ACADEMIC REGULATIONS (R22) FOR B.TECH REGULAR STUDENTS

WITH EFFECT FROM THE ACADEMIC YEAR 2022-23

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

Sreyas Institute of Engineering and Technology affiliated to Jawaharlal Nehru Technological University Hyderabad (JNTUH) offers a 4-year (8 semesters) **Bachelor of Technology** (B.Tech.) degree programme, unde-+---r Choice Based Credit System (CBCS) at its non-autonomous constituent and affiliated colleges with effect from the academic year **2022-23.**

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 ≥ 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 (≥ 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. All the guidelines issued by JNTUH/AICTE/UGC are followed:

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 on-line registration requests for any 'current semester' shall be **completed before the commencement of SEEs (Semester End Examinations) of the 'preceding semester'**.

A student can apply for **on-line** registration, **only after** obtaining the '**written approval**' from faculty advisor/counselor, which should be submitted to the college academic section through the Head of the Department. A copy of it shall be retained with 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 **on-line** registration for the subject(s) / course(s) under a given/ specified course group/ category as listed in the course structure, only the first mentioned subject/ course in that category will be taken into consideration.

Subject/ course options exercised through **on-line** registration are final and **cannot** be changed or inter-changed; further, alternate choices also will not be considered. However, if the subject/ course that has already been listed for registration by the Head of the Department in a semester could not be offered due to any 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 byhis 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 ofthe 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.**

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

A stipulated fee shall be payable for condoning of shortage of attendance.

Shortage of attendance below 65% in aggregate shall in **NO** case be condoned.

Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations of that semester. They get detained and their registration for that semester shall stand cancelled, 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 including minimum 35% of average Mid-Term examinations for 25 marks) in the internal examinations, not less than 35% (21 marks out of 60 marks) in the semester end examination, and a minimum of 40% (40 marks out of 100 marks) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of letter grades, this implies securing **'C'** grade or above in that subject/ course.

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

A student may reappear once for each of the above evaluations, when they are scheduled again; if the student fails in such 'one reappearance' evaluation also, the student 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 ≥ 5.0 (in each semester), and CGPA ≥ 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.**

Student shall have to earn 35%, i.e 14 marks out of 40 marks from average of two mid- term examinations (I Mid-Term & II Mid-Term).

The remaining 10 marks of Continuous Internal Assessment (out of 40) 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.

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 student has to get minimum of 35% (on 40 marks allocated for Mid-Term examinations) on average of two Mid-Term examinations.

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

Five (5) marks are allocated for assignments (as specified by the subject teacher concerned). The first 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.

There is no Computer Based Test (CBT) for R22 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 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 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 Project, which consists of the Design (or) Software / Hardware Model Presentation (or) App Development (or) Prototype Presentation submission which shall be evaluated after completion of laboratory course and before semester end practical examination.

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

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

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

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

1. I Year I Semester course (*ex., Elements of CE/ME/EEE/ECE/CSE*): The internal evaluation is for 50 marks and it shall take place during I Mid-Term examination and II Mid-Term examination. The average 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.

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 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 shall be given one time chance to re-register:

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

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

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

SEE Evaluation System

There will be two evaluations(1-Internal Valuator and 1-External Valuator),Internal Evaluator will be nominated by COE, External Evaluator will be drafted from any of the following Institutions (i) JNTUH affiliated/Autonomous colleges (ii) Osmania University affiliated/Autonomous college(iii)Deemed Universities (iv)State/Central Universities.

Finalization of marks, The average of the marks of both evaluators will be considered as the final marks

If the difference of the marks is more than 15% i.e 9 marks then it will be sent for third evaluation (External),in this case the average of two nearer values will be the considered final marks.
If the internal Examiners are not available, two external examiners can be drafted for the evaluation.

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^+ (Excellent)	9
70 and less than 80%	A (Very Good)	8
60 and less than 70%	B^+ (Good)	7
50 and less than 60%	B (Average)	6
40 and less than 50%	C (Pass)	5
Below 40%	F (FAIL)	0
Absent	Ab	0

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

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

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

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

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

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

The Semester Grade Point Average (SGPA) is calculated by dividing the sum of credit points (ΣCP) secured from 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

$$\textbf{SGPA} = \{ \sum_{i=1}^{N} C_i \, G_i \} / \{ \sum_{i=1}^{N} C_i \} \text{ …. For each semester,}$$

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^{th} subject, and G_i represents the grade points (GP) corresponding to the letter grade awarded for that i^{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

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

$$\textbf{(i.e., up to and inclusive of S semesters, } S \geq 2\textbf{)},$$

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^{st} semester onwards up to and inclusive of the 8^{th} semester, 'j' is the subject indicator index (takes into account all subjects from 1 to 8 semesters), C_j is the no. of credits allotted to the j^{th} subject, and G_j represents the grade points (GP) corresponding to the letter grade awarded for that j^{th} subject. After registration and completion of I year I semester, the SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

Illustration of calculation of SGPA:

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

SGPA = 152/21 = 7.24

Illustration of Calculation of CGPA up to 3rd Semester:

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

CGPA = 518/69 = 7.51

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

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

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

Passing Standards

A student shall be declared successful or 'passed' in a semester, if he secures a GP ≥ 5 (**'C'** grade or above) in every subject/course in that semester (i.e. when the student gets an SGPA 5.0 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 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 to all 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 ≥ 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) ≥ 7.0 but < 8.00 shall be placed in **'First Class'.**

Students with final CGPA (at the end of the undergraduate programme) ≥ 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) ≥ 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 (with in 4 years from the date of admission) upto B. Tech. – II Year – II Semester, if the student want to exit the 4-Year B. Tech. program. The student **once opted and awarded for 2-Year UG Diploma Certificate, the student will not be permitted to join** in B. Tech. III Year – I Semester and continue for completion of remaining years of study for 4-Year B. Tech. Degree.
2. 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 exam fees to the College at any stage, or has dues pending due to any reason whatsoever, or if any case of indiscipline is pending, the result of the student may be withheld, and the student will not be allowed to go into the next higher semester. The award or issue of the degree may also be withheld in such cases.

Transitory Regulations

A. For students detained due to shortage of attendance:

1. A Student who has been detained in I year of R18 Regulations due to lack of attendance,

shall be permitted to join I year I Semester of R22 Regulations and he is required to complete the study of B.Tech./B. Pharmacy programme within the stipulated period of eight academic years from the date of first admission in I Year.

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

B. For students detained due to shortage of credits:

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

C. For readmitted students in R22 Regulations:

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

Note: If a student readmitted to R22 Regulations and has not studied any subjects/topics in his/her earlier regulations of study which is prerequisite for further subjects in R22 Regulations, 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.

The students seeking transfer from other colleges will be given one chance to write the internal examinations in the **equivalent subject(s)** 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 Academic Council is final.

The College Academic Council 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”.

****

ACADEMIC REGULATIONS FOR B.TECH (LATERAL ENTRY SCHEME)

FROM THE AY 2023-24

1. Eligibility for the award of B.Tech Degree (LES)

The LES students after securing admission shall pursue a course of study for not less than three academic years and not more than six academic years.

2. The student shall register for 120 credits and secure 120 credits with CGPA ≥ 5 from II year to IV-year B.Tech. programme (LES) for the award of B.Tech. degree.

3. The students, who fail to fulfill the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech.

4. The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech. (LES).

5. Promotion rule

S. No	Promotion	Conditions to be fulfilled
1	Second year first semester to second year second semester	Regular course of study of second year first semester.
2	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 24 credits out of 40 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.
3	Third year first semester to third year second semester	Regular course of study of third year first semester.
4	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 48 credits out of 80 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.
5	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

6. All the other regulations as applicable to B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).

7. LES students are not eligible for 2-Year B. Tech. Diploma Certificate.

****

Malpractices Rules

Disciplinary Action For / Improper Conduct in Examinations

	Nature of Malpractices/Improper conduct	Punishment
	If the student:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which student is appearing but has not made use of (material shall include any marks on the body of the student which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any student or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the students involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the student is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The hall ticket of the student is to be cancelled and sent to the University.

3.	Impersonates any other student in connection with the examination.	The student who has impersonated shall be expelled from examination hall. The student is also debarred and forfeits the seat. The performance of the original student who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.

6.	Refuses to obey the orders of the chief superintendent/assistant – superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the student(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears off the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.

8.	Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat.
9.	If student of the college, who is not a student for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to the police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared for including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the student has appeared for including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award a suitable punishment.	

Malpractices identified by squad or special invigilators

1. Punishments to the students as per the above guidelines.

* * * * *

SREYAS INSTITUTE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

B.Tech. in ELECTRONICS AND COMMUNICATION ENGINEERING
COURSE STRUCTURE

I YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.	A1008	Matrices and Calculus	3	1	0	4
2.	A1001	Applied Physics	3	1	0	4
3.	A1503	C Programming for Engineers	3	0	0	3
4.	A1303	Engineering Workshop	0	1	3	2.5
5.	A1005	English for Skill Enhancement	2	0	0	2
6.	A1403	Elements of Electronics and Communication Engineering	0	0	2	1
7.	A1002	Applied Physics Laboratory	0	0	3	1.5
8.	A1006	English Language and Communication Skills Laboratory	0	0	2	1
9.	A1507	C Programming for Engineers Laboratory	0	0	2	1
10.	A1007	Environmental Science	3	0	0	0
11.		Induction Programme				
		Total	**14**	**3**	**12**	**20**

I YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.	A1010	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2.	A1003	Engineering Chemistry	3	1	0	4
3.	A1301	Computer Aided Engineering Graphics	1	0	4	3
4.	A1401	Basic Electrical Engineering	2	0	0	2
5.	A1405	Electronic Devices and Circuits	2	0	0	2
6.	A1508	Applied Python Programming Laboratory	0	1	2	2
7.	A1004	Engineering Chemistry Laboratory	0	0	2	1
8.	A1402	Basic Electrical Engineering Laboratory	0	0	2	1
9.	A1406	Electronic Devices and Circuits Laboratory	0	0	2	1
		Total	**11**	**3**	**12**	**20**

SREYAS INSTITUTE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

B.Tech. in COMPUTER SCIENCE AND ENGINEERING
COURSE STRUCTURE

I YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.	A1008	Matrices and Calculus	3	1	0	4
2.	A1003	Engineering Chemistry	3	1	0	4
3.	A1505	Programming for Problem Solving	3	0	0	3
4.	A1401	Basic Electrical Engineering	2	0	0	2
5.	A1301	Computer Aided Engineering Graphics	1	0	4	3
6.	A1504	Elements of Computer Science & Engineering	0	0	2	1
7.	A1004	Engineering Chemistry Laboratory	0	0	2	1
8.	A1506	Programming for Problem Solving Laboratory	0	0	2	1
9.	A1402	Basic Electrical Engineering Laboratory	0	0	2	1
10.		Induction Programme				
		Total	**12**	**2**	**12**	**20**

I YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.	A1010	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2.	A1001	Applied Physics	3	1	0	4
3.	A1303	Engineering Workshop	0	1	3	2.5
4.	A1005	English for Skill Enhancement	2	0	0	2
5.	A1405	Electronic Devices and Circuits	2	0	0	2
6.	A1002	Applied Physics Laboratory	0	0	3	1.5
7.	A1510	Python Programming Laboratory	0	1	2	2
8.	A1006	English Language and Communication Skills Laboratory	0	0	2	1
9.	A1509	IT Workshop	0	0	2	1
10.	A1007	Environmental Science	3	0	0	0
		Total	**13**	**4**	**12**	**20**

SREYAS INSTITUTE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

B.Tech. in COMPUTER SCIENCE AND ENGINEERING (AI&ML)
COURSE STRUCTURE

I YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.	A1008	Matrices and Calculus	3	1	0	4
2.	A1001	Applied Physics	3	1	0	4
3.	A1505	Programming for Problem Solving	3	0	0	3
4.	A1303	Engineering Workshop	0	1	3	2.5
5.	A1005	English for Skill Enhancement	2	0	0	2
6.	A1504	Elements of Computer Science & Engineering	0	0	2	1
7.	A1002	Applied Physics Laboratory	0	0	3	1.5
8.	A1506	Programming for Problem Solving Laboratory	0	0	2	1
9.	A1006	English Language and Communication Skills Laboratory	0	0	2	1
10.	A1007	Environmental Science	3	0	0	0
11.		Induction Programme				
		Total	**14**	**3**	**12**	**20**

I YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.	A1010	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2.	A1003	Engineering Chemistry	3	1	0	4
3.	A1301	Computer Aided Engineering Graphics	1	0	4	3
4.	A1401	Basic Electrical Engineering	2	0	0	2
5.	A1405	Electronic Devices and Circuits	2	0	0	2
6.	A1004	Engineering Chemistry Laboratory	0	0	2	1
7.	A1402	Basic Electrical Engineering Laboratory	0	0	2	1
8.	A1510	Python Programming Laboratory	0	1	2	2
9.	A1509	IT Workshop	0	0	2	1
		Total	**11**	**3**	**12**	**20**

SREYAS INSTITUTE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

B.Tech. in COMPUTER SCIENCE AND ENGINEERING (DS)
COURSE STRUCTURE

I YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.	A1008	Matrices and Calculus	3	1	0	4
2.	A1003	Engineering Chemistry	3	1	0	4
3.	A1505	Programming for Problem Solving	3	0	0	3
4.	A1401	Basic Electrical Engineering	2	0	0	2
5.	A1301	Computer Aided Engineering Graphics	1	0	4	3
6.	A1504	Elements of Computer Science & Engineering	0	0	2	1
7.	A1004	Engineering Chemistry Laboratory	0	0	2	1
8.	A1506	Programming for Problem Solving Laboratory	0	0	2	1
9.	A1402	Basic Electrical Engineering Laboratory	0	0	2	1
10.		Induction Programme				
		Total	**12**	**2**	**12**	**20**

I YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.	A1010	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2.	A1001	Applied Physics	3	1	0	4
3.	A1303	Engineering Workshop	0	1	3	2.5
4.	A1005	English for Skill Enhancement	2	0	0	2
5.	A1405	Electronic Devices and Circuits	2	0	0	2
6.	A1002	Applied Physics Laboratory	0	0	3	1.5
7.	A1510	Python Programming Laboratory	0	1	2	2
8.	A1006	English Language and Communication Skills Laboratory	0	0	2	1
9.	A1509	IT Workshop	0	0	2	1
10.	A1007	Environmental Science	3	0	0	0
		Total	**13**	**4**	**12**	**20**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

(Established by State Act No. 30 of 2008)

Kukatpally, Hyderabad, Telangana (India).

ACADEMIC REGULATIONS FOR B.TECH. REGULAR STUDENTS WITH EFFECT FROM ACADEMIC YEAR 2018-19 (R-18)

1.0 Under-Graduate Degree Programme in Engineering & Technology (UGP in 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 2018-19.

2.0 Eligibility for admission

2.1 Admission to the under graduate (UG) programme shall be made either on the basis of the merit rank obtained by the qualified student in entrance test conducted by the Telangana State Government (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.

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

3.0 B.Tech. Programme structure

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

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

3.2.1 Semester scheme

Each under graduate programme is of 4 academic years (8 semesters) with the academic year divided into two semesters of 22 weeks ($\geq$ 90 instructional days) each, each semester having - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'

under Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) indicated by UGC, and curriculum/course structure as suggested by AICTE are followed.

3.2.2 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.

3.2.3 Subject Course Classification

All subjects/ courses offered for the under graduate programme in E&T (B.Tech. degree programmes) are broadly classified as follows. The 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		Industrial training/ Mini- project	Industrial training/ Summer Internship/ Industrial Oriented Mini-project/ Mini-project

9		Seminar	Seminar/ Colloquium based on core contents related to parent discipline/ department/ branch of Engineering.
10	Minor courses	-	1 or 2 Credit courses (subset of HS)
11	Mandatory Courses (MC)	-	Mandatory courses (non-credit)

4.0 Course registration

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

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

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

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

4.5 Choice for '**additional subjects/ courses**' must be clearly indicated, which needs the specific approval and signature of the faculty advisor/ counselor.

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

4.7 Subject/ course options exercised through **on-line** registration are final and **cannot** be changed or inter-changed; further, alternate choices also will not be considered. However, if the subject/ course that has already been listed for registration by the Head of the Department in a semester could not be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to have alternate choice 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 the **first week** after the commencement of class-work for that semester.

4.8 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.

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

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

5.0 Subjects/ courses to be offered

5.1 A typical section (or class) strength for each semester shall be 60.

5.2 A subject/ course may be offered to the students, **only if** a minimum of 20 students (1/3 of the section strength) opt for it. The maximum strength of a section is limited to 80 (60 + 1/3 of the section strength).

5.3 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).

5.4 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**.

5.5 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**'.

6.0 Attendance requirements:

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

The attendance of Mandatory Non-Credit courses should be uploaded separately to the University.

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

6.3 A stipulated fee shall be payable for condoning of shortage of attendance.

6.4 Shortage of attendance below 65% in aggregate shall in **no** case be condoned.

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

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

7.0 Academic requirements

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

7.1 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% (26 marks out of 75 marks) in the semester end examination, and a minimum of 40% (40 marks out of 100 marks) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of letter grades, this implies securing **'C'** grade or above in that subject/ course.

7.2 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Industrial Oriented Mini Project/Summer Internship and 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 Industrial Oriented Mini Project/Summer Internship, or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) does not present the seminar as required in the IV year I Semester, or (iii) secures less than 40% marks in Industrial Oriented Mini Project/Summer Internship and seminar 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.

7.3 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 18 credits out of 37 credits i.e., 50% credits up to first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3.	Second year first semester to second year second semester	Regular course of study of second year first semester.
4	Second year second semester to third year first semester	(i) Regular course of study of second year second semester. (ii) Must have secured at least 47 credits out of 79 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Third year first semester to third year second semester	Regular course of study of third year first semester.
6	Third year second semester to fourth year first semester	(i) Regular course of study of third year second semester. (ii) Must have secured at least 73 credits out of 123 credits i.e., 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

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

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

7.6 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.

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

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

8.0 Evaluation - Distribution and Weightage of marks

8.1 The performance of a student in every subject/course (including practicals and Project Stage – I & II) will be evaluated for 100 marks each, with 25 marks allotted for CIE (Continuous Internal Evaluation) and 75 marks for SEE (Semester End-Examination).

8.2 For theory subjects, during a semester, there shall be two mid-term examinations. Each mid-term examination consists of one objective paper, one descriptive paper and one assignment. The objective paper and the descriptive paper shall be for 10 marks each with a total duration of 1 hour 20 minutes (20 minutes for objective and 60 minutes for descriptive paper). The objective paper is set with 20 multiple choice, fill-in the blanks and matching type of questions for a total of 10 marks. The descriptive paper shall contain 4 full questions out of which, the student has to answer 2 questions, each

carrying 5 marks. While the first mid-term examination shall be conducted on 50% of the syllabus, the second mid-term examination shall be conducted on the remaining 50% of the syllabus. Five marks are allocated for assignments (as specified by the subject teacher concerned). The first assignment should be submitted before the conduct of the first mid-term examination, and the second assignment should be submitted before the conduct of the second mid-term examination. The total marks secured by the student in each mid-term examination are evaluated for 25 marks, and the average of the two mid-term examinations shall be taken as the final marks secured by each student in Continuous Internal Evaluation. If any student is absent from any subject of a mid-term examination, an on-line test will be conducted for him by the University. The details of the end semester question paper pattern are as follows:

8.2.1 The semester end examinations (SEE) will be conducted for 75 marks consisting of two parts viz. i) **Part- A** for 25 marks, ii) **Part - B** for 50 marks.

- Part-A is a compulsory question consisting of ten sub-questions. The first five sub-questions are from each unit and carry 2 marks each. The next five sub-questions are one from each unit and carry 3 marks each.
- Part-B consists of five questions (numbered from 2 to 6) carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

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

8.2.3 For subjects like **Machine Drawing Practice/Machine Drawing**, the SEE shall be conducted for 75 marks consisting of two parts viz. (i) Part – A for 30 marks. 3 out of 4 questions must be answered, (ii) Part – B for 45 marks. Part – B is compulsory.

8.2.4 For the Subject **Estimation, Costing and Project Management**, the SEE paper should consist of Part- A, Part-B and Part C. (i) Part – A – 1 out of 2 questions from Unit – I for 30 Marks, (ii) Part – B – 1 out of 2 questions from Unit – II for 15 Marks, (iii) Part – C – 3 out of 5 questions from Units – III, IV, V for 30 Marks.

8.2.5 For subjects **Structural Engineering – I & II (RCC & STEEL),** the SEE will be conducted for 75 marks consisting of 2 parts viz. (i) Part – A for 15 marks and, (i) Part – B for 60 marks. Part – A is a compulsory question consisting of ten sub-questions. The first five sub-questions are from each unit relating to design theory and codal provisions and carry 2 marks each. The next five sub-questions are from each unit and carry 1 mark each. Part – B consists of 5 questions (numbered 2 to 6) carrying 12 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there is either or choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

8.3 For practical subjects there shall be a continuous internal evaluation during the semester for 25 marks and 75 marks for semester end examination. Out of the 25 marks for internal evaluation, day-to-day work in the laboratory shall be evaluated for 15 marks and internal practical examination shall be evaluated for 10 marks conducted by the laboratory teacher concerned. The semester end examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed from the clusters of colleges which are decided by the examination branch of the University.

8.4 For the subject having design and/or drawing, (such as engineering graphics, engineering drawing, machine drawing, machine drawing practice and estimation), the distribution shall be 25 marks for continuous internal evaluation (15 marks for day-to-day work and 10 marks for internal tests) and 75 marks for semester end examination. There shall be two internal tests in a semester and the average of the two shall be considered for the award of marks for internal tests.

8.5 There shall be an Industrial Oriented Mini Project/Summer Internship, in collaboration with an industry of their specialization. Students will register for this immediately after III year II semester examinations and pursue it during summer vacation. Industrial Oriented Mini Project/Summer Internship shall be submitted in a report form and presented before the committee in IV year I semester. It shall be evaluated for 100 external marks. The committee consists of an external examiner, Head of the Department, supervisor of the Industrial Oriented mini project/Summer Internship and a senior faculty member of the department. There shall be no internal marks for Industrial Oriented Mini Project/Summer Internship.

8.6 There shall be a seminar presentation in IV year I semester. For the seminar, the student shall collect the information on a specialized topic, prepare a technical report, and submit it to the department. It shall be evaluated by the departmental committee consisting of Head of the Department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 100 internal marks. There shall be no semester end examination for the seminar.

8.7 UG project work shall be carried out in two stages: Project Stage – I during IV Year I Semester, Project Stage – II during IV Year II Semester. Each stage will be evaluated for 100 marks. Student has to submit project work report at the end of each semester. First report includes project work carried out in IV Year I semester and second report includes project work carried out in IV Year I & II Semesters. SEE for both project stages shall be completed before the commencement of SEE Theory examinations.

8.8 For Project Stage – I, the departmental committee consisting of Head of the Department, project supervisor and a senior faculty member shall evaluate the project work for 75 marks and project supervisor shall evaluate for 25 marks. The student is deemed to have failed, if he (i) 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, or (ii) secures less than 40% marks in the sum total of the CIE and SEE taken together.

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.

8.9 For Project Stage – II, the external examiner shall evaluate the project work for 75 marks and the project supervisor shall evaluate it for 25 marks. The topics for industrial oriented mini project, seminar and Project Stage – I shall be different from one another. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - II, or does not make a presentation of the same before the external examiner as per schedule, or (ii) secures less than 40% marks in the sum total of the CIE and SEE taken together.

For conducting viva-voce of project stage – II, 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.

8.10 The laboratory marks and the internal marks awarded by the college are subject to scrutiny and scaling by the University wherever necessary. In such cases, the internal and laboratory marks awarded by the college will be referred to a committee. The committee will arrive at a scaling factor and the marks will be scaled accordingly. The recommendations of the committee are final and binding. The laboratory records and internal test papers shall be preserved in the respective institutions as per the University rules and produced before the committees of the University as and when asked for.

8.11 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 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.**

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

9.0 Grading procedure

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

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

% of Marks Secured in a Subject/Course (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points

Greater than or equal to 90%	**O (Outstanding)**	**10**
80 and less than 90%	**A^+ (Excellent)**	**9**
70 and less than 80%	**A (Very Good)**	**8**
60 and less than 70%	**B^+ (Good)**	**7**
50 and less than 60%	**B (Average)**	**6**
40 and less than 50%	**C (Pass)**	**5**
Below 40%	**F (FAIL)**	**0**
Absent	**Ab**	**0**

9.3 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.

9.4 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.

9.5 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.

9.6 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

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

9.8 The Semester Grade Point Average (SGPA) is calculated by dividing the sum of credit points (ΣCP) 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

$$\textbf{SGPA} = \{ \sum_{i=1}^{N} C_i \, G_i \} / \{ \sum_{i=1}^{N} C_i \} \text{ …. For each semester},$$

where 'i' is the subject indicator index (takes into account all subjects in a semester), 'N' is the no. of subjects '**registered'** for the semester (as specifically required and listed under the course structure of the parent department), C_i is the no. of credits

allotted to the i^{th} subject, and G_i represents the grade points (GP) corresponding to the letter grade awarded for that i^{th} subject.

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

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

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

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

Illustration of calculation of SGPA:

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

SGPA = 152/21 = 7.24

Illustration of calculation of CGPA up to 3rd semester:

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

II	Course 7	4	B	6	24
II	Course 8	4	A	8	32
II	Course 9	3	C	5	15
II	Course 10	3	O	10	30
II	Course 11	3	B+	7	21
II	Course 12	4	B	6	24
II	Course 13	4	A	8	32
II	Course 14	3	O	10	30
III	Course 15	2	A	8	16
III	Course 16	1	C	5	5
III	Course 17	4	O	10	40
III	Course 18	3	B+	7	21
III	Course 19	4	B	6	24
III	Course 20	4	A	8	32
III	Course 21	3	B+	7	21
	Total Credits	**69**		**Total Credit Points**	**518**

CGPA = 518/69 = 7.51

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

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

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

10.0 Passing standards

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

10.2 After the completion of each semester, a grade card or grade sheet shall be issued to all 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.), credits earned.

11.0 Declaration of results

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

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

% of Marks = (final CGPA – 0.5) x 10

12.0 Award of degree

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

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

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

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

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

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

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

12.4 Students with final CGPA (at the end of the under graduate programme) ≥ 6.50 but <

8.00 shall be placed in **'first class'.**

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

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

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

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

13.0 Withholding of results

13.1 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.

14.0 Student transfers

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

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

14.3 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.

14.4 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 (internal marks) in the **equivalent subject(s)** as per the clearance letter issued by the University.

14.5 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.

15.0 Scope

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

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

15.3 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.

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

(Established by State Act No. 30 of 2008)

Kukatpally, Hyderabad, Telangana (India).

ACADEMIC REGULATIONS FOR B.TECH. (LATERAL ENTRY SCHEME) FROM THE AY 2019-20

1. Eligibility for award of B. Tech. Degree (LES)

The LES students after securing admission shall pursue a course of study for not less than three academic years and not more than six academic years.

2. The student shall register for 123 credits and secure 123 credits with CGPA ≥ 5 from II year to IV year B.Tech. programme (LES) for the award of B.Tech. degree.

3. The students, who fail to fulfil the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech.

4. The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech. (LES).

5. Promotion rule

S. No	Promotion	Conditions to be fulfilled
1	**Second year first semester to second year second semester**	**Regular course of study of second year first semester.**
2	**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 25 credits out of 42 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.**
3	**Third year first semester to third year second semester**	**Regular course of study of third year first semester.**
4	**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 51 credits out of 86 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.
5	**Fourth year first semester to fourth year second semester**	**Regular course of study of fourth year first semester.**

6. All the other regulations as applicable to B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	**Punishment**
	If the student:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which student is appearing but has not made use of (material shall include any marks on the body of the student which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any student or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the students involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted to

	of the examination (theory or practical) in which the student is appearing.	appear for the remaining examinations of the subjects of that semester/year. The hall ticket of the student is to be cancelled and sent to the University.
3.	Impersonates any other student in connection with the examination.	The student who has impersonated shall be expelled from examination hall. The student is also debarred and forfeits the seat. The performance of the original student who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the chief superintendent/assistant – superintendent / any officer on duty or	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject

	misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	and all other subjects the student(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears off the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
8.	Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat.

9.	If student of the college, who is not a student for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to the police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared for including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the student has appeared for including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award a suitable punishment.	

Malpractices identified by squad or special invigilators

1. Punishments to the students as per the above guidelines.
2. Punishment for institutions: (if the squad reports that the college is also involved in encouraging malpractices)
   a. A show cause notice shall be issued to the college.
   b. Impose a suitable fine on the college.
   c. Shifting the examination centre from one college to another college for a specific period of not less than one year.

* * * * *

Examination Reform Policy

November 2018

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
Nelson Mandela Marg, Vasant Kunj, New Delhi-110070

Examination Reform Policy

November 2018

MESSAGE

AICTE is taking a multi-pronged approach to recalibrate the technical education in the country, to provide competent professionals. Challenged by keeping the pace of education with the advancements in the technology and industry needs, AICTE has pushed reforms by way of a model curriculum for various engineering disciplines, providing good quality self-learning content through MOOCs, framing a policy for the training of technical teachers 3-week student induction program and enunciating guidelines for the mandatory internship for student among others. Continuing with the streak, AICTE has now come out with an Examination Reform Policy, which would not only improve the quality of technical education in general but also examine the effectiveness of earlier initiatives of AICTE and also those on the anvil.

