

# **Academic Regulations Program Structure and Detailed Syllabus**

## **Master of Technology in VLSI**

(Two Year Regular Programme)  
(Applicable for Batches admitted from 2020)



**GOKARAJU RANGARAJU  
INSTITUTE OF ENGINEERING AND TECHNOLOGY**  
*(Autonomous)*  
**Bachupally, Kukatpally, Hyderabad- 500 090**



## Academic Regulations

### GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY, HYDERABAD For all Post Graduate Programmes (M.Tech) GR20 REGULATIONS

Gokaraju Rangaraju Institute of Engineering & Technology - GR20 Regulations are given here under. These regulations govern all the Post Graduate programmes offered by various departments of Engineering with effect from the students admitted to the programmes in 2020-21 academic year.

1. **Programme Offered:** The Post Graduate programme offered by the department is M.Tech in VLSI, 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 PG CET 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 semester 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 68.
  - 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 course.
  - 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 each course concerned in the semester.
  - b) Condonation of shortage of attendance 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 attendance is less than 65% in any course are detained and are not eligible to take their end examinations of that course. They may seek re-registration for that course 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.

<b>Particulars</b>	<b>Internal Evaluation</b>	<b>External Evaluation</b>	<b>Total</b>
<b>Theory</b>	<b>30</b>	<b>70</b>	<b>100</b>
<b>Practical</b>	<b>30</b>	<b>70</b>	<b>100</b>
<b>Mini Project</b>	<b>30</b>	<b>70</b>	<b>100</b>
<b>Dissertation</b>	<b>30</b>	<b>70</b>	<b>100</b>

- c) The marks for internal evaluation per semester per theory course are divided as follows:

<b>i. Mid Examinations:</b>	<b>20 Marks</b>
<b>ii. Tutorials/Assignment:</b>	<b>5 Marks</b>
<b>iii. Continuous Assessment:</b>	<b>5 Marks</b>
<b>Total:</b>	<b>30 arks</b>

- d) **Mid Examination:** There shall be two mid examinations during a semester. The first mid examination shall be conducted from the first 50 per cent of the syllabus and the second mid examination shall be conducted from the remaining 50 per cent of the syllabus. The mid examinations shall be evaluated for **20 marks** and average of the marks scored in the two mid examinations shall be taken as the marks scored by each student in the mid 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 members nominated by Head of the Department. Marks Distribution is as follows:

<b>i.</b>	Internal Exam:	10 Marks
<b>ii.</b>	Record:	05 Marks
<b>iii.</b>	Continuous Assessment:	15 Marks
	<b>Total:</b>	<b>30 Marks</b>

- 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.

h) For approval and evaluating mini project, Dissertation-I and Dissertation-II, a Project Review Committee (PRC) will be constituted by the Head of the Department. The composition of PRC is as follows

- i) Head of the Department
- ii) One senior faculty relevant to the specialization
- iii) Coordinator of the specialization.

i) **Mini Project:** 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.

**Internal Evaluation:** For internal evaluation, 10 Marks are given by PRC based on project reviews and 5 marks for the quality of report and abstract submitted. The supervisor continuously assesses the student performance for 15 marks. Tentative presentation dates and marks distribution of the mini project.

S.No	Date	Review	Marks
<b>Internal Marks (30)</b>			
1	First week of the semester	Abstract submission*	5
2	Mid of the semester	Second review	10
3	Last week of the semester	Last review	15

\*Following are the guidelines for the abstract submission

The faculty are requested to check the document submitted in the first review and should contain following

1. Title of the project and Literature review
2. Schematic/Block diagram which gives the broad idea of the entire project
3. