Academic Regulations
Programme Structure
&
Detailed Syllabus

Bachelor of Technology
(B. Tech)
(Four Year Regular Programme)
(Applicable for Batches admitted from 2020)

Electrical and Electronics Engineering

Department of Electrical and Electronics Engineering
GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING & TECHNOLOGY
Bachupally, Kukatpally, Hyderabad, Telangana, India
500 090

ACADEMIC REGULATIONS

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY, HYDERABAD

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

PROGRAMME BACHELOR OF TECHNOLOGY IN ELECTRICAL AND ELECTRONICS ENGINEERING

GR20 REGULATIONS

Gokaraju Rangaraju Institute of Engineering and Technology 2020 Regulations (GR20 Regulations) are given here under. These regulations govern the programmes offered by the Department of Electrical and Electronics Engineering with effect from the students admitted to the programmes in 2020- 21 academic year.

1. **Programme Offered:** The programme offered by the Department is B. Tech in Electrical and Electronics Engineering, a four-year regular programme.

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

3. **Admissions:** Admission to the B. Tech in Electrical and Electronics Engineering Programme shall be made subject to the eligibility, qualifications and specialization prescribed by the State Government/University from time to time. Admissions shall be made either on the basis ofthe 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.

4. **Programme Pattern:**

   a) Each Academic year of study is divided in to two semesters.
   b) Minimum number of instruction days in each semester is 90.
   c) Grade points, based on percentage of marks awarded for each course will form the basis for calculation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average).
   d) The total credits for the Programme is160.
   e) Student is introduced to "Choice Based Credit System (CBCS)".
   f) A student has a choice to register for all courses in a semester / one less or one additional course from other semesters provided the student satisfies prerequisites.
   g) All the registered credits will be considered for the calculation of final CGPA.
   h) Each semester has - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'. Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGCand course structure as suggested by AICTE are followed.
   i) **Subject / Course Classification:** All subjects/ courses offered for the under graduateprogramme in E & T (B.Tech. degree programmes) are broadly classified as follows.

S. No.	Broad Course Classification	Course Group/ Category	CourseDescription
1	BS	Basic Science Courses	Basic Science Courses
2	ES	Engineering Science Courses	Includes Engineering subjects
3	HS	Humanities and Social sciences	Includes Management courses
4	PC	Professional Core Courses	Includes core subjects related to the parent discipline/department/ branch of Engineering
5	PE	Professional Elective Courses	Includes elective subjects related to the parent discipline/ department/ branch of Engineering
6	OE	Open Elective Courses	Electives from other technical and/or emerging subjects
7	LC	Laboratory Courses	Laboratory Courses
8	MC	Mandatory Courses	Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge
9	PW	Project Work	Project work, seminar and internship in industry or elsewhere

5. **Award of B. Tech Degree:** A student will be declared eligible for the award of B. Tech Degree if he/she fulfills the following academic requirements:

a) He/She pursues the course of study and completes it successfully in not less than four academic years and not more than eight academic years.

b) A student has to register for all the 160 credits and secure all credits.

c) A student, who fails to fulfill all the academic requirements for the award of the degree within eight academic years from the date of admission, shall forfeit his/her seat in B. Tech course.

d) The Degree of B. Tech in Computer Science and Engineering shall be conferred by Jawaharlal Nehru Technological University Hyderabad (JNTUH), Hyderabad, on the students who are admitted to the programme and fulfill all the requirements for the award of the degree.

6. Attendance Requirements:

a) A student shall be eligible to appear for the semester-end examinations if he/she puts in a minimum of 75% of attendance in aggregate in all the courses concerned in the semester.

b) Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in a semester may be granted. A committee headed by Dean (Academic Affairs) shall be the deciding authority for granting the condonation.

c) Students who have been granted condonation shall pay a fee as decided by the Academic Council.

d) Shortage of Attendance more than 10% (attendance less than 65% in aggregate) shall in no case becondoned.

e) Students whose shortage of attendance is not condoned in any semester are detained and are not eligible to take their end examinations of that semester. They may seek reregistration for that semester when offered next with the academic regulations of the batch into which he/she getsre-registered.

