# Academic Regulations
# Programme Structure
# and
# Detailed Syllabus

## Bachelor of Technology (B.Tech)
## in
## Electrical and Electronics Engineering

(Four Year Regular Programme)

(Applicable for Batches admitted from 2025-26)

# GOKARAJU RANGARAJU
# INSTITUTE OF ENGINEERING AND TECHNOLOGY

***(Autonomous)***

**Bachupally, Kukatpally, Hyderabad- 500 090**

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**HYDERABAD**

# Academic Regulations for B.Tech (Regular) under GR25

**(Applicable for Batches Admitted from 2025-26)**

## Under Graduate Degree Programme in Engineering and Technology (UG)

Gokaraju Rangaraju Institute of Engineering and Technology (GRIET) offers a 4-year (8 Semesters) Bachelor of Technology (B.Tech) degree programme. The following programmes are offered in GRIET.

| S.No | Department | Programme Code | Programme |
|---|---|---|---|
| 1 | Civil Engineering | 01 | B.Tech Civil Engineering |
| 2 | Electrical and Electronics Engineering | 02 | B.Tech Electrical and Electronics Engineering |
| 3 | Mechanical Engineering | 03 | B.Tech Mechanical Engineering |
| 4 | Electronics and Communication Engineering | 04 | B.Tech Electronics and Communication Engineering |
| 5 | Computer Science and Engineering | 05 | B.Tech Computer Science and Engineering |
| 6 | Computer Science and Business System | 32 | B.Tech Computer Science & Business System |
| 7 | Computer Science and Engineering (AIML) | 66 | B.Tech Computer Science and Engineering (Artificial Intelligence & Machine Learning) |
| 8 | Computer Science and Engineering (Data Science) | 67 | B.Tech Computer Science and Engineering (Data Science) |

GR25 Regulations shall govern the above programmes offered by the Departments with effect from the students admitted to the programmes in 2025-26 academic year is given below.

1. **Medium of Instruction:** The medium of instruction (including examinations and reports) is English.

2. **Admissions:** Admission to the undergraduate (UG) Programme shall be made subject to the eligibility, qualifications and specialization prescribed by the Telangana State Government/JNTUH University from time to time. Admissions shall be made either on the basis of the merit rank obtained by the student in the common entrance examination conducted by the Government/University or on the basis of any other order of merit approved by the Government/University, subject to reservations as prescribed by the Government/University from time to time.

3. **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 and a maximum period of eight academic years starting from the date of commencement of first year first semester, failing which student shall forfeit seat in B.Tech course. Each student has to secure a minimum of 160 credits out of 164 credits for successful completion of the undergraduate 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.

#### 3.2.1 Semester Scheme

The undergraduate programme is of four academic years and there shall be two semesters in each academic year. There shall be a minimum of 15 weeks of instruction, excluding the mid- term and semester-end exams. Around 15 instruction hours, 30 instruction hours and 45 hours of learning need to be followed per one credit of theory course, practical course and project/field-based learning respectively. In each semester, there shall be 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)' under Choice Based Credit System (CBCS).

#### 3.2.2 Credit Courses

All courses offered in each semester are to be registered by the student. Against each course in the course structure, the L: T: P: C (lecture periods: tutorial periods: practical periods: credits) pattern has been defined.

- One credit is allocated for one hour per week in a semester for lecture (L) or Tutorial (T) session.
- One credit is allocated for two hours per week in a semester for Laboratory/ Practical (P) session.
- One credit is allocated for three hours per week in a semester for Project/Mini-Project session.

For example, a theory course with three credit weightage requires three hours of classroom instruction per week, totaling approximately 45 hours of instruction over the entire semester.

### 3.2.3 Subject Course Classification

All subjects/courses offered for the undergraduate programme in E&T (B.Tech degree programmes) are broadly classified as follows.

| S. No. | Broad Course Classification | Course Group/ Category | Course Description |
|---|---|---|---|
| 1 | BS | Basic Sciences | Includes Mathematics, Physics and Chemistry courses |
| 2 | ES | Engineering Sciences | Includes Fundamental Engineering Courses |
| 3 | HS | Humanities and Social Sciences | Includes courses related to Humanities, Social Sciences and Management |
| 4 | PC | Professional Core | Includes core courses related to the parent branch of Engineering |
| 5 | PE | Professional Electives | Includes elective courses related to the parent branch of Engineering |
| 6 | OE | Open Electives | Elective courses which include inter-disciplinary courses or courses in an area outside the parent branch of Engineering |
| 7 | PC | Project Work | B.Tech Project Work |
| 8 | PC | Industry Training/ Internship/ Industry Oriented Mini- project | Industry Training/ Internship/ Industry Oriented Mini-Project |
| 9 | PC | Seminar | Seminar based on core contents related to parent branch of Engineering |
| 10 | SD | Skill Development Courses | Courses designed to help individuals gain, improve, or refine specific skills |
| 11 | VAC | Value Added Courses | Courses to build professional values, traditional knowledge and sensitization of societal issues |

## 4. Mandatory Induction Programme

An induction programme of one week duration for the UG students entering the institution, right at the start shall be implemented. Normal classes commence only after the induction programme is conducted. Following activities could be part of the induction programme: i) Physical Activity ii) Creative Arts iii) Imparting Universal Human Values iv) Literary Activities v) Lectures by Eminent People vi) Visits to Local Areas vii) Familiarization to department as well as entire institute and viii) Making students understand Innovative practices at the college premises etc.

## 5. Course Registration

**5.1** A faculty advisor / mentor shall be assigned to a group of around 20 students, who will advise the students about the undergraduate programme, its course structure and curriculum, choices/options of the courses, based on their competence, progress, pre-requisites and interest.

**5.2** A student shall register for all the courses offered in a semester as specified in the course structure. Course registrations are exercised through F-235 form.

**5.3 Professional Electives:** The students have to choose six Professional Electives (PE-I to PE- VI) from the specified list.

Students have the flexibility to choose from the list of professional electives offered by the Institute or opt to register for the equivalent Massive Open Online Courses (MOOCs).

