Academic Regulations
Programme Structure
&
Detailed Syllabus

Bachelor of Technology
(B. Tech)
(Four Year Regular Programme)
(Applicable for Batches admitted from 2015)

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 (B. Tech)
GR15 REGULATIONS

Gokaraju Rangaraju Institute of Engineering and Technology 2015 Regulations (GR15 Regulations) are given hereunder. These regulations govern the programmes offered by the Department of Electrical and Electronics Engineering with effect from the students admitted to the programmes in 2015-16 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 of the merit rank obtained by the student in the common entrance examination conducted by the Government/Universityor 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) **A student is introduced to "Choice Based Credit System (CBCS)"**
   b) Each Academic year of study is divided into two semesters.
   c) Minimum number of instruction days in each semester is 90.
   d) The total credits for the Programme is 200. Typically each semester has 25 credits.
   e) 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).
   f) A student has a choice of registering for credits from the courses offered in the programme ensuring the total credits in a semester are between 21 and 29.
   g) **All the registered credits will be considered for the calculation of final CGPA.**
   h) All courses are to be registered by a student in a semester as per the procedure at the beginning of the semester. All the courses are broadly classified as

S No	Code	Area	% of credits in the Programme	
			Min	Max
1	HS	Humanities and Social Sciences	5	10
2	BS	Basic Sciences	15	20
3	ES	Engineering Sciences	15	20
4	PC	Professional subjects – Core	30	40
5	PE	Professional Subjects – Elective	10	15
6	OE	Open Elective	5	10
7	PW	Project Work	10	15

8	MC	Mandatory Course	Non credit

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) A student shall be declared eligible for the award of B. Tech degree, if 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 200 credits and secure all credits.
   c) A student has to acquire a minimum of 5.00 SGPA in each semester for the award of B. Tech degree.
   d) 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.
   e) The Degree of B. Tech in Electrical and Electronics 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 be condoned.
   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 re-registration for that semester when offered next with the academic regulations of the batch into which he/she gets re-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	25	50	75
3	Engineering Graphics	30	70	100
4	Industry OrientedMini Project	25	50	75
5	Comprehensive Viva	-	100	100
6	Seminar	50	-	50
7	Major Project	50	150	200

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 Exams & Continuous Evaluation	1) Two mid semester examinations shall be conducted for 20 marks each for a duration of 2 hours. Average of the two mid exams shall be considered **i) Subjective - 15 marks** **ii) Objective - 5 marks** **2) Tutorials - 5 marks**
		70	Semester-end examination	The semester-end examination is for a duration of 3 hours
2	Practical	25	Internal Exams & Continuous Evaluation	20 marks are allotted for internal lab exam **i) Internal Exam-10 marks** **ii) Record - 5 marks** **iii) Continuous Assessment - 5 marks** **iv) Attendance – 5 marks**
		50	Semester-end examination	The semester-end examination is for a duration of 3 hours

d)Industry Oriented Mini Project: The Mini Project is to be taken up with relevance to Industry and is evaluated for 75 marks. Out of 75 marks, 25 marks are for internal evaluation and 50 marks are for external evaluation. The supervisor continuously assesses the students for 15 marks (Attendance – 5 marks, Continuous Assessment – 5 marks, Report – 5 marks). At the end of the semester, Mini Project shall be displayed in theroad show at the department level for the benefit of all students and staff and the same is to be evaluated by Mini Project Review Committeefor 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 50 marks. Mini Project Review Committee consists of HOD, Mini Project Coordinator and Supervisor.

e) Comprehensive Viva: The comprehensive viva shall be conductedby a Committee consisting of HOD and two senior faculty members of the department. The student shall be assessed for his/her understanding of various courses studied during the programme of study. The Viva-voce shall be evaluated for 100 marks.