Evaluation, grading and certification in our system rest on examinations which play an important role in the progression of a learner on the learning path. The examinations not only indicate whether the desired learning outcomes have been achieved but also assess the level of achievements against benchmarks. Thus, examinations serve as checkpoints for both the learner and the external world, allowing appropriate certification to be issued reflecting the proficiency of an individual operating in socio-economic spheres.

This policy comes at a time when knowledge is freely available for creating resources, opportunities for more knowledge, which requires skill of higher order beyond remembering and comprehension. This policy intends to push the evaluation notches up on the Bloom's taxonomy and examine the learner for higher order cognitive skills to drive critical thinking, creativity and problem solving which have to be the attributes of any technical professional. It is hoped that this will also force necessary alignment in the teaching-learning processes on one hand to the bridging of the gap between theory and practicals on the other and prepare students for innovation and creativity.

We request the technical institutions and universities in the country to adopt this examination reform policy. To facilitate this, model question papers and question banks will be developed/ shared through AICTE website. With a view to impart momentum to this much-awaited reform, AICTE shall be conducting a series of training workshops for faculty, across the country.

We thank members of the committee led by Prof. Shettar, Vice-Chancellor, KLE University for developing the policy which will go a long way to enhance the employability ratio and also enable youngsters to become problem-solvers, innovators and job creators. We especially thank MHRD for providing guidance and support throughout the process of creation of this Policy.

(Prof. Anil D. Sahasrabudhe)

PREFACE

Globalisation of the world economy and higher education are driving profound changes in engineering education system. Worldwide adaptation of Outcome-Based Education (OBE) framework and enhanced focus on higher-order learning and professional skills necessitates paradigm shift in traditional practices of curriculum design, education delivery and assessment. In recent years, worldwide sweeping reforms are being undertaken to bring about essential changes in engineering education in terms of what to teach (content) and how to teach (knowledge delivery) and how to assess (student learning).

Examinations/student assessments play a very important role in deciding the quality of education. The academic quality of examinations (question papers) in Indian engineering education system has been a matter of concern from a long time. This report attempts to bring out recommendations for reforms in examination system to meet challenges of emerging engineering education landscape.

The recommendations are presented in four sections. Beginning in Section-1, the most important drivers for examination reforms in Indian engineering education system are discussed. Section-2 brings out strategies to be adopted to align assessment with the desired student learning outcomes. A two-step method is proposed for mapping the examination questions with course outcomes. Section-3 highlights the necessity of designing question papers to test higher order abilities and skills. Application of blooms taxonomy framework to create an optimal structure of examination papers to test the different cognitive skills is discussed in detail. Challenge of assessing higher order abilities and professional skills through traditional examination system is brought out in Section-4. Several educational experiences and assessment opportunities are identified to overcome the challenges. Appendices contain the supplement material that is helpful for Universities/ Colleges to implement recommendations.

At this juncture, reforms in examinations are critical for the improvement of the quality and relevance of Indian engineering education. It is hoped that the Report will be of use to Universities and Colleges to bring out the much-needed change. The cooperation received from AICTE officials in bringing out the Report is gratefully acknowledged.

Prof. Ashok S. Shettar

Prof. Rama Krishna Challa

Prof. Sanjay Agarwal

Prof. Upendra Pandel

ACKNOWLEDGEMENT

The development of an outcome based Examination Reform Policy for technical education is a result of thoughtful deliberations, involving dedicated and specialized experts. This Policy has been framed to meet the expectations of an academically challenging environment, develop problem-solving skills by students, aligning with current global standards and to enrich the students learning to make them self-enablers and/or match job requirements on successful completion of their degree.

The performance-based new-age reforms in the examination will benefit each student for preparing him/her for success in the knowledge society. This will create proper mapping between program outcomes and assessment tools that lead to the accurate and reliable measurement of attainment of outcomes of the students. In short, the Policy focuses on providing the ability of student to understand the subject and apply the knowledge to real world problems.

We are thankful to the members of the committee Prof. Ashok S. Shettar, Prof. Rama Krishna Challa, Prof. Sanjay Agarwal and Prof. Upendra Pandel who were devotedly committed towards framing this Policy. We thank them for identifying Competencies and Performance Indicators (PIs) with Program Outcomes (POs); Sample Questions for all six levels of Bloom's Taxonomy; Model Question Papers for end semester examinations based on Bloom's Taxonomy; and Sample Scoring Rubrics for communication (written & oral), and assessment of design projects and semester mini projects.

Special thanks and gratitude to Prof. Anil D. Sahasrabdhe, Chairman; Prof M.P. Poonia, Vice Chairman and Prof. A.P. Mittal, Member Secretary, AICTE who have been pivotal in developing this Policy and encouraging throughout the process.

I appreciate the officers and officials of Policy & Academic Planning Bureau for their contribution and support in the exercise that has led to this Policy.

I also sincerely thank all officers and officials of AICTE, who have contributed in one way or other for the development of this Policy.

Thanking all once again and seeking continued support and also feedback on the Policy.

(Prof. Rajive Kumar)
Adviser-I
Policy & Academic Planning Bureau, AICTE

TABLE OF CONTENTS

INTRODUCTION

Globalisation of the world economy and higher education are driving profound changes in engineering education system. There is a continuing need to dynamically adapt to these changes, to ensure that we remain competitive and can respond effectively to the challenges of globalisation. Future engineering graduates not only need to be knowledgeable in his/her discipline but also needs a new set of soft, professional skills and competencies [1].

In recent years, there have been essential changes in engineering education in terms of what to teach (content) and how to teach (knowledge delivery) and how to assess (student learning).

AICTE has already taken initiation to come out with model curriculum for engineering programs. The digital initiatives of MHRD and AICTE have made available very large number of MOOC courses through SWAYAM, that can help the colleges and teachers to adopt innovative methodologies in the delivery of course.

The present report focusses on the recommendations for reforms in examinations (assessment of student) in the context of emerging landscape of engineering education.

Examinations/student assessments play a very important role in deciding the quality of education. They must not only assess student's achievements (and grades) but also measure whether the desired learning outcomes have been achieved. The achievement of objectives and program outcomes are crucial and needs to be proven through accurate and reliable assessments.

The academic quality of examinations (question papers) in Indian engineering education system has been a matter of concern from a long time. It is widely acknowledged that "assessment drives learning'', what and how students learn depends to a major extent on how they think they will be assessed [2]. The question papers that require simple memory recall will not ensure deep, meaningful learning. High expectations for learning motivate the students to rise to the occasion. The assessment (examination) must embed those high expectations to ensure that the learner is motivated to attain them.

Considering the above imperatives, it is clear that reforms in Examinations are critical for improvement of the quality of Indian engineering education. The most important drivers for reforms in examination system of Indian engineering education are:

1. Adaptation of Outcome-Based Education Framework

Outcome-based education (OBE)- a performance-based approach has emerged as a major reform model in the global engineering education scenario [3]. The country that wants to be a signatory member of a multinational agreement for the mutual recognition of engineering degrees, i.e. the Washington Accord (WA) must implement OBE. This will be an endorsement that the engineering education system has demonstrated a strong, long-term commitment to quality assurance in producing engineers ready for industry practice in the international scene. Being signatory to the Washington Accord, Indian accreditation agency 'National Board of Accreditation (NBA)' has made it mandatory for engineering institutions to adapt OBE framework for their curriculum design, delivery and assessment. In OBE framework, the educational outcomes of a program are clearly and unambiguously specified. These determine the curriculum content and its organization, the teaching methods and strategies and the assessment process.

Though Indian Universities and Colleges have started adapting OBE framework for their engineering programs, the focus is limited to the curriculum design part, i.e. connecting curriculum components to the program outcomes. Very little attention is being given for connecting examination questions/assessment tools to the program outcomes. The absence of proper mapping between program outcomes and assessment tools lead to the inaccurate and unreliable measurement of attainment of outcomes by the students. This missing connect creates a big gap in the effective adaptation of OBE framework, making the whole exercise futile.

2. Importance of Higher-order Abilities and Professional Skills

In the present examination system, memorization occupies a dominant place. The recall of factual knowledge, though essential to any examination, is only one of several major abilities to be demonstrated by the graduates. The assessment process must also test higher level skills viz. ability to apply knowledge, solve complex problems, analyse, synthesise and design. Further, professional skills like the ability to communicate, work in teams, lifelong learning have become important elements for employability of the graduates [4]. It is important that the examinations also give appropriate weightage to the assessment of these higher-level skills and professional competencies.

Keeping in view of the above challenges and looking at some of the worldwide best practices in assessment, the present report comes up with several recommendations that can be used by Universities/ Colleges to design their assessment strategies.

ASSESSMENT STRATEGY FOR OUTCOME-BASED EDUCATION

1. Mapping Program Outcomes to Assessment (Examinations)

Graduate attributes (GAs) articulate the generic abilities to be looked for in a graduate of any undergraduate degree program. They form the Program Outcomes (POs) that reflect the skills, knowledge and abilities of graduates regardless of the field of study. This does not mean that POs are necessarily independent of disciplinary knowledge –rather, these qualities may be developed in various disciplinary contexts.

In outcome-based education, a "design down" process is employed which moves from POs to Course Outcomes (COs) and outcomes for individual learning experiences. Outcomes at each successive level need to be aligned with, and contribute to, the program outcomes.

Courses are the building blocks of a program. Teaching strategies, learning activities, assessments and resources should all be designed and organized to help students achieve the learning outcomes at the course level. In the assessment activities, students demonstrate their level of achievement of the course learning outcomes. In a constructively aligned program, the courses are carefully coordinated to ensure steady development or scaffolding from the introduction to mastery of the learning outcomes, leading to achievement of the intended POs. For the effectiveness of the program, the achievement of POs is crucial which needs to be proven through accurate and reliable assessments.

2. Two-step Process for Bringing Clarity to POs

POs give useful guidance at the program level for the curriculum design, delivery and assessment of student learning. However, they represent fairly high-level generic goals that are not directly measurable. Real observability and measurability of the POs at course level is very difficult. To connect high-level learning outcomes (POs) with course content, course outcomes and assessment, there is a necessity to bring further clarity and specificity to the program outcomes [5]. This can be achieved through the following two-step process of identifying Competencies and Performance Indicators (PI).

(1) Identify Competencies to be attained: For each PO define competencies –different abilities implied by program outcome statement that would generally require different assessment measures. This helps us to create a shared understanding of the competencies we want students to achieve. They serve as an intermediate step to the creation of measurable indicators.

Example:

Program Outcome (Attribute 3)

Design:

PO3: Design/Development of Solutions: Design solutions for complex engineering problems and

design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.

Competencies

1. Demonstrate an ability to define a complex, open-ended problem in engineering terms.
2. Demonstrate an ability to generate a diverse set of alternative design solutions.
3. Demonstrate an ability to select the optimal design scheme for further development.
4. Demonstrate an ability to advance an engineering design to the defined end state.

(2) Define Performance Indicators: For each of the competencies identified, define performance Indicators (PIs) that are explicit statements of expectations of the student learning. They can act as measuring tools in assessment to understand the extent of attainment of outcomes. They can also be designed to determine the appropriate achievement level or competency of each indicator so that instructors can target and students can achieve the acceptable level of proficiency.

Example:

For the Competency -2

Demonstrate an ability to generate a diverse set of alternative design solutions

Performance Indicators:

1. Apply formal idea generation tools to develop multiple engineering design solutions
2. Build models, prototypes, algorithms to develop a diverse set of design solutions
3. Identify the functional and non-functional criteria for evaluation of alternate design solutions.

It should be noted that, when we consider the program outcome, it looks like, it can be achieved only in the Capstone project. But if we consider the competencies and performance indicators, we start seeing the opportunities of addressing them (and hence PO) in various courses of the program.

Once the above process is completed for the program, the assessment of COs for all the courses is designed by connecting assessment questions (used in various assessment tools) to the PIs. By following this process, where examination questions map with PIs, we get clarity and better resolution for the assessment of COs and POs. The pictorial representation of the process is given in Fig. 1

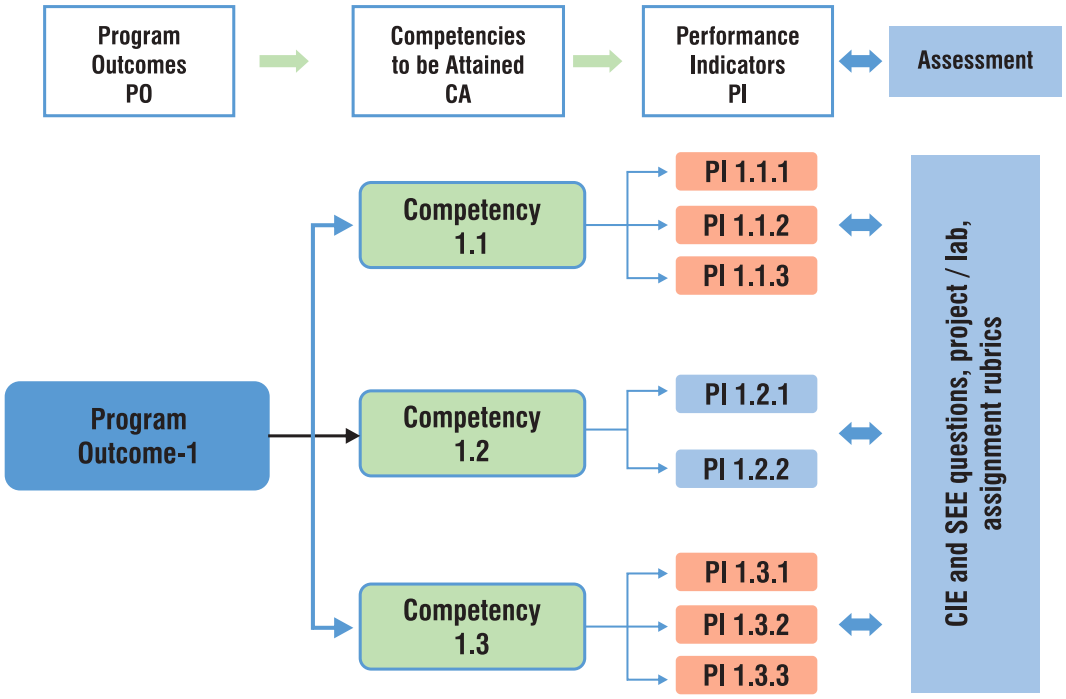


Fig. 1: Connecting POs to Assessment

3. Program Outcomes – Competencies – Performance Indicators

Following table gives the suggestive list of competencies and associated performance indicators for each of the PO in Mechanical Engineering Program.

PO 1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialisation for the solution of complex engineering problems.	
Competency	**Indicators**
1.1 Demonstrate competence in mathematical modelling	1.1.1 Apply mathematical techniques such as calculus, linear algebra, and statistics to solve problems 1.1.2 Apply advanced mathematical techniques to model and solve mechanical engineering problems
1.2 Demonstrate competence in basic sciences	1.2.1 Apply laws of natural science to an engineering problem
1.3 Demonstrate competence in engineering fundamentals	1.3.1 Apply fundamental engineering concepts to solve engineering problems
1.4 Demonstrate competence in specialized engineering knowledge to the program	1.4.1 Apply Mechanical engineering concepts to solve engineering problems.
PO 2: Problem analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	
Competency	**Indicators**
2.1 Demonstrate an ability to identify and formulate complex engineering problem	2.1.1 Articulate problem statements and identify objectives 2.1.2 Identify engineering systems, variables, and parameters to solve the problems 2.1.3 Identify the mathematical, engineering and other relevant knowledge that applies to a given problem

2.2	Demonstrate an ability to formulate a solution plan and methodology for an engineering problem	2.2.1 2.2.2 2.2.3 2.2.4	Reframe complex problems into interconnected sub-problems Identify, assemble and evaluate information and resources. Identify existing processes/solution methods for solving the problem, including forming justified approximations and assumptions Compare and contrast alternative solution processes to select the best process.
2.3	Demonstrate an ability to formulate and interpret a model	2.3.1 2.3.2	Combine scientific principles and engineering concepts to formulate model/s (mathematical or otherwise) of a system or process that is appropriate in terms of applicability and required accuracy. Identify assumptions (mathematical and physical) necessary to allow modeling of a system at the level of accuracy required.
2.4	Demonstrate an ability to execute a solution process and analyze results	2.4.1 2.4.2 2.4.3 2.4.4	Apply engineering mathematics and computations to solve mathematical models Produce and validate results through skilful use of contemporary engineering tools and models Identify sources of error in the solution process, and limitations of the solution. Extract desired understanding and conclusions consistent with objectives and limitations of the analysis

PO 3: Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.

Competency		Indicators	
3.1	Demonstrate an ability to define a complex/ open-ended problem in engineering terms	3.1.1 3.1.2 3.1.3 3.1.4 3.1.5 3.1.6	Recognize that need analysis is key to good problem definition Elicit and document, engineering requirements from stakeholders Synthesize engineering requirements from a review of the state-of-the-art Extract engineering requirements from relevant engineering Codes and Standards such as ASME, ASTM, BIS, ISO and ASHRAE. Explore and synthesize engineering requirements considering health, safety risks, environmental, cultural and societal issues Determine design objectives, functional requirements and arrive at specifications
3.2	Demonstrate an ability to generate a diverse set of alternative design solutions	3.2.1 3.2.2 3.2.3	Apply formal idea generation tools to develop multiple engineering design solutions Build models/prototypes to develop a diverse set of design solutions Identify suitable criteria for the evaluation of alternate design solutions
3.3	Demonstrate an ability to select an optimal design scheme for further development	3.3.1 3.3.2	Apply formal decision-making tools to select optimal engineering design solutions for further development Consult with domain experts and stakeholders to select candidate engineering design solution for further development
3.4	Demonstrate an ability to advance an engineering design to defined end state	3.4.1 3.4.2	Refine a conceptual design into a detailed design within the existing constraints (of the resources) Generate information through appropriate tests to improve or revise the design

PO 4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Competency		Indicators	
4.1	Demonstrate an ability to conduct investigations of technical issues consistent with their level of knowledge and understanding	4.1.1 4.1.2 4.1.3 4.1.4	Define a problem, its scope and importance for purposes of investigation Examine the relevant methods, tools and techniques of experiment design, system calibration, data acquisition, analysis and presentation Apply appropriate instrumentation and/or software tools to make measurements of physical quantities Establish a relationship between measured data and underlying physical principles.

4.2	Demonstrate an ability to design experiments to solve open-ended problems	4.2.1	Design and develop an experimental approach, specify appropriate equipment and procedures
		4.2.2	Understand the importance of the statistical design of experiments and choose an appropriate experimental design plan based on the study objectives
4.3	Demonstrate an ability to analyze data and reach a valid conclusion	4.3.1	Use appropriate procedures, tools and techniques to conduct experiments and collect data
		4.3.2	Analyze data for trends and correlations, stating possible errors and limitations
		4.3.3	Represent data (in tabular and/or graphical forms) so as to facilitate analysis and explanation of the data, and drawing of conclusions
		4.3.4	Synthesize information and knowledge about the problem from the raw data to reach appropriate conclusions

PO 5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

Competency		Indicators	
5.1	Demonstrate an ability to identify/ create modern engineering tools, techniques and resources	5.1.1	Identify modern engineering tools such as computer-aided drafting, modeling and analysis; techniques and resources for engineering activities
		5.1.2	Create/adapt/modify/extend tools and techniques to solve engineering problems
5.2	Demonstrate an ability to select and apply discipline-specific tools, techniques and resources	5.2.1	Identify the strengths and limitations of tools for (i) acquiring information, (ii) modeling and simulating, (iii) monitoring system performance, and (iv) creating engineering designs.
		5.2.2	Demonstrate proficiency in using discipline-specific tools
5.3	Demonstrate an ability to evaluate the suitability and limitations of tools used to solve an engineering problem	5.3.1	Discuss limitations and validate tools, techniques and resources
		5.3.2	Verify the credibility of results from tool use with reference to the accuracy and limitations, and the assumptions inherent in their use.

PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Competency		Indicators	
6.1	Demonstrate an ability to describe engineering roles in a broader context, e.g. pertaining to the environment, health, safety, legal and public welfare	6.1.1	Identify and describe various engineering roles; particularly as pertains to protection of the public and public interest at the global, regional and local level
6.2	Demonstrate an understanding of professional engineering regulations, legislation and standards	6.2.1	Interpret legislation, regulations, codes, and standards relevant to your discipline and explain its contribution to the protection of the public

PO 7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and the need for sustainable development.

Competency		Indicators	
7.1	Demonstrate an understanding of the impact of engineering and industrial practices on social, environmental and in economic contexts	7.1.1	Identify risks/impacts in the life-cycle of an engineering product or activity
		7.1.2	Understand the relationship between the technical, socio-economic and environmental dimensions of sustainability

7.2	Demonstrate an ability to apply principles of sustainable design and development	7.2.1 7.2.2	Describe management techniques for sustainable development Apply principles of preventive engineering and sustainable development to an engineering activity or product relevant to the discipline
PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.			
Competency		**Indicators**	
8.1	Demonstrate an ability to recognize ethical dilemmas	8.1.1	Identify situations of unethical professional conduct and propose ethical alternatives
8.2	Demonstrate an ability to apply the Code of Ethics	8.2.1 8.2.2	Identify tenets of the ASME professional code of ethics Examine and apply moral & ethical principles to known case studies
PO 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.			
Competency		**Indicators**	
9.1	Demonstrate an ability to form a team and define a role for each member	9.1.1 9.1.2	Recognize a variety of working and learning preferences; appreciate the value of diversity on a team Implement the norms of practice (e.g. rules, roles, charters, agendas, etc.) of effective team work, to accomplish a goal.
9.2	Demonstrate effective individual and team operations--communication, problem-solving, conflict resolution and leadership skills	9.2.1 9.2.2 9.2.3 9.2.4	Demonstrate effective communication, problem-solving, conflict resolution and leadership skills Treat other team members respectfully Listen to other members Maintain composure in difficult situations
9.3	Demonstrate success in a team-based project	9.3.1	Present results as a team, with smooth integration of contributions from all individual efforts
PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions			
Competency		**Indicators**	
10.1	Demonstrate an ability to comprehend technical literature and document project work	10.1.1 10.1.2 10.1.3	Read, understand and interpret technical and non-technical information Produce clear, well-constructed, and well-supported written engineering documents Create flow in a document or presentation - a logical progression of ideas so that the main point is clear
10.2	Demonstrate competence in listening, speaking, and presentation	10.2.1 10.2.2	Listen to and comprehend information, instructions, and viewpoints of others Deliver effective oral presentations to technical and non-technical audiences
10.3	Demonstrate the ability to integrate different modes of communication	10.3.1 10.3.2	Create engineering-standard figures, reports and drawings to complement writing and presentations Use a variety of media effectively to convey a message in a document or a presentation

PO 11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	
Competency	**Indicators**
11.1 Demonstrate an ability to evaluate the economic and financial performance of an engineering activity	11.1.1 Describe various economic and financial costs/benefits of an engineering activity 11.1.2 Analyze different forms of financial statements to evaluate the financial status of an engineering project
11.2 Demonstrate an ability to compare and contrast the costs/benefits of alternate proposals for an engineering activity	11.2.1 Analyze and select the most appropriate proposal based on economic and financial considerations.
11.3 Demonstrate an ability to plan/manage an engineering activity within time and budget constraints	11.3.1 Identify the tasks required to complete an engineering activity, and the resources required to complete the tasks. 11.3.2 Use project management tools to schedule an engineering project, so it is completed on time and on budget.
PO 12: Life-long learning: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	
Competency	**Indicators**
12.1 Demonstrate an ability to identify gaps in knowledge and a strategy to close these gaps	12.1.1 Describe the rationale for the requirement for continuing professional development 12.1.2 Identify deficiencies or gaps in knowledge and demonstrate an ability to source information to close this gap
12.2 Demonstrate an ability to identify changing trends in engineering knowledge and practice	12.2.1 Identify historic points of technological advance in engineering that required practitioners to seek education in order to stay current 12.2.2 Recognize the need and be able to clearly explain why it is vitally important to keep current regarding new developments in your field
12.3 Demonstrate an ability to identify and access sources for new information	12.3.1 Source and comprehend technical literature and other credible sources of information 12.3.2 Analyze sourced technical and popular information for feasibility, viability, sustainability, etc.

The above table can be used for most of the engineering programs. However, for Computer Science & Engineering/ Information Technology programs it requires some modifications.

A suggestive list of competencies and associated performance indicators for Computer Science & Engineering/ Information Technology **Programs is given in Appendix- A.**

IMPROVING STRUCTURE AND QUALITY OF ASSESSMENTS

For improving the structure and quality of assessment in various engineering programs following points need to be remembered:

1. In Indian engineering education system, written examinations play a major role in assessing the learning and awarding of grades to the student. Universities and colleges give highest weightage to the outcomes of the written examinations in overall grading. Questions raised in the examination/test papers play an important role in defining the level of learning the student is expected to achieve in the courses and hence in the program. Since assessment drives learning, the design of question papers needs to go beyond the mere test of memory recall. They also need to test higher-order abilities and skills.
2. Written examinations assess a very limited range of outcomes and cognitive levels. Particularly in the courses, where course outcomes (COs) cover a broad range of expectations, written examinations alone will not be sufficient to make valid judgements about student learning. A wide range of assessment methods (e.g., term papers, open-ended problem-solving assignments, course/lab project rubrics, portfolios etc.) need to be employed to ensure that assessment methods match with learning outcomes.
3. It is advisable to formulate assessment plans for each of the course in the program that brings clarity to the following:
    a. Alignment of assessment with learning outcome of the course
    b. Level of learning (cognitive) student is expected to achieve
    c. Assessment method to be adapted

The method to align examination questions/assessment to COs and hence POs was discussed in the section-1. The following sections discuss the application of Bloom's taxonomy framework to create the optimal structure of examination papers to test the different cognitive skills.

1. Bloom's Taxonomy for Assessment Design

Bloom's Taxonomy provides an important framework to not only design curriculum and teaching methodologies but also to design appropriate examination questions belonging to various cognitive levels. Bloom's Taxonomy of Educational Objectives developed in 1956 by Benjamin Bloom [6] was widely accepted by educators for curriculum design and assessment. In 2001, Anderson and Krathwohl modified Bloom's taxonomy [7] to make it relevant to the present-day requirements. It attempts to divide learning into three types of domains (cognitive, affective, and behavioural) and then defines the level of performance for each domain. Conscious efforts to map the curriculum and assessment to these levels can help the programs to aim for higher-level abilities which go beyond remembering or understanding, and require application, analysis, evaluation or creation.

Revised Bloom's taxonomy in the cognitive domain includes thinking, knowledge, and application of knowledge. It is a popular framework in engineering education to structure the assessment as it characterizes complexity and higher-order abilities. It identifies six levels of competencies within the cognitive domain (Fig. 2) which are appropriate for the purposes of engineering educators.

According to revised Bloom's taxonomy, the levels in the cognitive domain are as follows:

Level	Descriptor	Level of attainment
1	Remembering	Recalling from the memory of the previously learned material
2	Understanding	Explaining ideas or concepts
3	Applying	Using the information in another familiar situation
4	Analysing	Breaking information into the part to explore understandings and relationships
5	Evaluating	Justifying a decision or course of action
6	Creating	Generating new ideas, products or new ways of viewing things

Fig. 2: Revised Bloom's Taxonomy

Bloom's taxonomy is hierarchical, meaning that learning at the higher level requires that skills at a lower level are attained.

2. Action Verbs for Assessment

Choice of action verbs in constructing assessment questions is important to consider. Quite often, the action verbs are indicators of the complexity (level) of the question. Over time, educators have come up with a taxonomy of measurable verbs corresponding to each of the Bloom's cognitive levels [8]. These verbs help us not only to describe and classify observable knowledge, skills and abilities but also to frame the examination or assignment questions that are appropriate to the level we are trying to assess.

Suggestive list of skills/ competencies to be demonstrated at each of the Bloom's level and corresponding cues/ verbs for the examination/ test questions is given below:

Level	Skill Demonstrated	Question cues / Verbs for tests
1. Remember	• Ability to recall of information like facts, conventions, definitions, jargon, technical terms, classifications, categories, and criteria • ability to recall methodology and procedures, abstractions, principles, and theories in the field • knowledge of dates, events, places • mastery of subject matter	list, define, tell, describe, recite, recall, identify, show, label, tabulate, quote, name, who, when, where
2. Understand	• understanding information • grasp meaning • translate knowledge into new context • interpret facts, compare, contrast • order, group, infer causes • predict consequences	describe, explain, paraphrase, restate, associate, contrast, summarize, differentiate interpret, discuss
3. Apply	• use information • use methods, concepts, laws, theories in new situations • solve problems using required skills or knowledge • Demonstrating correct usage of a method or procedure	calculate, predict, apply, solve, illustrate, use, demonstrate, determine, model, experiment, show, examine, modify
4. Analyse	• break down a complex problem into parts • Identify the relationships and interaction between the different parts of a complex problem • identify the missing information, sometimes the redundant information and the contradictory information, if any	classify, outline, break down, categorize, analyze, diagram, illustrate, infer, select
5. Evaluate	• compare and discriminate between ideas • assess value of theories, presentations • make choices based on reasoned argument • verify value of evidence • recognize subjectivity • use of definite criteria for judgments	assess, decide, choose, rank, grade, test, measure, defend, recommend, convince, select, judge, support, conclude, argue, justify, compare, summarize, evaluate
6. Create	• use old ideas to create new ones • Combine parts to make (new) whole, • generalize from given facts • relate knowledge from several areas • predict, draw conclusions	design, formulate, build, invent, create, compose, generate, derive, modify, develop, integrate

It may be noted that some of the verbs in the above table are associated with multiple Bloom's Taxonomy levels. These verbs are actions that could apply to different activities. We need to keep in mind that it's the skill, action or activity we need students to demonstrate that will determine the contextual meaning of the verb used in the assessment question.