7. Paper Setting, Evaluation of Answer Scripts, Marks and Assessment:

a) Paper setting and evaluation of the answer scripts shall be done as per the procedures laid down by the Academic Council from time to time.

b) Distribution and Weightage of marks

S. No	Components	Internal	External	Total
1	Theory	30	70	100
2	Practical	30	70	100
3	Engineering Graphics	30	70	100
4	Mini Project	30	70	100
5	Project Work	30	70	100

c) Continuous Internal Evaluation and Semester End Examinations: The assessment of the student's performance in each course will be based on Continuous Internal Evaluation (CIE) and Semester-End Examination (SEE). The marks for each of the component of assessment are fixed as shown in the following Table.

Assessment Procedure:

S. No	Component of Assessment	Marks Allotted	Type of Assessment	Scheme of Examinations
1	Theory	30	Internal Examination & Continuous Evaluation	1) Two mid semester examination shall be conducted for 20 markseach for a durationof2 hours. Average of the two mid exams shall be considered **i) Subjective - 15marks** **ii) Objective - 5marks** **2) Tutorials - 5marks** **3) Continuous Assessment– 5 marks**
		70	Semester end examination	The semester-end examination is for a duration of 3 hours
2	Practical	30	Internal Examination & Continuous Evaluation	**i) Internal Exam-10marks** **ii) Record - 5marks** **iii) ContinuousAssessment - 15 marks**
		70	Semester end examination	The semester-end examination is for a duration of 3 hours

d) Mini Project with Seminar: The Mini Project is to be taken up with relevance to Industry and is evaluated for 100 marks. Out of 100 marks, 30 marks are for internal evaluation and 70 marks are for external evaluation. The supervisor continuously assesses the students for 20 marks (Continuous Assessment – 15 marks, Report – 5 marks). At the end of the semester, Mini Project shall be displayed in the road show at the department level for the benefit of all students and staff and the same is to be evaluated by Mini Project Review Committee for 10 marks. The mini project report shall be presented before Project Review Committee in the presence of External Examiner and the same is evaluated for 70 marks. Mini Project Review Committee consists of HOD, Mini Project Coordinator and Supervisor. Plagiarism check is compulsory for mini project report as per the plagiarism policy of GRIET.

e) Summer Internship: Summer Internship shall be done by the student in the summer break after III B. Tech II Semester and shall be evaluated in IV B. Tech I Semester along with the Project Work (Phase I).

f) Project Work (Phase–I and Phase-II): The project work is evaluated for 100 marks. Out of 100, 30 marks shall be for internal evaluation and 70 marks for the external evaluation. The supervisor assesses the student for 20 marks (Continuous Assessment – 15 marks, Report –5 marks). At the end of the semester, projects shall be displayed in the road show at the department level for the benefit of all students and staff and the same is to be evaluated by the Project Review Committee for 10 marks.

The external evaluation for Project Work is a Viva-Voce Examination which is conducted by the Project Review Committee in the presence of external examiner and is evaluated for 70 marks, Project Review Committee consists of HOD, Project Coordinator and Supervisor. These rules are applicable for both Phase I and PhaseII.

Plagiarism check is compulsory for project work report (Phase I and PhaseII) as per the plagiarism policy of GRIET.

g) EngineeringGraphics:

- Two internal examinations, each is of 10 marks. The average of the two internal tests shall be considered for the award ofmarks.
- Submission of day to day work - 15marks.
- Continuous Assessment - 5marks.

8. **Recounting of Marks in the End Examination Answer Books:** A student can request for recounting of his/her answer book on payment of a prescribed fee.

9. **Re-evaluation of the End Examination Answer Books:** A student can request for re- evaluation of his/her answer book on payment of a prescribed fee.

10. **Supplementary Examinations:** A student who has failed to secure the required creditscan appear for a supplementary examination, as per the schedule announced by the College.

11. **Malpractices in Examinations:** Disciplinary action shall be taken in case ofmalpractices during Mid / End-examinations as per the rules framed by the Academic Council.

12. **Academic Requirements and PromotionRules:**

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 totalof 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.