f) Seminar: For the seminar, the student shall collect information on a specialized topic andprepare a technical report and present the same to a Committee consisting of HODand two senior faculty and the seminar coordinator of the department. The student shall be assessed for his/her understanding of the topic, its application and its relation with various courses studied during the programme of studyfor **50 marks.**

g) Major Project: The project work is evaluated for 200 marks. Out of 200, 50 marksshall be for internal evaluation and 150 marksfor the external evaluation. The supervisor assesses the student for 25 marks (Attendance – 5 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 25 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 150 marks, Project Review Committee consists of HOD, Project Coordinator and Supervisor.

h) Engineering Graphics:

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

8. **Recounting of Marks in the End Examination Answer Books:** A student can request for re-counting 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. **a) Supplementary Examinations:** A student who has failed to secure the required credits can appear for a supplementary examination, as per the schedule announced by the College.

    b) Improvement Examinations: A student who failed to secure SGPA of at least 5.00 in a semester can reappear for the external examination of the required courses of the semester for an improvement in SGPA, with the approval from HOD and faculty advisor.
11. **Malpractices in Examinations:** Disciplinary action shall be taken in case of malpractices during Mid / End-examinations as per the rules framed by the Academic Council.
12. **Academic Requirements:**
    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 from I year to II year if and only if he/she secures 25 credits from all the I year regular and supplementary examinations.
    c) A student shall be promoted from II year to III year if and only if he/she secures 45 credits up to and including II year I Semester or 60 credits up to and including II year II Semester from all regular and supplementary examinations, whether or not the candidate takes the examinations.
    d) A student shall be promoted from III year to IV year if and only if he/she secures 75

credits up to and including III year I Semester or 90 credits up to and including III year II Semester from all regular and supplementary examinations, whether or not the candidate takes the examinations.

e) **Grade Points: A 10 - point grading system with corresponding letter grades and percentage of marks, as given below, is followed**

Letter Grade	Grade Point	Percentage of marks
O (Outstanding)	10	Marks >= 80 and Marks <= 100
A+ (Excellent)	9	Marks >= 70 and Marks < 80
A (Very Good)	8	Marks >= 60 and Marks < 70
B+ (Good)	7	Marks >= 55 and Marks < 60
B (Above Average)	6	Marks >= 50 and Marks < 55
C (Average)	5	Marks >= 45 and Marks < 50
P (Pass)	4	Marks >= 40 and Marks < 45
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.,

$$\text{SGPA } (S_k) = \sum_{i=1}^{n} (Ci * Gi) / \sum_{i=1}^{n} Ci$$

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 a student over all the semesters of a programme, i.e., upto and inclusive of S_k, where $k \geq 2$.

$$\text{CGPA} = \sum_{i=1}^{m} (Ci * Gi) / \sum_{i=1}^{m} Ci$$

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

13.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 (the marks awarded are from the aggregate marks secured for the 200 credits):

	Class Awarded	CGPA Secured
13.1	**First Class With Distinction**	**CGPA ≥ 8.00 with no F or below grade/ detention anytime during the programme**
13.2	**First Class**	**CGPA ≥ 8.00 with rest of the clauses of 13.1 not satisfied**
13.3	**First Class**	**CGPA ≥ 6.50 and CGPA < 8.00**
13.4	**Second Class**	**CGPA ≥ 5.50 and CGPA < 6.50**
13.5	**Pass Class**	**CGPA ≥ 5.00 and CGPA < 5.50**

14. 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 withheld 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.

15. 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.

16. 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.

17. 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 is final.
c) In case of any error in the above rules and regulations, the decision of the Academic Council is final.
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 the college.

I BTECH **I SEMESTER**

Group	Subject code	Name of subject	Credits			Total credits	Total Hours	Total Marks
			L	T	P			
BS	GR15A1001	Linear Algebra and Single Variable Calculus	2	1		3	4	100
BS	GR15A1002	Advanced Calculus	2	1		3	4	100
BS	GR15A1007	Engineering Physics	2	1		3	4	100
ES	GR15A1009	Computer Programming	2	1		3	4	100
ES	GR15A1018	Basic Electrical Engineering	3	1		4	5	100
HS	GR15A1005	English	2	1		3	4	100
ES	GR15A1025	Engineering Workshop			2	2	4	75
BS	GR15A1029	Engineering Physics lab			2	2	4	75
ES	GR15A1027	Computer Programming lab			2	2	4	75
		Total credits/Hours/Marks	**13**	**6**	**6**	**25**	**37**	**825**

Group	Subject code	Name of subject	Credits			Total credits	Total Hours	Total Marks
			L	T	P			
BS	GR15A1003	Transform Calculus and Fourier Series	2	1		3	4	100
BS	GR15A1004	Numerical Methods	2	1		3	4	100
BS	GR15A1008	Engineering Chemistry	2	1		3	4	100
ES	GR15A1010	Data Structures	2	1		3	4	100
ES	GR15A1023	Engineering Graphics	1		2	3	5	100
ES	GR15A1019	Fundamentals of Electronics Engineering	3	1		4	5	100
HS	GR15A1024	Business Communication and Soft Skills			2	2	4	75
ES	GR15A1026	IT Workshop			2	2	4	75
BS	GR15A1030	Engineering Chemistry lab			2	2	4	75
		Total credits/Hours/Marks	**12**	**5**	**8**	**25**	**38**	**825**

II BTECH **I SEMESTER**

Group	Subject code	Name of subject	Credits			Total credits	Total Hours	Total Marks
			L	T	P			
BS	GR15A2058	Special functions and Complex variables	2	1		3	4	100
PC	GR15A2034	Electromagnetic Fields	3	1		4	5	100
PC	GR15A2035	Network Theory	3	1		4	5	100
PC	GR15A2036	DC Machines and Transformers	3	1		4	5	100
PC	GR15A2076	Computer Organization	3	1		4	5	100
PC	GR15A2037	DC Machines Lab			2	2	4	75
PC	GR15A2038	Electrical Networks Lab			2	2	4	75
PC	GR15A2039	Electrical Simulation Lab			2	2	4	75
		Total credits/Hours/Marks				**25**	**36**	**725**
MC	GR15A2001	Environmental Science			2	2	2	100

Group	Subject code	Name of subject	Credits		Total credits		Total Hours	Total Marks
			L	T	P			
HS	GR15A2104	Managerial Economics and Financial Analysis	2	1		3	4	100
PC	GR15A2040	Power Generation and Distribution	3	1		4	5	100
PC	GR15A2041	AC Machines	3	1		4	5	100
PC	GR15A2042	Control Systems	3	1		4	5	100
PC	GR15A2105	Principles of Digital Electronics	3	1		4	5	100
PC	GR15A2044	AC Machines Lab			2	2	4	75
PC	GR15A2045	Control Systems Lab			2	2	4	75
PC	GR15A2046	Analog and Digital Electronics Lab			2	2	4	75
		Total credits/Hours/Marks				**25**	**36**	**725**
MC	GR15A2002	Value Education and Ethics			2	2	2	100
MC	GR15A2106	Gender sensitization Lab			2	2	2	75

III BTECH **I SEMESTER**

Group	Sub-Code	Name Of Subject	Credits			Total credits	Total Hours	Total Marks
			L	T	P			
PC	GR15A3016	Power Transmission System	2	1		3	4	100
	GR15A2055	Microcontrollers	3	1		4	5	100
PC	GR15A3018	Power Electronics	3	1		4	5	100
Open Elective 1			**3**	**1**		**4**	**5**	**100**
Professional Elective 1			**3**	**1**		**4**	**5**	**100**
PE	GR15A3015	Operational Amplifiers						
PE	GR15A3017	Electrical Measurements and Instrumentation						
PE	GR15A2049	Signals & Systems						
PC	GR15A3019	Sensors/ Measurements and Instrumentation Lab			2	2	4	75
PC	GR15A3020	Power Electronics Lab			2	2	4	75
PC	GR15A2059	Microcontrollers Lab			2	2	4	75
Total			**14**	**5**	**6**	**25**	**36**	**725**