**5.4 Open Electives:** Students have to choose three Open Electives (OE-I, II & III) from the two threads of Open Electives given by other than the parent department. However, the student can opt for an Open Elective course offered by his parent department, if the student has not studied that course so far. Similarly, Open Elective courses being studied should not match with any courses of the forthcoming semesters.

Students have the flexibility to choose from the list of open electives offered by the Institute or opt to register for the equivalent Massive Open Online Courses (MOOCs).

**5.5 Provision for Early Registration of MOOCs:**

For a professional elective/ open elective in a semester, students are allowed to register for an equivalent MOOCs course listed from time to time by the University one semester in advance. For example, a Professional Elective of III Year II Sem shall be allowed to register under MOOCs platform in III year I Sem.

The credits earned in one semester in advance can be submitted in the subsequent semester for the assessment.

The students who have registered in advance in an equivalent MOOCs course and fail to secure any pass grade in the MOOCs course, can register for the regular course offered in the following semester of their course structure.

**5.6 Conversion of Marks Secured in MOOCs into Grades:** Marks secured in the internal and external evaluations of a MOOCs course shall be scaled to 40 and 60 marks respectively. The sum of these two components shall be considered as the total marks out of 100. The corresponding grade shall then be determined as per the marks-to-grades conversion rules

specified in Clause 10.3.

**5.7** MOOCs are allowed only for PE-I, PE-II/OE-I, OE-II courses and for few Minors & Honors courses

**5.8 Additional learning resources:**

Students are encouraged to acquire additional course-related knowledge by auditing learning resources from MOOCs platforms for each course offered in their course structure. These additional courses are not meant for earning credits but are intended to enhance knowledge.

## 6. Rules to offer Elective courses

**6.1** An elective course may be offered to the students, only if a minimum of 25% of class strength opts for it.

**6.2** Same elective course for different sections may be offered by different faculty members. The selection of elective course by students will be based on first come first serve and / or CGPA criterion.

**6.3** If the number of students registrations are more than the strength of one section, then it is choice of the concerned Department to offer the same course for more than one section based on the resources available in the department.

## 7. Attendance requirements:

**7.1** A student shall be eligible to appear for the semester-end examinations, if the student acquires a minimum of 75% of aggregate attendance of all the courses for that semester.

**7.2** Shortage of attendance in aggregate upto 10% (securing 65% and above but 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.

**7.3** A stipulated fee shall be payable for condoning of shortage of attendance as notified in the respective college websites.

**7.4** Two hours of attendance for each theory course shall be considered, if the student appears for the mid-term examination of that course.

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

**7.6** Students whose shortage of attendance is not condoned in any semester, are not eligible to take their semester-end examinations of that semester. They get detained and will not be promoted to the next semester. Their registration for that semester shall stand cancelled, including internal marks. They may seek re-registration for that semester in the next academic year.

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

## 8. Criteria for Earning of Credits in a Course

**8.1** A student shall be deemed to have satisfied the academic requirements and earned the credits

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

**8.2** A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Field Based Research Project / Industry Oriented Mini Project / Internship, 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/she (i) does not submit a report on Field-Based Research Project/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 Field-Based Research Project / Industry Oriented Mini Project / Internship evaluations.

**8.3** A student eligible to appear in the semester-end examination for any course, is absent from it or failed (thereby failing to secure 'C' grade or above) may re-appear for that course in the supplementary examination as and when it is conducted. In such cases, internal marks assessed in continuous internal evaluation (CIE) earlier for that course will be carried over, and added to the marks obtained in the SEE supplementary/make-up examination. If the student secures sufficient marks for passing, 'C' grade or above shall be awarded as specified in clause 10.3.

## 9. Distribution of Marks and Evaluation

**9.1** The performance of a student in every course (including Value Added Courses and Skill Development Courses, Laboratory/Practical and Project Work) will be evaluated for 100 marks each, with 40 marks allotted for CIE (Continuous Internal Evaluation) and 60 marks for SEE (Semester End-Examination), irrespective of the credits allocated.

### 9.2 Continuous Internal Evaluation (CIE)

#### 9.2.1 Theory Courses:

For theory courses, 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, totaling to 30 marks. Total duration of mid-term examination is two hours.

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

The objective/quiz paper is set with multiple choice, fill-in the blanks and match the following type of questions for a total of 10 marks.

The descriptive paper shall contain 6 questions out of which, the student has to answer 4 questions, each carrying 5 marks. The average of the two Mid Term Examinations shall be taken as the final marks for Mid Term Examination (for 30 marks).

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. Questions will be drawn from the mid-term exam syllabus, ensuring uniform coverage of all topics.

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

2. Five marks for the assignment for 5 marks. Student shall submit two assignments and the average of 2 Assignments each for 5 marks shall be taken. 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.

3. Five marks for the Quiz/Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in the concerned subject. This assessment shall be completed before II Mid-Term Examination.

#### 9.2.2 Graphics for Engineers Course:

For this course, 20 marks will be allocated for day-to-day assessments conducted during drawing practice sessions, and another 20 marks will be allocated for the mid-term examination. In the mid-term examination, students shall attempt any four out of six given questions. Each mid examination is conducted for 90 minutes. Average of the two mid exams shall be considered.

**9.3 Computer-Based Test (CBT)** in each course is available for students who either:

1. missed one of the two mid-term examinations due to unavoidable circumstances, or
2. attended both mid-term examinations but wish to improve their internal marks.

The CBT will be conducted at the end of the semester and will carry a total of 30 marks. The marks obtained in the CBT will be considered equivalent to those obtained in one mid-term examination. Zero marks will be awarded to students who are absent from the mid-term examination. The average of the best two scores from the three exams (the two mid-term exams and the CBT), combined with other internal assessment components, will constitute the Continuous Internal Improvement (CII) marks for that specific course.

### 9.4 Semester End Examination for theory courses

#### 9.4.1 Theory Courses:

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

- Part-A is compulsory, consists of five short answer questions covering all units of syllabus; each question carries two marks.

- Part-B consists of five questions carrying 10 marks each. There shall be two questions asked in the question paper from each unit with either-or choice and the student should answer either of the two questions. The student shall answer one question from each of five units.