3. Assessment Planning

While using Bloom's taxonomy framework in planning and designing of assessment of student learning, following points need to be considered:

1. Normally the first three learning levels; remembering, understanding and applying and to some extent fourth level analysing are assessed in the Continuous Internal Evaluation (CIE) and Semester End

Examinations (SEE), where students are given a limited amount of time. And abilities; analysis, evaluation and creation can be assessed in extended course works or in a variety of student works like course projects, mini/ minor projects, internship experience and final year projects.

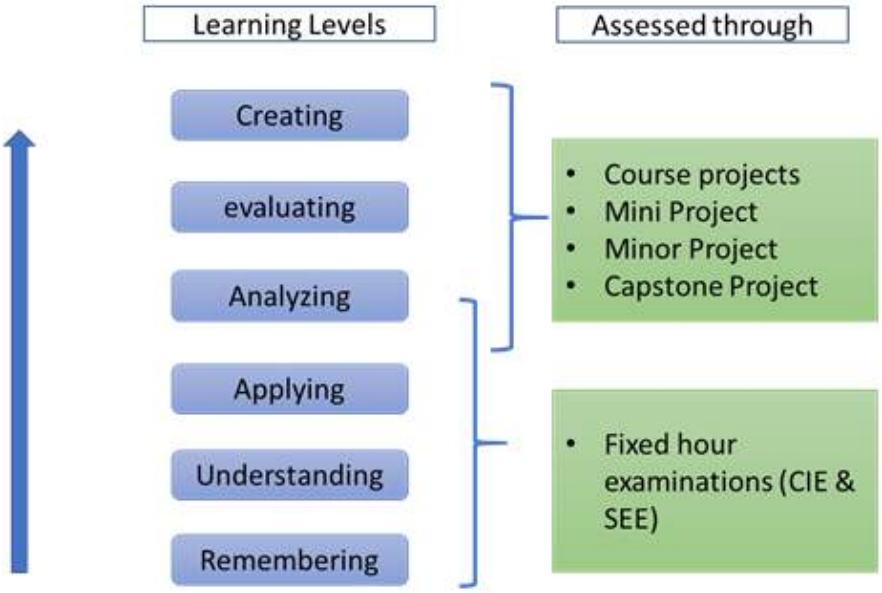


Fig. 3: Assessment methods for different Bloom's cognitive levels

2. Before adopting this framework for reforms in examination system of a University/Institution, it is worthwhile to study the present pattern of assessment in each of the course in the program to gain insight about:

    a) Alignment of assessment questions with course learning outcomes

    b) Whether all the learning outcomes are tested; sometimes some learning outcomes are over tested at the expense of others which may be not tested at all.

    c) Overall weightage in the assessment, to each of Bloom's learning levels

    d) Assessment methods used to adequately assess the content and desired learning outcomes

    Based on the study, improvement priorities for each of the above factors need to be arrived at. The reform process needs to be well planned and implemented through institutional strategy and communicated to all stakeholders particularly to the students.

3. A good and reasonable examination paper must consist of various difficulty levels to accommodate the different capabilities of students. Bloom's taxonomy framework helps the faculty to set examination papers that are well balanced, testing the different cognitive skills without a tilt towards a tough or easy paper perception. If the present examination questions are more focused towards lower cognitive skills, conscious efforts need to be made to bring in application skills or higher cognitive skills in the assessment. It is recommended that at institution/ University level, upper limit need to be arrived for lower order skills (for example, no more than 40% weightage for knowledge-oriented questions). It is important to note that, as nature of every course is different, the weightage for different cognitive levels in the question papers can also vary from course to course.

    - Examples of typical questions for each of Bloom's cognitive level are given in Appendix-B
    - Model Question Papers are given in Appendix- C

ASSESSING HIGHER-ORDER ABILITIES & PROFESSIONAL SKILLS

In the 21st century, professional skills (also known as soft skills, generic skills or transferable skills) have emerged as important attributes of a graduate engineer. Studies show that Industry/ employers around the world value these abilities more than the disciplinary knowledge. This is also reflected in the NBA graduate attributes wherein six out of twelve attributes belong to this category, viz. (1) communication, (2) teamwork, (3) understanding ethics and professionalism, (4) understanding global and societal contexts, (5) lifelong learning, and (6) knowledge of contemporary issues. Further, higher-order cognitive abilities like critical thinking, problem-solving and making informed decisions are also crucial for a graduate to succeed in the emerging world. Though the employers consider these professional skills and higher abilities as important, students are weak in them. The main challenge surrounding them is that they are difficult to assess through existing conventional examination system.

1. Innovative Educational Experiences to Teach and Assess

One of the main obstacles in addressing these outcomes is the limitation of educational experience we create within our engineering programs. Most of the coursework in our programs are oriented towards teaching technical knowledge and skills; hence, the assessment is limited to those abilities. However, acquiring the professional outcomes may not result simply from participation in a particular class or set of classes. Rather, these outcomes are more often acquired or influenced through sources both in and outside the classroom [4].

To address these challenges, comprehensive reforms are needed in the way we design our curriculum, student learning experiences and assessment of the outcomes. Worldwide several attempts are being made to address these challenges. Following are the few educational experiences that are recommended to teach and assess professional outcomes and higher-order cognitive abilities:

- Course projects
- Open-ended experiments in laboratories
- Project-based learning modules
- MOOCs
- Co-Curricular experiences
- Mini / Minor projects
- Final year projects
- Internship experiences
- E-portfolios of student works

2. Using Scoring Rubrics as Assessment Tool

To evaluate the above, student works for attainment of course outcomes and hence POs, it is of

utmost importance to have reliable methods / proper assessment tools. Rubrics provide a powerful tool for assessment and grading of student work. They can also serve as a transparent and inspiring guide to learning. Rubrics are scoring, or grading tool used to measure a students' performance and learning across a set of criteria and objectives. Rubrics communicate to students (and to other markers) your expectations in the assessment, and what you consider important.

There are three components within rubrics namely (i) criteria / performance Indicator: the aspects of performance that will be assessed, (ii) descriptors: characteristics that are associated with each dimension, and (iii) scale/level of performance: a rating scale that defines students' level of mastery within each criterion.

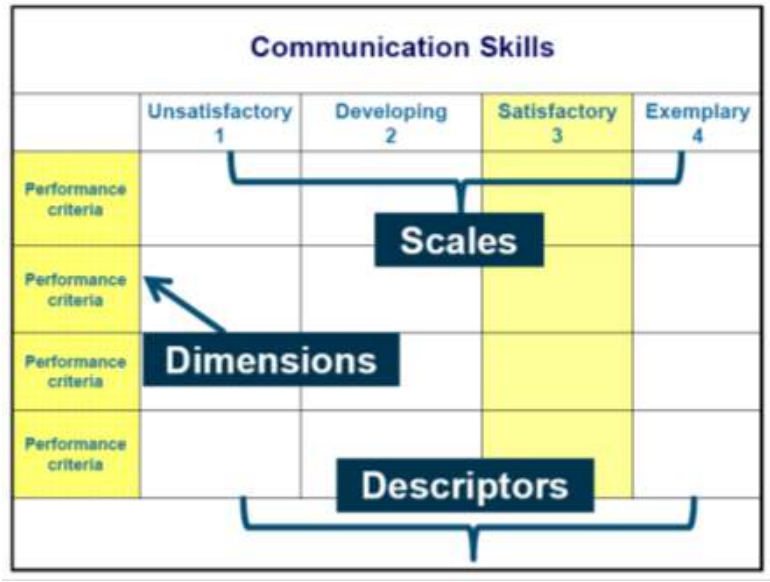


Fig. 4: Examples of Rubrics (Accessed from Rogers 2010)

3. Open-Book Examinations

In the earlier sections it was noted that the traditional written examinations have a significant weakness that they tend to encourage rote learning and more superficial application of knowledge. This deficiency can be overcome by "open-book examination". Open-book examination is similar to time constrained written examinations but designed in a way that allows students to refer to either class notes, textbooks, or other approved material while answering questions. They are particularly useful if you want to test skills in application, analysis and evaluation, i.e. higher levels of Bloom's taxonomy. However, in a program, the courses or the curriculum areas that are best suited to an open-book exam are to be carefully chosen.

Advantages of open-book examinations

1. Less demanding on memory and hence less stressful
2. Questions can emphasise more on problem-solving, application of knowledge and higher-order thinking rather than simple recall of facts.
3. Assessment questions can reflect real-life situations that require comprehension, information retrieval and synthesising skills of the students to solve.

Designing a good open-book examination

- Set questions that require students to do things with the information available to them, rather than to merely locate the correct information and then summarize or rewrite it.
- The questions in open-book exam must take advantage of the format, and give more weightage

to the application of knowledge, critical thinking and use of resources for solving real complex engineering problems.

- As the nature of questions is complex, it is to be ensured that the students get enough time. Open book test questions typically take longer time compared to traditional examinations. It is advisable either to set less number of questions that encompass 2 or 3 concepts taught or allocate longer duration of time for the examinations.

References:

1. Lueny Morell, Engineering Education in the 21st Century: Roles, Opportunities and Challenges (2010) Int. J. Technol. Eng. Educ. Vol.7, No.2, p. 1-10
2. Miller, A.H., Imrie, B.W. & Cox, K. (1998). Student Assessment in Higher Education. London, UK: Kogan
3. Felder, R.M. & Brent, R. (2003). Designing and teaching courses to address the ABET engineering criteria. J. Engr. Education 92(1), p. 7–25
4. Shuman, L. J., Besterfield-Sacre, M., and McGourty, J. (2005). The ABET "Professional Skills"-Can They Be Taught? Can They Be Assessed? Journal of Engineering Education, p. 41-55.
5. University of Toronto. Report on the Outcomes and Indicators for the CEAB Graduate Attributes Process, Faculty of Applied Science and Engineering University of Toronto http://www.engineering.utoronto.ca/wp-content/blogs.dir/28/files/2015/02/Revised-UCC-Grad-Att-Cover2c-Rpt-26-Table_Apr-11-2012.pdf. (available as on April 12, 2018)
6. Bloom, B.S., Engelhart, M.D., Furst, E.J., Hill, W.H. and Krathwohl, D.R. 1956 Taxonomy of educational objectives Handbook 1: cognitive domain. London, Longman Group Ltd.
7. Anderson, L.W., Krathwohl, D.R., Airasian, P.W., Cruikshank, K.A., Mayer, R.E., Pintrich, P.R., Raths, J. and Wittrock, M.C. (eds.) (2001). A taxonomy for learning and teaching and assessing: A revision of Bloom's taxonomy of educational objectives. Addison Wesley Longman.
8. Illinois online network, Assessing Learning Objectives Bloom's Taxonomy, http://www.ion.uillinois.edu/resources/tutorials/assessment/bloomtaxonomy.asp (available as on April 12, 2018)
9. Chan, CKY (2015). "Rubrics for Engineering Education", Engineering Education Enhancement and Research Asia (E3R Asia)
10. Rogers, G. (2010). Developing rubrics. Retrieved from http://www.abet.org/uploadedFiles/Events/Webinars/Developing_Rubrics.pdf

APPENDIX

Competencies and Performance Indicators (PIs)
Computer Science & Engineering/Information Technology Programs

Appendix-A

PO 1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialisation for the solution of complex engineering problems.	
Competency	**Indicators**
1.2 Demonstrate competence in mathematical modelling	1.2.1 Apply the knowledge of discrete structures, linear algebra, statistics and numerical techniques to solve problems 1.2.2 Apply the concepts of probability, statistics and queuing theory in modeling of computer-based system, data and network protocols.
1.5 Demonstrate competence in basic sciences	1.5.1 Apply laws of natural science to an engineering problem
1.6 Demonstrate competence in engineering fundamentals	1.6.1 Apply engineering fundamentals
1.7 Demonstrate competence in specialized engineering knowledge to the program	1.7.1 Apply theory and principles of computer science and engineering to solve an engineering problem
PO 2: Problem analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	
Competency	**Indicators**
2.1 Demonstrate an ability to identify and formulate complex engineering problem	2.5.1 Evaluate problem statements and identifies objectives 2.5.2 Identify processes/modules/algorithms of a computer-based system and parameters to solve a problem 2.5.3 Identify mathematical algorithmic knowledge that applies to a given problem
2.6 Demonstrate an ability to formulate a solution plan and methodology for an engineering problem	2.6.1 Reframe the computer-based system into interconnected subsystems 2.6.2 Identify functionalities and computing resources. 2.6.3 Identify existing solution/methods to solve the problem, including forming justified approximations and assumptions 2.6.4 Compare and contrast alternative solution/methods to select the best methods 2.6.5 Compare and contrast alternative solution processes to select the best process.
2.7 Demonstrate an ability to formulate and interpret a model	2.7.1 Able to apply computer engineering principles to formulate modules of a system with required applicability and performance. 2.7.2 Identify design constraints for required performance criteria.
2.8 Demonstrate an ability to execute a solution process and analyze results	2.8.1 Applies engineering mathematics to implement the solution. 2.8.2 Analyze and interpret the results using contemporary tools. 2.8.3 Identify the limitations of the solution and sources/causes. 2.8.4 Arrive at conclusions with respect to the objectives.

PO 3: Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.	
Competency	**Indicators**
3.5 Demonstrate an ability to define a complex/ open-ended problem in engineering terms	3.5.1 Able to define a precise problem statement with objectives and scope. 3.5.2 Able to identify and document system requirements from stake- holders. 3.5.3 Able to review state-of-the-art literature to synthesize system requirements. 3.5.4 Able to choose appropriate quality attributes as defined by ISO/IEC/IEEE standard. 3.5.5 Explore and synthesize system requirements from larger social and professional concerns. 3.5.6 Able to develop software requirement specifications (SRS).
3.6 Demonstrate an ability to generate a diverse set of alternative design solutions	3.6.1 Able to explore design alternatives. 3.6.2 Able to produce a variety of potential design solutions suited to meet functional requirements. 3.6.3 Identify suitable non-functional requirements for evaluation of alternate design solutions.
3.7 Demonstrate an ability to select optimal design scheme for further development	3.7.1 Able to perform systematic evaluation of the degree to which several design concepts meet the criteria. 3.7.2 Consult with domain experts and stakeholders to select candidate engineering design solution for further development
3.8 Demonstrate an ability to advance an engineering design to defined end state	3.8.1 Able to refine architecture design into a detailed design within the existing constraints. 3.8.2 Able to implement and integrate the modules. 3.8.3 Able to verify the functionalities and validate the design.
PO 4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	
Competency	**Indicators**
4.4 Demonstrate an ability to conduct investigations of technical issues consistent with their level of knowledge and understanding	4.4.1 Define a problem for purposes of investigation, its scope and importance 4.4.2 Able to choose appropriate procedure/algorithm, dataset and test cases. 4.4.3 Able to choose appropriate hardware/software tools to conduct the experiment.
4.5 Demonstrate an ability to design experiments to solve open-ended problems	4.5.1 Design and develop appropriate procedures/methodologies based on the study objectives
4.6 Demonstrate an ability to analyze data and reach a valid conclusion	4.6.1 Use appropriate procedures, tools and techniques to collect and analyze data 4.6.2 Critically analyze data for trends and correlations, stating possible errors and limitations 4.6.3 Represent data (in tabular and/or graphical forms) so as to facilitate analysis and explanation of the data, and drawing of conclusions 4.6.4 Synthesize information and knowledge about the problem from the raw data to reach appropriate conclusions

PO 5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.			
Competency		**Indicators**	
5.4	Demonstrate an ability to identify/create modern engineering tools, techniques and resources	5.4.1 5.4.2	Identify modern engineering tools, techniques and resources for engineering activities Create/adapt/modify/extend tools and techniques to solve engineering problems
5.5	Demonstrate an ability to select and apply discipline-specific tools, techniques and resources	5.5.1 5.5.2	Identify the strengths and limitations of tools for (i) acquiring information, (ii) modeling and simulating, (iii) monitoring system performance, and (iv) creating engineering designs. Demonstrate proficiency in using discipline-specific tools
5.6	Demonstrate an ability to evaluate the suitability and limitations of tools used to solve an engineering problem	5.6.1 5.6.2	Discuss limitations and validate tools, techniques and resources Verify the credibility of results from tool use with reference to the accuracy and limitations, and the assumptions inherent in their use.
PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.			
Competency		**Indicators**	
6.3	Demonstrate an ability to describe engineering roles in a broader context, e.g. pertaining to the environment, health, safety, legal and public welfare	6.3.1	Identify and describe various engineering roles; particularly as pertains to protection of the public and public interest at the global, regional and local level
6.4	Demonstrate an understanding of professional engineering regulations, legislation and standards	6.4.1	Interpret legislation, regulations, codes, and standards relevant to your discipline and explain its contribution to the protection of the public
PO 7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and the need for sustainable development.			
Competency		**Indicators**	
7.3	Demonstrate an understanding of the impact of engineering and industrial practices on social, environmental and in economic contexts	7.3.1 7.3.2	Identify risks/impacts in the life-cycle of an engineering product or activity Understand the relationship between the technical, socio-economic and environmental dimensions of sustainability
7.4	Demonstrate an ability to apply principles of sustainable design and development	7.4.1 7.4.2	Describe management techniques for sustainable development Apply principles of preventive engineering and sustainable development to an engineering activity or product relevant to the discipline
PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.			
Competency		**Indicators**	
8.3	Demonstrate an ability to recognize ethical dilemmas	8.3.1	Identify situations of unethical professional conduct and propose ethical alternatives

8.4	Demonstrate an ability to apply the Code of Ethics	8.4.1 Identify tenets of the ASME professional code of ethics 8.4.2 Examine and apply moral & ethical principles to known case studies

PO 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Competency		Indicators
9.4	Demonstrate an ability to form a team and define a role for each member	9.4.1 Recognize a variety of working and learning preferences; appreciate the value of diversity on a team 9.4.2 Implement the norms of practice (e.g. rules, roles, charters, agendas, etc.) of effective team work, to accomplish a goal.
9.5	Demonstrate effective individual and team operations--communication, problem-solving, conflict resolution and leadership skills	9.5.1 Demonstrate effective communication, problem-solving, conflict resolution and leadership skills 9.5.2 Treat other team members respectfully 9.5.3 Listen to other members 9.5.4 Maintain composure in difficult situations
9.6	Demonstrate success in a team-based project	9.6.1 Present results as a team, with smooth integration of contributions from all individual efforts

PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

Competency		Indicators
10.4	Demonstrate an ability to comprehend technical literature and document project work	10.4.1 Read, understand and interpret technical and non-technical information 10.4.2 Produce clear, well-constructed, and well-supported written engineering documents 10.4.3 Create flow in a document or presentation - a logical progression of ideas so that the main point is clear
10.5	Demonstrate competence in listening, speaking, and presentation	10.5.1 Listen to and comprehend information, instructions, and viewpoints of others 10.5.2 Deliver effective oral presentations to technical and non-technical audiences
10.6	Demonstrate the ability to integrate different modes of communication	10.6.1 Create engineering-standard figures, reports and drawings to complement writing and presentations 10.6.2 Use a variety of media effectively to convey a message in a document or a presentation

PO 11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Competency		Indicators
11.4	Demonstrate an ability to evaluate the economic and financial performance of an engineering activity	11.4.1 Describe various economic and financial costs/benefits of an engineering activity 11.4.2 Analyze different forms of financial statements to evaluate the financial status of an engineering project
11.5	Demonstrate an ability to compare and contrast the costs/benefits of alternate proposals for an engineering activity	11.5.1 Analyze and select the most appropriate proposal based on economic and financial considerations.

11.6	Demonstrate an ability to plan/manage an engineering activity within time and budget constraints	11.6.1 Identify the tasks required to complete an engineering activity, and the resources required to complete the tasks. 11.6.2 Use project management tools to schedule an engineering project, so it is completed on time and on budget.
PO 12: Life-long learning: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.		
Competency		**Indicators**
12.4	Demonstrate an ability to identify gaps in knowledge and a strategy to close these gaps	12.4.1 Describe the rationale for the requirement for continuing professional development 12.4.2 Identify deficiencies or gaps in knowledge and demonstrate an ability to source information to close this gap
12.5	Demonstrate an ability to identify changing trends in engineering knowledge and practice	12.5.1 Identify historic points of technological advance in engineering that required practitioners to seek education in order to stay current 12.5.2 Recognize the need and be able to clearly explain why it is vitally important to keep current regarding new developments in your field
12.6	Demonstrate an ability to identify and access sources for new information	12.6.1 Source and comprehend technical literature and other credible sources of information 12.6.2 Analyze sourced technical and popular information for feasibility, viability, sustainability, etc.

APPENDIX
Sample questions for Bloom's Taxonomy levels

Appendix-B

SAMPLES QUESTIONS FOR BLOOMS TAXONOMY LEVELS:

1. REMEMBER

Skill Demonstrated	Question Ques / Verbs for tests
• Ability to recall of information like, facts, conventions, definitions, jargon, technical terms, classifications, categories, and criteria • ability to recall methodology and procedures, abstractions, principles, and theories in the field • knowledge of dates, events, places • mastery of subject matter	list, define, describe, state, recite, recall, identify, show, label, tabulate, quote, name, who, when, where, etc.

Sample Questions:

1. State Ohm's law
2. List the physical and chemical properties of silicon
3. List the components of A/D converter
4. List the arithmetic operators available in C in increasing order of precedence.
5. Define the purpose of a constructor.
6. Define the terms: Sensible heat, Latent heat and Total heat of evaporation
7. List the assembler directives.
8. Describe the process of galvanisation and tinning
9. Write truth table and symbol of AND, OR, NOT, XNOR gates
10. Define the terms: Stress, Working stress and Factor of safety.
11. What is the difference between declaration and definition of a variable/function?
12. List the different storage class specifiers in C.
13. What is the use of local variables?
14. What is a pointer to a pointer?
15. What are the valid places for the keyword "break" to appear?
16. What is a self-referential structure?

2. UNDERSTAND

Skill Demonstrated	Question Ques / Verbs for tests
• understanding information • grasp meaning • translate knowledge into new context • interpret facts, compare, contrast • order, group, infer causes • predict consequences	describe, explain, paraphrase, restate, associate, contrast, summarize, differentiate interpret, discuss

Sample Questions:

1. Explain the importance of sustainability in Engineering design
2. Explain the behaviour of PN junction diode under different bias conditions
3. Describe the characteristics of SCR and transistor equivalent for a SCR
4. Explain the terms: Particle, Rigid body and Deformable body giving two examples for each.
5. How many values of the variable num must be used to completely test all branches of the following code fragment?

```
if (num>0)
    if (value<25)
{
        value=10*num;
        if(num<12)
                value=value/10;
}
else
        Value=20*num;
else
        Value=30*num
```

6. Discuss the effect of Make in India initiative on the Indian manufacturing Industry.
7. Summarise the importance of ethical code of conduct for engineering professionals
8. Explain the syntax for 'for loop'.
9. What is the difference between including the header file with-in angular braces < > and double quotes " "?
10. What is the meaning of base address of the array?
11. What is the difference between actual and formal parameters?
12. Explain the different ways of passing parameters to the functions.
13. Explain the use of comma operator (,).
14. Differentiate between entry and exit controlled loops.
15. How is an array different from linked list?

3. APPLY

Skill Demonstrated	Question Ques / Verbs for tests
• use information • use methods, concepts, laws, theories in new situations • solve problems using required skills or knowledge • Demonstrating correct usage of a method or procedure	calculate, predict, apply, solve, illustrate, use, demonstrate, determine, model, experiment, show, examine, modify

Sample Questions:

1. Model and realize the following behaviors using diodes with minimum number of digital inputs.

   (i) Turning on of a burglar alarm only during night time when the locker door is opened.

   (ii) Providing access to an account if either date of birth or registered mobile number or both are correct.

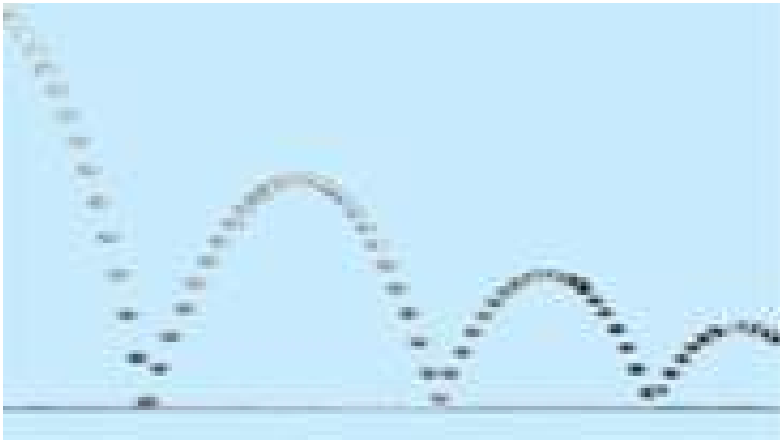
   (iii) Updating the parking slot empty light in the basement of a shopping mall.

2. One of the resource persons needs to address a huge crowd (nearly 400 members) in the auditorium. A system is to be designed in such a way that everybody attending the session should be able to hear properly and clearly without any disturbance. Identify the suitable circuit to boost the voice signal and explain its functionality in brief.

3. A ladder 5.0 m long rests on a horizontal ground & leans against a smooth vertical wall at an angle 20^0 with the vertical. The weight of the ladder is 900 N and acts at its middle. The ladder is at the point of sliding, when a man weighing 750 N stands on a rung 1.5 m from the bottom of the ladder. Calculate the coefficient of friction between the ladder & the floor.

4. A ball is dropped from 6 meters above a flat surface. Each time the ball hits the surface after falling a distance h, it rebounds a distance rh. What will be the total distance the ball travels in each of the following cases.

   (a) r>1 (b) 0<r<1 (c) r=1



5. The region bounded by the curves y=e ^ ((-1)□x),y=0,x=1, and x=5 is rotated about the x-axis. Use Simpson's Rule with n=8 to estimate the volume of the resulting solid.

6. An electric train is powered by machine which takes the supply from 220 V DC rail running above the train throughout. Machine draws current of 100 A from the DC rail to account for high torque during starting and runs at 700 r.p.m initially. Calculate the new speed of the train once it picks up the speed

where the torque output required is only 70% of starting torque. Assume the motor has a resistance of 0.1Ω across its terminals.

7. Write an algorithm to implement a stack using queue.

8. A single array A[1..MAXSIZE] is used to implement two stacks. The two stacks grow from opposite ends of the array. Variables top1 and top2 (topl< top2) point to the location of the topmost element in each of the stacks. What is the condition for "stack full", if the space is to be used efficiently.

9. Consider the following table of arrival time and burst time for three processes P0, P1 and P2.

Process	Arrival time	Burst Time
P0	0 ms	9 ms
P1	1 ms	4 ms
P2	2 ms	9 ms

The pre-emptive shortest job first scheduling algorithm is used. Scheduling is carried out only at arrival or completion of processes. What is the average waiting time for the three processes?

10. A CPU generates 32-bit virtual addresses. The page size is 4 KB. The processor has a translation look-aside buffer (TLB) which can hold a total of 128-page table entries and is 4-way set associative. What is the minimum size of the TLB tag?

4. ANALYZE

Skill Demonstrated	Question Ques / Verbs for tests
• break down a complex problem into parts. • Identify the relationships and interaction between the different parts of complex problem	classify, outline, break down, categorize, analyse, diagram, illustrate, infer, select

Sample Questions:

1. A class of 10 students consists of 5 males and 5 females. We intend to train a model based on their past scores to predict the future score. The average score of females is 60 whereas that of male is 80. The overall average of the class is 70. Give two ways of predicting the score and analyse them for fitting model.

2. Suppose that we want to select between two prediction models, M1 and M2. We have performed 10 rounds of 10-fold cross-validation on each model, whereas the same data partitioning in round one is used for both M1 and M2. The error rates obtained for M1 are 30.5, 32.2, 20.7, 20.6, 31.0, 41.0, 27.7, 26.0, 21.5, 26.0. The error rates for M2 are 22.4, 14.5, 22.4, 19.6, 20.7, 20.4, 22.1, 19.4, 16.2, 35.0. Comment on whether one model is significantly better than the other considering a significance level of 1%.

3. Return statement can only be used to return a single value. Can multiple values be returned from a function? Justify your answer.

4. Bob wrote a program using functions to find sum of two numbers whereas Alex wrote the statements to find the sum of two numbers in the main() function only. Which of the two methods is efficient in execution and why?

5. Carly wants to store the details of students studying in 1st year and later on wishes to retrieve the

information about the students who score the highest marks in each subject. Specify the scenario where the data can be organized as a single 2-D array or as multiple 1-D arrays.

6. Dave is working on a Campus Management Software but is unable to identify the maximum number of students per course. He decided to implement the same using arrays but discovered that there is memory wastage due to over-provisioning. Which method of memory storage should be used by Dave and how it can be implemented using C?

