

ACADEMIC REGULATIONS PROGRAM STRUCTURE and DETAILED SYLLABUS

Master of Technology

[VLSI]

(Two Year Regular Programme)

(Applicable for Batches admitted from 2017)



**GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY**
(Autonomous)



ACADEMIC REGULATIONS

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

For all Postgraduate Programmes (M.Tech)
GR17 REGULATIONS

Gokaraju Rangaraju Institute of Engineering and Technology-2015 Regulations (GR 17 Regulations) are given hereunder. These regulations govern all the Post Graduate programmes offered by various departments of Engineering with effect from the students admitted to the programmes from 2017-18 academic year.

1. **Programme Offered:** The Post Graduate programme offered by the department is M.Tech, a two-year regular programme in that discipline.
2. **Medium of Instruction:** The medium of instruction (including examinations and reports) is English.
3. **Admissions:** Admission into the M.Tech Programme in any discipline shall be made subject to the eligibility and qualifications prescribed by the University from time to time. Admissions shall be made either on the basis of the merit rank obtained by the student in PGCET conducted by the APSCHE for M. Tech Programmes or on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the Government from time to time.
4. **Programme Pattern:**
 - a) A student is introduced to “Choice Based Credit System (CBCS)” for which he/she has to register for the courses at the beginning of each semesters as per the procedure.
 - 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 88.
 - 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.
 - g) All the registered credits will be considered for the calculation of final CGPA.
5. **Award of M .Tech Degree:** A student will be declared eligible for the award of the M. Tech Degree if he/she fulfills the following academic requirements:
 - a) A student shall be declared eligible for the award of M.Tech degree, if he/she pursues the course of study and completes it successfully in not less than two academic years and not more than four academic years.



- b) A Student, who fails to fulfill all the academic requirements for the award of the degree within four academic years from the date of admission, shall forfeit his/her seat in M.Tech courses.
- c) The Degree of M.Tech 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) 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 of the College from time to time.
- b) The following is the division of marks between internal and external evaluations.

S.no	Particulars	Internal	External	Total
1	Theory	30	70	100
2	Practical	30	70	100
3	Comprehensive Viva	-	100	100
4	Seminar	30	70	100
5	Project work	30	70	100

- c) The marks for internal evaluation per semester per theory course are divided as follows:
 - i. **Mid written examinations:** 20 Marks
 - ii. **Assignment:** 5 Marks
 - iii. **Continuous Assessment:** 5 Marks
 - iv. **Total:** 30Marks
- d) **Mid-Term Written Examination:** There shall be two mid-term written examinations during a semester. The first mid-term written examination shall be conducted from the first



50 per cent of the syllabus and the second mid-term written examination shall be conducted from the remaining 50 per cent of the syllabus. The mid-term written examinations shall be evaluated for **20 marks** and average of the marks scored in the two mid-term written examinations shall be taken as the marks scored by each student in the mid-term written examination for that semester.

- e) **Assignment:** Assignments are to be given to the students and marks not exceeding 5 (5%) per semester per paper are to be awarded by the teacher concerned.
- f) **For Internal Evaluation in Practical/Lab Subjects:** The marks for internal evaluation are 30. Internal Evaluation is done by the teacher concerned with the help of the other staff member nominated by Head of the Department. Marks Distribution is as follows:
- | | |
|---|-----------------|
| i. Writing the program/Procedure: | 10 Marks |
| ii. Executing the program/Procedure: | 10 Marks |
| iii. Viva: | 05 Marks |
| iv. Continuous Assessment: | 05 Marks |
| v. Total: | 30Marks |
- g) **For External Evaluation in Practical/Lab Subjects:** The Semester end examination shall be conducted by an external examiner and a staff member of the Department nominated by Head of the Department. Marks distribution is as follows:
- | | |
|---|-----------------|
| i. Writing the program/Procedure: | 20 Marks |
| ii. Executing the program/Procedure: | 20 Marks |
| iii. Viva: | 15 Marks |
| iv. Lab Record: | 15 Marks |
| v. Total: | 70 Marks |
- h) **Comprehensive Viva:** There shall be a Comprehensive Viva-Voce in II year I semester. The Comprehensive Viva-Voce will be conducted by the committee consisting of Head of the Department and two senior faculty members of the Department. The Comprehensive Viva-Voce is aimed to assess the student's understanding in various subjects he/she studies during the M.Tech course of study. The Comprehensive Viva-Voce is valued for 100 marks by the committee. There are no internal marks for the Comprehensive Viva-voce.
- i) **Seminar:** There shall be two Seminar Presentations by the student, one each in I and II semesters. For the seminar, the student shall collect the information on a specialized topic other than his/her project and prepare a technical report, showing his understanding over the topic, and submit to the department, which shall be evaluated by a Departmental committee consisting of the Head of the department, seminar Supervisor and a senior faculty member. **The seminar shall be evaluated for 100 marks. Internal evaluation is for 30 marks and external for 70 marks.**