#### 9.4.2 Graphics for Engineers Course:

Question paper consists of five questions carrying 12 marks each. There shall be two questions asked in the question paper from each unit with either-or choice and the student should answer either of the two questions. The student shall answer one question from each of five units. There shall be no section with short answer questions.

#### 9.4.3 Duration of SEE:

The duration of Semester End Examination of theory and graphics for engineers courses is 3 hours.

### 9.5 Continuous Internal Evaluation and Semester End Examination for Practical Courses

For practical courses there shall be a Continuous Internal Evaluation (CIE) during the semester for 40 marks and semester-end examination for 60 marks. The breakup of the continuous internal evaluation for 40 marks is as follows:

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

The Semester End Examination for practical courses shall be conducted with an external examiner and the laboratory course teacher. The external examiner shall be appointed from the college outside their cluster and not from a group colleges.

In the Semester End Examination for practical courses held for 3 hours, rubrics of evaluation for 60 marks is as given 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.

For any change of experiment, 5 marks will be deducted from the total of 60 marks. If second time change of experiment is requested, another five marks will be deducted from the 60 marks. No third change will be permitted.

### 9.6 Field-based Research Project:

There shall be a Field-based Research Project in the intervening summer between II-II and III- I Semesters. Students will register for this project immediately after II Year II Semester examinations and pursue it during summer vacation. The Field-based Research Project shall be submitted in a report form and presented before the committee in III year I semester. It shall be evaluated for 100 external marks. The evaluation committee shall consist of an External Examiner, Head of the Department, Supervisor of the Project and a Senior Faculty Member of the department. There shall be no internal marks for Field-based Research Project. Student shall have to earn 40% marks, i.e 40 marks out of 100 marks. 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 committee as per schedule, or (iii) secures less than 40% marks in this course.

## 9.7 Internship/Industry Oriented Mini Project:

There shall be an Internship/Industry Oriented Mini Project in collaboration with an industry from their specialization. Students shall register for this project immediately after III Year II Semester Examinations and pursue it during summer vacation. Internship should be carried out at an organization (or) Industry. The Industry Oriented Mini Project shall be submitted in a report form and presented before the committee in IV Year I Semester before the semester end 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/Internship, and a Senior Faculty Member of the Department.

**9.7.1** For evaluating industry-oriented mini-projects, it is preferable to appoint an external examiner from the industry, ideally from one of the organizations/ industries with which the institute has established / proposing to establish collaborations.

## 9.8UG Project Work:

**9.8.1** The UG project work shall be initiated at the beginning of the IV Year II Semester and the duration of the project work is one semester. The student must present in consultation with his/her supervisor, the title, objective and plan of action of his/her Project work to the departmental committee for approval within two weeks from the commencement of IV Year II Semester. Only after obtaining the approval of the departmental committee, the student can start his/her project work.

**9.8.2** Student has to submit project work report at the end of IV Year II Semester. The project work shall be evaluated for 100 marks. Out of which 40 marks and 60 marks are allocated for CIE and External Evaluation respectively.

**9.8.3** For internal evaluation, the departmental committee consisting of Head of the Department, Project Supervisor and a Senior Faculty Member shall evaluate the project work for 40 marks. The distribution of marks is as follows:

- Objective(s) of the work done - 05 Marks
- Methodology adopted - 15 Marks
- Results and Discussions - 15 Marks
- Conclusions and Outcomes - 05 Marks
- Total - 40 Marks

**9.8.4** The External Evaluation shall be conducted by the external examiner for a total of 60 marks. It shall comprise the presentation of the work, communication skills, and viva-voce, with a weightage of 20 marks, 15 marks, and 25 marks respectively.

The topics for main Project shall be different from the topic of Industry Oriented Mini Project/ Internship/SDC. 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.

**9.8.5** For conducting viva-voce exam of project work, Controller of Examination appoints an external examiner. The external examiner may be selected from the list of experts submitted by the Head of the department.

**9.8.6** A student who has failed, may re-appear once for the above evaluation, when it is scheduled again; if student fails in such 'one re-appearance' evaluation also, he/she has to appear for the same in the next subsequent year, as and when it is scheduled.

### 9.9 Skill Development Courses:

Skill Development Courses are included in the Curriculum. Each Skill Development Course carries one credit. The evaluation pattern will be same as that of a laboratory course including the internal and external assessments.

The objective of Skill Courses is to develop the cognitive skills as well as the psychomotor skills.

### 9.10 Value-Added Courses:

The evaluation of Value-Added Courses shall be similar to that of theory courses. However, the scheduling of these mid-term exams and semester-end examinations may not be combined with main-stream examinations. One hour /45 mins proctored mid-term examination shall be conducted in the regular class by the same subject teacher. It should not impact the conduct of other classes on that day. The scheduling of the semester-end examinations shall also be intimated by the controller of examination from time to time.

## 10. Grading Procedure

**10.1** Absolute grading system is followed for awarding the grades to each course.

**10.2** Grades will be awarded to indicate the performance of students in each Theory, Laboratory, Industry-Oriented Mini Project/ Internship/ Skill development course and Project Work. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in clause 8 above, a letter grade shall be given as explained in the following clause.

**10.3** To measure the performance of a student, a 10-point grading system is followed. The mapping between the percentage of marks secured and the corresponding letter grade is as follows:

| Letter Grade | Grade Point | Percentage of marks |
|---|---|---|
| O (Outstanding) | 10 | Marks >= 90 |
| A+ (Excellent) | 9 | Marks >= 80 and Marks < 90 |
| A (Very Good) | 8 | Marks >= 70 and Marks < 80 |
| B+ (Good) | 7 | Marks >= 60 and Marks < 70 |
| B (Average) | 6 | Marks >= 50 and Marks < 60 |
| C (Pass) | 5 | Marks >= 40 and Marks < 50 |
| F (Fail) | 0 | Marks < 40 |
| Ab (Absent) | 0 | Absent |

Letter grade 'F' in any Course implies failure of the student in that course and no credits of the above table are earned.