7. Albert is working on a 32-bit machine whereas Julie is working on a 64-bit machine. Both wrote the same code to find factorial of a number but Albert is unable to find factorial of a number till 9 whereas Julie is able to find the factorial of higher number. Identify the possible reason why Albert is unable to find the factorial. Suggest some changes in the code so that Albert can handle bigger inputs.

8. While writing a C code, the problem faced by the programmers is to find if the parenthesis is balanced or not. Write an algorithm to check if the parenthesis in C code are balanced. Initially your code should work for balanced { and } braces.

9. Swapping of the data in a linked list can be performed by swapping the contents in the linked list. Can the contents of a linked list be swapped without actually swapping the data?

5. EVALUATE

Skill Demonstrated	Question Ques / Verbs for tests
• compare and discriminate between ideas • assess value of theories, presentations • make choices based on reasoned argument • verify value of evidence • recognize subjectivity • use of definite criteria for judgments	assess, decide, choose, rank, grade, test, measure, defend, recommend, convince, select, judge, support, conclude, argue, justify, compare, summarize, evaluate

6. CREATE

Skill Demonstrated	Question Ques / Verbs for tests
• use old ideas to create new ones • Combine parts to make (new) whole, • generalize from given facts • relate knowledge from several areas • predict, draw conclusions	design, formulate, build, invent, create, compose, generate, derive, modify, develop, integrate

Both higher order cognitive skills 'Evaluate' and 'Create' are difficult to assess in time-limited examinations. These need to be assessed in variety of student works like projects, open ended problem-solving exercises etc. Typical examples of problem statements or need statements which need higher order abilities to solve are given below

Sample Problem / Need statements:

1. Automatic tethering of milking machine to the udder of a cow. A milk diary wants to automate the milking process. The milking process involves attaching the milking cups to the teats. Design a system for the same.

2. An electric vehicle uses LIoN batteries. The batteries have to be charged and get discharged during use.

The batteries require continuous monitoring during charging and discharging so that they remain healthy and yield a long life. Design a system to monitor and manage the health of the batteries.

3. A Biotech industry needs automation for filling its product into 20 ltr bottles. Design a system to meter the flow into the bottles so that each bottle has 20 ltr of the liquid. There will be more than one filling station and the system has to monitor all the filling stations as well as keep count of the total production on a daily basis.
4. Microwave Doppler radar with a range of 9m are available for motion detection. Design a surround view monitoring system for a 3 wheeler to detect human obstacles while the vehicle is in motion.
5. Design a system to assist the driver by using cameras to detect lane markers and pedestrians while the vehicle is in motion.
6. Develop a small size USB 2.0 / 3.0 CMOS camera system which can be used for industrial inspection, medical applications, microscopy, etc. The system should be able to capture the image quickly and be able to process the captured image and then store it also

APPENDIX
Model Question Papers

Appendix-C

MODEL QUESTION PAPER

Course: Programming for Problem solving (ESC 103)
Maximum Marks :100; Duration: 03 hours

Q.No	Questions	Marks	CO	BL	PI
1(a)	Explain the steps involved in solving a problem using computer.	08	CO1	L2	1.4.1
1(b)	Write an algorithm to find roots of a quadratic equation ax2 + bx +c = 0 reading the values of a, b and c.	12	CO2	L3	1.4.1
2(a)	Compare if-else-if and switch statement giving examples for their relevant use.	08	CO2	L2	1.4.1
2b	Write a C program that reads a given integer number and checks whether it a palindrome. A palindrome is a number that has same value even when it is reversed. Eg: 12321 is a palindrome.	12	CO3	L3	1.4.1
3a	Compare the working of three looping constructs of C language giving their syntax.	08	CO3	L2	1.4.1

3b	What does the following program do?
	#include <stdio.h>
	int main()
	{
	char ch;
	int vcnt = 0, ccnt=0;
	for (ch = getchar(); ch != '\n'; ch=getchar()){
	if(ch=='a' || ch=='e' || ch=='i' || ch=='o' || ch=='u' || ch=='A' || ch=='E' || ch=='I' || ch=='O' || ch=='U')
	vcnt++;
	else if((ch >= 'a' && ch <= 'z') || (ch >= 'A' && ch <= 'Z'))
	ccnt++;
	}
	printf(" %d %d\n", vcnt, ccnt);
	}
	Rewrite the above program using while and switch constructs.
		12	CO4	L4	1.4.1

4a	Compare call by value and call by reference with relevant examples.	8	CO3	L2	1.4.1
4b	Write a C function to find the largest and smallest in a given list of integers of size n using call by reference: void minmax(int list[ ], int n, int *min, int *max);	12	CO3	L3	1.4.1
5a	Explain at least four file handling operations available in C language giving their syntax.	4	CO3	L2	1.4.1
5b	Identify the bug in the following function written to return the swapped values of two integer variables given:				

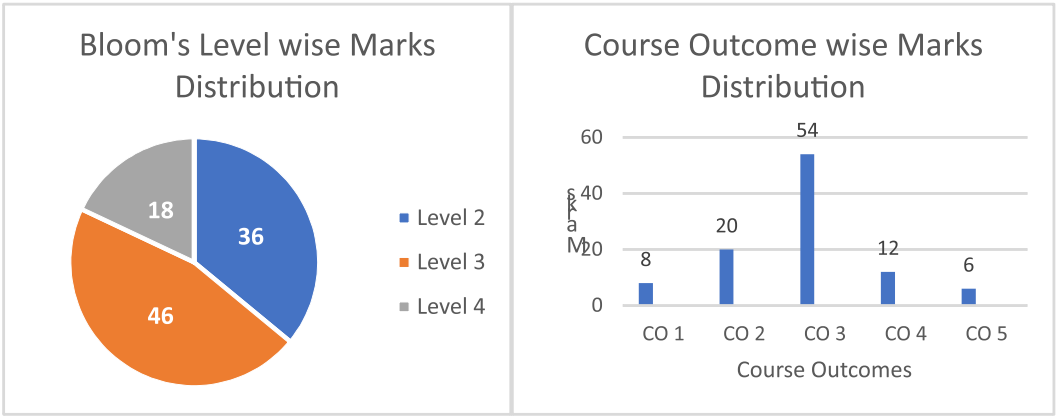
	int swap(int *x, int *y)
	{
	int *temp;
	temp = x, x=y, y = temp;
	}
		6	CO5	L4	1.4.1

5c	Define a structure to store time with three components hours, mins and seconds. Write a modular C program to compute the time taken by an athlete to complete a marathon reading the start and end time of his run.	10	CO3	L3	1.4.1

BL – Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3 – Applying, 4 – Analysing, 5 – Evaluating, 6 - Creating)

CO – Course Outcomes

PO – Program Outcomes; PI Code – Performance Indicator Code



MODEL QUESTION PAPER FOR END SEMESTER EXAMINATION

Course Name: Programming for Problem Solving
Duration: 3 hrs. ; Max. Marks: 100

Instructions:

a. Attempt five questions selecting ONE from each section. Question 9 (Section E) is compulsory.

b. All the questions carry equal marks.

c. Draw neat diagrams wherever applicable.

Q. No	Question	Marks	BL	CO	PO	PI Code
	Section-A					
1.	a. What is an algorithm? Explain the characteristics of an algorithm.	2+6	1,2	2	1	1.4.1
	b. Write an algorithm to find angle between hour and minute hands of a clock at a given time.	7	3	3	1	1.4.1
	c. Is it mandatory to declare main() function with return type as void or int. What will be the effect if there is no return type declared for main() function?	3+2	4	3	1	1.4.1
	OR					
2.	a. What is the difference between definition and declaration in C? When a user writes “int x;” is it treated as declaration or definition in C.	3+2	2,4	3	1	1.4.1
	b. Write a program in C to find largest of 3 positive integer numbers using conditional operators.	7	3	3	1,2	1.4.1, 2.2.4
	c. What is meant by iterative statements? What are the different types of iterative statements in C?	8	1,2	3	1	1.4.1
	Section-B					
3.	a. Bob has placed N objects in a row which are marked with a number equal to their weight in Kg. He wants to check whether the objects are in increasing order of their weights or not. Write a C program to help Bob.	12	3	3,6,7	1,2	1.4.1, 2.2.4
	b. Differentiate between Big-O and Big-Omega notation.	4	2	3	1	1.4.1
	c. What is the role of index in an array? How are the elements of a 2D array accessed in C?	2+2	2	3	1	1.4.1
	OR					
4.	a. Ram is conducting a study which is based on counting the number of cars crossing the highway. Every hour he generates a random string containing sequence of characters <rbwbwr…>, where r represents red color, w denotes white color and b denotes blue color cars. The string is forwarded to Shyam for analysis who computes the number of red, blue and white color cars crossing Ram every hour. Assume that Ram works for 5 hours in a day, help Shyam generate a daily report containing the following: i. Total number of different colour cars crossing Ram in an hour. ii. Total number of different colour cars crossing Ram in a day. iii. Total number of cars crossing Ram in a day.	4+4+4	3	3,6,7	1,2	1.4.1, 2.2.4

	b. What is a variable? Explain the ways to declare scope of a variable.	2+6	1,2	3	1	1.4.1
Section-C						
5.	a. Write a program which will read positive integer numbers from the users and compute the sum if the number can be expressed as power of 2. The test whether a number can be expressed as power of 2 will be done using a function power_of_two(int a).	12	3	3,6,7	1,2	1.4.1
	b. What is recursion? Differentiate between homogeneous and heterogeneous recursion with the help of an example.	2+3+3	2	3	1	1.4.1
OR						
6.	a. What are the different ways to pass parameters to a function? Explain with the help of a suitable example.	4+4	2	3,5	1	1.4.1
	b. Is it possible to return multiple values from a function? Justify the statement with the help of an example.	4+8	3	3,6,7	1,2	1.4.1
Section-D						
7.	a. What is a structure? What is the benefit offered by using a structure over multiple arrays?	2+6	2	5	1	1.4.1
	b. Ram is working on a project which requires returning multiple values from a function. He observed that a return statement can only be used to return a single value from a function. How the function should be implemented so that multiple values can be returned by Ram?	12	4	5	1	1.4.1
OR						
8.	a. Write a program that reads a number as input from the user. The entered number is written to a file “even.txt” if the input is even else it is written to “odd.txt”. Write a C code to perform the desired task.	12	3	5	1	1.4.1
	b. What are the different methods to open a file? Explain each with the help of a C program.	3+5	2	5	1	1.4.1
Section-E (Compulsory Question)						
9.	a. What is a compiler? List names of any 2 compilers.	2 ½	1	1	1	1.4.1
	b. What are the benefits of designing a flowchart for solving a problem?	2 ½	4	2	1	1.4.1

	c. What is the output of the following code?
	int main(){
	int x=10;
	int y=sizeof(x/2);
	printf(“%d”,y); }
		2 ½	3	4	1	1.4.1

	d. What is the difference between creating constant using #define macro and const keyword?	2 ½	3	3	1	1.4.1
	e. What is the role of function prototype? When is it required in C?	2 ½	2	3	1	1.4.1
	f. Which of the following are unary operators in C? State reason for your answer. a. ! b. sizeof c. ~ d. &&	2 ½	2	3	1	1.4.1

	g. Which of the following special symbol allowed in a variable name? State reason for your answer. a. * (asterisk) b. | (pipeline) c. - (hyphen) d. _ (underscore)	2 ½	2	3	1	1.4.1
	h. In which header file is the NULL macro defined? State reason for your answer. a. stdio.h b. stddef.h c. stdio.h and stddef.h d. math.h	2 ½	2	3	1	1.4.1

BL – Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3 – Applying, 4 – Analysing, 5 – Evaluating, 6 - Creating)

CO – Course Outcomes

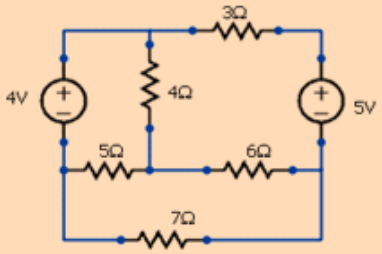
PO – Program Outcomes; PI Code – Performance Indicator Code

MODEL QUESTION PAPER

Total Duration (H:M): 3:00

Course : Basic Electrical Engineering (ESC101)

Maximum Marks :100

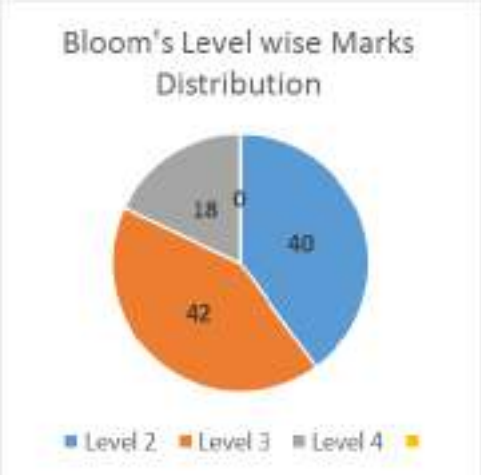
Q.No	Questions	Marks	CO	BL	PI
1(a)	Calculate current through 4 Ω resistor using Kirchoff's Laws? Verify the same using Superposition Theorem. 	12	CO1	L3	1.3.1
1(b)	Derive the expression for the transient current in a series 'R-L' circuit when a 'dc' voltage of V volts is applied. Sketch time variation of current in the circuit.	8	CO1	L2	1.3.1
2(a)	Two impedances Z1=15+j12Ω and Z2=8-j5 Ω are connected in parallel. If the potential difference across one of the impedance is 250 V, calculate i) total current and branch currents ii) total power and power consumed in each branch iii) overall p.f. IV) draw the phasor diagram	12	CO2	L3	1.3.1
2b	It is desired to operate a 100 W, 120 V, electric bulb at its rated current on a 240 V, 50 Hz supply. The simplest arrangement is to use either (a) a resistor, or (b) a capacitor or (c) an inductor having 10 Ω resistance in series with the electric bulb so as to drop the excess voltage. Determine the value of the component used, the total power consumed and the power factor in each case. Giving reasons, state which alternative is the best.	8	CO2	L4	1.3.1

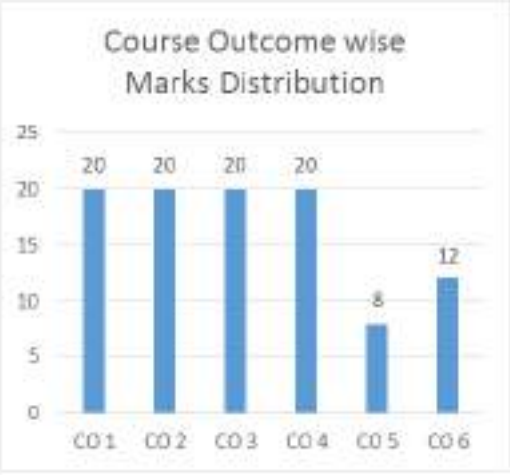
3a	A single phase 25 kVA 1000/2000 V, 50 Hz transformer has maximum efficiency of 98% at full load upf. Determine its efficiency at, (a) 3/4th full load, unity power factor (b) 3/4th full load 0.8 power factor	12	CO3	L3	1.3.1
3b	Explain the working of a practical transformer with relevant phasor diagram. and define voltage regulation.	8	CO3	L2	1.3.1
4a	A two pole 3 phase 50 Hz induction motor is running on load with a slip of 4%. Calculate the actual speed and the synchronous speed of the machine. Sketch the speed/ load characteristic of the machine.	8	CO4	L2	1.3.1
4b	A wireless battery powered drilling machine operates on 24 V DC with constant speed and negligible field current. Initially when the machine is powered it runs at 1200 rpm and draws 0.5 A from the battery. Further when the drill bit starts drilling the hole, the speed reduces to 1120 rpm. Determine power requirement from the battery for drilling if the resistance of the armature is 0.2Ω. What is the power drawn initially?	12	CO4	L4	1.3.1
5a	Explain the working principle of a single phase pulse width modulated voltage source inverter with relevant circuit diagram and draw the output voltage wave form.	8	CO5	L2	1.3.1
5b	To protect an expensive circuit component from being delivered too much power, you decide to incorporate a fast blowing fuse into the design. Knowing that the circuit component is connected to 12 V, its minimum power consumption is 12 watts and the maximum power it can safely dissipate is 100 watts, which of the three available fuse ratings should you select: 1A , 4A or 10 A? Give reasons.	6	CO6	L4	1.3.1
5c	Calculate the i) ampere-hour and ii) watt-hour efficiency of a secondary cell which is discharged at a uniform rate of 30 A for 6 hours at an average terminal voltage of 2 V. It is then charged at a uniform rate of 40 A for 5 hours to restore it to its original condition. The terminal voltage during charging is 2.5 V.	6	CO6	L3	1.3.1

BL – Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3 – Applying, 4 – Analysing, 5 – Evaluating, 6 - Creating)

CO – Course Outcomes

PO – Program Outcomes; PI Code – Performance Indicator Code





APPENDIX
Sample Scoring Rubrics

Appendix-D

RUBRICS FOR COMMUNICATION (WRITTEN & ORAL)

Component	Proficient	Acceptable	Needs Improvements
Written Communication	Report is well organized and clearly written. The underlying logic is clearly articulated and easy to follow. Words are chosen that precisely express the intended meaning and support reader comprehension. Diagrams or analyses enhance and clarify presentation of ideas. Sentences are grammatical and free from spelling errors.	Report is organized and clearly written for the most part. In some areas the logic or flow of ideas is difficult to follow. Words are well chosen with some minor exceptions. Diagrams are consistent with the text. Sentences are mostly grammatical and only a few spelling errors are present but they do not hinder the reader.	Report lacks an overall organization. Reader has to make considerable effort to understand the underlying logic and flow of ideas. Diagrams are absent or inconsistent with the text. Grammatical and spelling errors make it difficult for the reader to interpret the text in places.
Presentation Visual Aids	Slides are error-free and logically present the main components of the process and recommendations. Material is readable and the graphics highlight and support the main ideas.	Slides are error-free and logically present the main components of the process and recommendations. Material is mostly readable and graphics reiterate the main ideas.	Slides contain errors and lack a logical progression. Major aspects of the analysis or recommendations are absent. Diagrams or graphics are absent or confuse the audience.
Oral Presentation	Speakers are audible and fluent on their topic, and do not rely on notes to present or respond. Speakers respond accurately and appropriately to audience questions and comments.	Speakers are mostly audible and fluent on their topic, and require minimal referral to notes. Speakers respond to most questions accurately and appropriately.	Speakers are often inaudible or hesitant, often speaking in incomplete sentences. Speakers rely heavily on notes. Speakers have difficulty responding clearly and accurately to audience questions.
Body Language	Body language, as indicated by appropriate and meaningful gestures (e.g., drawing hands inward to convey contraction, moving arms up to convey lift, etc.) eye contact with audience, and movement, demonstrates a high level of comfort and connection with the audience.	Body language, as indicated by a slight tendency to repetitive and distracting gestures (e.g., tapping a pen, wringing hands, waving arms, clenching fists, etc.) and breaking eye contact with audience, demonstrates a slight discomfort with the audience.	Body language, as indicated by frequent, repetitive and distracting gestures, little or no audience eye-contact, and /or stiff posture and movement, indicate a high degree of discomfort interacting with audience.

RUBRICS FOR ASSESSMENT OF DESIGN PROJECTS

Category	Needs Improvements	Acceptable	Proficient
Purpose of the Project	Does not clearly explain the intended outcome of the project or provides little information about the problem that was being solved, the need being met, or why the project was selected	Provides a description of the intended outcome of the project which includes information about the problem that was being solved or the need being met, and why the project was selected	Provides a detailed intended outcome of the project which includes information about the problem that was being solved or the need being met, and clearly articulates the reasons and decision-making process used to select the project
Research	Lacks awareness of similar work done by others in an unacceptable literary form	Reflects awareness of similar work done by others and presents it in an acceptable literary format	•Reflects thorough understanding of similar work done by others and presents it in an acceptable literary format
Choices	Lacks justification of choices with little or no references to functional, aesthetic, social, economic, or environmental considerations	Justifies choices made with reference to functional, aesthetic, social, economic, or environmental considerations	Demonstrates sophisticated justification of choices with reference to functional, aesthetic, social, economic, or environmental consideration
Alternative Designs	Only one design presented or clearly infeasible alternative given. Serious deficiencies in exploring and identifying alternative designs.	Alternative approaches identified to some degree.	Final design achieved after review of reasonable alternatives.
Application of Engineering Principles	No or erroneous application of engineering principles yielding unreasonable solution. Serious deficiencies in proper selection and use of engineering principles.	Effective application of engineering principles resulting in reasonable solution.	Critical selection and application of engineering principles ensuring reasonable results.
Final Design	Not capable of achieving desired objectives.	Design meets desired objectives.	Design meets or exceeds desired objectives.
Interpretation of Results	No or erroneous conclusions based on achieved results. Serious deficiencies in support for stated conclusions.	Sound conclusions reached based on achieved results.	Insightful, supported conclusions and recommendations.

Rubrics can also be used effectively to design the continuous assessment of the student projects. The Performance Indicators referred to in the previous sections can be used measurement criteria in the rubric. In the following example, we can see that for different phases of the students projects, we can design the rubrics keeping in mind the deliverables of the project at that particular stage.

5 - SEMESTER MINI PROJECT

RUBRICS FOR REVIEW – I

PI Code	PI	Marks	Very Poor Up to 20%	Poor Up to 40%	Average Up to 60%	Good Up to 80%	Very good Up to 100%
2.1.1	Articulate problem statements and identify objectives - GA	02	Problem statement and objectives are not identified	Problem statement and objectives are not clear	Problem statement is clear and objectives are not in line with problem statement	Problem statement is clear and objectives are not completely defined.	Problem statement is clear and objectives are completely defined
2.1.2	Identify engineering systems, variables, and parameters to solve the problems - IA	02	Engineering systems are not identified. Variables, and parameters to solve the problems are not defined	Engineering systems are identified but not clear. Variables, and parameters to solve the problems are not defined	Engineering systems are clear. Variables, and parameters to solve the problems are not defined	Engineering systems are identified. Variables, and parameters to solve the problems are partially defined	Engineering systems are identified. Variables, and parameters to solve the problems are completely defined
2.2.3	Identify existing processes/ solution methods for solving the problem, including forming justified approximations and assumptions - GA	02	Not able to identify existing solution for solving the problem. The assumptions, approximations and justifications are also not identified.	Not able to identify existing solution for solving the problem. The assumptions, approximations and justifications are identified but not clear	Not able to identify existing solution for solving the problem. But assumptions and approximations are aligned to the objectives.	Able to identify existing solution for solving the problem. Assumptions, and approximations are clear	Able to identify existing solution for solving the problem. But assumptions, approximations and justifications are clear
2.2.4	Compare and contrast alternative solution processes to select the best process - GA	02	Not able to identify alternative solution processes	Not able to compare alternative solution processes	Able to compare alternative solution processes but could not contrast clearly	Able to compare alternative solution processes and contrast clearly but not able to select best process	Able to compare alternative solution processes, contrast it and also able to select best process
10.1.1	Read, understand and interpret technical and non-technical information - GA	02	Not able to identify technical and non-technical information	Able to identify non-technical information	Able to read technical and non-technical information, but could not understand and interpret	Able to read, understand technical and non-technical information, but could not interpret	Able to read, understand and interpret technical and non-technical information

GA – Group Assessment IA – Individual Assessment

RUBRICS FOR REVIEW – II

PI Code	PI	Marks	Very Poor Up to 20%	Poor Up to 40%	Average Up to 60%	Good Up to 80%	Very good Up to 100%
3.2.1	Apply formal idea generation tools to develop multiple engineering design solutions - GA	02	Not able to identify tools to develop solutions	Able to identify but not able to use it effectively	Able to use the tool but not able to generate engineering designs	Able to generate engineering designs but not able to justify	Able to generate engineering designs with justification
3.2.3	Identify suitable criteria for evaluation of alternate design solutions - GA	02	Not able to identify criteria	Able to identify criteria but not able to use them	Able to use criteria but not able to compare alternatives	Not able to justify the comparison with criteria	Able to justify the comparison with criteria
3.3.1	Apply formal decision-making tools to select optimal engineering design solutions for further development - GA	02	Not able to identify decision-making tools	Able to identify but not able to choose optimum one	Able to identify optimum one but not able to use it	Able to use optimum one but not able to justify	Able to use optimum one with justification
3.2.2	Build models/ prototypes to develop diverse set of design solutions - IA	02	Not able to identify tool to build model/ prototype	Able to choose the tool but not able to use it effectively	Able to use the tool but not able to generate alternatives	Able to generate alternatives but not able to justify the best solution	Able to generate and justify the best solution
13.1.1	Develop 2D drawings of components/ systems using modern CAD tools - IA	02	Not able to identify CAD tools	Able to identify but not able to use CAD tool	Able to use CAD tool but not able to generate drawings	Able to generate drawings but not able to follow drawing standards	Able to generate drawings with standards
13.1.2	Develop 3D models of components/systems using modern CAD tools - IA	03	Not able to identify CAD tools	Able to identify but not able to use CAD tool	Able to use CAD tool but not able to generate 3D models	Able to generate models but not able to follow standards	Able to generate models with standards
13.1.3	Apply GD&T principles as per ASME standards to manufacturing drawings, with all relevant data like material, hardness, surface finish, and tolerances - IA	02	Not able to extract GD&T principles from ASME standards	Able to extract but not able to understand them	Able to understand but not able to apply GD&T standards	Able to apply GD&T standards to drawings but not able to justify	Able to apply and justify GD&T standards to drawings

GA – Group Assessment IA – Individual Assessment

RUBRICS FOR REVIEW – III

PI Code	PI	Marks	Very Poor Up to 20%	Poor Up to 40%	Average Up to 60%	Good Up to 80%	Very good Up to 100%
3.4.2	Generate information through appropriate tests to improve or revise design - GA	02	Not able to identify suitable tests to be done	Able to identify but not able to follow testing procedure	Able to follow testing procedures but not able to collect information	Able to collect information but not able to apply it for improvement	Able to apply information for the improvement
4.3.1	Use appropriate procedures, tools and techniques to conduct experiments and collect data - GA	04	Not able to identify tools, techniques and procedures	Able to identify but not able to conduct experiments	Able to conduct experiments but not able to follow procedure	Able to follow procedure but not able to collect data	Able to collect data as per the standards
4.3.2	Analyze data for trends and correlations, stating possible errors and limitations - GA	03	Not able to understand data	Able to understand but not able to analyze data	Able to analyze data but not able to correlate them	Able to correlate but not able to identify errors and limitations	Able to identify errors and limitations
10.2.2	Deliver effective oral presentations to technical and non-technical audiences - IA	03	Could not deliver effective presentations.	Could not deliver presentation, but presentation was prepared and attempted.	Able to deliver fair presentation but not able to answer to the audiences	Deliver effective presentations but able to answer partially to the audience queries.	Deliver effective presentation and able to answer all queries of the audience.
9.3.1	Present results as a team, with smooth integration of contributions from all individual efforts – GA + IA	03	No Contribution from an individual to a team	Contributions from an individual to a team is minimal	Contributions from an individual to a team is moderate	A contribution from an individual to a team is good but not well groomed in team.	Contribution from an individual to a team is good and results in an integrated team presentation.

GA – Group Assessment IA – Individual Assessment

AICTE COMMITTEE ON EXAMINATION REFORMS

Members of the Committee

1. **Prof. Ashok S. Shettar, Chairman**
   Vice Chancellor, KLE Technological University, Hubballi, Karnataka
2. **Prof. Rama Krishna Challa,**
   Head, Dept. of Computer Science and Engineering, NITTTR, Chandigarh
3. **Prof. Sanjay Agrawal**
   Dept. of Computer Engineering and Applications, NITTR, Bhopal (M.P)
4. **Prof. Upendra Pandel**
   Dept. of Metallurgical & Material Engineering, MNIT, Jaipur

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
Nelson Mandela Marg, Vasant Kunj, New Delhi-110070

SREYAS
INSTITUTE OF ENGINEERING AND TECHNOLOGY
EXAMINATION BRANCH

9-39, Sy No.107, Tattiannaram (V), GSI, Bandlaguda, Nagole, Hyderabad-500 068.

Cr.No. SIET/Exam Branch/2022-23/62 **Date: 21-08-2023**

Circular

This is to inform all the B.Tech students that, **II-II B.Tech Regular/Supplementary and II Year I sem Supplementary Examinations - September 2023 Notification** is released, exams are to be held in the month of September/October 2023.

The process of Exam registration is ***"Get the exam registration form from the respective examination branch co-ordinators and pay the fee in the accounts section by producing the form."***

Examination fee details:

EXAMINATION FEE	Amount in Rs.
FOR WHOLE EXAMINATION (ALL SUBJECTS)	900/-
FOR ONE SUBJECT (THEORY/PRACTICAL)	400/-
FOR TWO SUBJECTS (THEORY/PRACTICAL/BOTH)	500/-
FOR THREE SUBJECTS (THEORY/PRACTICAL/BOTH)	600/-
FOR FOUR SUBJECTS & ABOVE (THEORY/PRACTICAL/BOTH)	800/-

The Deadlines issued by the University are as follows:

EXAM REGISTRATION	*START DATE*	*END DATE*
Without Late Fee	***21-08-2023***	***30-08-2023***
With Late Fee of Rs.100 /-	***31-08-2023***	***08-09-2023***
With Late Fee of Rs.1000 /-	***09-09-2023***	***14-09-2023***
With Late Fee of Rs.2000 /-	***15-09-2023***	***19-09-2023***
With Late Fee of Rs.5000 /-	***20-09-2023***	***23-09-2023***

Exam Branch I/c

PRINCIPAL
PRINCIPAL
SREYAS INSTITUTE OF ENGG & TECH
AUTONOMOUS
GSI, Bandlaguda, Nagole, Hyd-68.