	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 secondsemester. (ii) Must have secured at least 50% credits up to first year second semester from all the relevant regular and supplementary examinations, whether thestudent 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 secondsemester (ii) Must have secured at least 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether thestudent 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 yearsecond semester. (ii) Must have secured at least 60% credits up to third year second semester fromall the relevant regular and supplementary examinations, whether the student takes those examinations ornot.
7	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

13. Grade Points: A 10 - point grading system with corresponding letter gradesand percentage of marks, as given below, is followed

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	

Earning of Credit:

A student shall be considered to have completed a course successfully and earned the credits if he/she secures an acceptable letter grade in the range O-P. Letter grade 'F' in any Course implies failure of the student in that course and no credits earned.

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.,

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

Where C_i is the number of credits of the i^{th} course and G_i 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., upto and inclusive of S_k, where $k \geq 2$.

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

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

14. 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 the160 credits.

	Class Awarded	CGPA Secured
14.1	First Class With Distinction	CGPA >= 8.00 with no F or below grade/ detention anytime during the programme
14.2	First Class	CGPA >= 8.00 with rest of the clauses of 14.1 not satisfied
14.3	First Class	CGPA ≥ 6.50 and CGPA < 8.00
14.4	Second Class	CGPA ≥ 5.50 and CGPA < 6.50
14.5	Pass Class	CGPA ≥ 5.00 and CGPA < 5.50

15. Withholding of Results: If the student has not paid dues to the Institute/ University, or if any case of indiscipline is pending against the student, the result of the student (for that Semester) may be with held and the student will not be allowed to go into the next semester. The award or issue of the Degree may also be withheld in such cases.

16. **Transfer of students from the Constituent Colleges of JNTUH or from other Colleges / Universities:** Transfer of students from the Constituent Colleges of JNTUH or from other Colleges/ Universities shall be considered only on case-to-case basis by the Academic Council of the Institute.

17. **Transitory Regulations:** Students who have discontinued or have been detained for want of attendance, or who have failed after having undergone the Degree Programme, may be considered eligible for readmission/re-registration to the same or equivalent subjects as and when they are offered.

18. **General Rules**

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

b) In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council isfinal.

c) In case of any error in the above rules and regulations, the decision of the Academic Council isfinal.

d) The college may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by thecollege.

Academic Regulations for B.Tech (Lateral Entry) under GR20
(Applicable for Batches Admitted from 2021-2022)

1. All regulations as applicable for B.Tech Four 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 for all 120 credits and secure all credits. The marks obtained in all 120 credits shall be considered for the calculation of the final CGPA.

c) 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.Techprogramme.

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 totalof 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.
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 50% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations ornot.
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 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.**

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.

	Class Awarded	CGPA Secured
3.1	**First Class With Distinction**	**CGPA >= 8.00 with no F or below grade/ detention anytime during the Programme**
3.2	**First Class**	**CGPA >= 8.00 with rest of the clauses of 3.1 not satisfied**
3.3	**First Class**	**CGPA ≥ 6.50 and CGPA < 8.00**
3.4	**Second Class**	**CGPA ≥ 5.50 and CGPA < 6.50**
3.5	**Pass Class**	**CGPA ≥ 5.00 and CGPA < 5.50**

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

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ELECTRCAL AND ELECTRONICS ENGINEERING
B. Tech (EEE) – GR20 Course Structure

I B. Tech (EEE) - I Semester

S.No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	To Tal	L	T	P	To tal			
1	Maths	BS	GR20A1001	Linear Algebra and Differential Calculus	3	1	0	4	3	1	0	4	30	70	100
2	Chemistry	BS	GR20A1005	Engineering Chemistry	3	1	0	4	3	1	0	4	30	70	100
3	EEE	ES	GR20A1008	Basic Electrical Engineering	2	1	0	3	2	1	0	3	30	70	100
4	CSE	ES	GR20A1007	Programming for Problem Solving	2	1	0	3	2	1	0	3	30	70	100
5	EEE	ES	GR20A1017	Basic Electrical Engineering Lab	0	0	1	1	0	0	2	2	30	70	100
6	Chemistry	BS	GR20A1014	Engineering Chemistry Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
7	CSE	ES	GR20A1016	Programming for Problem Solving Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
8	ME	ES	GR20A1019	Engineering Workshop	1	0	1.5	2.5	1	0	3	4	30	70	100
		TOTAL			**11**	**4**	**5.5**	**20.5**	**11**	**4**	**11**	**26**	**240**	**560**	**800**
9	Mgmt	MC		Induction Programme											
10	Mgmt	MC	GR20A1020	Design Thinking	1	0	0	1	2	0	0	2	30	70	100