### 10.4 Computation of SGPA and CGPA:

The UGC recommends the following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

**i)** **$S_k$** the SGPA of **$k^{th}$** semester (1 to 8) is the ratio of sum of the product of the number of credits and grade points to the total credits of all courses registered by a student, i.e.,

$$GPA\ (S_k) = \sum_{i=1}^{n} (C_i * G_i) / \sum_{i=1}^{n} C_i$$

Where **Ci** is the number of credits of the **$i^{th}$** course and **Gi** is the grade point scored by the student in the **$i^{th}$** course and **n** is the number of courses registered in that semester.

**ii)** The CGPA is calculated in the same manner taking into account all the courses **m**, registered by student over all the semesters of a programme, i.e., up to and inclusive of **$S_k$**, where **$k \geq 2$**.

$$CGPA = \sum_{i=1}^{m} (C_i * G_i) / \sum_{i=1}^{m} C_i$$

**iii)** The CGPA of the entire B.Tech programme shall be calculated considering the best 160 credits earned by the student.

**iv)** The SGPA and CGPA shall be rounded off to 2 decimal points.

## 11. 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 and fulfilment of attendance requirement. |
| 2 | First year second semester to Second year first semester | (i) Regular course of study of first year second semester and fulfilment of attendance requirement<br>(ii) Must have secured at least **25%** of the total 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 and fulfilment of attendance requirement. |

| | | |
|---|---|---|
| 4 | Second year second semester to Third year first semester | (i) Regular course of study of second year second semester and fulfilment of attendance requirement.<br>(ii) Must have secured at least **25%** of the total 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 and fulfilment of attendance requirement. |
| 6 | Third year second semester to Fourth year first semester | Regular course of study of third year second semester and fulfilment of attendance requirement. |
| 7 | Fourth year first semester to Fourth year second semester | Regular course of study of fourth year first semester and fulfilment of attendance requirement. |

**12. Re-admission after Detention**

- A student detained due to lack of credits, shall be promoted to the next academic year only after acquiring the required number of credits.
- A student detained due to shortage of attendance shall be admitted in the same semester in the successive academic years.
- When a student is readmitted in the following academic years, the academic regulations under which the student seeks re-admission shall only be applicable to this student, not the academic regulations in which he got admitted in his/her first year of study.

**13. Credit Exemption**

A student (i) shall register for all courses covering 164 credits as specified and listed in the course structure and (ii) earn 160 or more credits to successfully complete the undergraduate programme.

- Best 160 credits shall be considered for CGPA computation. The student can avail exemption of courses totaling up to 4 credits other than Professional core courses, Laboratory Courses, Seminars, Project Work and Field Based Research Project / Industry Oriented Mini Project / Internship, for optional drop out from these 164 credits registered;
- The semester grade point average (SGPA) of each semester shall be mentioned at the bottom of the grade card, when all the subjects in that semester have been passed by the student.
- Credits earned by the student in either a Minor or Honors program cannot be counted towards the required 160 credits for the award of the B.Tech degree.

**14. Award of Degree:**

**14.1** After a student satisfies all the requirements prescribed for the completion of the Degree and becomes eligible for the award of B.Tech Degree by JNTUH, he/she shall be placed in one of

the following four classes based on CGPA secured from the 160 credits.

| S. No | Class Awarded | CGPA Secured |
|---|---|---|
| 1 | First Class with Distinction | CGPA >= 7.50 with no F or below grade/ detention anytime during the programme |
| 2 | First Class | CGPA >= 7.50 with rest of the clauses of S.No 1 not satisfied |
| 3 | First Class | CGPA >= 6.50 and CGPA < 7.50 |
| 4 | Second Class | CGPA >=5.50 and CGPA < 6.50 |
| 5 | Pass Class | CGPA >= 5.00 and CGPA < 5.50 |

Equivalence of grade to marks

Marks % = (CGPA -0.5)*10

### 14.2 Grace Marks

Grace marks shall be given to those students who complete the course work of four year B.Tech degree, not secured pass grade in not more than three subjects and adding a specified grace marks enables the student to pass the subject(s) as well as gets eligibility to receive the provisional degree certificate.

Grace marks for students admitted under the GR25 Academic Regulations should not exceed 0.15% of the total maximum marks in all eight semesters (excluding the marks allocated for value added courses and skill development courses).

## 15. Multiple Entry Multiple Exit Scheme (MEME)

### 15.1 Exit Option after Second Year:

Students enrolled in the 4-Year B.Tech program are permitted to exit the program after successful completion of the second year (B.Tech II Year II Semester). The students who desire to exit after the II year shall formally inform the exit plan one semester in advance i.e. at the commencement of II Year II Semester itself. Such students need to fulfil the additional requirements as specified in Clause 15.2 described below.

Upon fulfilling the requirements like earning all the credits up to II Year II Semester and successfully completing the additional requirements, the students will be awarded a 2-Year Undergraduate (UG) Diploma in the concerned engineering branch.

### 15.2 Additional Requirements for Diploma Award

To qualify for the diploma under the exit option, students must also complete 2 additional credits through one of the following University-prescribed pathways:

**Work-based Vocational Course:**

Participation in a practical, hands-on vocational training program relevant to the engineering field, typically conducted during the summer term.

**Internship/Apprenticeship:**

Completion of a minimum 8-week internship or apprenticeship in their related field to gain practical industry exposure. In addition, students must clear any associated course(s) and submit the internship/ apprenticeship report.

### 15.3 Re-entry into the B.Tech Programme

Students who have exited the B.Tech program with a 2-Year UG Diploma may apply for re-entry into the Third Year (Fifth Semester) of the B.Tech program. Re-entry is subject to the following conditions:

- The student must surrender the awarded UG Diploma Certificate.
- Students who wish to rejoin in III Year must join the same B.Tech program and same college from which the student exited. Before rejoining, students should check for continuation of the same branch at the college. If the specific branch is closed in that particular college, then student should consult the University for the possible alternative solutions.
- Re-registered students will be governed by the academic regulations in effect at the time of re-entry, regardless of the original regulations under which they were admitted.
- If a student opts to continue his/her studies without a gap after being awarded the diploma, they must register for the third-year courses before the commencement of classwork.