Copy to: 1. A.O.
2. All HODs
3. Accounts Section
4. Dean IQAC
5. Associate Dean Academics
6. Notice Board

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

KUKATPALLY,HYDERABAD-500 085

PROCEEDINGS OF THE DIRECTOR OF UNIVERSITY EXAMINATIONS

Procs.No.JNTUH/EB/B.Tech/VV/2023, Dt:18.12.2023

Sub: JNTUH - Examinaton Branch-Appointment of External Examiner for conduct of B.Tech Project Viva-Voce Exam -Orders-Issued.

ORDER

The Principal,Sreyas Institute of Engg. & Technology, has sent the panel of external examiners for conducting mini-project viva-voce examination for B.Tech. IV - I(R18 Regulation) Regular/supply and (R16 Regulation) mini-project viva-voce supply students. They have requested the University to issue necessary orders for appointing the external examiners. The following is the list of examiners appointed to conduct the above mentioned project viva-voce examinations.

Name Of The Course	Approved External Examiner
B.Tech(CE) Panel_Id : VE_A_01_1_206	G VENKATA REDDY Professor Civil Engineering Vardhaman College of Engineering vkgaddam@yahoo.com 9490118339
B.Tech(ME) Panel_Id : VE_A_03_1_206	HAJI BANOTHU Assistant Professor Mechanical Engineering GURU NANAK INSTITUTIONS TECHNICAL CAMPUS haji.banothu@gmail.com 9010496795
B.Tech(ECE) (SECTION : 1) Panel_Id : VE_A_04_1_206	KRISHNA JANAPATI Associate Professor ECE Vardhaman College of Engineering j.krishnachaitanya@vardhaman.org 9885052980
B.Tech(ECE) (SECTION : 2) Panel_Id : VE_A_04_2_206	PENTAMSETTY KUMAR Professor ECE ACE Engineering College satishkumar_1968@rediffmail.com 9849628630
B.Tech(CSE) (SECTION : 1) Panel_Id : VE_A_05_1_206	DEEPTHI PUTNALA Assistant Professor CSE Bhoj Reddy Engineering College for women deepthi_123@yahoo.com 8897523600

B.Tech(CSE) (SECTION : 2) Panel_Id : VE_A_05_2_206	RAJESH BANALA Assistant Professor CSE T.K.R College of Engineering & Tech rajesh.banala@gmail.com 9652764108
B.Tech(CSE) (SECTION : 3) Panel_Id : VE_A_05_3_206	Dr. K. Shahu Chatrapati Professor CSE JNTUHCE JAGTIAL shahujntu@gmail.com 9866301501
B.Tech(CSE) (SECTION : 4) Panel_Id : VE_A_05_4_206	CHINAPAGA RAVI Associate Professor CSE T.K.R College of Engineering & Tech ravi.chinapaga@gmail.com 8886588891
B.Tech(CSE(AI&ML)) (SECTION : 1) Panel_Id : VE_A_66_1_206	Dr.K Ujwala Rekha Professor CSE JNTUHCE ujwala_rekha@yahoo.com 9849116040
B.Tech(CSE(AI&ML)) (SECTION : 2) Panel_Id : VE_A_66_2_206	RAYAPATI SUDHAKAR Associate Professor CSE St Martina Engineering College rayapati1113@gmail.com 9705006254
B.Tech(CSE(DS)) (SECTION : 1) Panel_Id : VE_A_67_1_206	SRINU BANOTHU Associate Professor CSE Vignan Inst. of Technology &Science srinub1307@gmail.com 8185924275
B.Tech(CSE(DS)) (SECTION : 2) Panel_Id : VE_A_67_2_206	KAMAKSHAIAH KOLLI Associate Professor CSE Geetanjali College of Engg & Tech kamakshaiah.k@gmail.com 8099903505

The Principal is requested to arrange for conduct of Project viva-voce examination before the due date mentioned in the notification and upload the project viva-voce awarded marks to the JNTUH University Examination Registrations Portal on the same day. Take the printout of system generated marks report and get it signed with internal & external examiners and submit the same to DUEX/JNTUH.

TO
THE PRINCIPAL
Sreyas Institute of Engg. & Technology

k. venkateswara Rao

DIRECTOR OF UNIVERSITY EXAMINATIONS

Sreyas Institute of Engineering and Technology

An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH

Accredited by NAAC-A Grade, NBA (CSE, ECE, ME) & ISO 9001:2015 Certified

EXAMINATIONS BRANCH

Cr. No. SIET(A)/Exam Branch/2022-23/40

Date: 02-08-2023

R22 B.Tech I Year I Semester - Supplementary - Aug / Sept - 2023

SEMESTER END EXAMINATIONS TIMETABLE

EXAM TIME: 10:00 AM to 01:00 PM

PROGRAM	DATE & DAY				
	11-09-2023 MONDAY	12-09-2023 TUESDAY	13-09-2023 WEDNESDAY	15-09-2023 FRIDAY	16-09-2023 SATURDAY
ELECTRONICS & COMMUNICATIONS ENGINEERING	Matrices and Calculus (A1008)	Applied Physics (A1001)	C Programming for Engineers (A1503)	English for Skill Enhancement (A1005)	–
COMPUTER SCIENCE & ENGINEERING	Matrices and Calculus (A1008)	Engineering Chemistry (A1003)	Programming for Problem Solving (A1505)	Basic Electrical Engineering (A1401)	Computer Aided Engineering Graphics (A1301) **10:00 AM To 01:00 PM**
CSE-ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	Matrices and Calculus (A1008)	Applied Physics (A1001)	Programming for Problem Solving (A1505)	English for Skill Enhancement (A1005)	
CSE-DATA SCIENCE	Matrices and Calculus (A1008)	Engineering Chemistry (A1003)	Programming for Problem Solving (A1505)	Basic Electrical Engineering (A1401)	Computer Aided Engineering Graphics (A1301) **10:00 AM To 01:00 PM**

Controller of Examinations
SREYAS INSTITUTE OF ENGG & TECH
AUTONOMOUS

CONTROLLER OF EXAMINATIONS

PRINCIPAL

Sreyas Institute of Engineering and Technology

An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH

Accredited by NAAC-A Grade, NBA (CSE, ECE, ME) & ISO 9001:2015 Certified

EXAMINATIONS BRANCH

Cr. No. SIET(A)/Exam Branch/2022-23/41 **Date: 02-08-2023**

R22 B.Tech I Year II Semester - August-2023

CIE-II TIME TABLE

TIME: 10:00 AM to 12:00 PM

PROGRAM	DATE & DAY				
	14-08-2023 MONDAY	16-08-2023 WEDNESDAY	17-08-2023 THURSDAY	18-08-2023 FRIDAY	19-08-2023 SATURDAY
ELECTRONICS & COMMUNICATIONS ENGINEERING	Ordinary Differential Equations and Vector Calculus (A1010)	Engineering Chemistry (A1003)	Basic Electrical Engineering (A1401)	Electronic Devices And Circuits (A1404)	Computer Aided Engineering Graphics (A1301) 09:30 AM to 11:30 AM
COMPUTER SCIENCE & ENGINEERING	Ordinary Differential Equations and Vector Calculus (A1010)	Applied Physics (A1001)	English for Skill Enhancement (A1005)	Data Structures (A1508)	–
CSE-ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	Ordinary Differential Equations and Vector Calculus (A1010)	Engineering Chemistry (A1003)	Basic Electrical Engineering (A1401)	Data Structures (A1508)	Computer Aided Engineering Graphics (A1301) 01:30 PM to 03:30 PM
CSE-DATA SCIENCE	Ordinary Differential Equations and Vector Calculus (A1010)	Applied Physics (A1001)	English for Skill Enhancement (A1005)	Data Structures (A1508)	

CONTROLLER OF EXAMINATIONS
Controller of Examinations
SREYAS INSTITUTE OF ENGG & TECH
AUTONOMOUS
Gsi Bandlaguda, Nagole Hyd-68

PRINCIPAL
PRINCIPAL
SREYAS INSTITUTE OF ENGG & TECH
AUTONOMOUS
Bandlaguda, Nagole, Hyd-68.

Sreyas Institute of Engineering and Technology

An Autonomous Institution
Approved by AICTE, Affiliated to JNTUH

Accredited by NAAC-A Grade, NBA (CSE, ECE, ME) & ISO 9001:2015 Certified

EXAMINATIONS BRANCH

Cr. No. SIET(A)/Exam Branch/2022-23/40 Date: 02-08-2023

R22 B.Tech I Year II Semester - Regular - Aug / Sept - 2023

SEMESTER END EXAMINATIONS TIMETABLE

EXAM TIME: 10:00 AM to 01.00 PM

PROGRAM	DATE & DAY				
	28-08-2023 MONDAY	31-08-2023 THURSDAY	02-09-2023 SATURDAY	05-09-2023 TUESDAY	08-09-2023 FRIDAY
ELECTRONICS & COMMUNICATIONS ENGINEERING	Ordinary Differential Equations and Vector Calculus (A1010)	Engineering Chemistry (A1003)	Basic Electrical Engineering (A1401)	Electronic Devices And Circuits (A1404)	Computer Aided Engineering Graphics (A1301) **10:00 AM To 01:00 PM**
COMPUTER SCIENCE & ENGINEERING	Ordinary Differential Equations and Vector Calculus (A1010)	Applied Physics (A1001)	English for Skill Enhancement (A1005)	Data Structures (A1508)	
CSE-ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	Ordinary Differential Equations and Vector Calculus (A1010)	Engineering Chemistry (A1003)	Basic Electrical Engineering (A1401)	Data Structures (A1508)	Computer Aided Engineering Graphics (A1301) **02:00 PM to 05:00 PM**
CSE-DATA SCIENCE	Ordinary Differential Equations and Vector Calculus (A1010)	Applied Physics (A1001)	English for Skill Enhancement (A1005)	Data Structures (A1508)	-

CONTROLLER OF EXAMINATIONS

Controller of Examinations
SREYAS INSTITUTE OF ENGG & TECH
AUTONOMOUS
GSI, Bandlaguda, Nagole, Hyd-68

PRINCIPAL

PRINCIPAL
SREYAS INSTITUTE OF ENGG & TECH
AUTONOMOUS
... Bandlaguda, Nagole, Hyd-68

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

KUKATPALLY - HYDERABAD – 500085

EXAMINATION BRANCH

II YEAR B.TECH I SEMESTER R18 REGULATION II -MID TERM EXAMINATIONS MAY-2023

TIMETABLE

TIME→ FN: 10.00 AM TO 11.20 AM AN: 02.00 PM TO 03.20 PM

BRANCH	DATE, SESSION AND DAY					
	01-05-2023 FN MONDAY	01-05-2023 AN MONDAY	02-05-2023 FN TUESDAY	02-05-2023 AN TUESDAY	03-05-2023 FN WEDNESDAY	03-05-2023 AN WEDNESDAY
CIVIL ENGINEERING (01-C E)	Surveying and Geomatics	Engineering Geology	Strength of Materials - I	Probability and Statistics	Fluid Mechanics	--
MECHANICAL ENGINEERING (03- ME)	Probability and Statistics & Complex	Mechanics of Solids	Material Science and Metallurgy	Production Technology	Thermodynamics	---
ELECTRONICS & COMMUNICATIONS ENGINEERING (04- ECE)	Probability Theory and Stochastic Processes	Network Analysis and Transmission Lines	Digital System Design	Signals and Systems	Electronic Devices and Circuits	--
COMPUTER SCIENCE & ENGINEERING (05- CSE)	Analog and Digital Electronics	Data Structures	Computer Oriented Statistical Methods	Object Oriented Programming using C -+	Computer Organization and Architecture	--
COMPUTER SCIENCE AND ENGINEERING (AIML)	Discrete Mathematics	Data Structures	Mathematical and Statistical Foundations	Python Programming	Computer Organization and Architecture	Business Economics & Financial Analysis
COMPUTER SCIENCE AND ENGINEERING (DS)	Discrete Mathematics	Data Structures	Mathematical and Statistical Foundations	Python Programming	Computer Organization and Architecture	Business Economics & Financial Analysis

DATE: 26-04-2023

Sreyas Institute of Engg. & Tech. EXAM BRANCH

PRINCIPAL
SREYAS INSTITUTE OF ENGG & TECH
AUTONOMOUS
GSI, Bandlaguda, Nagole, Hyd-68

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

KUKATPALLY - HYDERABAD – 500085

E X A M I N A T I O N B R A N C H

II YEAR B.TECH –I1 SEMESTER – R18 REGULATION - I MID TERM EXAMINATIONS JULY-2023

TIME→ FN: 9.40 AM TO 11.00 AM (DESCRIPTIVE EXAM: 9.40 AM TO 10.40 AM, OBJECTIVE EXAM: 10.40 AM TO 11.00 AM)
AN: 1.40 PM TO 03.00 PM (DESCRIPTIVE EXAM: 1.40 PM TO 2.40 PM, OBJECTIVE EXAM: 2.40 PM TO 03.00 PM)

BRANCH	DATE, SESSION AND DAY					
	10-07-2023 FN MONDAY	**10-07-2023 AN MONDAY**	**11-07-2023 FN TUESDAY**	**11-07-2023 AN TUESDAY**	**12-07-2023 FN WEDNESDAY**	**12-07-2023 AN WEDNESDAY**
CIVIL ENGINEERING (01-C E)	Basic Electrical and Electronics Engineering	Basic Mechanical Engineering for Civil Engineers	Strength of Materials - II	Structural Analysis - I	Hydraulics and Hydraulic Machinery	Building Materials, Construction and Planning
ELECTRICAL AND ELECTRONICS ENGINEERING (02- EEE)	Laplace Transforms, Numerical Methods & Complex variables	Electrical Machines – II	Control Systems	Power System - I	Digital Electronics	---
MECHANICAL ENGINEERING (03- ME)	Basic Electrical and Electronics Engineering	Kinematics of Machinery	Thermal Engineering - I	Fluid Mechanics and Hydraulic Machines	Instrumentation and Control Systems	---

DATE: **30-06-2023**

Sd/-
CONTROLLER OF EXAMINATIONS

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

KUKATPALLY - HYDERABAD – 500085

E X A M I N A T I O N B R A N C H

II YEAR B.TECH –I1 SEMESTER – R18 REGULATION - I MID TERM EXAMINATIONS JULY-2023

TIME→ FN: 9.40 AM TO 11.00 AM (DESCRIPTIVE EXAM: 9.40 AM TO 10.40 AM, OBJECTIVE EXAM: 10.40 AM TO 11.00 AM)
AN: 1.40 PM TO 03.00 PM (DESCRIPTIVE EXAM: 1.40 PM TO 2.40 PM, OBJECTIVE EXAM: 2.40 PM TO 03.00 PM)

BRANCH	DATE, SESSION AND DAY					
	10-07-2023 FN MONDAY	**10-07-2023 AN MONDAY**	**11-07-2023 FN TUESDAY**	**11-07-2023 AN TUESDAY**	**12-07-2023 FN WEDNESDAY**	**12-07-2023 AN WEDNESDAY**
ELECTRONICS & COMMUNICATIONS ENGINEERING (04- ECE)	Laplace Transforms, Numerical Methods & Complex Variables	Electromagnetic Fields and Waves	Analog and Digital Communications	Linear IC Applications	Electronic Circuit Analysis	---
COMPUTER SCIENCE & ENGINEERING (05- CSE)	Discrete Mathematics	Business Economics & Financial Analysis	Operating Systems	Database Management Systems	Java Programming	---
ELECTRONICS AND INSTRUMSNTTATIO N ENGINEERING (10-EIE)	Laplace Transforms, Numerical Methods & Complex Variables	Industrial Instrumentation	Digital System Design	Linear IC Applications	Electronic Circuit Analysis	----

DATE: 30-06-2023

Sd/-
CONTROLLER OF EXAMINATIONS

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

KUKATPALLY - HYDERABAD – 500085

E X A M I N A T I O N B R A N C H

II YEAR B.TECH –I1 SEMESTER – R18 REGULATION - I MID TERM EXAMINATIONS JULY-2023

TI M E T A B L E

TIME→ FN: 9.40 AM TO 11.00 AM (DESCRIPTIVE EXAM: 9.40 AM TO 10.40 AM, OBJECTIVE EXAM: 10.40 AM TO 11.00 AM)
AN: 1.40 PM TO 03.00 PM (DESCRIPTIVE EXAM: 1.40 PM TO 2.40 PM, OBJECTIVE EXAM: 2.40 PM TO 03.00 PM)

BRANCH	DATE,					
	10-07-2023 FN MONDAY	10-07-2023 AN MONDAY	11-07-2023 FN TUESDAY	11-07-2023 AN TUESDAY	12-07-2023 FN WEDNESDAY	12-07-2023 AN WEDNESDAY
INFORMATION TECHNOLOGY (12-IT)	Discrete Mathematics	Business Economics & Financial Analysis	Operating Systems	Database Management Systems	Java Programming	---
MECHANICAL ENGINEERING (MECHATRONICS) (14- MECT)	Electrical Engineering	Kinematics of Machinery	Fluid Mechanics and Heat Transfer	Switching Theory and Logic Design	Machine Drawing and Computer Aided Graphics	---
METALLURGY AND MATERIAL ENGINEERING (18- MME)	Basic Electrical and Electronics Engineering	Principles of Extractive Metallurgy	Mechanical Metallurgy	Phase Transformations	Iron and Steel Making	---

Sd/-

DATE: 30-06-2023

CONTROLLER OF EXAMINATIONS

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

KUKATPALLY - HYDERABAD – 500085

E X A M I N A T I O N B R A N C H

II YEAR B.TECH –I1 SEMESTER – R18 REGULATION - I MID TERM EXAMINATIONS JULY-2023

T I M E T A B L E

TIME→ FN: 9.40 AM TO 11.00 AM (DESCRIPTIVE EXAM: 9.40 AM TO 10.40 AM, OBJECTIVE EXAM: 10.40 AM TO 11.00 AM)
AN: 1.40 PM TO 03.00 PM (DESCRIPTIVE EXAM: 1.40 PM TO 2.40 PM, OBJECTIVE EXAM: 2.40 PM TO 03.00 PM)

BRANCH	DATE, SESSION AND DAY					
	10-07-2023 FN MONDAY	10-07-2023 AN MONDAY	11-07-2023 FN TUESDAY	11-07-2023 AN TUESDAY	12-07-2023 FN WEDNESDAY	12-07-2023 AN WEDNESDAY
ELECTRONICS AND COMPUTER ENGINEERING ECM-(19)	Probability Theory and Stochastic Process	Computer Organization and Operating Systems	Analog and Digital Communications	Database Management Systems	Electronic Circuit Analysis	---
AERONUTICAL ENGINEERING (21- AE)	Probability Distributions and Numerical Methods	Low Speed Aerodynamics	Aircraft Materials and Production	Analysis of Aircraft Structures	Aero-Thermodynamics	--
MINING ENGG. (25-MNE)	Basic Electrical and Electronics Engineering	Mining Geology	Mine Mechanization - I	Drilling and Blasting	Mine Environmental Engineering - I	---
PETROLIUM ENGG. (27- PTME)	Elements of Mechanical Engineering	Chemical Engineering Fluid Mechanics	Petroleum Geology	Petroleum Exploration Methods	Process Heat Transfer	---
COMPUTER SCIENCE AND BUSINESS SYSTEMS (32-CSBS)	Strategic Management	Software Engineering	Operating Systems	Database Management Systems	Object Oriented Programming using Java	---

DATE: 30-06-2023

Sd/-
CONTROLLER OF EXAMINATIONS

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

KUKATPALLY - HYDERABAD – 500085

E X A M I N A T I O N B R A N C H

II YEAR B.TECH –I1 SEMESTER – R18 REGULATION - I MID TERM EXAMINATIONS JULY-2023

TI M E T A B L E

TIME→ FN: 9.40 AM TO 11.00 AM (DESCRIPTIVE EXAM: 9.40 AM TO 10.40 AM, OBJECTIVE EXAM: 10.40 AM TO 11.00 AM)
AN: 1.40 PM TO 03.00 PM (DESCRIPTIVE EXAM: 1.40 PM TO 2.40 PM, OBJECTIVE EXAM: 2.40 PM TO 03.00 PM)

BRANCH	DATE, SESSION AND DAY					
	10-07-2023 FN MONDAY	**10-07-2023 AN MONDAY**	**11-07-2023 FN TUESDAY**	**11-07-2023 AN TUESDAY**	**12-07-2023 FN WEDNESDAY**	**12-07-2023 AN WEDNESDAY**
COMPUTER SCIENCE INFORMATION TECHNOLOGY CSIT(33)	Automata Theory & Compiler Design	Software Engineering	Operating Systems	Database Management Systems	Object Oriented Programming using Java	--
INFORMATION TECHNOLOGY AND ENGINEERING (34- ITE)	Discrete Mathematics	Business Economics & Financial Analysis	Operating Systems	Database Management	Object Oriented Programming using J	---
COMPUTER ENGINEERING (SOFTWARE ENGINEERING) (56-CE(SE)	Discrete Mathematics	Business Economics & Financial Analysis	Operating Systems	Principles of Software Engineering	Object Oriented Programming using Java	--
COMPUTER SCIENCE AND ENGINEERING) (CYBER SECURITY) (62-CSE(CS)	Discrete Mathematics	Business Economics & Financial Analysis	Operating Systems	Computer Networks	Object Oriented Programming using Java	--

Sd/-

DATE: 30-06-2023

CONTROLLER OF EXAMINATIONS

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

KUKATPALLY - HYDERABAD – 500085

E X A M I N A T I O N B R A N C H

II YEAR B.TECH –I1 SEMESTER – R18 REGULATION - I MID TERM EXAMINATIONS JULY-2023

TIME→ FN: 9.40 AM TO 11.00 AM (DESCRIPTIVE EXAM: 9.40 AM TO 10.40 AM, OBJECTIVE EXAM: 10.40 AM TO 11.00 AM)
AN: 1.40 PM TO 03.00 PM (DESCRIPTIVE EXAM: 1.40 PM TO 2.40 PM, OBJECTIVE EXAM: 2.40 PM TO 03.00 PM)

BRANCH	DATE, SESSION DAY					
	10-07-2023 FN MONDAY	10-07-2023 AN MONDAY	11-07-2023 FN TUESDAY	11-07-2023 AN TUESDAY	12-07-2023 FN WEDNESDAY	12-07-2023 AN WEDNESDAY
COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING) (66-CSE(AI&ML)	Formal Language and Automata Theory	Software Engineering	Operating Systems	Database Management Systems	Object Oriented Programming using Java	--
COMPUTER SCIENCE AND ENGINEERING (DATASCIENCE) (67-CSE(DS)	Formal Language and Automata Theory	Software Engineering	Operating Systems	Database Management Systems	Object Oriented Programming using Java	---
COMPUTER SCIENCE AND ENGINEERING (IOT) (69-CSE(IOT)	Computer Organization and Architecture	Business Economics & Financial Analysis	Operating Systems	Sensors and Devices	Object Oriented Programming using Java	---
COMPUTER SCIENCE AND ENGINEERING (NETWORKS) (70-CSE(NETWORKS)	Discrete Mathematics	Business Economics & Financial Analysis	Operating Systems	Computer Networks	Object Oriented Programming using Java	---

DATE: 30-06-2023

Sd/-
CONTROLLER OF EXAMINATIONS

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

KUKATPALLY - HYDERABAD – 500085

E X A M I N A T I O N B R A N C H

II YEAR B.TECH –I1 SEMESTER – R18 REGULATION - I MID TERM EXAMINATIONS JULY-2023

TIME→ FN: 9.40 AM TO 11.00 AM (DESCRIPTIVE EXAM: 9.40 AM TO 10.40 AM, OBJECTIVE EXAM: 10.40 AM TO 11.00 AM)
AN: 1.40 PM TO 03.00 PM (DESCRIPTIVE EXAM: 1.40 PM TO 2.40 PM, OBJECTIVE EXAM: 2.40 PM TO 03.00 PM)

BRANCH	DATE, SESSION DAY					
	10-07-2023 FN MONDAY	10-07-2023 AN MONDAY	11-07-2023 FN TUESDAY	11-07-2023 AN TUESDAY	12-07-2023 FN WEDNESDAY	12-07-2023 AN WEDNESDAY
TEXTILE ENGINEERING (71-TTE)	Basic Electrical and Electronics Engineering	Yarn Manufacture - II	Technology of Knits & Nonwoven	Textile Testing - II	Man Made Fibre Technology	---
ARTIFICIAL INTELLIGENCE AND DATA SCINCE (72- AIDS)	Mathematical and Statistical Foundations	Automata Theory and Compiler Design	Introduction to Artificial Intelligence	Database Management Systems	Object Oriented Programming using Java	
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (73-AI&ML)	Formal Languages and Automata Theory	Software Engineering	Operating Systems	Database Management Systems	Object Oriented Programming using Java	---
COMPUTER SCIENCE AND DESIGN (74-CSD)	Mathematical and Statistical Foundations	Design Thinking	Operating Systems	Database Management Systems	Object Oriented Programming through Java	

DATE: 30-06-2023

Sd/-
CONTROLLER OF EXAMINATIONS

Note: (I) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMMEDIATELY.
(II) EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL
(III) THE PATTERN OF THE DESCRIPTIVE AND OBJECTIVE TYPE PAPERS SHALL BE IN REGULAR PATTERN AS GIVEN IN R18 REGULATION

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

KUKATPALLY - HYDERABAD – 500085

E X A M I N A T I O N B R A N C H

II YEAR B.TECH –I1 SEMESTER – R18 REGULATION - II MID TERM EXAMINATIONS SEPTEMBER-2023

TIME→ FN: 10.00 AM TO 11.20 AM (DESCRIPTIVE EXAM: 10.00 AM TO 11.00 AM, OBJECTIVE EXAM: 11.00 AM TO 11.20 AM)
AN: 02.00 PM TO 03.20 PM (DESCRIPTIVE EXAM: 02.00 PM TO 03.00 PM, OBJECTIVE EXAM: 03.00 PM TO 03.20 PM)

BRANCH	DATE, SESSION AND DAY					
	12-09-2023 FN TUESDAY	12-09-2023 AN TUESDAY	13-09-2023 FN WEDNESDAY	13-09-2023 AN WEDNESDAY	14-09-2023 FN THURSDAY	14-09-2023 AN THURSDAY
CIVIL ENGINEERING (01-C E)	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	BASIC MECHANICAL ENGINEERING FOR CIVIL ENGINEERS	STRENGTH OF MATERIALS - II	STRUCTURAL ANALYSIS - I	HYDRAULICS AND HYDRAULIC MACHINERY	BUILDING MATERIALS, CONSTRUCTION AND PLANNING
MECHANICAL ENGINEERING (03- ME)	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	KINEMATICS OF MACHINERY	THERMAL ENGINEERING - I	FLUID MECHANICS AND HYDRAULIC MACHINES	INSTRUMENTATION AND CONTROL SYSTEMS	---
ELECTRONICS & COMMUNICATIONS ENGINEERING (04- ECE)	LAPLACE TRANSFORMS, NUMERICAL METHODS & COMPLEX VARIABLES	ELECTROMAGNETIC FIELDS AND WAVES	ANALOG AND DIGITAL COMMUNICATIONS	LINEAR IC APPLICATIONS	ELECTRONIC CIRCUIT ANALYSIS	---
COMPUTER SCIENCE & ENGINEERING (05- CSE)	DISCRETE MATHEMATICS	BUSINESS ECONOMICS & FINANCIAL ANALYSIS	OPERATING SYSTEMS	DATABASE MANAGEMENT SYSTEMS	JAVA PROGRAMMING	---
COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING) (66-CSE(AI&ML)	FORMAL LANGUAGE AND AUTOMATA THEORY	SOFTWARE ENGINEERING	OPERATING SYSTEMS	DATABASE MANAGEMENT SYSTEMS	OBJECT ORIENTED PROGRAMMING USING JAVA	--
COMPUTER SCIENCE AND ENGINEERING (DATASCIENCE) (67-CSE(DS)	FORMAL LANGUAGE AND AUTOMATA THEORY	SOFTWARE ENGINEERING	OPERATING SYSTEMS	DATABASE MANAGEMENT SYSTEMS	OBJECT ORIENTED PROGRAMMING USING JAVA	---

Sd/-

DATE: **06-09-2023**

CONTROLLER OF EXAMINATIONS

Note: (I) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMMEDIATELY.