I B. Tech (EEE) - II Semester

S.No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	To Tal	L	T	P	To tal			
1	Maths	BS	GR20A1002	Differential Equations and Vector Calculus	3	1	0	4	3	1	0	4	30	70	100
2	Physics	BS	GR20A1003	Applied Physics	3	1	0	4	3	1	0	4	30	70	100
3	English	HS	GR20A1006	English	2	0	0	2	2	0	0	2	30	70	100
4	CSE	ES	GR20A1011	Data Structures	2	1	0	3	2	1	0	3	30	70	100
5	Physics	BS	GR20A1012	Applied Physics Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
6	ME	ES	GR20A1010	Engineering Graphics	1	0	2	3	1	0	4	5	30	70	100
7	CSE	ES	GR20A1018	Data Structures Lab	0	0	1	1	0	0	2	2	30	70	100
8	English	HS	GR20A1015	English Language and Communication Skills Lab	0	0	1	1	0	0	2	2	30	70	100
		TOTAL			**11**	**3**	**5.5**	**19.5**	**11**	**3**	**11**	**25**	**270**	**630**	**900**
9	Mgmt	MC	GR20A1021	Life skills and Personality Development	1	**0**	0	1	**2**	**0**	0	2	30	70	100

II B.Tech(EEE) - I Semester

S.No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	Total	L	T	P	Total			
1	EEE	PC	GR20A2023	Electrical Circuit Analysis	2	1	0	3	2	1	0	3	30	70	100
2	EEE	PC	GR20A2024	Principles of Analog Electronics	3	0	0	3	3	0	0	3	30	70	100
3	EEE	PC	GR20A2025	DC Machines and Transformers	3	0	0	3	3	0	0	3	30	70	100
4	EEE	PC	GR20A2026	Electromagnetic Fields	3	0	0	3	3	0	0	3	30	70	100
5	EEE	PC	GR20A2033	Power Generation and Transmission	3	0	0	3	3	0	0	3	30	70	100
6	CSE	ES	GR20A2028	Java Programming for Engineers	2	0	0	2	2	0	0	2	30	70	100
7	EEE	PC	GR20A2029	Principles of Analog Electronics Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
8	EEE	PC	GR20A2030	DC Machines and Transformers Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
		TOTAL			**15**	**1**	**4**	**20**	**15**	**1**	**8**	**24**	**240**	**560**	**800**
9	Mgmt	MC	GR20A2003	Constitution of India	2	0	0	2	2	0	0	2	30	70	100
10	Mgmt	MC	GR20A2002	Value Ethics and Gender Culture	2	0	0	2	2	0	0	2	30	70	100

II B.Tech(EEE) - II Semester

S.No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	Total	L	T	P	Total			
1	Maths	BS	GR20A2005	Probability and Statistics	3	0	0	3	3	0	0	3	30	70	100
2	EEE	PC	GR20A2031	AC Machines	2	1	0	3	2	1	0	3	30	70	100
3	EEE	PC	GR20A2032	Control Systems	3	0	0	3	3	0	0	3	30	70	100
4	EEE	PC	GR20A2027	Principles of Digital Electronics	3	0	0	3	3	0	0	3	30	70	100
5	EEE	PC	GR20A2034	Power Distribution and Protection	0	0	2	2	0	0	4	4	30	70	100
6	EEE	PC	GR20A2035	Principles of Digital ElectronicsLab	0	0	2	2	0	0	4	4	30	70	100
7	EEE	PC	GR20A2036	AC Machines Lab	0	0	2	2	0	0	4	4	30	70	100
8	EEE	PC	GR20A2037	Control Systems Lab	0	0	2	2	0	0	4	4	30	70	100
		TOTAL			**11**	**1**	**8**	**20**	**11**	**1**	**16**	**28**	**240**	**560**	**800**
9	Chemistry	MC	GR20A2001	Environmental Science	2	0	0	2	2	0	0	2	30	70	100
10	CSE	MC	GR20A2006	Data Base for Engineers	2	0	0	2	2	0	0	2	30	70	100