III BTECH **II SEMESTER**

Group	Sub-Code	Name Of Subject	Credits			Total credits	Total Hours	Total Marks
			L	T	P			
PC	GR15A3021	Computer Methods in Power Systems	2	1		3	4	100
PC	GR15A3022	Switch Gear and Protection	3	1		4	5	100
PC	GR15A3102	Management Science	3	1		4	5	100
Open Elective 2			**3**	**1**		**4**	**5**	**100**
Professional Elective 2			**3**	**1**		**4**	**5**	**100**
PE	GR15A3023	Utilization of Electrical Energy						
PE	GR15A3024	Non Conventional Sources of Energy						
PE	GR15A3106	Neural and Fuzzy Systems						
PC	GR15A3025	Power Systems Lab			2	2	4	75
PC	GR15A3100	Advanced English Communication Skills Lab			2	2	4	75
PC	GR15A3101	Industry Oriented Mini Project			2	2	4	75
Total			**14**	**5**	**6**	**25**	**36**	**725**

IV BTECH **I SEMESTER**

Group	Sub-Code	Name Of Subject	Credits			Total credits	Total Hours	Total Marks
			L	T	P			
PC	GR15A4022	Power Semiconductor Drives	2	1		3	4	100
PC	GR15A4023	Power System Operation And Control	3	1		4	5	100
PC	GR15A4024	HVDC Transmission	3	1		4	5	100
Open Elective 3			**3**	**1**		**4**	**5**	**100**
Professional Elective 3			**3**	**1**		**4**	**5**	**100**
PE	GR15A4147	High Voltage Engineering						
PE	GR15A4026	Electrical Distribution Systems						
PE	GR15A4148	Principles of signal processing						
PC	GR15A4027	DSP Based Electrical Lab			2	2	4	75
PC	GR15A4028	Power System Simulation Lab			2	2	4	75
PC	GR15A4029	Power Electronics And Drives Lab			2	2	4	75
Total			**14**	**5**	**6**	**25**	**36**	**725**

IV BTECH **II SEMESTER**

Group	Sub-Code	Name Of Subject	Credits			Total credits	Total Hours	Total Marks
			L	T	P			
PC	GR15A4030	Programmable Logic Controllers	2	1		3	4	100
Professional Elective 4			**3**	**1**		**4**	**5**	**100**
PE	GR15A4032	Flexible AC Transmission Systems						
PE	GR15A4035	EHV AC Transmission						
PE	GR15A4031	Power System Automation						
Professional Elective 5			**3**	**1**		**4**	**5**	**100**
PE	GR15A4036	Modern Power Electronics						
PE	GR15A4149	DSP Based Electromechanical Systems						
PE	GR15A4037	Advanced Control Systems						
PC	GR15A4038	Programmable Logic Controllers Lab			2	2	4	75
SPW	GR15A4143	Seminar			1	1	2	100
SPW	GR15A4142	Comprehensive Viva			1	1	2	100
SPW	GR15A4144	Major Project			10	10	14	200
Total			8	3	**14**	**25**	**36**	**775**

Open Elective 1		Course Title	Department Offering
OE - I	GR15A3151	Water Resources Engineering	CE
	GR15A3152	Solar & Wind Energy Systems	EEE
	GR15A3153	Applied Thermodynamics	ME
	GR15A3154	Principles of E- Commerce	CSE
	GR15A3155	Datamining and Applications	IT
	GR15A3156	Computer Architecture and Organization	ECE
Open Elective 2		**Course Title**	**Department Offering**
OE - II	GR15A3161	Transportation Engineering	CE
	GR15A3162	Sensors & Transducers	EEE
	GR15A3163	Automobile Engineering	ME
	GR15A3164	Human Computer Interaction	CSE
	GR15A3165	Essentials of Big Data Analytics	IT
	GR15A3166	Principles of Operating Systems	ECE
Open Elective 3		**Course Title**	**Department Offering**
OE - III	GR15A4161	Green Building Technology	CE
	GR15A4162	Soft Computing Techniques	EEE
	GR15A4163	Operations Research	ME
	GR15A4164	Mobile Computing and Applications	CSE
	GR15A4165	Business Intelligence	IT
	GR15A4166	Principles Of Satellite Communications	ECE