### 15.4 Break in Study and Maximum Duration

Students are allowed to take a break of up to four years after completion of II Year II Semester with prior permission.

Re-entry after such a break is subject to the condition that the student completes all academic requirements within twice the duration of the program (i.e., within 8 years for a 4-year B.Tech programme).

## 16. Transitory Regulations for the students re-admitted in GR25 Regulations:

**16.1** Transitory regulations are applicable to the students detained due to shortage of attendance as well as detained due to the shortage of credits and seek permission to re-join the B.Tech programme, where GR25 regulations are in force.

**16.2** A student detained due to shortage of attendance and re-admitted in GR25 regulations: Such students shall be permitted to join the same semester, but in GR25 Regulations.

**16.3** A student detained due to shortage of credits and re-admitted in GR25 regulations: Such students shall be promoted to the next semester in GR25 regulations, only after acquiring the required number of credits as per the corresponding regulations of his/her previous semester.

**16.4** A student who has failed in any course in a specific regulation has to pass those courses in the same regulations.

**16.5** If a student is readmitted to GR25 Regulations and has any course with 80% of syllabus common with his/her previous regulations, that particular course in GR25 Regulations will be substituted by an equivalent course of previous regulations

**16.6** The GR25 Academic Regulations are applicable to a student from the year of re-admission. However, the student is required to complete the study of B.Tech degree within the stipulated period of eight academic years from the year of first admission.

## 17 Student Transfers

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

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

**17.3** The students seeking transfer to colleges affiliated to JNTUH from various other Universities/institutions is having back-logs at the previous University/institute, have to pass the courses offered at JNTUH which are equivalent to the failed courses at the previous University/institute.

**17.4** The transferred students from other Universities/Institutions to JNTUH affiliated colleges, shall be given a chance to write CBTs for getting CIE component in the equivalent course(s) as per the clearance letter issued by the University.

## 18 Honors and Minor Degree Programmes

Honors Degree programme is available for B.Tech CSE and Minor Degree programme is available in Artificial Intelligence & Machine Learning for all branches of B.Tech. degree except for B.Tech CSE(AIML). Minor Degree programmes will commence from II Year II Semester and continue till IV Year I semester and Honors Degree programmes will commence from III Year I Semester and continue till IV Year II Semester.

# Academic Regulations for B.Tech (Lateral Entry) under GR25

**(Applicable for Batches Admitted from 2025-26)**

**1.** All regulations as applicable for B.Tech 4-year degree programme (Regular) will hold good for B.Tech (Lateral Entry Scheme) except for the following rules:

**a)** Pursued programme of study for not less than three academic years and not more than six academic years.

**b)** A student should register 123/124 credits and secure 120 credits. The marks obtained in all 120 credits shall be considered for the calculation of the final CGPA.

**c)** The student can avail exemption of courses totaling up to 3/4 credits other than Professional core courses, Laboratory Courses, Seminars, Project Work and Field Based Research Project/ Industry Oriented Mini Project / Internship, for optional drop out.

**d)** Lateral Entry students are not permitted to exit the B.Tech. program after completion of second year (B.Tech. II Year II Semester).

**e)** Students who fail to fulfil all the academic requirements for the award of the degree within six academic years from the year of their admission, shall forfeit their seat in B.Tech programme.

**2. Academic Requirements and Promotion Rules:**

**a)** A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or laboratories if he/she secures not less than 35% of marks in the Semester-End Examination and a minimum of 40% of the sum total of the Internal Evaluation and Semester-End Examination taken together.

**b)** A student shall be promoted to the next year only when he/she satisfies the requirements of all the previous semesters.

| 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 and fulfilment of attendance requirement. |
| 2 | Second year second semester to Third year first semester | (i) Regular course of study of second year second semester and fulfilment of attendance requirement.<br>(ii) Must have secured at least **25%** of the total 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 and fulfilment of attendance requirement. |
| 4 | Third year second semester to Fourth year first semester | Regular course of study of third year second semester and fulfilment of attendance requirement. |
| 5 | Fourth year first semester to Fourth year second semester | Regular course of study of fourth year first semester and fulfilment of attendance requirement. |

3. **Award of Class:** After a student satisfies all the requirements prescribed for the completion of the Degree and becomes eligible for the award of B.Tech Degree by JNTUH, he/she shall be placed in one of the following four classes based on CGPA secured from the 120 credits.

| S. No | Class Awarded | CGPA Secured |
|---|---|---|
| 1 | First Class with Distinction | CGPA >= 7.50 with no F or below grade/ detention anytime during the Programme |
| 2 | First Class | CGPA >= 7.50 with rest of the clauses of S.no 1 not satisfied |
| 3 | First Class | CGPA >=6.50 and CGPA < 7.50 |
| 4 | Second Class | CGPA >= 5.50 and CGPA < 6.50 |
| 5 | Pass Class | CGPA >= 5.00 and CGPA < 5.50 |

# Academic Regulations for B.Tech with Minors Programme under GR25

**(Applicable for Batches Admitted from 2025-26)**

## 1. Objectives

The key objectives of offering B.Tech with Minor programme are:

- To expand the domain knowledge of the students in one of the other programmes of engineering.
- To increase the employability of undergraduate students keeping in view of better opportunity in interdisciplinary areas of engineering & technology.
- To provide an opportunity to students to pursue their higher studies in the inter-disciplinary areas in addition to their own programme of study.
- To offer the knowledge in the areas which are identified as emerging technologies/thrust areas of Engineering.

## 2. Academic Regulations for B.Tech Degree with Minor programmes

**a)** The weekly instruction hours, internal & external evaluation and award of grades are on par with regular 4 -Years B.Tech programme.

**b)** For B.Tech with Minor, a student needs to earn additional 18 credits (over and above the required 160 credits for B.Tech degree). Minor Degree programmes will commence from II Year II Semester and continue till IV Year I Semester.

**c)** After registering for the Minor programme, if a student is unable to earn all the required 18 credits in a specified duration (twice the duration of the course), he/she shall not be awarded Minor degree. However, if the student earns all the required 160 credits of B.Tech, he/she will be awarded only B.Tech degree in the concerned programme.

