Data
  - a) DHT Sensor interface
    - o Connect the terminals of DHT GPIO pins of Raspberry Pi.
    - o Import the DHT library using `import Adafruit_DHT`
    - o Read sensor data and display it on screen.

## MH24PH207BS: APPLIED PHYSICS LABORATORY

B.Tech. I Year II Sem.

L T P C  
0 0 3 1.5

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

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

**Course Outcomes:** The students will be able to:

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

### LIST OF EXPERIMENTS:

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

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

### REFERENCE BOOK:

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

## MH24EN208HS: ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

B.Tech. I Year II Sem.

L T P C  
0 0 2 1

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

### Course Objectives:

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

### Course Outcomes: Students will be able to:

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

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

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

### Listening Skills:

#### Objectives

1. To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. 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

1. To involve students in speaking activities in various contexts
  2. To enable students express themselves fluently and appropriately in social and professional contexts
- Oral practice
  - Describing objects/situations/people
  - Role play - Individual/Group activities

- Just A Minute (JAM) Sessions

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

### **Exercis**

#### **e – 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.

### **Exercis**

#### **e – II**

#### **CALL**

#### **Lab:**

*Understand:* Structure of Syllables - Word Stress- Weak Forms and Strong Forms - Stress pattern in sentences – Intonation.

*Practice:* Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern in sentences – 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.

### **Exercis**

#### **e - III**

#### **CALL**

#### **Lab:**

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

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

#### **ICS Lab:**

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

*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

*Practice:* Group Discussion

**Minimum Requirement of infrastructural facilities for ELCS Lab:**

**1. Computer Assisted Language Learning (CALL) Lab:**

**The Computer Assisted Language Learning Lab** has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self-study by students.

**System Requirement (Hardware component):**

*Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:*

- i) Computers with Suitable Configuration
- ii) High Fidelity Headphones

**2. Interactive Communication Skills (ICS) Lab :**

**The Interactive Communication Skills Lab:** A Spacious room with movable chairs and audio- visual aids with a Public Address System, a T. V. or LCD, a digital stereo -audio & video system and camcorder etc.

**Source of Material (Master Copy):**

- *Exercises in Spoken English. Part 1,2,3.* CIEFL and Oxford University Press

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

**Suggested Software:**

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

**REFERENCE BOOKS:**

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

**MH24EE209ES: ELECTRICAL CIRCUIT ANALYSIS LABORATORY**

**B.Tech. I Year II Sem.**

**L T P C**  
**0 0 2 1**

**Prerequisites:** Elements of Electrical Engineering & Electrical Circuit Analysis

**Course Objectives:**

- To design electrical systems and analyze them by applying various Network Theorems
- To measure three phase Active and Reactive power.
- To understand the locus diagrams and concept of resonance.

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

- Analyze complex DC and AC linear circuits
- Apply concepts of electrical circuits across engineering
- Evaluate response of a given network by using theorems.

Course Objectives	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
To design electrical systems and analyse them by applying various Network Theorems	2	1	2	2	2	2	2	1	1	1	2	3
To measure three phase Active and Reactive power	2	1	2	2	2	2	2	1	1	1	2	3
To understand the locus diagrams and concept of resonance.	2	1	2	2	2	2	2	1	1	1	2	3

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Analyse complex DC and AC linear circuits.	2	1	2	2	2	2	2	1	2	1	2	3
Apply concepts of electrical circuits across engineering	2	1	2	2	2	2	2	1	2	1	2	3
Evaluate response of a given network by using theorems.	2	1	2	2	2	2	2	1	2	1	2	3

**The following experiments are required to be conducted as compulsory**

1. To draw the locus Diagrams of RL (R-Varying) and RC (R-Varying) Series Circuits.
2. Verification of Series and Parallel Resonance.
3. Determination of Time response of first order RL and RC circuit for periodic non – sinusoidal inputs – Time Constant and Steady state error.
4. Determination of Two port network parameters - Z & Y parameters.
5. Determination of Two port network parameters - A, B, C, D parameters.
6. Determination of Co-efficient of Coupling and Separation of Self and Mutual inductance in a Coupled Circuits.
7. Frequency domain analysis of Low-pass filter.
8. Frequency domain analysis of Band-pass filter.

**In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted**

1. Harmonic Analysis of non-sinusoidal waveform signals using Harmonic Analyzer and plotting frequencyspectrum.

2. Measurement of Active Power for Star and Delta connected balanced loads.
3. Measurement of Reactive Power for Star and Delta connected balanced loads.
4. Frequency domain analysis of High-pass filter.
5. Determination of Two port network parameters -Hybrid parameters.
6. To draw the locus Diagrams of RL (L-Varying) and RC (C-Varying) Series Circuits.
7. Determination of Time response of first order RLC circuit for periodic non - sinusoidal inputs - Time Constant and Steady state error.

**TEXTBOOKS:**

1. Van Valkenburg M.E, "Network Analysis", Prentice Hall of India, 3<sup>rd</sup> Edition, 2000.
2. Ravish R Singh, "Network Analysis and Synthesis", McGrawHill, 2<sup>nd</sup> Edition, 2019.

**REFERENCE BOOKS:**

1. B. Subramanyam, "Electric Circuit Analysis", Dreamtech Press & Wiley, 2021.
2. James W.Nilsson, Susan A. Riedel, "Electric Circuits", Pearson, 11<sup>th</sup> Edition, 2020.
3. A Sudhakar, Shyammohan S Palli, "Circuits and Networks: Analysis and Synthesis", McGraw Hill, 5<sup>th</sup> Edition, 2017.
4. Jagan N.C, Lakshrninarayana C., "Network Analysis", B.S. Publications, 3<sup>rd</sup> Edition, 2014.
5. William Hayt H, Kimmerly Jack E. and Steven Durbin M, "Engineering Circuit Analysis", McGraw Hill, 6<sup>th</sup> Edition, 2002.
6. Chakravarthy A., "Circuit Theory", Dhanpat Rai & Co., First Edition, 1999.

**\*MH24MC210: ENVIRONMENTAL SCIENCE**

**B.Tech. I Year II Sem.**

**L T P C**  
**3 0 0 0**

**Course Objectives:**

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- 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, Biomagnification, 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 Issues 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 Montréal Protocol. NAPCC-Gol Initiatives.

**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 Goals, 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.

**TEXT BOOKS:**

- 1 Textbook of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission.
- 2 Environmental Studies by R. Rajagopalan, Oxford University Press.

**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, 4<sup>th</sup> Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.