(II) EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL

(III) THE PATTERN OF THE DESCRIPTIVE AND OBJECTIVE TYPE PAPERS SHALL BE IN REGULAR PATTERN AS GIVEN IN R18 REGULATION

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

KUKATPALLY - HYDERABAD - 500085

EXAMINATION BRANCH

II YEAR B.TECH – II SEMESTER – R18 REGULATION - II MID TERM EXAMINATIONS SEPTEMBER-2023 (REVISED)

TIME: FN: 10.00 AM TO 11.30 AM (DESCRIPTIVE EXAM: 10.00 AM TO 11.00 AM OBJECTIVE EXAM: 11.00 AM TO 11.20 AM)
AN: 02.00 PM TO 03.30 PM (DESCRIPTIVE EXAM: 02.00 PM TO 02.00 PM OBJECTIVE EXAM: 03.00 PM TO 03.20 PM)

BRANCH	DATE, SESSION AND DAY									
	12-09-2023 FN TUESDAY	12-09-2023 AN TUESDAY	13-09-2023 FN WEDNESDAY	13-09-2023 AN WEDNESDAY	14-09-2023 FN THURSDAY	14-09-2023 AN THURSDAY	15-09-2023 FN FRIDAY	15-09-2023 AN FRIDAY	16-09-2023 FN SATURDAY	16-09-2023 AN SATURDAY
CIVIL ENGINEERING (01-CE)	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	BASIC MECHANICAL ENGINEERING FOR CIVIL ENGINEERS	--	--	--	--	STRENGTH OF MATERIALS - II	STRUCTURAL ANALYSIS - I	HYDRAULICS AND HYDRAULIC MACHINERY	BUILDING MATERIALS, CONSTRUCTION AND PLANNING
MECHANICAL ENGINEERING (03-ME)	--	KINEMATICS OF MACHINERY	--	--	--	--	THERMAL ENGINEERING - I	FLUID MECHANICS AND HYDRAULIC MACHINES	INSTRUMENTATION AND CONTROL SYSTEMS	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
ELECTRONICS & COMMUNICATION ENGINEERING (04-ECE)	--	ELECTRO MAGNETIC FIELDS AND WAVES	--	--	--	--	ANALOG AND DIGITAL COMMUNICATIONS	LINEAR IC APPLICATIONS	ELECTRONIC CIRCUIT ANALYSIS	LAPLACE TRANSFORMS, NUMERICAL METHODS & COMPLEX VARIABLES
COMPUTER SCIENCE & ENGINEERING (05-CSE)	--	--	DISCRETE MATHEMATICS	BUSINESS ECONOMICS & FINANCIAL ANALYSIS	--	--	OPERATING SYSTEMS	DATABASE MANAGEMENT SYSTEMS	JAVA PROGRAMMING	--
COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING) (46-CSM)	FORMAL LANGUAGE AND AUTOMATA THEORY	SOFTWARE ENGINEERING	--	--	--	--	OPERATING SYSTEMS	DATABASE MANAGEMENT SYSTEMS	OBJECT ORIENTED PROGRAMMING USING JAVA	--
COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE) (67-CSD)	--	--	FORMAL LANGUAGE AND AUTOMATA THEORY	SOFTWARE ENGINEERING	--	--	OPERATING SYSTEMS	DATABASE MANAGEMENT SYSTEMS	OBJECT ORIENTED PROGRAMMING USING JAVA	--

DATE: 06-09-2023

SD/-
CONTROLLER OF EXAMINATIONS

Note (I) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMMEDIATELY.
(II) IF ANY FESTIVAL/PUBLIC HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL.
(III) THE PATTERN OF THE DESCRIPTIVE AND OBJECTIVE TYPE PAPERS SHALL BE AS PER REGULATION AS GIVEN IN R18 REGULATION

Examination Branch
Sreyas Institute of Engg & Tech • Autonomous •

PRINCIPAL
SREYAS INSTITUTE OF ENGG & TECH
AUTONOMOUS

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

KUKATPALLY - HYDERABAD – 500085

EXAMINATION BRANCH

III YEAR B.TECH II SEMESTER R18 REGULATION I -MID TERM EXAMINATIONS MAY-2023

TIMETABLE

TIME→ FN: 10.00 AM TO 11.20 AM AN: 02.00 PM TO 03.20 PM

BRANCH	DATE, SESSION AND DAY					
	08-05-2023 FN MONDAY	08-05-2023 AN MONDAY	09-05-2023 FN TUESDAY	09-05-2023 AN TUESDAY	10-05-2023 FN WEDNESDAY	10-05-2023 AN WEDNESDAY
CIVIL ENGINEERING (01-CE)	HYDROLOGY & WATER RESOURCES ENGINEERING	ENVIRONMENTAL ENGINEERING	FOUNDATION ENGINEERING	PRESTRESSED CONCRETE	STRUCTURAL ENGINEERING II(STEEL)	FUNDAMENTALS OF MANAGEMENT FOR ENGINEERS
MECHANICAL ENGINEERING (03- ME)	DESIGN OF MACHINE MEMBERS-II	CAD & CAM	HEAT TRANSFER	UNCONVENTIONAL MACHINING PROCESSES	FINITE ELEMENT METHODS	NON CONVENTIONAL ENERGY SOURCES
ELECTRONICS & COMMUNICATIONS ENGINEERING (04- ECE)	ANTENNAS AND PROPAGATION	DIGITAL SIGNAL PROCESSING	EMBEDDED SYSTEM DESIGN	–	VLSI DESIGN	CYBER LAW & ETHICS
COMPUTER SCIENCE & ENGINEERING (05- CSE)	MACHINE LEARNING	COMPILER DESIGN	DESIGN AND ANALYSIS OF ALGORITHMS	SCRIPTING LANGUAGES	--	DISASTER PREPAREDNESS & PLANNING MANAGEMENT
COMPUTER SCIENCE AND ENGINEERING (AIML)	ARTIFICIAL INTELLIGENCE	NATURAL LANGUAGE PROCESSING	DEVOPS	SCRIPTING LANGUAGES	--	DISASTER PREPAREDNESS & PLANNING MANAGEMENT
COMPUTER SCIENCE AND ENGINEERING (DS)	MACHINE LEARNING	COMPILER DESIGN	BIG DATA ANALYTICS	SCRIPTING LANGUAGES	--	DISASTER PREPAREDNESS & PLANNING MANAGEMENT

DATE: 01-05-2023

PRINCIPAL
VASI INSTITUTE OF ENGG & TECH
AUTONOMOUS

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

KUKATPALLY - HYDERABAD 500085

EXAMINATION BRANCH

III YEAR B.TECH II SEMESTER R18 REGULATION II -MID TERM EXAMINATIONS JUNE-2023

TIMETABLE

TIME→ FN: 10.00 AM TO 11.20 AM AN: 02.00 PM TO 03.20 PM

BRANCH	DATE, SESSION AND DAY					
	26-06-2023 FN MONDAY	26-06-2023 AN MONDAY	27-06-2023 FN TUESDAY	27-06-2023 AN TUESDAY	28-06-2023 FN WEDNESDAY	28-06-2023 AN WEDNESDAY
CIVIL ENGINEERING (01-CE)	HYDROLOGY & WATER RESOURCES ENGINEERING	ENVIRONMENTAL ENGINEERING	FOUNDATION ENGINEERING	PRESTRESSED CONCRETE	STRUCTURAL ENGINEERING II(STEEL)	FUNDAMENTALS OF MANAGEMENT FOR ENGINEERS
MECHANICAL ENGINEERING (03- ME)	DESIGN OF MACHINE MEMBERS-II	CAD & CAM	HEAT TRANSFER	UNCONVENTIONAL MACHINING PROCESSES	FINITE ELEMENT METHODS	NON CONVENTIONAL ENERGY SOURCES
ELECTRONICS & COMMUNICATIONS ENGINEERING (04- ECE)	ANTENNAS AND PROPAGATION	DIGITAL SIGNAL PROCESSING	EMBEDDED SYSTEM DESIGN	–	VLSI DESIGN	CYBER LAW & ETHICS
COMPUTER SCIENCE & ENGINEERING (05-CSE)	MACHINE LEARNING	COMPILER DESIGN	DESIGN AND ANALYSIS OF ALGORITHMS	SCRIPTING LANGUAGES	–	DISASTER PREPAREDNESS & PLANNING MANAGEMENT
COMPUTER SCIENCE AND ENGINEERING (AIML)	ARTIFICIAL INTELLIGENCE	NATURAL LANGUAGE PROCESSING	DEVOPS	SCRIPTING LANGUAGES	--	DISASTER PREPAREDNESS & PLANNING MANAGEMENT
COMPUTER SCIENCE AND ENGINEERING (DS)	MACHINE LEARNING	COMPILER DESIGN	BIG DATA ANALYTICS	SCRIPTING LANGUAGES	--	DISASTER PREPAREDNESS & PLANNING MANAGEMENT

Date: 20-06-2023

Sd/-

CONTROLLER OF EXAMINATIONS

Note:

I. ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMMEDIATELY

II. EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL. READMITTED STUDENTS HAVE TO APPEAR FOR THE SUBSTITUTE SUBJECTS (WHICH IS/ARE NOT SHOWN IN THE TIME-TABLE) IN PLACE OF THE SUBJECTS ALREADY PASSED. FOR DETAILS OF SUBSTITUTE SUBJECTS REFER THE COMMUNICATIONS RECEIVED FROM THE DIRECTOR OF ACADEMIC & PLANNING

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

KUKATPALLY - HYDERABAD – 500085

EXAMINATION BRANCH

IV YEAR B.TECH II SEMESTER R18 REGULATION I-MID TERM EXAMINATIONS MAY-2023

TIMETABLE

TIME→ FN: 10.00 AM TO 11.20 AM AN: 02.00 PM TO 03.20 PM

BRANCH	DATE, SESSION AND DAY		
	08-05-2023 FN MONDAY	08-05-2023 AN MONDAY	09-05-2023 FN TUESDAY
CIVIL ENGINEERING (01-C E)	SOLID WASTE MANAGEMENT	AIRPORTS, RAILWAYS AND WATERWAYS	NON-CONVENTIONAL SOURCES OF ENERGY
MECHANICAL ENGINEERING (03- ME)	INDUSTRIAL ROBOTICS	INDUSTRIAL MANAGEMENT	BASICS OF POWER PLANT ENGINEERING
ELECTRONICS & COMMUNICATIONS ENGINEERING (04- ECE)	SATELLITE COMMUNICATIONS	SYSTEM ON CHIP ARCHITECTURE	ENVIRONMENTAL IMPACT ASSESSMENT
COMPUTER SCIENCE & ENGINEERING (05- CSE)	ORGANIZATIONAL BEHAVIOUR	HUMAN COMPUTER INTERACTION	ENVIRONMENTAL IMPACT ASSESSMENT

DATE: 01-05-2023

PRINCIPAL

PRINCIPAL
YAS INSTITUTE OF ENGG & TECH
AUTONOMOUS
Yenkapally, Moinabad, Hyd-60

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

KUKATPALLY - HYDERABAD – 500085

EXAMINATION BRANCH

IV YEAR B.TECH II SEMESTER R18 REGULATION II -MID TERM EXAMINATIONS JUNE-2023

TIMETABLE

TIME→ FN: 10.00 AM TO 11.20 AM AN: 02.00 PM TO 03.20 PM

BRANCH	DATE, SESSION AND DAY		
	19-06-2023 FN MONDAY	19-06-2023 AN MONDAY	21-06-2023 FN TUESDAY
CIVIL ENGINEERING (01-C E)	SOLID WASTE MANAGEMENT	AIRPORTS, RAILWAYS AND WATERWAYS	NON-CONVENTIONAL SOURCES OF ENERGY
MECHANICAL ENGINEERING (03- ME)	INDUSTRIAL ROBOTICS	INDUSTRIAL MANAGEMENT	BASICS OF POWER PLANT ENGINEERING
ELECTRONICS & COMMUNICATIONS ENGINEERING (04- ECE)	SATELLITE COMMUNICATIONS	SYSTEM ON CHIP ARCHITECTURE	ENVIRONMENTAL IMPACT ASSESSMENT
COMPUTER SCIENCE & ENGINEERING (05- CSE)	ORGANIZATIONAL BEHAVIOUR	HUMAN COMPUTER INTERACTION	ENVIRONMENTAL IMPACT ASSESSMENT

Sri Vasavi Institute of Engg & Tech * Autonomous * Examination Branch

Date: 12-06-2023

Sd/-
CONTROLLER OF EXAMINATIONS

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

KUKATPALLY - HYDERABAD – 5000 85

EXAMINATION BRANCH

IV YEAR B.TECH – II SEMESTER– R18 REGULATION ADVANCED SUPPLEMENTARY EXAMINATIONS AUGUST/SEPTEMBER-2023

TIMETABLE

TIME: →FN 10.00 AM TO 1:00 PM

DATE &DAY			
BRANCH	**24-08-2023 THURSDAY**	**26-08-2023 SATURDAY**	**28-08-2023 MONDAY**
CIVIL ENGINEERING (01-CE)	SOLID WASTE MANAGEMENT	AIRPORTS, RAILWAYS AND WATERWAYS	NON-CONVENTIONAL SOURCES OF ENERGY
MECHANICAL ENGINEERING (03-ME)	INDUSTRIAL ROBOTICS	INDUSTRIAL MANAGEMENT	BASICS OF POWER PLANT ENGINEERING
ELECTRONICS AND COMMUNICATION ENGINEERING (04-ECE)	SATELLITE COMMUNICATIONS	SYSTEM ON CHIP ARCHITECTURE	ENVIRONMENTAL IMPACT ASSESSMENT
COMPUTER SCIENCE AND ENGINEERING (05-CSE)	ORGANIZATIONAL BEHAVIOUR	HUMAN COMPUTER INTERACTION	ENVIRONMENTAL IMPACT ASSESSMENT

DATE:14-08-2023

Sd/-

CONTROLLER OF EXAMINATIONS

Note: (i) ANY OMISSIONS OR CLASHES IN THIS TIME TABLE MAY PLEASE BE INFORMED TO THE CONTROLLER OF EXAMINATIONS IMMEDIATELY.

(ii) EVEN IF GOVERNMENT DECLARES HOLIDAY ON ANY OF THE ABOVE DATES, THE EXAMINATIONS SHALL BE CONDUCTED AS USUAL

(iii) READMITTED STUDENTS HAVE TO APPEAR FOR THE SUBSTITUTE SUBJECT(S) [WHICH IS/ARE NOT SHOWN IN THE TIME-TABLE] IN PLACE OF THE SUBJECT(S) ALREADY PASSED. FOR DETAILS OF SUBSTITUTE SUBJECTS REFER THE COMMUNICATIONS RECEIVED FROM THE DIRECTOR OF ACADEMIC & PLANNING.

BOOKLET NUMBER : 1057

College Code : VE

SREYAS

INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

Nagole, Hyderabad - 500 068.

CONTINUOUS INTERNAL EVALUATION (CIE) - ANSWER BOOKLET

Course : B.Tech

Branch : ECE, Section A,

Year : I, Semester : II, CIE (I / II) : I, Month & Year : June, 2023

Hall Ticket No : 22VE1A0451

Signature of the Student with date

Name of the Student : S. SRI SSANYI

Name of the Subject : ELECTRONIC DEVICES & CIRCUITS.

Date of the Exam : 15/06/23.

Signature of the Invigilator with date

MARKS AWARDED FOR QUESTIONS

Question No.	1		2		3		4		5		6		Total
	a	b	a	b	a	b	a	b	a	b	a	b	
Marks Awarded	2½	2½	2½	2½			2½	2½	2½	2½			20
Sub Total	5		5				5		5				

Marks	Subjective	Objective	Assignment	Total
Maximum	20	10	05	35
Awarded	20	9	05	34

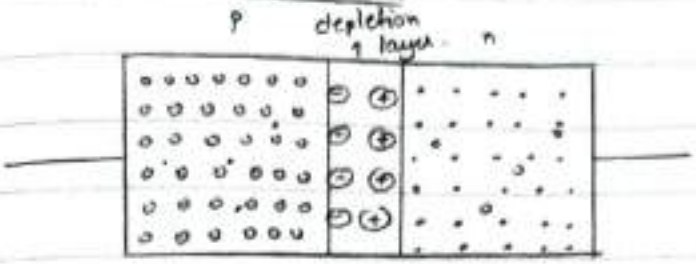
Signature of the Evaluator with date

INSTRUCTIONS TO THE CANDIDATES :

1. Students must be present in the examination hall 15 minutes before the commencement of the examination.
2. Write H.T. No. Name etc., correct & legible and must be signed on the main answer book and attendance sheet.
3. Student must adhere to all instructions given by an Invigilator prior to, during and immediately after an examination.
4. Students are required to ensure submission of answer scripts at the end of the examination, failure to submission of

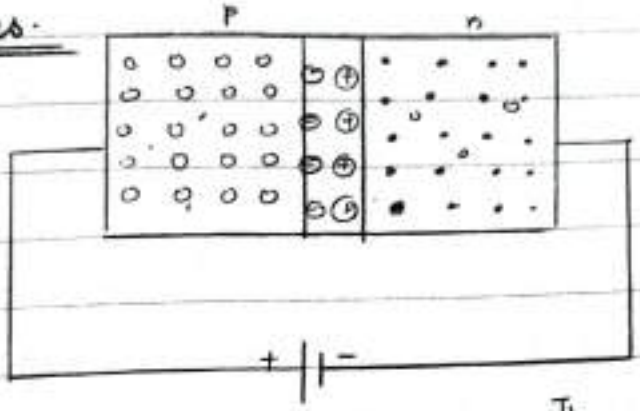
PART-B.

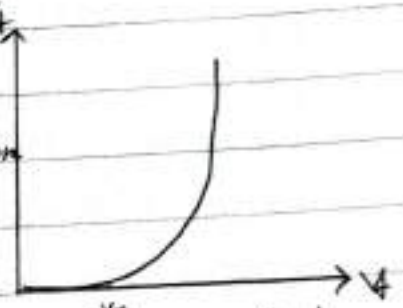
(10)



p-n junction Diode

1. Forward Bias.

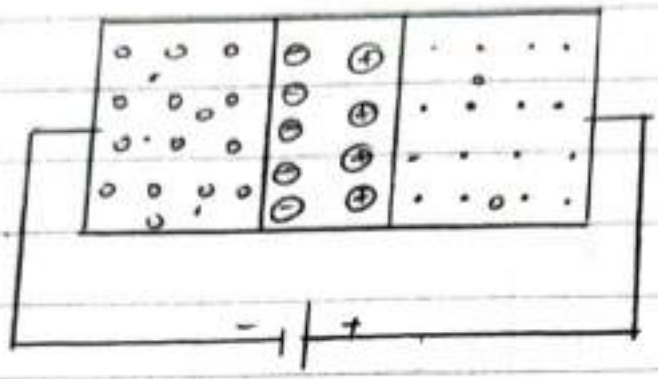


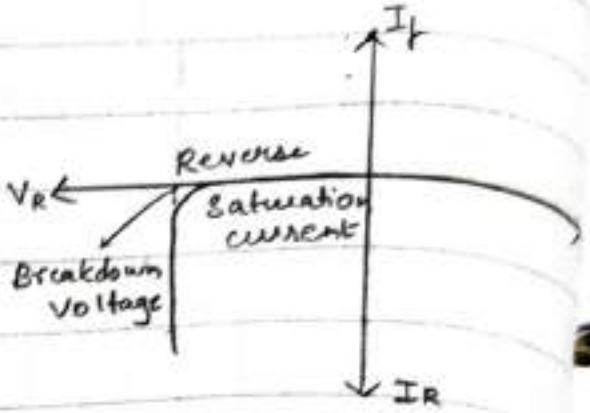


- The majority charge carriers are holes and minority charge carriers are electron
- The diode is said to be forward biased if the p-type is connected to the positive terminal and n-type is connected to the negative terminal.
- The holes and electrons are repelled by the terminals of the battery and are accumulated near the junction, decreasing the width of the depletion layer.
- The holes and electrons try to diffuse into n and p region respectively but a barrier voltage V_B is present in the depletion layer.
- As the voltage is further increased and greater than V_B, the current conduction also increases.

- As the forward voltage is increased, the current is also increased exponentially.

Reverse Bias:



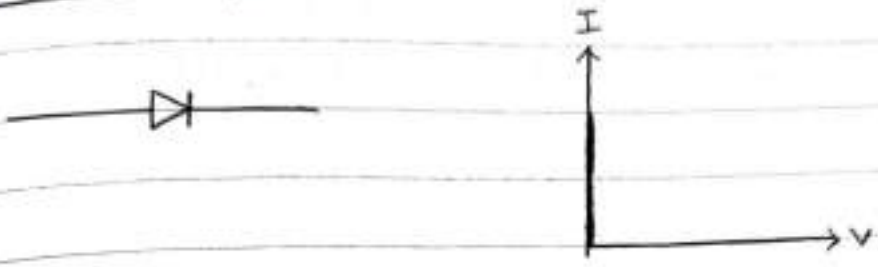


- When the p-type of the diode is connected to negative terminal and n-type is connected to positive terminal of the battery, then the diode is said to be in reverse bias.
- Due to the negative and positive terminals of the battery, the holes and electrons gets attracted and the width of the depletion layer increases.
- There is no current conduction in reverse bias.
- Due to the minority charge carriers, reverse saturation current is produced and after the Breakdown voltage the current increases rapidly and the diode gets damaged.

(b) Diode Equivalent Circuits :-

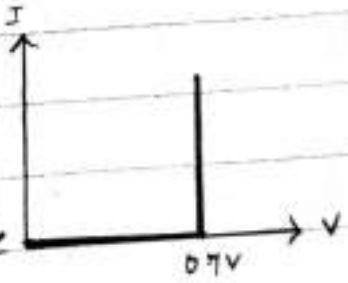
The components which are replaced by the diode without affecting the output of the circuit are called as Diode Equivalent circuits.

(i) Ideal Diode Equivalent.



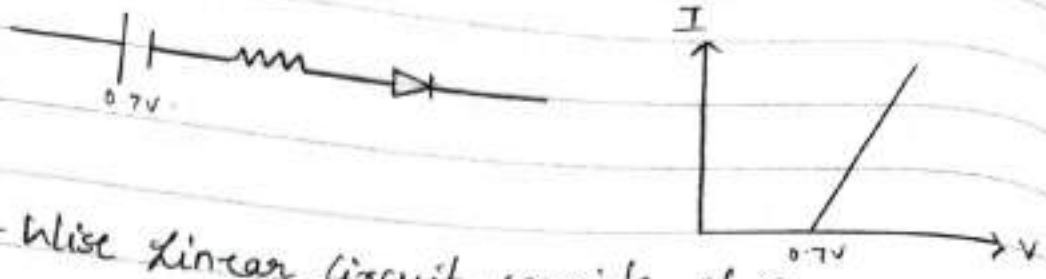
- An ideal diode offers zero resistance and no barrier voltage / voltage.
- Ideal diode does not has any Reverse bias.
- The output of the Ideal diode is the vertical line as shown in the the above graph.

(ii) Simplified Equivalent circuit:



- Simplified Equivalent circuit is made of a battery and Ideal diode.
- The horizontal line represents the Barrier voltage.
- Once the barrier voltage 0.7V is overcome the current increases in a vertical direction as in Ideal diode.

(iii) Peice-Wise Linear Equivalent Circuit.



- Peice-Wise Linear circuit consists of a Battery, resistor and Ideal diode.
- This is ~~not~~ does not give the exact same properties of a diode, but almost equal to the actual diode.
- The slant line represents the presence of the resistance and the 0.7 V as barrier voltage.

2. Diffusion Capacitance.

(a) When the diode is biased the holes and electrons try to diffuse into the n-region and p-region respectively with the applied voltage. The rate of change of charge with respect to the rate of change of voltage is called as diffusion capacitance.

$$C_D = \frac{dQ}{dV} = \frac{\tau I}{\eta V_T}$$

We know that,

$$I = \frac{Q}{\tau} \Rightarrow Q = I\tau \quad -(1)$$

From diode current equation,

$$I = I_0(e^{V/\eta V_T} - 1)$$

$$I = I_0 e^{V/\eta V_T} - I$$

$$I + I_0 = I_0 e^{V/\eta V_T} \quad -③$$

From eqn ①,

$$Q = I\tau$$

$$= (I_0 e^{V/\eta V_T} - I_0)\tau \qquad [\text{from eqn ②}]$$

$$Q = \tau I_0 e^{V/\eta V_T} - I_0\tau$$

Differentiate above eqn w.r.t V

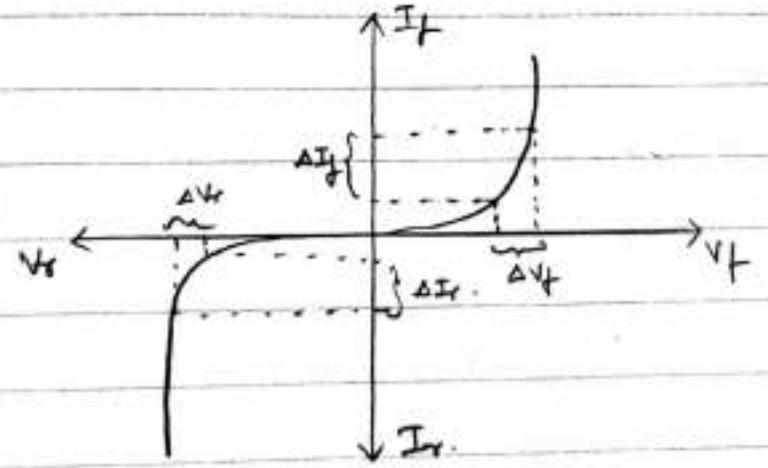
$$\frac{dQ}{dV} = \tau I_0 e^{V/\eta V_T} \cdot \frac{1}{\eta V_T} - 0$$

$$\frac{dQ}{dV} = \frac{\tau}{\eta V_T}(I_0 e^{V/\eta V_T})$$

$$\frac{dQ}{dV} = \frac{\tau}{\eta V_T}(I + I_0) \qquad [I >> I_0]$$

$$\therefore \boxed{\frac{dQ}{dV} = \frac{\tau I}{\eta V_T}}$$

b.



(i) **Static forward resistance:-**

The resistance offered by the diode in DC in forward bias is static forward resistance.

$$R_f = \frac{V_f}{I_f}$$

(ii) Dynamic forward resistance.

The resistance offered by the diode in AC in forward bias.

$$R_{df} = \frac{\Delta V_f}{\Delta I_f}.$$

(iii) Static Reverse resistance.

The resistance offered by the diode in DC in reverse bias.

$$R_r = \frac{V_r}{I_r}$$

2½

(iv) Dynamic Reverse resistance.

The resistance offered by the diode in AC in reverse bias.

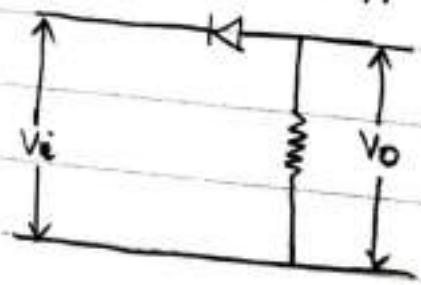
$$R_{df} = \frac{\Delta V_r}{\Delta I_r}.$$

---

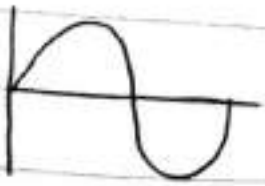
4. Clippers:-

(a) The circuit which clips off the unwanted signal without disturbing the rest is called as clipper

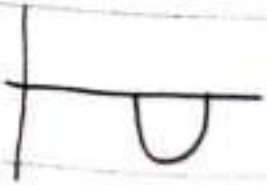
1) Series Positive Clippers



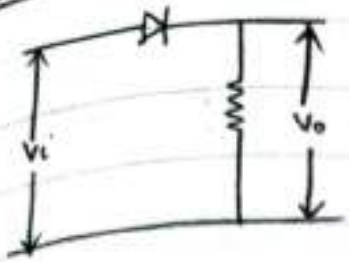
I/p :-



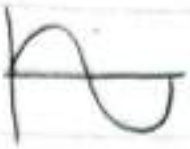
O/p :-



3) Series Negative

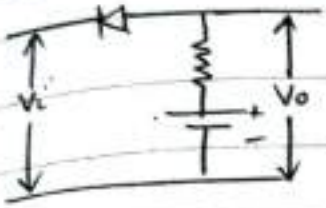


I/p -

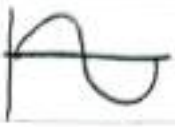


O/p :-

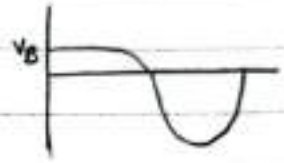
3) Series Positive with Positive Bias



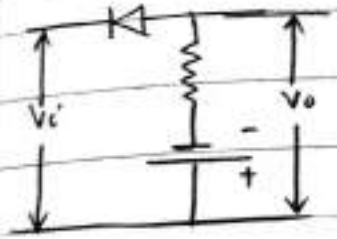
I/p :-



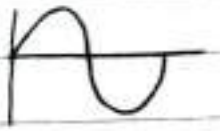
O/p :-



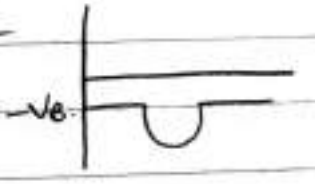
4. Series Positive with Negative Bias.



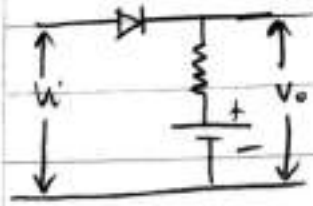
I/p :-

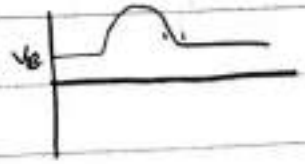


O/p :-

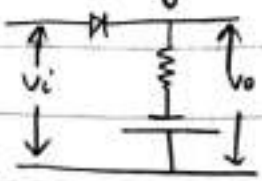


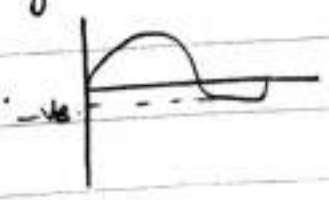
5. Series Negative with Positive Bias.