**d)** There is no transfer of credits from Minor programme courses to regular B.Tech degree course and vice versa.

**e)** These 18 credits are to be earned from the additional Courses offered by the host department in the college as well as from the MOOCs platform.

**f)** For the course selected under MOOCs platform following guidelines may be followed:

**i)** Prior to registration of MOOCs courses, formal approval of the courses, by the University is essential. University before the issue of approval considers the parameters like the institute / agency which is offering the course, syllabus, credits, duration of the programme and mode of evaluation etc.

**ii)** Minimum credits for MOOCs course must be equal to or more than the credits specified in the Minor course structure provided by the University.

**iii)** Only Pass-grade/marks or above shall be considered for inclusion of grades in minor grade memo.

**iv)** Any expenses incurred for the MOOCs courses are to be met by the students only.

**g)** The option to take a Minor programme is purely the choice of the student.

**h)** The student shall be given a choice of withdrawing all the courses registered and/or the credits earned for Minor programme at any time; and in that case the student will be awarded only B.Tech degree in the concerned programme on earning the required credits of 160.

**i)** The student can choose only one Minor programme along with his/her basic engineering degree. A student who chooses an Honors programme is not eligible to choose a Minor programme and vice-versa.

**j)** A student can graduate with a Minor if he/she fulfils the requirements for his/her regular B.Tech programme as well as fulfils the requirements for Minor programme.

**k)** The institute shall maintain a record of students registered and pursuing their Minor programmes, minor programme-wise and parent programme -wise. The same report needs to be sent to the University once the enrolment process is complete.

**l)** The institute / department shall prepare the time-tables for each Minor course offered at their respective institutes without any overlap/clash with other courses of study in the respective semesters.

**3. Eligibility conditions for the student to register for Minor programme**

**a)** A student can opt for B.Tech programme with Minor programme if she/he has no active backlogs till II Year I Semester (III semester) at the time of entering into II year II semester.

**b)** Prior approval of mentor and Head of the Department for the enrolment into Minor programme, before commencement of II year II Semester (IV Semester), is mandatory

**c)** If more than 50% of the students in a programme fulfil the eligibility criteria (as stated above), the number of students given eligibility should be limited to 50%.

**4. Registration for the courses in Minor Programme**

**a)** At the beginning of each semester, just before the commencement of classes, students shall register for the courses which they wish to take in that semester.

**b)** The students should choose a course from the list against each semester (from Minors course structure) other than the courses they have studied/registered for regular B.Tech programme. No course should be identical to that of the regular B.Tech course. The students should take the advice of faculty mentors while registering for a course at the beginning of semester.

**c)** The maximum No. of courses for the Minor is limited to two (three in case of inclusion of lab) in a semester along with regular semester courses.

**d)** The registration fee to be collected from the students by the College is **Rs. 1000/-** per one credit.

**e)** A fee for late registration may be imposed as per the norms.

**5. Minor courses and the offering departments**

| S. No. | Minor Programme | Eligible programme of students | @Offering Department | Award of Degree |
|---|---|---|---|---|
| 1. | Artificial Intelligence & Machine Learning | All programmes, except B.Tech in CSE (AI&ML) /B.Tech (AI&ML)/ B.Tech (AI)/ B.Tech CSE(AI) | CSE | "B.Tech in programme name with Minor in Artificial Intelligence & Machine Learning" |

# GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

**(Autonomous)**

**Bachupally, Kukatpally, Hyderabad–500090, India.**

## ELECTRICAL AND ELECTRONICS ENGINEERING
## B. Tech (EEE) – GR25 Course Structure

### I B. Tech (EEE) - I Semester

| S.No | BOS | Group | Course Code | Course Name | L | T | P | Credits |
|---|---|---|---|---|---|---|---|---|
| 1 | Maths | BS | GR25A1001 | Linear Algebra and Function Approximation | 3 | 1 | 0 | 4 |
| 2 | Chemistry | BS | GR25A1004 | Engineering Chemistry | 3 | 0 | 0 | 3 |
| 3 | EEE | ES | GR25A1010 | Fundamentals of Electrical and Electronics Engineering | 2 | 0 | 0 | 2 |
| 4 | CSE | ES | GR25A1006 | Programming for Problem Solving | 2 | 0 | 0 | 2 |
| 5 | Mgmt | HS | GR25A1027 | Innovation and Design Thinking | 1 | 0 | 0 | 1 |
| 6 | ME | ES | GR25A1024 | Engineering Workshop | 1 | 0 | 3 | 2.5 |
| 7 | ME | ES | GR25A1015 | Graphics for Engineers | 1 | 0 | 4 | 3 |
| 8 | EEE | ES | GR25A1011 | Elements of Electrical and Electronics Engineering Lab | 0 | 0 | 2 | 1 |
| 9 | Chemistry | BS | GR25A1018 | Engineering Chemistry Lab | 0 | 0 | 2 | 1 |
| 10 | CSE | ES | GR25A1020 | Programming for Problem Solving Lab | 0 | 0 | 3 | 1.5 |
| | | **TOTAL** | | | **13** | **1** | **14** | **21** |

**I B. Tech (EEE) - II Semester**

| S. No | BOS | Group | Course Code | Course Name | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | Credits |
| 1 | Maths | BS | GR25A1002 | Differential Equations and Vector Calculus | 3 | 1 | 0 | 4 |
| 2 | Physics | BS | GR25A1003 | Advanced Engineering Physics | 3 | 0 | 0 | 3 |
| 3 | English | HS | GR25A1005 | English for Skill Enhancement | 3 | 0 | 0 | 3 |
| 4 | CSE | ES | GR25A1016 | Data Structures | 2 | 0 | 0 | 2 |
| 5 | EEE | ES | GR25A1013 | Electrical Circuit Analysis | 2 | 1 | 0 | 3 |
| 6 | Physics | BS | GR25A1017 | Advanced Engineering Physics Lab | 0 | 0 | 2 | 1 |
| 7 | CSE | ES | GR25A1023 | Data Structures Lab | 0 | 0 | 2 | 1 |
| 8 | English | HS | GR25A1019 | English Language and Communication Skills Lab | 0 | 0 | 2 | 1 |
| 9 | EEE | ES | GR25A1021 | Electrical Circuit Analysis Lab | 0 | 0 | 2 | 1 |
| | | **TOTAL** | | | **13** | **2** | **8** | **19** |