III YEAR I SEMESTER

S.No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	Total	L	T	P	Total			
1	EEE	PC	GR20A3012	Power System Analysis	2	1	0	3	2	1	0	3	30	70	100
2	EEE	PC	GR20A3013	Power Electronics	3	0	0	3	3	0	0	3	30	70	100
3	EEE	PC	GR20A3014	Microprocessors and Microcontrollers	3	0	0	3	3	0	0	3	30	70	100
4	EEE	PE		Professional Elective I	3	0	0	3	3	0	0	3	30	70	100
5	EEE	OE		Open Elective I	3	0	0	3	3	0	0	3	30	70	100
6	EEE	PC	GR20A3020	Power Systems Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
7	EEE	PC	GR20A3021	Power Electronics Lab	0	0	2	2	0	0	4	4	30	70	100
8	EEE	PC	GR20A3022	Microprocessors and Microcontrollers Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
		TOTAL			**14**	**1**	**5**	**20**	**14**	**1**	**10**	**25**	**240**	**560**	**800**

Professional Elective –I			
S.No	**BOS**	**Course Code**	**Course Name**
1	EEE	GR20A3015	Electrical and Hybrid Vehicles
2	EEE	GR20A3016	Solar and Wind Energy Systems
3	EEE	GR20A3017	Electrical Machine Design
4	MECH	GR20A3018	Optimization Techniques

Open Elective I			
S.No.	**BOS**	**Course Code**	**COURSE**
1	EEE	GR20A3019	Non-Conventional Energy Sources

III YEAR II SEMESTER

S.No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	Total	L	T	P	Total			
1	EEE	PC	GR20A3091	Programmable Logic Controllers	3	0	0	3	3	0	0	3	30	70	100
2	EEE	PC	GR20A3092	Sensors Measurements and Instrumentation	2	1	0	3	2	1	0	3	30	70	100
3	Mgnt	HS	GR20A2004	Economics and Accounting for Engineers	3	0	0	3	3	0	0	3	30	70	100
4	EEE	PE		Professional Elective II	3	0	0	3	3	0	0	3	30	70	100
5	EEE	OE		Open Elective II	3	0	0	3	3	0	0	3	30	70	100
6	EEE	PC	GR20A3096	Power System Analysis Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
7	EEE	PC	GR20A3097	Sensors Measurements and Instrumentation Lab	0	0	1.5	1.5	0	0	3	3	30	70	100
8	EEE	PW	GR20A3141	Mini Project with Seminar	0	0	2	2	0	0	4	4	30	70	100
		TOTAL			**14**	**1**	**5**	**20**	**14**	**1**	**10**	**25**	**240**	**560**	**800**

Professional Elective -II			
S.No	**BOS**	**Course Code**	**Course Name**
1	EEE	GR20A3093	Modern Power Electronics
2	EEE	GR20A3094	HVDC Transmission Systems
3	EEE	GR20A3095	Advanced Control Systems
4	CSE	GR20A2075	Operating Systems

Open Elective II

S.No.	BOS	Course Code	COURSE
1	CSE	GR20A3123	Machine Learning

IV YEAR I SEMESTER

S.No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	Total	L	T	P	Total			
1	PC	ES	GR20A4014	Power Semiconductor Drives	2	1	0	3	2	1	0	3	30	70	100
2	EEE	PE		Professional Elective III	3	0	0	3	3	0	0	3	30	70	100
3	EEE	PE		Professional Elective IV	3	0	0	3	3	0	0	3	30	70	100
4	Mgnt	HS	GR20A3140	Fundamentals of Management and Entrepreneurship	3	0	0	3	3	0	0	3	30	70	100
5	EEE	OE		Open Elective III	3	0	0	3	3	0	0	3	30	70	100
6	EEE	PC	GR20A4023	Programmable Logic Controllers lab	0	0	2	2	0	0	4	4	30	70	100
7	EEE	PC	GR20A4024	Power Semiconductor Drives Lab	0	0	2	2	0	0	4	4	30	70	100
8	EEE	PW	GR20A4129	Project Work Phase-I	0	0	6	6	0	0	12	12	30	70	100
		TOTAL			**14**	**1**	**10**	**25**	**14**	**1**	**20**	**35**	**240**	**560**	**800**