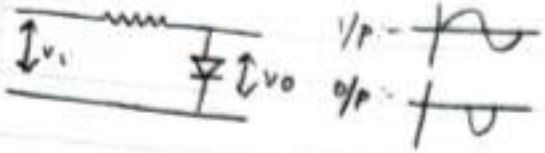


6. Series Negative with Negative Bias.

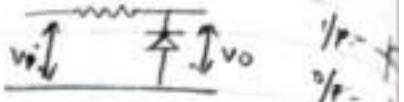




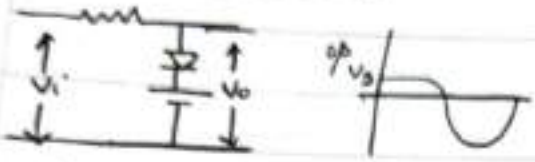
7) Shunt Positive.



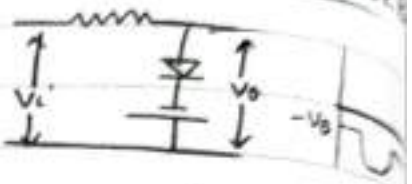
8. Shunt Negative.



9. Shunt +ve with +ve Bias

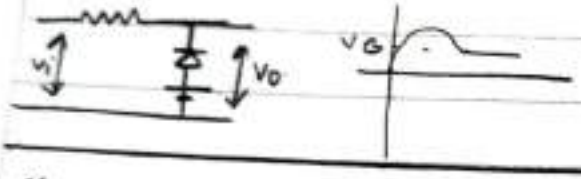


10. Shunt +ve with -ve

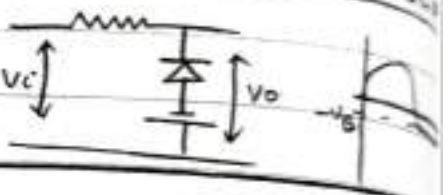


2½

11. Shunt -ve with +ve Bias



12. Shunt -ve with -ve



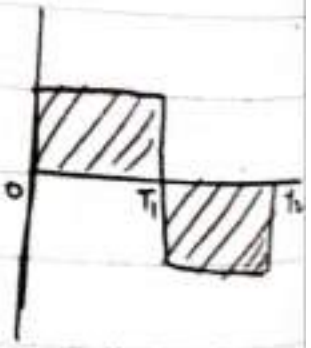
b) **Clamping Circuit theorem:-**

Clamping circuit theorem states that the ratio of the carea under the voltage curve of forward bias to reverse bias is equal to the ratio of forward resistance w.r.t reverse resistance.

$$\frac{A_f}{A_r} = \frac{R_f}{R}$$

A_f = Area under forward Bias
A_r = Area under reverse Bias
R_f = forward resistance.
R = Reverse resistance.

In forward bias, $i_f = \frac{V_f}{R_f}$.



$$Q_f = \int_0^T i_f(t)\,dt$$

$$Q_f = \int_0^T \frac{V_f(t)}{R_f(t)}\,dt$$

$$Q_f = \frac{1}{R_f}\int_0^T V_f(t)\,dt \rightarrow \text{Area}$$

$$Q_f = \frac{A_f}{R_f} \quad -(1)$$

In reverse bias, $i_r(t) = \frac{V_r(t)}{R(t)}$.

$$Q_r = \int_{T_1}^{T_2} i_r(t)\,dt$$

$$Q_r = \int_{T_1}^{T_2} \frac{V_r(t)}{R(t)}\,dt$$

$$Q_r = \frac{1}{R_t}\int_{T_1}^{T_2} V_r(t)\,dt \rightarrow \text{Area}$$

$$Q_r = \frac{A_r}{R} \quad -(2)$$

Under static-condition,

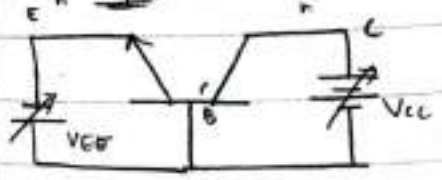
$$Q_f = Q_r$$

$$\frac{A_f}{R_f} = \frac{A_r}{R}$$

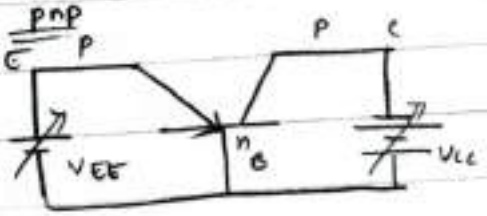
$$\Rightarrow \boxed{\frac{A_f}{A_r} = \frac{R_f}{R}}$$

5(b) Common Base Configuration.

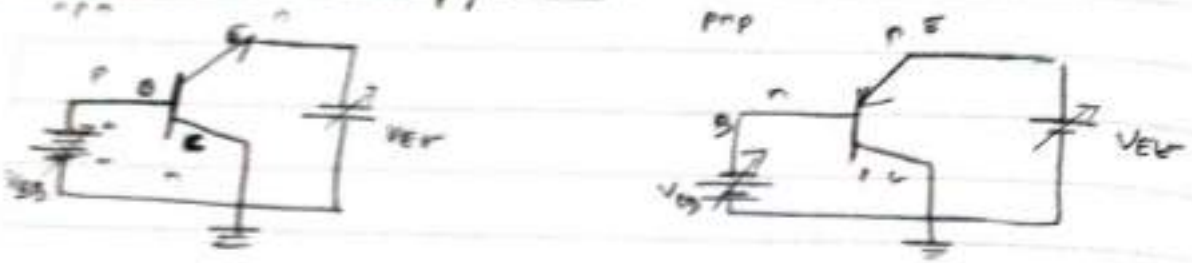
(i) npn



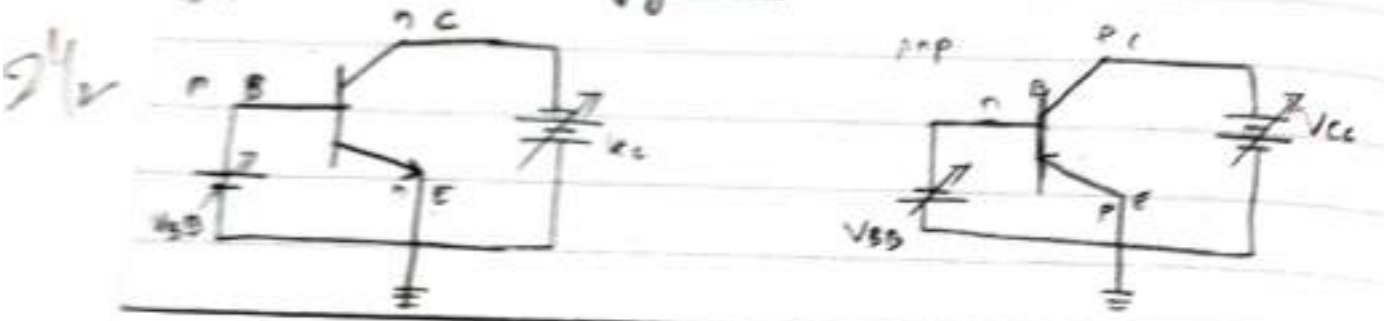
pnp



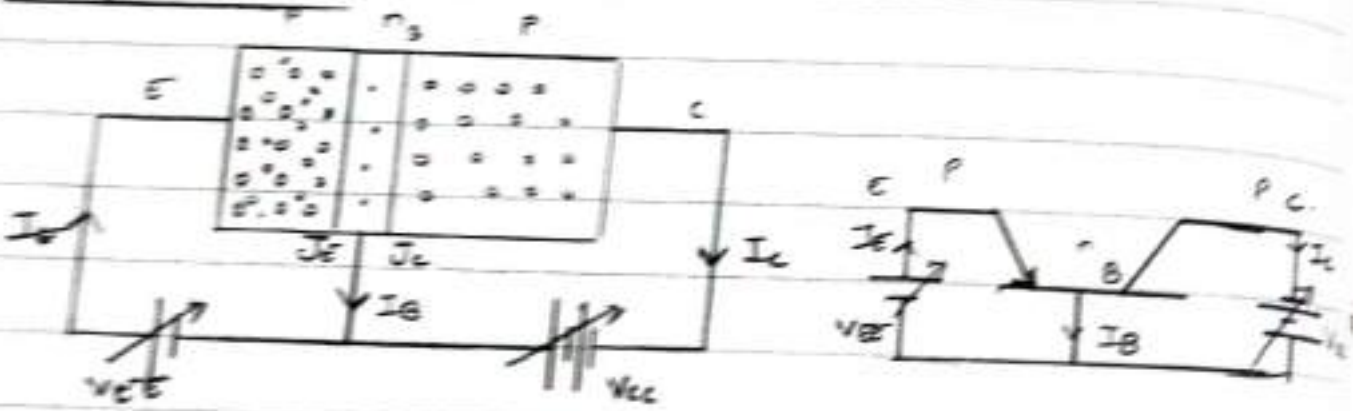
(c) Common Collector Configuration.



(b) Common Emitter Configuration.



5(a) p-np transistor :-

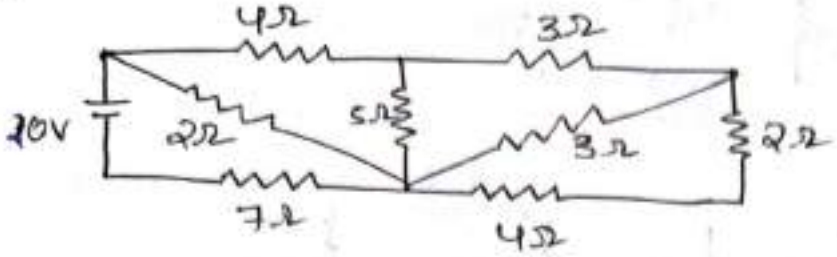


- In a pnp transistor, the emitter is heavily doped and is connected to the positive terminal of the V_{EE} Battery, i.e., the emitter region is in forward bias.

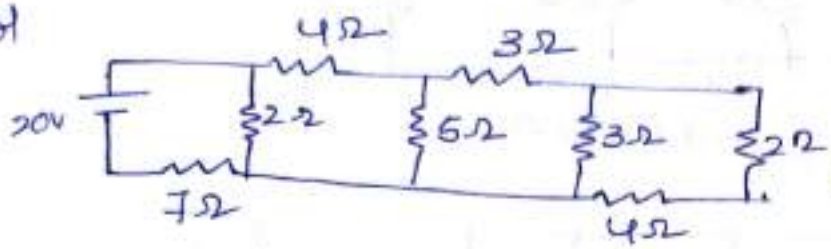
The collector is moderately doped and is connected to the negative terminal of the V_{cc} battery, i.e., the collector region is in reverse bias.

- Due to the positive terminal of V_{EE} the holes in the emitter region are repelled and moves towards the emitter junction.
- The Base or n-type region is very less and only 2-5% of the holes recombine with the electrons in the Base region and move towards the collector.
- Due to the movement of electro holes in p-region of emitter, a current I_E is constituted
- Due to the movement of holes from base to collector, current I_B is constituted.
- The p-type of collector is connected to the negative terminal of battery V_{CC}. The holes get attracted to the battery and current I_C is generated.
- Similarly, the process is repeated in the PNP transistor and the current is generated.
- This is the working of P-N-P transitor.

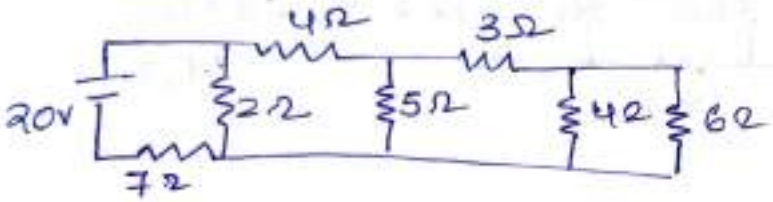
1. Find the R_{eq} and that total current supplied by the source.



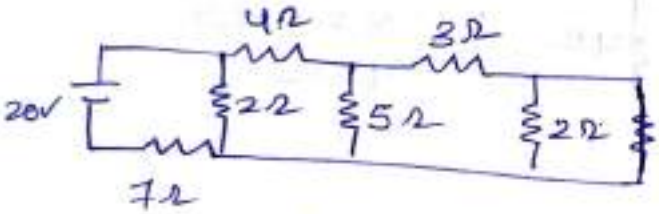
Sol



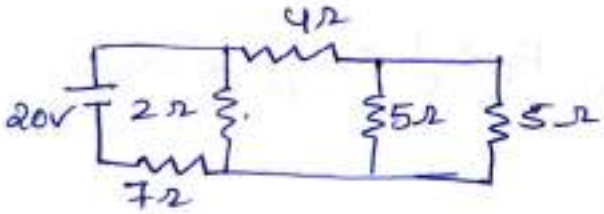
$R_s = (4+2)\Omega = 6\Omega$



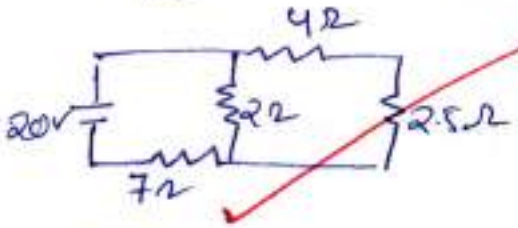
$R_p = \frac{1}{3}\Omega + \frac{1}{6}\Omega = 2\Omega$



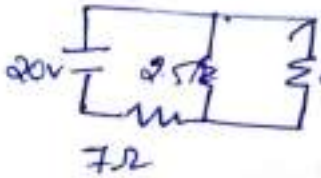
$R_s = 3\Omega + 2\Omega = 5\Omega$



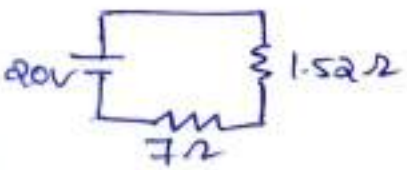
$R_p = \frac{1}{5}\Omega + \frac{1}{5}\Omega = 2.5\Omega$.



$R_s = 4\Omega + 2.5\Omega = 6.5\Omega$



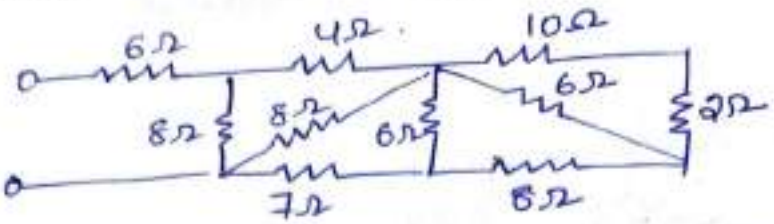
$R_p = \frac{1}{2.5} + \frac{1}{6.5\Omega} = 1.52\Omega$.



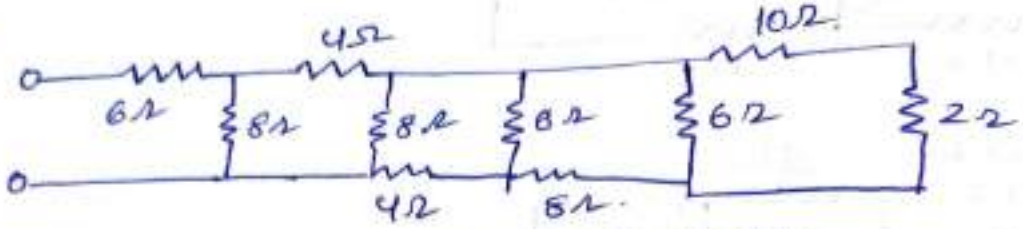
$R_s = 7\Omega + 1.32\Omega = 8.52\Omega$

$I = \frac{20V}{8.5\Omega} = 2.34\Omega$.

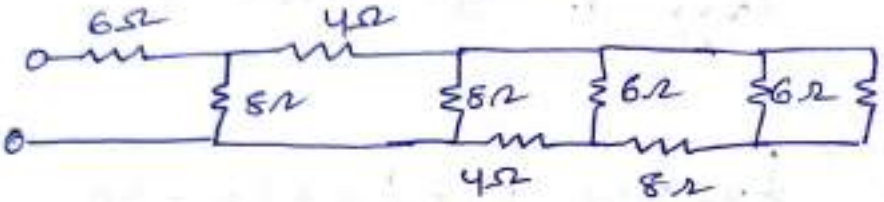
2. Find the total Resistance for given circuits



Sol

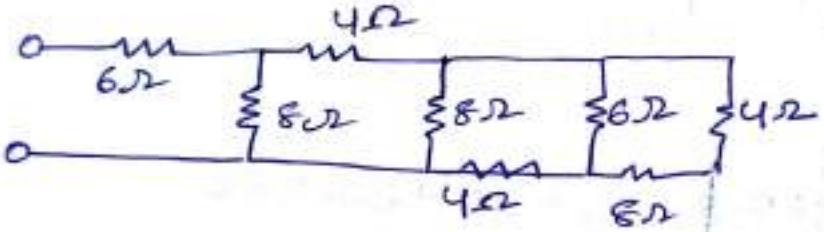


$R_s = 10+2 = 12\Omega$.



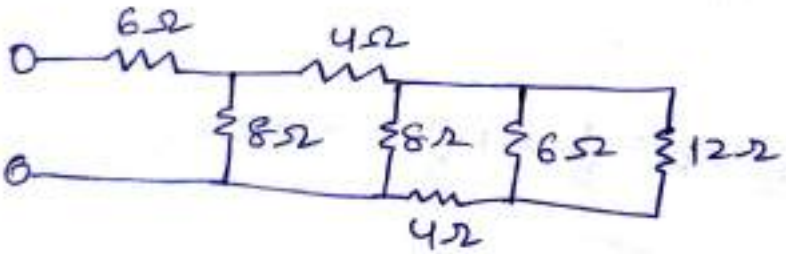
$R_p = \frac{1}{6}\Omega + \frac{1}{12}\Omega$

$= 4\Omega$

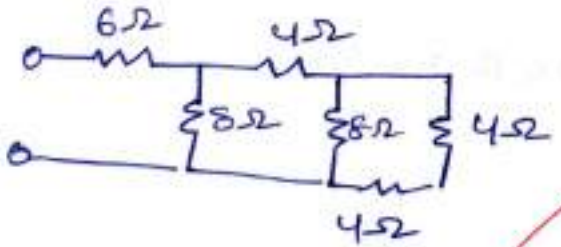


$R_s = 8\Omega + 4\Omega$

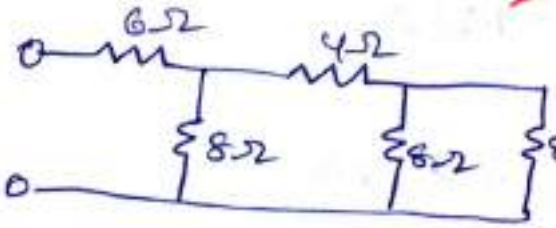
$= 12\Omega$



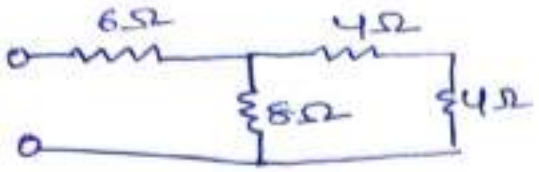
$R_p = \frac{1}{6}\Omega + \frac{1}{12}\Omega = 4\Omega$



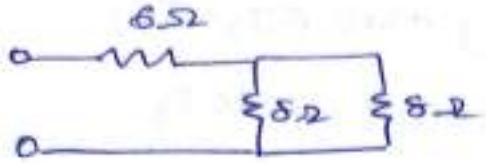
$R_s = 4\Omega + 4\Omega = 8\Omega$



$R_p = \frac{1}{8}\Omega + \frac{1}{8}\Omega = 4\Omega$



$R_S = 4+4 = 8\Omega$

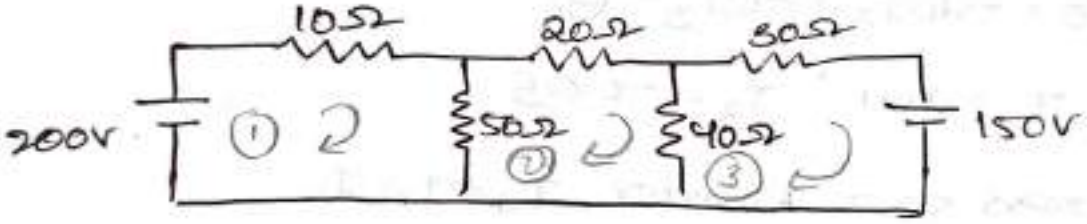


$R_P = \frac{1}{8}\Omega + \frac{1}{8}\Omega = 4\Omega$

$R_S = (6+4)\Omega = 10\Omega$

$R_{eq} = 10\Omega$.

③ Find current in 60Ω resistance using KVL



Applying KVL on mesh ①

$\Sigma V_S = \Sigma V_D$

$200 = 10I_1 + 50(I_1 - I_2)$

$200 = 60I_1 - 50I_2$ — ①

Applying KVL on mesh ②

$\Sigma V_3 = \Sigma V_D$

$0 = 50(I_2 - I_1) + 20I_2 + 40(I_2 - I_3)$

$= 50I_2 - 50I_1 + 20I_2 + 40I_2 - 40I_3$

$= -50I_1 + 110I_2 - 40I_3$ — ②

Applying KVL on mesh (3)

$$\Sigma V_3 = \Sigma V_P$$

$$0 = 50(I_2 - I_1) + 20(I_2) + 40(I_2 - I_3)$$

$$50I_2 - 50I_1 + 20I_2 + 40I_2 - 40I_3$$

$$-50I_1 + 110I_2 - 40I_3 \quad \text{—(2)}$$

Applying KVL on mesh (3)

$$\Sigma V_3 = \Sigma V_P$$

$$-100 = 30I_3 + 40(I_3 - I_2)$$

$$-100 = -40I_2 + 70I_3 \quad \text{—(3)}$$

$I_1 = 5.84$ $I_2 = 2.41$ $I_3 = -0.05$

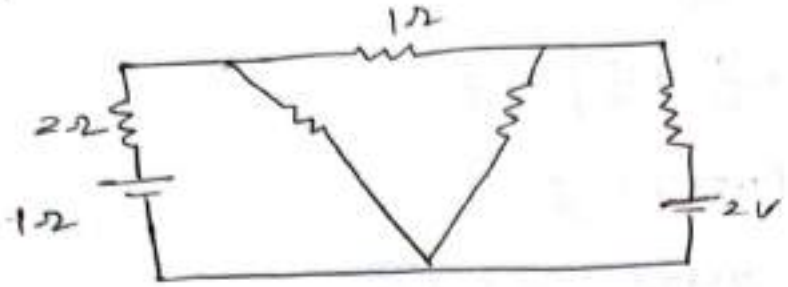
Current across 50Ω Resistor $I_4 = I_1 - I_2$

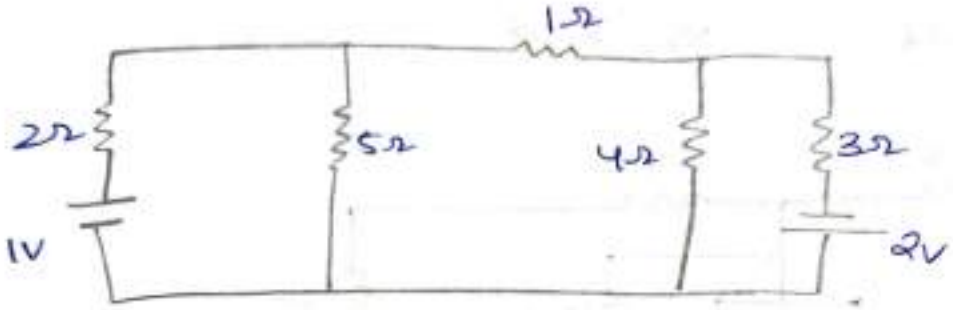
$I_4 = I_2 - I_1$ $5.34 - 2.41$

$= -2.93A$ $= 2.93A$

$\therefore I_4 = \pm 2.93A$.

4) find nodal voltage using KCL





Apply KCL at node V_1

$$I_1 + I_2 + I_3 = 0$$

$$\frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3} = 0$$

$$\frac{V_1 - 12V}{2} + \frac{V_1}{5} + \frac{V_1 - V_2}{1} = 0$$

$$V_1\left[\frac{1}{2} + \frac{1}{5} - V_2\right] = \frac{17}{2}$$

$$V_1\left[1.7 - V_2\right] = \frac{12}{2}$$

$$\boxed{1.7V_1 - V_2 = 6} \quad -(1)$$

Apply KCL at node V_2

$$I_4 + I_5 + I_6 = 0$$

$$\frac{V}{R_4} + \frac{V}{R_5} + \frac{V}{R_6} = 0$$

$$\frac{V_2 - V_1}{1} + \frac{V_2}{4} + \frac{V_2 + 2}{3} = 0$$

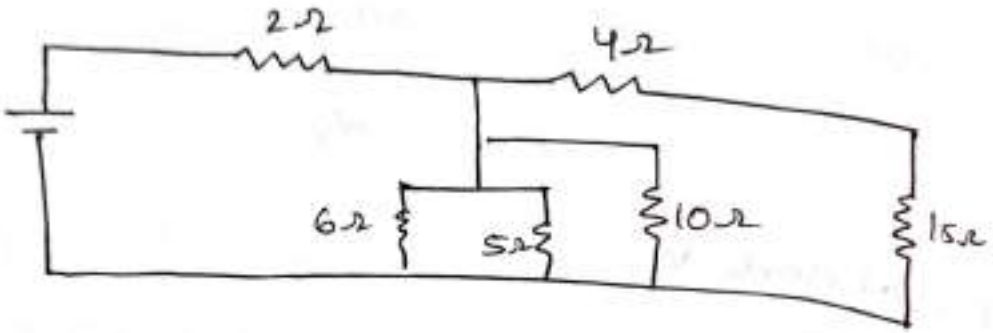
$$-V_1 + V_2\left[1 + \frac{1}{4} + \frac{1}{3}\right] = \frac{-2}{3}$$

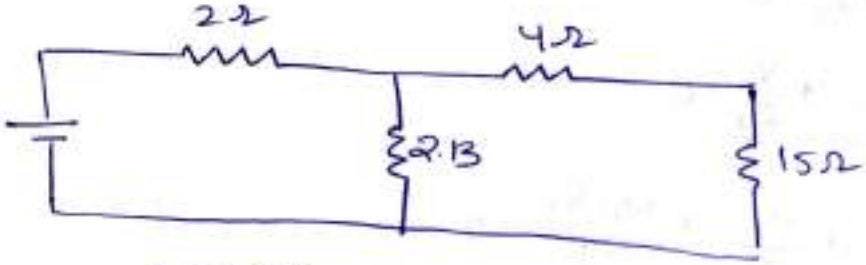
$$-V_1 + V_2\,[1.58] = \frac{-2}{3}$$

$$-3V_1 + 4 - 7.4V_3 = -2 \quad \text{—(2)}$$

$V_1 = 5.22$ $\qquad$ $V_2 = 2.58$.