**II B.Tech(EEE) - I Semester**

| S.No | BOS | Group | Course Code | Course Name | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | **L** | **T** | **P** | **Credits** |
| 1 | Maths | BS | GR25A2102 | Numerical Methods and Complex Variables | 3 | 0 | 0 | 3 |
| 2 | EEE | PC | GR25A2023 | Sensors Measurements and Instrumentation | 2 | 1 | 0 | 3 |
| 3 | EEE | PC | GR25A2024 | Principles of Analog Electronics | 3 | 0 | 0 | 3 |
| 4 | EEE | PC | GR25A2025 | DC Machines and Transformers | 3 | 0 | 0 | 3 |
| 5 | EEE | PC | GR25A2026 | Electromagnetic Fields | 3 | 0 | 0 | 3 |
| 6 | CSE | PC | GR25A2027 | Database for Engineers | 1 | 0 | 0 | 1 |
| 7 | Mgmt | VAC | GR25A2002 | Value Ethics and Gender Culture | 1 | 0 | 0 | 1 |
| 8 | EEE | PC | GR25A2028 | Principles of Analog Electronics Lab | 0 | 0 | 2 | 1 |
| 9 | EEE | PC | GR25A2029 | DC Machines and Transformers Lab | 0 | 0 | 2 | 1 |
| 10 | EEE | PC | GR25A2030 | Sensors Measurements and Instrumentation Lab | 0 | 0 | 2 | 1 |
| 11 | CSE | SD | GR25A2007 | Java Programming for Engineers Lab | 0 | 0 | 2 | 1 |
| | | **TOTAL** | | | **16** | **1** | **8** | **21** |

**II B.Tech (EEE) - II Semester**

| S.No | BOS | Group | Course Code | Course Name | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | **L** | **T** | **P** | **Credits** |
| 1 | EEE | PC | GR25A2031 | Power Generation and Distribution | 3 | 0 | 0 | 3 |
| 2 | EEE | PC | GR25A2032 | AC Machines | 2 | 1 | 0 | 3 |
| 3 | EEE | PC | GR25A2033 | Control Systems | 3 | 0 | 0 | 3 |
| 4 | EEE | PC | GR25A2034 | Principles of Digital Electronics | 3 | 0 | 0 | 3 |
| 5 | EEE | PC | GR25A2035 | Microprocessors and Microcontrollers | 3 | 0 | 0 | 3 |
| 6 | Chemistry | VAC | GR25A2001 | Environmental Science | 1 | 0 | 0 | 1 |
| 7 | EEE | PC | GR25A2036 | Principles of Digital Electronics Lab | 0 | 0 | 2 | 1 |
| 8 | EEE | PC | GR25A2037 | AC Machines Lab | 0 | 0 | 2 | 1 |
| 9 | EEE | PC | GR25A2038 | Control Systems Lab | 0 | 0 | 2 | 1 |
| 10 | EEE | SD | GR25A2103 | PCB Design Lab | 0 | 0 | 2 | 1 |
| | | **TOTA L** | | | **16** | **1** | **6** | **20** |

**III YEAR I SEMESTER**

| S.No | BOS | Group | Course Code | Course Name | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | Credits |
| 1 | EEE | PC | | Power Transmis Sion Systems | 2 | 1 | 0 | 3 |
| 2 | EEE | PC | | Power Electronics | 3 | 0 | 0 | 3 |
| 3 | EEE | PC | | Power System Protection | 3 | 0 | 0 | 3 |
| 4 | EEE | PE | | Professional Elective I | 3 | 0 | 0 | 3 |
| 5 | EEE | OE | | Open Elective I | 3 | 0 | 0 | 3 |
| 6 | Englis h | HS | | Effective Technica l Commun icat ion | 1 | 0 | 0 | 1 |
| 7 | Englis h | VAC | | Indian Knowled ge System | 1 | 0 | 0 | 1 |
| 8 | EEE | PC | | Power System Protection Lab | 0 | 0 | 2 | 1 |
| 9 | EEE | PC | | Power Electronics Lab | 0 | 0 | 2 | 1 |
| 10 | EEE | PC | | Microproce ssors and Microcontr ollers Lab | 0 | 0 | 2 | 1 |
| 11 | EEE | PW | | Field-Based Project/Intern ship | 0 | 0 | 4 | 2 |
| | | **TOTAL** | | | **16** | **1** | **10** | **22** |

| **Professional Elective –I** | | | |
|---|---|---|---|
| **S.No** | **BOS** | **Course Code** | **Course Name** |
| 1 | EEE | | Wide Band Gap power Devices |
| 2 | EEE | | Solar And Wind Energy Systems |
| 3 | EEE | | Electrical Machine Design |
| 4 | MECH | | Operations Research |

| Open Elective I | | | |
|---|---|---|---|
| **S.No.** | **BOS** | **Course Code** | **COURSE** |
| 1 | EEE | | Non-Conventional Energy Sources |

**III YEAR II SEMESTER**

| S.No | BOS | Group | Course Code | Course Name | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | Credits |
| 1 | EEE | PC | | DSP based Electromechanical Systems | 3 | 0 | 0 | 3 |
| 2 | EEE | PC | | Power System Analysis | 2 | 1 | 0 | 3 |
| 3 | Mgnt | HS | | Economics and Accounting for Engineers | 3 | 0 | 0 | 3 |
| 4 | EEE | PE | | Professional Elective II | 3 | 0 | 0 | 3 |
| 5 | EEE | OE | | Open Elective II | 3 | 0 | 0 | 3 |
| 6 | EEE | PC | | Power System Analysis Lab | 0 | 0 | 2 | 1 |
| 7 | EEE | PC | | DSP based Electrical Lab | 0 | 0 | 2 | 1 |
| | | **TOTAL** | | | **14** | **1** | **4** | **17** |

| **Professional Elective -II** | | | |
|---|---|---|---|
| **S.No** | **BOS** | **Course Code** | **Course Name** |
| 1 | EEE | | Modelling and Simulation of Power Electronic Converters |
| 2 | EEE | | HVDC Transmission Systems |
| 3 | EEE | | Advanced Control Systems |
| 4 | CSE | | Operating Systems |

| **Open Elective II** | | | |
|---|---|---|---|
| **S.No.** | **BOS** | **Course Code** | **COURSE** |
| 1 | EEE | | Concepts of Control Systems |