Professional Elective -III			
S.No	**BOS**	**Course Code**	**Course Name**
1	EEE	GR20A4015	Wide Band Gap Power Devices
2	EEE	GR20A4016	High Voltage Engineering
3	EEE	GR20A4017	Digital Control Systems
4	EEE	GR20A4018	Fundamentals of Digital Signal Processing
Professional Elective -IV			
S.No	**BOS**	**Course Code**	**Course Name**
1	EEE	GR20A4019	Power Quality and FACTS
2	EEE	GR20A4020	Electrical Energy Audit
3	EEE	GR20A4021	Special Electrical Machines
4	ECE	GR20A3108	VLSI Design

Open Elective III			
S.No.	**BOS**	**Course Code**	**COURSE**
1	EEE	GR20A4022	Artificial Intelligence Techniques

IV YEAR II SEMESTER

S.No	BOS	Group	Course Code	Course Name	Credits				Hours				Int.	Ext	Total Marks
					L	T	P	Total	L	T	P	Total			
1	EEE	PC	GR20A4092	Power System Monitoring and Control	2	1	0	3	2	1	0	3	30	70	100
2	EEE	PE		Professional Elective V	3	0	0	3	3	0	0	3	30	70	100
3	EEE	PE		Professional Elective VI	3	0	0	3	3	0	0	3	30	70	100
4	EEE	PW	GR20A4130	Project Work Phase-II	0	0	6	6	0	0	12	12	30	70	100
		TOTAL			**8**	**1**	**6**	**15**	**8**	**1**	**12**	**21**	**120**	**280**	**400**

Professional Elective -V			
S.No	**BOS**	**Course Code**	**Course Name**
1	EEE	GR20A4093	Advanced Electric Drives
2	EEE	GR20A4094	Big Data Applications in Power Systems
3	EEE	GR20A4095	Modern Control Theory
4	EEE	GR20A4096	Industrial IoT
Professional Elective -VI			
S.No	**BOS**	**Course Code**	**Course Name**
1	EEE	GR20A4097	Applications of AI and ML in Power Electronics
2	EEE	GR20A4098	Electric Smart Grid
3	ECE	GR20A4099	Embedded Systems
4	CSE	GR20A3131	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	Electrical and Hybrid Vehicles	Solar and Wind Energy Systems	Electrical Machine Design	Optimization Techniques
2	Modern Power Electronics	HVDC Transmission Systems	Advanced Control Systems	Operating Systems
3	Wide Band Gap Power Devices	High Voltage Engineering	Digital Control Systems	Fundamentals of Digital Signal Processing
4	Power Quality and FACTS	Electrical Energy Audit	Special Electrical Machines	VLSI Design
5	Advanced Electric Drives	Big Data Applications in Power Systems	Modern Control Theory	Industrial IoT
6	Applications of AI and ML in Power Electronics	Electric Smart Grid	Embedded Systems	Big Data Analytics

OPENELECTIVESFORGR20REGULATIONS:

THREAD1	THREAD 2	OFFEREDBY
1. Soft Skills and Interpersonal Communication 2. Human Resource Development And Organizational Behavior 3. Cyber Law and Ethics 4. Economic Policies in India	1.Principles of E-Commerce 2.BusinessAnalytics 3.AugmentedRealityandVirtualReality	**CSE**
	1. Internet of Things 2. Augmented Reality and Virtual Reality 3. Human Computer Interaction	**CSE(AIML)**
	1.Augmented Reality and Virtual Reality 2. Internet of Things 3. Human Computer Interaction	**CSE (DS)**
	1. Services Science and Service Operational Management 2. IT Project Management 3. Marketing Research and Marketing Management	**CSBS**
	1.Artificial Intelligence 2. Introduction to Data Science 3.HumanComputerInteraction	**IT**
	1.Non-Conventional Energy Sources 2.Machine Learning 3.Artificial Intelligence Techniques	**EEE**
	1.Principles of Communication 2.Sensor Technology 3.Cellular and Mobile Communications	**ECE**
	1.Robotics 2. Composite Materials	**ME**

	3.Operations Research	
	1.EngineeringMaterials forSustainability 2.Geographic Information Systems and Science 3.EnvironmentalImpactAssessment and Life Cycle Analyses	**CE**

I YEAR
I SEMESTER