(5)





$$\frac{20 \times 2.12}{10 \times 2.72} = 2.13$$

$$I_1 + I_2 + I_3 = 0$$

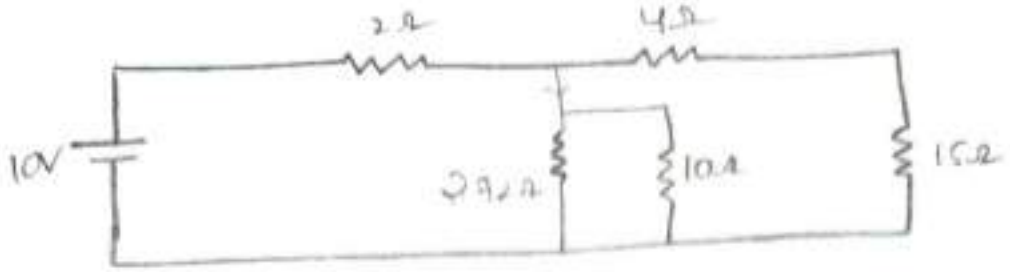
$$\frac{V_1 - 10}{2} + \frac{V_1}{2.13} + \frac{V_1}{19} = 0$$

$$V_1\left[\frac{1}{2} + \frac{1}{2.13} + \frac{1}{19}\right] - 5 = 0$$

$$V_1\,[1.02] = 5$$

$$V_1 = \frac{5}{1.02} = 4.90V$$

$$I_2 = \frac{V_1}{2.13} = \frac{4.9}{2.13} = 2.30A$$



$$I_{10\Omega} = I\left(\frac{\text{Opp}\Omega}{\text{Sum of}\Omega}\right)$$

$$= 2.30\left(\frac{2.72}{2.72+10}\right)$$

$$= 2.30\,(0.21)$$

$$= 1.13\text{A}.$$

Ans

SREYAS INSTITUTE OF ENGINEERING AND TECHNOLOGY

II-I B.Tech_**MID-I**_MARKS A.Y.2022-23

S.N.	Sec	H. T. No.	DM	DS	MSF	PP	COA	BEFA	DS LAB	PP LAB	GS			DM	DS	MSF	PP	COA	BEFA	DS LAB	PP LAB	GS
1	A	**20VE1A66B8**	IMPORT RANGE	IMPORT RANGE	IMPORT RANGE	IMPORT RANGE	IMPORT RANGE	IMPORT RANGE	IMPORT RANGE	IMPORT RANGE	IMPORT RANGE			IMPORT RANGE	IMPORT RANGE	IMPORT RANGE	IMPORT RANGE	IMPORT RANGE	IMPORT RANGE	E(" ","MA	E(" ","MA	E(" ","MA
2	A	**21VE1A6601**																				
3	A	**21VE1A6602**																				
4	A	**21VE1A6603**																				
5	A	**21VE1A6604**																				
6	A	**21VE1A6605**																				
7	A	**21VE1A6606**																				
8	A	**21VE1A6607**																				
9	A	**21VE1A6608**																				
10	A	**21VE1A6609**																				
11	A	**21VE1A6610**																				
12	A	**21VE1A6611**																				
13	A	**21VE1A6612**																				
14	A	**21VE1A6613**																				
15	A	**21VE1A6614**																				
16	A	**21VE1A6615**																				
17	A	**21VE1A6616**																				
18	A	**21VE1A6617**																				
19	A	**21VE1A6618**																				
20	A	**21VE1A6619**																				
21	A	**21VE1A6620**																				
22	A	**21VE1A6621**																				
23	A	**21VE1A6622**																				
24	A	**21VE1A6623**																				
25	A	**21VE1A6624**																				
26	A	**21VE1A6625**																				
27	A	**21VE1A6626**																				
28	A	**21VE1A6627**																				
29	A	**21VE1A6628**																				
30	A	**21VE1A6629**																				
31	A	**21VE1A6630**																				
32	A	**21VE1A6631**																				
33	A	**21VE1A6632**																				
34	A	**21VE1A6633**																				
35	A	**21VE1A6634**																				
36	A	**21VE1A6635**																				
37	A	**21VE1A6636**																				
38	A	**21VE1A6637**																				
39	A	**21VE1A6638**																				
40	A	**21VE1A6639**																				
41	A	**21VE1A6640**																				
42	A	**21VE1A6641**																				
43	A	**21VE1A6642**																				
44	A	**21VE1A6643**																				
45	A	**21VE1A6644**																				
46	A	**21VE1A6645**																				
47	A	**21VE1A6646**																				
48	A	**21VE1A6647**																				
49	A	**21VE1A6648**																				
50	A	**21VE1A6649**																				
51	A	**21VE1A6650**																				
52	A	**21VE1A6651**																				
53	A	**21VE1A6652**																				
54	A	**21VE1A6653**																				
55	A	**21VE1A6654**																				
56	A	**21VE1A6655**																				
57	A	**21VE1A6656**																				
58	A	**21VE1A6657**																				
59	A	**21VE1A6658**																				
60	A	**21VE1A6659**																				
61	A	**21VE1A6660**																				
62	A	**21VE1A6661**																				
63	A	**21VE1A6662**																				
64	A	**21VE1A6663**																				
65	A	**21VE1A6664**																				
66	A	**21VE1A6665**																				
67	A	**22VE5A6601**																				
68	A	**22VE5A6602**																				
69	A	**22VE5A6603**																				
70	A	**22VE5A6604**																				
71	A	**22VE5A6605**																				
72	A	**22VE5A6606**																				
		<14	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
		Faculty Sign																				

SREYAS INSTITUTE OF ENGINEERING AND TECHNOLOGY

II-I B.Tech_**MID-II**_MARKS A.Y.2022-23

SREYAS

II-I B.Tech_

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
HYDERABAD-500085

SREYAS INSTITUTE OF ENGINEERING AND TECHNOLOGY(VE)

B.Tech - R18 - II Year - I Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

Final University Consolidated Internal Marks Report-Date- 2023-05-30 10.18.37

HTNO	15305	15308	15311	15331	153AN	153AT	153BH	153BQ	153BT
21VE1A0401	23	24	25	98	20	20	24	20	22
21VE1A0402	9	10	8	97	14	12	10	5	15
21VE1A0403	21	21	17	98	16	14	19	15	16
21VE1A0404	20	24	20	98	18	13	22	18	19
21VE1A0405	13	18	17	95	14	13	15	14	12
21VE1A0406	18	25	25	99	18	19	23	20	19
21VE1A0407	24	23	25	98	15	17	21	15	16
21VE1A0409	14	18	16	95	13	9	17	14	13
21VE1A0410	18	23	20	98	16	14	19	15	14
21VE1A0411	17	20	22	99	12	13	14	14	15
21VE1A0413	11	15	12	94	12	10	6	8	11
21VE1A0414	12	18	19	96	12	10	14	9	10
21VE1A0415	18	19	19	99	11	13	13	10	12
21VE1A0416	22	20	22	98	16	14	18	14	14
21VE1A0417	21	23	24	98	15	15	17	14	14
21VE1A0418	22	21	21	97	16	12	20	14	14
21VE1A0419	16	18	20	95	10	10	8	9	9
21VE1A0420	15	15	20	95	11	11	16	14	11
21VE1A0421	12	17	19	95	11	11	10	14	14
21VE1A0422	24	24	25	99	20	19	23	23	20
21VE1A0423	24	24	25	99	18	14	20	18	16
21VE1A0424	24	24	25	98	19	15	23	19	18
21VE1A0425	13	20	20	97	15	13	17	14	12
21VE1A0426	19	17	18	99	13	11	9	14	11
21VE1A0427	20	19	22	98	14	16	22	17	15
21VE1A0428	24	24	23	99	20	17	21	20	16
21VE1A0429	24	22	21	96	17	15	19	16	15
21VE1A0430	16	23	25	97	19	17	20	17	17
21VE1A0431	22	20	20	90	16	12	21	17	16
21VE1A0432	11	14	14	89	10	12	11	8	11
21VE1A0433	23	23	23	97	18	16	21	18	16
21VE1A0434	19	14	17	96	11	12	11	14	13

HTNO	15305	15308	15311	15331	153AN	153AT	153BH	153BQ	153BT
21VE1A0435	23	22	22	99	17	15	21	19	17
21VE1A0436	23	23	23	99	16	17	22	18	15
21VE1A0437	19	14	14	97	9	10	10	14	9
21VE1A0438	23	22	25	99	18	13	21	16	17
21VE1A0439	25	24	23	99	21	21	24	23	23
21VE1A0440	24	23	22	99	16	13	21	17	15
21VE1A0441	20	21	21	97	16	15	20	16	14
21VE1A0442	19	24	23	98	18	13	20	17	19
21VE1A0443	20	16	20	98	13	12	17	9	12
21VE1A0444	20	20	20	98	11	11	8	14	10
21VE1A0445	24	25	25	99	19	21	19	21	16
21VE1A0446	25	25	23	99	20	19	22	22	19
21VE1A0447	24	25	25	97	18	16	21	17	14
21VE1A0448	23	24	23	98	15	20	22	22	18
21VE1A0449	22	24	23	99	17	17	21	18	19
21VE1A0450	19	19	17	99	13	13	12	14	14
21VE1A0451	20	18	16	97	13	15	15	15	11
21VE1A0452	17	24	23	95	15	16	16	15	14
21VE1A0453	23	25	25	98	20	20	24	23	21
21VE1A0454	24	21	22	99	20	18	24	22	20
21VE1A0455	18	15	17	80	12	10	8	7	10
21VE1A0456	20	20	17	98	15	16	19	16	13
21VE1A0457	24	22	23	98	12	14	15	14	13
21VE1A0458	17	22	23	98	16	14	17	16	16
21VE1A0459	17	21	23	95	14	18	19	20	19
21VE1A0460	24	22	21	95	18	19	19	17	15
21VE1A0461	12	14	15	80	5	3	4	6	5
21VE1A0462	21	20	20	90	16	16	14	15	15
21VE1A0463	25	24	23	97	20	19	23	21	21
21VE1A0464	25	25	25	97	22	21	24	24	21
21VE1A0465	24	22	21	98	15	15	19	18	18
21VE1A0466	24	24	22	89	8	11	19	14	9
21VE1A0467	21	24	25	98	17	18	23	19	20
21VE1A0468	8	16	15	98	14	4	11	14	11
21VE1A0469	14	15	14	97	9	4	8	8	10
21VE1A0470	14	17	15	98	15	13	10	7	13
21VE1A0471	9	15	17	65	14	12	11	8	11
21VE1A0472	10	15	14	98	11	12	10	7	11
21VE1A0473	24	23	20	97	16	17	20	18	18
21VE1A0474	24	20	16	95	13	12	14	9	9
21VE1A0475	25	24	24	94	20	16	20	17	19
21VE1A0476	24	23	24	97	20	19	20	19	18
21VE1A0477	14	20	16	95	12	11	7	9	7
21VE1A0478	21	20	22	95	13	11	14	14	12
21VE1A0479	14	14	13	96	13	12	13	6	10

HTNO	15305	15308	15311	15331	153AN	153AT	153BH	153BQ	153BT
21VE1A0480	25	23	19	95	16	14	23	17	18
21VE1A0481	21	23	23	95	16	16	22	16	20
21VE1A0482	23	20	15	96	13	14	14	14	11
21VE1A0483	22	19	19	96	15	12	10	14	9
21VE1A0484	16	18	23	94	10	17	10	5	14
21VE1A0485	23	23	25	97	19	21	23	18	18
21VE1A0486	25	25	25	98	21	19	24	24	22
21VE1A0487	24	22	20	98	17	16	21	14	12
21VE1A0488	24	22	24	96	10	12	14	14	13
21VE1A0489	25	24	23	98	15	15	20	18	19
21VE1A0490	14	19	15	95	16	15	16	14	12
21VE1A0491	25	19	15	92	14	12	19	14	14
21VE1A0492	11	14	12	95	8	10	6	7	6
21VE1A0493	14	16	18	98	11	11	7	15	10
21VE1A0494	16	16	15	98	8	13	11	7	7
21VE1A0496	25	25	22	95	20	20	24	22	22
21VE1A0497	18	17	14	98	12	13	11	8	10
21VE1A0498	15	15	16	96	14	12	13	8	9
21VE1A0499	22	23	23	97	17	14	19	19	17
21VE1A04A0	23	25	24	98	17	17	18	15	15
21VE1A04A1	25	25	25	95	21	18	25	24	21
21VE1A04A2	19	20	16	96	10	11	11	9	11
21VE1A04A3	22	23	21	95	19	14	22	20	16
21VE1A04A4	14	14	15	96	5	12	4	6	5
21VE1A04A5	24	23	25	96	19	15	21	14	19
21VE1A04A6	25	25	25	98	15	19	24	20	20
21VE1A04A7	25	24	25	98	20	15	22	16	19
21VE1A04A8	24	25	24	98	15	13	20	15	16
21VE1A04A9	14	15	14	98	8	11	7	9	11
21VE1A04B0	24	24	25	96	20	20	24	22	23
21VE1A04B1	15	16	15	97	7	9	10	8	8
21VE1A04B3	24	24	23	98	18	14	22	20	18
21VE1A04B4	23	22	22	80	19	19	21	22	18
21VE1A04B5	25	24	25	98	18	21	23	19	19
21VE1A04B6	23	24	25	96	17	19	20	20	17
21VE1A04B7	23	21	16	95	16	11	19	14	12
21VE1A04B8	24	22	22	95	15	15	14	14	13
21VE1A04B9	24	24	25	98	18	17	23	18	21
21VE1A04C0	17	24	17	96	16	14	20	18	15
21VE1A04C1	24	24	22	98	18	17	23	21	20
21VE1A04C2	22	23	20	98	14	14	17	14	13
21VE1A04C3	24	24	24	97	19	17	22	20	18
21VE1A04C4	22	24	22	96	15	14	19	14	15
21VE1A04C5	23	22	18	95	16	16	21	16	17
21VE1A04C6	22	23	20	97	15	16	20	15	13

HTNO	15305	15308	15311	15331	153AN	153AT	153BH	153BQ	153BT
21VE1A04C7	23	21	17	96	10	6	9	8	9
22VE5A0401	12	17	16	98	16	13	17	10	16
22VE5A0402	14	18	18	95	14	14	15	14	13
22VE5A0404	25	25	25	97	21	23	24	20	20
22VE5A0405	10	17	14	98	12	12	12	14	12
22VE5A0406	24	25	25	97	19	21	24	18	22
22VE5A0407	25	25	25	90	23	22	25	22	22
22VE5A0408	19	20	23	96	20	18	22	16	16
22VE5A0409	11	15	24	96	12	15	14	9	10
22VE5A0410	24	24	24	97	18	18	23	21	20
22VE5A0411	22	24	23	96	18	17	22	18	16
22VE5A0412	14	23	18	85	16	16	17	14	15
22VE5A0413	25	25	25	97	21	23	25	23	22
Total:135	2709	2822	2767	12960	2067	1983	2353	2064	2016

Note : '-1' indicates student is absent for the exam.

Subject Code	Subject Name
15311	ELECTRONIC DEVICES AND CIRCUITS LAB
153BQ	PROBABILITY THEORY AND STOCHASTIC PROCESSES
15331	CONSTITUTION OF INDIA
153AN	DIGITAL SYSTEM DESIGN
153AT	ELECTRONIC DEVICES AND CIRCUITS
153BT	SIGNALS AND SYSTEMS
15308	DIGITAL SYSTEM DESIGN LAB
153BH	NETWORK ANALYSIS AND TRANSMISSION LINES
15305	BASIC SIMULATION LAB

Signature Of Principal with Date & Office seal

Web : www.jntuh.ac.in
E Mail : dejntuh@jntuh.ac.in
Phone : Off: +91–40–23156113
Fax : +91–40–23158668

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

(Established by JNTU Act No. 30 of 2008)
Kukatpally, Hyderabad – 500 085 Telangana (India)
ACCREDITED BY NAAC WITH 'A' GRADE

Dr. K. VENKATESWARA RAO
M.Sc.,M.Tech.,PhD.,PDF(USA).
Professor of Nano Technology &
DIRECTOR OF EVALUATION

Letter No EB / OLE /1206 **Date:09-06-2023**

To
The Principals
All the JNTUH Constituent and Affiliated Colleges offering B. Tech/B.Pharm. Courses.

Dear Sir/Madam,

Sub: JNTUH Examination Branch – Uploading of project stage –II of B. Tech IV year II sem (R18 Regulations) regular/supply and (R16, R15, R13 Regulations) major project viva-voce supply external examination, B. Tech IV Year II sem regular Minor Degree Program Mini Project external examination, IV year II sem (R17 Regulations) viva-voce regular/supply and (R16, R15, R13 Regulations) major project viva-voce supply external examination and B. Tech IV year I sem (R18 and R16 Regulations) mini-project viva-voce supply external examination panel of examiners July -2023 University Exams on or before 18-06-2023-Intimation-Reg.

All the Principals of the JNTUH Constituent and Affiliated Colleges offering B. Tech/B.Pharm. courses are requested to upload the panel of examiners for the B. Tech. IV year II sem regular (R18 Regulations) project stage –II, (R16, R15, R13 Regulations) major project viva-voce supply external examination, B. Tech IV Year II sem Minor Degree Program Mini Project external examination, B.Pharm IV year II sem (R17 Regulations) viva-voce regular/supply , (R16, R15, R13 Regulations) major project viva-voce supply external examination and B. Tech IV year I sem (R18 and R16 Regulations) mini-project viva-voce supply external Examinations panel of examiners July-2023, on or before 18-06-2023 by using the URL:http://registrations1.jntuh.ac.in/ugprojectpanels. The service for uploading panels will be available from 16-06-2023.

The approved panel of examiners will be intimated from 19-06-2023 to 24-06-2023. It is also requested to conduct all the above B. Tech/B. Pharm viva-voce exams from 27-06-2023 to 01-07-2023.

The award list of project stage –II/ major / mini-project exams should be uploaded on or before 03-07-2023.

The cooperation of the Principals is highly solicited.

Thanking you,

Yours sincerely

Sd/-
Director of Evaluation

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD, HYDERABAD-500085

SREYAS INSTITUTE OF ENGINEERING AND TECHNOLOGY(VE)

University External Exam Final Award List

R18- IV Year B.Tech I Semester Regular

COMPUTER SCIENCE AND ENGINEERING,SECTION-D

INDUSTRIAL ORIENTED MINI PROJECT SUMMER INTERNSHIP (15722)

Maxmimum Marks: 100 Date: 2023-01-11 17.39.59

S.No	HTNO	MARKS AWARDED
1	18VE1A0549	69
2	18VE1A05M4	-1
3	18VE1A05P3	80
4	19VE1A05J1	98
5	19VE1A05J2	96
6	19VE1A05J3	95
7	19VE1A05J4	92
8	19VE1A05J5	98
9	19VE1A05J6	93
10	19VE1A05J7	94
11	19VE1A05J8	96
12	19VE1A05J9	96
13	19VE1A05K0	98
14	19VE1A05K1	84
15	19VE1A05K2	96
16	19VE1A05K3	88
17	19VE1A05K4	89
18	19VE1A05K5	98
19	19VE1A05K6	96
20	19VE1A05K7	82
21	19VE1A05K8	78
22	19VE1A05K9	94
23	19VE1A05L0	98
24	19VE1A05L1	78
25	19VE1A05L2	94
26	19VE1A05L3	98
27	19VE1A05L4	89
28	19VE1A05L5	91
29	19VE1A05L6	94
30	19VE1A05L7	92
31	19VE1A05L8	95
32	19VE1A05L9	90

33	19VE1A05M0	89
34	19VE1A05M1	98
35	19VE1A05M2	92
36	19VE1A05M3	97
37	19VE1A05M5	95
38	19VE1A05M6	95
39	19VE1A05M7	96
40	19VE1A05M8	98
41	19VE1A05M9	97
42	19VE1A05N0	92
43	19VE1A05N1	72
44	19VE1A05N2	92
45	19VE1A05N3	98
46	19VE1A05N4	94
47	19VE1A05N5	82
48	19VE1A05N6	98
49	19VE1A05N7	91
50	19VE1A05N8	92
51	19VE1A05N9	97
52	19VE1A05P0	92
53	19VE1A05P1	90
54	19VE1A05P2	94
55	19VE1A05P3	92
56	19VE1A05P4	76
57	19VE1A05P5	84
58	19VE1A05P6	96
59	19VE1A05P7	94
60	19VE1A05P8	90
61	19VE1A05P9	92
62	19VE1A05Q0	88
63	20VE5A0519	93
64	20VE5A0520	95
65	20VE5A0521	96
66	20VE5A0522	80
67	20VE5A0523	92
68	20VE5A0524	80

Signature of External Examiner

Signature of Internal Examiner

Signature of The Principal With Date & Office Seal

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD, HYDERABAD-500085

SREYAS INSTITUTE OF ENGINEERING AND TECHNOLOGY(VE)

University External Exam Final Award List

R18- IV Year B.Tech I Semester Regular

COMPUTER SCIENCE AND ENGINEERING,SECTION-D

PROJECT STAGE - I (15734)

Maxmimum Marks: 75 Date: 2023-01-12 14.53.51

S.No	HTNO	MARKS AWARDED
1	18VE1A0549	50
2	18VE1A05M4	50
3	18VE1A05P3	65
4	19VE1A05J1	73
5	19VE1A05J2	72
6	19VE1A05J3	73
7	19VE1A05J4	71
8	19VE1A05J5	74
9	19VE1A05J6	72
10	19VE1A05J7	73
11	19VE1A05J8	74
12	19VE1A05J9	73
13	19VE1A05K0	74
14	19VE1A05K1	65
15	19VE1A05K2	73
16	19VE1A05K3	66
17	19VE1A05K4	65
18	19VE1A05K5	74
19	19VE1A05K6	73
20	19VE1A05K7	62
21	19VE1A05K8	60
22	19VE1A05K9	73
23	19VE1A05L0	74
24	19VE1A05L1	60
25	19VE1A05L2	72
26	19VE1A05L3	74
27	19VE1A05L4	68
28	19VE1A05L5	69
29	19VE1A05L6	66
30	19VE1A05L7	69
31	19VE1A05L8	70
32	19VE1A05L9	70

33	19VE1A05M0	68
34	19VE1A05M1	74
35	19VE1A05M2	73
36	19VE1A05M3	72
37	19VE1A05M5	71
38	19VE1A05M6	70
39	19VE1A05M7	73
40	19VE1A05M8	74
41	19VE1A05M9	71
42	19VE1A05N0	70
43	19VE1A05N1	55
44	19VE1A05N2	70
45	19VE1A05N3	74
46	19VE1A05N4	72
47	19VE1A05N5	61
48	19VE1A05N6	74
49	19VE1A05N7	68
50	19VE1A05N8	71
51	19VE1A05N9	73
52	19VE1A05P0	70
53	19VE1A05P1	67
54	19VE1A05P2	72
55	19VE1A05P3	70
56	19VE1A05P4	55
57	19VE1A05P5	61
58	19VE1A05P6	73
59	19VE1A05P7	71
60	19VE1A05P8	70
61	19VE1A05P9	70
62	19VE1A05Q0	71
63	20VE5A0519	70
64	20VE5A0520	72
65	20VE5A0521	74
66	20VE5A0522	61
67	20VE5A0523	71
68	20VE5A0524	63

Signature of External Examiner

Signature of Internal Examiner

Signature of The Principal With Date & Office Seal

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD, HYDERABAD-500085

SREYAS INSTITUTE OF ENGINEERING AND TECHNOLOGY(VE)

University External Exam Final Award List

R18- IV Year B.Tech II Semester Regular

COMPUTER SCIENCE AND ENGINEERING,SECTION-C

PROJECT STAGE II (15805)

Maxmimum Marks: 75 Date: 2023-06-28 12.15.53

S.No	HTNO	MARKS AWARDED
1	17D91A0516	69
2	195T1A0506	73
3	195T1A0511	71
4	195T1A0512	74
5	195T1A0522	73
6	195T1A0524	74
7	195T1A0527	73
8	195T1A0531	71
9	19VE1A05C1	74
10	19VE1A05C2	74
11	19VE1A05C3	74
12	19VE1A05C4	71
13	19VE1A05C5	73
14	19VE1A05C6	71
15	19VE1A05C7	73
16	19VE1A05C8	71
17	19VE1A05C9	74
18	19VE1A05D0	65
19	19VE1A05D1	72
20	19VE1A05D2	73
21	19VE1A05D3	72
22	19VE1A05D4	70
23	19VE1A05D5	74
24	19VE1A05D6	74
25	19VE1A05D7	74
26	19VE1A05D8	71
27	19VE1A05D9	72
28	19VE1A05E0	70
29	19VE1A05E1	70
30	19VE1A05E2	74
31	19VE1A05E3	74
32	19VE1A05E4	68

33	19VE1A05E6	74
34	19VE1A05E7	74
35	19VE1A05E8	60
36	19VE1A05F0	74
37	19VE1A05F1	72
38	19VE1A05F2	71
39	19VE1A05F3	74
40	19VE1A05F4	71
41	19VE1A05F5	73
42	19VE1A05F6	73
43	19VE1A05F7	73
44	19VE1A05F8	72
45	19VE1A05F9	70
46	19VE1A05G0	68
47	19VE1A05G1	72
48	19VE1A05G2	68
49	19VE1A05G3	71
50	19VE1A05G4	72
51	19VE1A05G5	65
52	19VE1A05G6	74
53	19VE1A05G7	74
54	19VE1A05G8	74
55	19VE1A05G9	70
56	19VE1A05H0	74
57	19VE1A05H1	71
58	19VE1A05H2	71
59	19VE1A05H3	69
60	19VE1A05H4	74
61	19VE1A05H5	68
62	19VE1A05H6	74
63	19VE1A05H7	67
64	19VE1A05H8	72
65	19VE1A05H9	65
66	19VE1A05J0	73
67	20VE5A0513	69
68	20VE5A0514	68
69	20VE5A0515	71
70	20VE5A0516	73
71	20VE5A0517	70
72	20VE5A0518	65

Signature of External Examiner

Signature of Internal Examiner

Signature of The Principal With Date & Office Seal

Sreyas Institute of Engineering and Technology

An Autonomous Institution

Approved by AICTE, Affiliated to JNTUH

SREYAS Accredited by NAAC-A Grade, NBA (CSE, ECE & ME) & ISO 9001:2015 Certified

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MAJOR PROJECT PRC-II EVALUATION SHEET

Date: 15-06-2023

Batch No: C-12

Title of the Project: Design of Autonomous Robotic Vehicle for Remote Monitoring

Location of Work:

Name of the Guide with Designation: Dr. J. Pandu Ranga Rao (Professor & Dean, IQAC, Dept of ECE)

In-case of External Project, Name of the External Guide with Designation:

Recommendations of the Guide (To be filled by the Guide before the PRC):

Roll No's & Names with Signatures:

19VE1A04G8 (S. Nikshitha) S. Nikshitha

19VE1A04H0 (S. Rathwik)

19VE1A04D5 (D. Rakesh) D. Rakesh

For Evaluators

Roll No's	Team Work	Presentation Skills and Time Management	PPT	Results/output	Viva-Voce
19VE1A04G8	A	A	A+	A+	A
19VE1A04H0	A	A	A+	A+	A
19VE1A04D5	A	A	A+	A+	A

Grading Rubric:

A – Sophisticated (70% +) B – Competent (45 – 70%) C – Not Completed / Not Satisfactory – (<45%)

Maximum Grading Points:

Team Work – 5 Points Presentation skills and Time management – 5 Points PPT – 5 Points

Results & Viva-Voce (10): Results/Output– 5 Points Viva-Voce –5 Points

Recommendations of the Panel (if necessary use the other side of the page):

Specifications of the components should be kno

Name of the Evaluators with Signatures:

15/6/23

C-12

hardware explanation – okay

Result – okay

16/06/2023

* Suggested to change the PPT

17/6/23.

SREYAS

EXAMINATION BRANCH

9-39, Sy No.107, Tattiannaram (V), GSI, Bandlaguda, Nagole, Hyderabad-500 068.

Cr. No. SIET/Exam Branch/2022-23/38 Date: 09-02-2023

CIRCULAR

SUB: Notification for III-I & IV-I B.Tech Computer Based Test (CBT) Examinations, Feb/Mar-2023

The CBT Exam Notification of III-I & IV-I B.Tech is released.The absenties of MID-I/MID-II are eligible to apply.

Fee details and dates are given below.

Examination fee details:

1. FOR ONE THEORY SUBJECT	**Rs. 400/-**
2. FOR TWO THEORY SUBJECTS	**Rs. 500/-**
3. FOR THREE THEORY SUBJECTS	**Rs. 600/-**
4. FOR FOUR THEORY SUBJECTS AND ABOVE	**Rs. 800/-**

Student registration schedule:

EVENT	Start date of registration for Regular	Last date of registration for regular
Exam Registration Without Late Fee	10-02-2023	16-02-2023
Exam Registration With Late Fee of Rs.100/-	17-02-2023	20-02-2023
Exam Registration With Late Fee of Rs.1000/-	21-02-2023	22-02-2023

I/c Exam Branch I/c

EXAM BRANCH IN-CHARGE
SREYAS INSTITUTE OF ENGG &TECH.
2-50/5, Sy.No.107, Tattiannaram (V),
GSI, Bandlaguda, Nagole, Hyd-68.

PRINCIPAL

PRINCIPAL
SREYAS INSTITUTE OF ENGG &TECH.
9-39, Sy No 107, Tattiannaram (V),
GSI, Bandlaguda, Nagole, Hyd-68.

Copy to:
1. A.O
2. All HODs
3. Associate Dean Academics
4. Dean IQAC
5. Accounts Section
6. Notice Board

SREYAS
EXAMINATION BRANCH

9-39, Sy No.107, Tattiannaram (V), GSI, Bandlaguda, Nagole, Hyderabad-500 068.

Cr. No. SIET/Exam Branch/2022-23/59 Date: 19-07-2023

CIRCULAR

SUB: Notification for III-II B.Tech Computer Based Test (CBT) Examinations, August-2023

The CBT Exam Notification of III-II B.Tech is released. The absentees of MID-I/MID-II are eligible to apply.

Fee details and dates are given below.

Examination fee details:

1. FOR ONE THEORY SUBJECT	**Rs. 400/-**
2. FOR TWO THEORY SUBJECTS	**Rs. 500/-**
3. FOR THREE THEORY SUBJECTS	**Rs. 600/-**
4. FOR FOUR THEORY SUBJECTS AND ABOVE	**Rs. 800/-**

Student registration schedule:

EVENT	Start date of registrations	Last date of registrations
Exam Registration Without Late Fee	20-07-2023	26-07-2023
Exam Registration With Late Fee of Rs.100/-	27-07-2023	31-07-2023
Exam Registration With Late Fee of Rs.1000/-	01-08-2023	02-08-2023

Exam Branch I/c
EXAM BRANCH IN-CHARGE
SREYAS INSTITUTE OF ENGG.&TECH.
2-50/5, Sy.No.107, Tattiannaram (V),
GSI, Bandlaguda, Nagole, Hyd-68.

PRINCIPAL
PRINCIPAL
SREYAS INSTITUTE OF ENGG &TECH.
9-39, Sy.No: 107, Tattiannaram (V),
GSI, Bandlaguda, Nagole, Hyd-68.

Copy to:
1. A.O
2. All HODs
3. Associate Dean Academics
4. Dean IQAC
5. Accounts Section
6. Notice Board