**IV YEAR I SEMESTER**

| S.No | BOS | Group | Course Code | Course Name | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | Credits |
| 1 | EEE | PC | | Power Semiconductor Drives | 2 | 1 | 0 | 3 |
| 2 | EEE | PC | | Electric and Hybrid Vehicles | 3 | 0 | 0 | 3 |
| 3 | EEE | PE | | Professional Elective III | 3 | 0 | 0 | 3 |
| 4 | EEE | PE | | Professional Elective IV | 3 | 0 | 0 | 3 |
| 5 | Mgnt | HS | | Fundamentals of Management and Entrepreneurship | 3 | 0 | 0 | 3 |
| 6 | EEE | OE | | Open Elective III | 3 | 0 | 0 | 3 |
| 7 | EEE | PC | | Power Semiconductor Drives Lab | 0 | 0 | 2 | 1 |
| 8 | EEE | PW | | Industry Oriented Mini Project/Summer Internship | 0 | 0 | 4 | 2 |
| | | **TOTAL** | | | **17** | **1** | **6** | **21** |

| **Professional Elective -III** | | | |
|---|---|---|---|
| **S.No** | **BOS** | **Course Code** | **Course Name** |
| 1 | EEE | | Modern Power Electronics |
| 2 | EEE | | High Voltage Engineering |
| 3 | EEE | | Digital Control Systems |
| 4 | EEE | | Industrial Automation |
| **Professional Elective -IV** | | | |
| **S.No** | **BOS** | **Course Code** | **Course Name** |
| 1 | EEE | | Power Quality and FACTS |
| 2 | EEE | | Utilization of Electrical Energy |
| 3 | EEE | | Special Electrical Machines |
| 4 | ECE | | VLSI Design |

| Open Elective III | | | |
|---|---|---|---|
| **S.No.** | **BOS** | **Course Code** | **COURSE** |
| 1 | EEE | | Artificial Neural Networks and Fuzzy Logic |

**IV YEAR II SEMESTER**

| S.No | BOS | Group | Course Code | Course Name | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | Credits |
| 1 | EEE | PC | | Power System Monitoring and Control | 2 | 1 | 0 | 3 |
| 2 | EEE | PE | | Professional Elective V | 3 | 0 | 0 | 3 |
| 3 | EEE | PE | | Professional Elective VI | 3 | 0 | 0 | 3 |
| 4 | EEE | PW | | Project Work | 0 | 0 | 42 | 14 |
| | | **TOTAL** | | | **8** | **1** | **42** | **23** |

| **Professional Elective -V** | | | |
|---|---|---|---|
| **S.No** | **BOS** | **Course Code** | **Course Name** |
| 1 | EEE | | Advanced Electric Drives |
| 2 | EEE | | Energy Storage Systems |
| 3 | EEE | | Modern Control Theory |
| 4 | EEE | | Industrial IoT |
| **Professional Elective -VI** | | | |
| **S.No** | **BOS** | **Course Code** | **Course Name** |
| 1 | EEE | | AI and ML applications to Power Electronics |
| 2 | EEE | | Electric Smart Grid |
| 3 | ECE | | Embedded Systems Design |
| 4 | CSE | | Introduction to Big Data Analytics |

**PROFESSIONAL ELECTIVES – 4 THREADS**

| S. No. | Thread 1: Power Electronics | Thread 2: Power Systems | Thread 3: Machines and Control Systems | Thread 4: Computer and Electronics |
|---|---|---|---|---|
| 1 | Wide Band Gap Power Devices | Solar and Wind Energy Systems | Electrical Machine Design | Operations Research |
| 2 | Modelling and Simulation of Power Electronic Converters | HVDC Transmission Systems | Advanced Control Systems | Operating Systems |
| 3 | Modern Power Electronics | High Voltage Engineering | Digital Control Systems | Industrial Automation |
| 4 | Power Quality and FACTS | Utilization of Electrical Energy | Special Electrical Machines | VLSI Design |
| 5 | Advanced Electric Drives | Energy Storage Systems | Modern Control Theory | Industrial IoT |
| 6 | AI and ML applications to Power Electronics | Electric Smart Grid | Embedded Systems Design | Introduction to Big Data Analytics |

## OPEN ELECTIVES FOR GR25 REGULATIONS:

| THREAD 1 | THREAD 2 | OFFERED BY |
|---|---|---|
| Soft Skills and Interpersonal Skills | Data Science for Engineers | **CSE** |
| | Data Analytics using Open Source Tools | |
| | Augmented Reality and Virtual Reality | |
| Human Resource Development and Organizational Behavior | Basics of Java Programming | **CSE (AIML)** |
| | Introduction to DBMS | |
| | Introduction to Data Mining | |
| Cyber Law and Ethics | Programming in Python | **CSE (DS)** |
| | Internet of Things | |
| | Scripting Languages | |
| Economic Policies in India | Services Science and Service Operational Management | **CSBS** |
| | IT Project Management | |
| | Marketing Research and Marketing Management | |
| Constitution of India | Non-Conventional Energy Sources | **EEE** |
| | Concepts of Control Systems | |
| | Artificial Neural Networks and Fuzzy Logic | |
| | Principles of Communications | **ECE** |
| | Sensor Technology | |
| | Communication Technologies | |
| | Industrial Automation and Control | **ME** |
| | Composite Materials | |
| | Operations Research | |
| | Engineering Materials for Sustainability | **CE** |
| | Geographic Information Systems and Science | |
| | Environmental Impact Assessment | |
| | Basics of Java Programming | **CSE (AI)** |
| | Introduction to DBMS | |
| | Introduction to Data Mining | |