- j) **Evaluation of Main Project Work:** A Project Review Committee (PRC) is to be constituted by the Principal/Director with Head of the Department as the Chairman and two other senior faculty members of the department.
- i. **Registration for Project work:** A candidate is permitted to register for the project work after satisfying the attendance requirements of all the courses (theory and practical courses) up to III Semester.
 - ii. After satisfying the registration requirements, a candidate is permitted to register for the project work after satisfying, the title, objectives and plan of action of his project work to the Project Review Committee for its approval. Only after obtaining the approval of Project Review Committee of the Department, the student can initiate the project work. Any changes thereafter in the project are to be approved by PRC. The student has to work under the guidance of both internal guide (one faculty member of the department) and external guide (from Industry not below the rank of an officer). Internal guide is allotted by the Head of the Department or Coordinator of the Project Work whereas external guide is allotted by the industrial organization in which the project is undertaken.
 - iii. The candidate shall submit status of the report in two stages at least with a gap of 20 days between them.
 - iv. The work on the project shall be initiated in the beginning of the fourth semester and the duration is one semester. A candidate is permitted to submit project report only after successful completion of theory and practical courses with the approval of PRC and not earlier than 40 days from the date of registration of the project work. For the approval of PRC the candidate shall submit the draft copy of the thesis to the Head/Coordinator (through internal research guide) and shall make an oral presentation before the PRC.
 - v. After approval from the PRC, the final thesis is to be submitted along with ANTI-PLAGIARISM report from the approved agency with a similarity index not more than 30%.
 - vi. Two hardcopies and one soft copy of the project work (dissertation) certified by the research supervisors shall be submitted to the College/Institute.
 - vii. The thesis shall be adjudicated by one external examiner selected by the Institute out of 5-member panel, submitted by the department.
 - viii. The marks allotted for project work review are 100, out of which 30 are for internal and 70 for external. Internal evaluation marks are awarded by the PRC on the basis of the student's performance in the three pre-submission reviews and the external evaluation is done by the external examiner.
 - ix. The marks allotted for project work and dissertation are 100, out of which 30 are for internal and 70 for external. Internal evaluation marks are awarded by the PRC on the basis of the student's performance in the three pre-submission reviews and the external evaluation is done by the external examiner. In both internal and external evaluations the student shall score at least 40% marks and an aggregate of 50% marks to pass in the project work.



If the report of the examiner is favourable, Viva-voce examination shall be conducted by a Board consisting of the Supervisor, Head and the External Examiner who adjudicated the project work. The Board shall jointly evaluate the student's performance in the project work.

- x. In case the student doesn't pass through the project work, he has to reappear for the viva-voce examination, as per the recommendations of the Board. If he fails to succeed at the second Viva-voce examination also, he will not be eligible for the award of the degree, unless he is asked to revise and resubmit the Project by the Board. Head of the Department and Project coordinator shall coordinate and make arrangements for the conduct of viva-voce examination. When one does get the required minimum marks both in internal and external evaluations the candidate has to revise and resubmit the dissertation in the time frame prescribed by the PRC. If the report of the examiner is unfavourable again, the project shall be summarily rejected.
 - xi. If the report of the viva-voce is not satisfactory, the candidate will retake the viva-voce examination after three months. If he fails to get a satisfactory report at the second viva-voce examination, he will not be eligible for the award of the degree, unless the candidate is asked to revise and resubmit.
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. **Supplementary Examinations:** A student who has failed in an end semester examination can appear for a supplementary examination, as per the schedule announced by the College/Institute.
 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 secured the minimum academic requirement in a subject if he / she secures a minimum of 40% of marks in the Semester-end Examination and a minimum aggregate of 50% of the total marks in the Semester-end examination and Internal Evaluation taken together.
 - b) A student shall be promoted to the next semester only when he/she satisfies the requirements of all the previous semesters.
 - c) In order to qualify for the award of M.Tech Degree, the student shall complete the academic requirements of passing in all the Courses as per the course structure including Seminars and Project if any.
 - d) In case a Student does not secure the minimum academic requirement in any course, he/she has to reappear for the Semester-end Examination in the course, or re-register for the same course when next offered or re-register for any other specified course, as may be required.



However, one more additional chance may be provided for each student, for improving the internal marks provided the internal marks secured by a student are less than 50% and he/she failed finally in the course concerned. In the event of taking another chance for re-registration, the internal marks obtained in the previous attempt are nullified. In case of re-registration, the student has to pay the re-registration fee for each course, as specified by the college.

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 >= 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 (Above Average)	6	Marks >= 50 and Marks < 60
F (Fail)	0	Marks < 50
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 kth semester (1 to 4) 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,

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

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

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

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



- 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 M. Tech Degree by JNTUH, he/she shall be placed in one of the following four classes:

Class Awarded		CGPA Secured
3.1	First class with distinction	CGPA > 7.75
3.2	First Class	CGPA ≥ 6.75 and CGPA < 7.75
3.3	Second Class	CGPA ≥ 6.00 and CGPA < 6.75

- 14. Withholding of Results:** If the student has not paid dues to the Institute/ University, or if any case of indiscipline is pending against him, the result of the student (for that Semester) may be withheld and he 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 to the same or equivalent subjects as and when they are offered.
- 17. General Rules**
- The academic regulations should be read as a whole for the purpose of any interpretation.
 - In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.
 - In case of any error in the above rules and regulations, the decision of the Academic Council is final.
 - 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.




**M.Tech
(VLSI)**
M.Tech (VLSI) PROGRAMME STRUCTURE
**I Year-I
Semester**

Sub-Code	Group	Subject	L	T	P	C	Int	Ext	Total
GR17D5077	PC	VLSI Technology and Design	3	1	0	4	30	70	100
GR17D5094	PC	CMOS Analog Integrated Circuit Design	3	1	0	4	30	70	100
GR17D5086	PC	CPLD & FPGA Architectures and Applications	3	1	0	4	30	70	100
	OE-I	Open Elective – I	3	1	0	4	30	70	100
		Elective I	3	1	0	4	30	70	100
GR17D5079	PE	Digital System Design							
GR17D5102	PE	Scripting Languages for VLSI							
GR17D5096	PE	Device Modelling							
		Elective II	3	1	0	4	30	70	100
GR17D5081	PE	Advanced Operating Systems							
GR17D5073	PE	Micro Controllers for Embedded Systems Design							
GR17D5095	PE	CMOS Digital Integrated Circuit Design							
GR17D5097	Lab	VLSI Lab – I	0	0	2	2	30	70	100
GR17D5173	SPW	Seminar – I	0	0	2	2	30	70	100
		Total	18	6	4	28	240	560	800

**M.Tech
(VLSI)**
M.Tech (VLSI) PROGRAMME STRUCTURE
**I Year-II
Semester**

Sub-Code	Group	Subject	L	T	P	C	Int	Ext	Total
GR17D5099	PC	CAD for VLSI Circuits	3	1	0	4	30	70	100
GR17D5100	PC	CMOS Mixed Signal Circuit Design	3	1	0	4	30	70	100
GR17D5101	PC	Design for Testability	3	1	0	4	30	70	100
	OE-I	Open Elective – I	3	1	0	4	30	70	100
		Elective III	3	1	0	4	30	70	100
GR17D5098	PE	Low Power VLSI Design							
GR17D5084	PE	Digital Signal Processors & Architectures							
GR17D5103	PE	VLSI Signal Processing							
		Elective IV	3	1	0	4	30	70	100
GR17D5104	PE	Optimization Techniques in VLSI Design							
GR17D5091	PE	System On Chip Architecture							
GR17D5105	PE	Semiconductor Memory Design & Testing							
GR17D5106	Lab	VLSI Lab – II	0	0	2	2	30	70	100
GR17D5174	SPW	Seminar – II	0	0	2	2	30	70	100
		Total	18	6	4	28	240	560	800

II Year I Semester

Sub-code	Group	Subject	L	T	P	C	Int	Ext	Total
GR17D5175	SPW	Comprehensive Viva-voce	-	-	-	4	0	100	100
GR17D5176	SPW	Project work Review	-	-	-	12	30	70	100
Total			-	-	-	16	30	170	200

II Year-II Semester

Sub-code	Group	Subject	L	T	P	C	Int	Ext	Total
GR17D5177	SPW	Project work and Dissertation	-	-	-	16	30	70	100
Total			-	-	-	16	30	70	100

A student has a choice to select one Open Elective Pool I in I Semester and one Open Elective Pool II in II Semester.

Open Elective Pool-I

Sub-code	Group	Subject	L	T	P	C	Int.	Ext.	Total
GR17D5178	OE-I	E- Commerce and Applications (CSE)	3	1	0	4	30	70	100
GR17D5179		Enterprise Resource Planning (IT)	3	1	0	4	30	70	100
GR17D5180		Modern Control Theory (EEE)	3	1	0	4	30	70	100
GR17D5181		Computer Oriented Numerical Methods in Engineering (CE)	3	1	0	4	30	70	100
GR17D5182		Advanced Computer Architecture (ECE)	3	1	0	4	30	70	100
GR17D5183		Operations Research (ME)	3	1	0	4	30	70	100

Open Elective Pool-II

Sub-Code	Group	Subject	L	T	P	C	Int	Ext	Total
GR17D5184	OE-II	Human Computer Interaction (CSE)	3	1	0	4	30	70	100
GR17D5185		Big Data and Analytics (IT)	3	1	0	4	30	70	100
GR17D5186		Neural and Fuzzy Systems (EEE)	3	1	0	4	30	70	100
GR17D5187		Project Management (CE)	3	1	0	4	30	70	100
GR17D5188		Hardware Software Co-Design(ECE)	3	1	0	4	30	70	100
GR17D5189		Non-Conventional Energy Resources(ME)	3	1	0	4	30	70	100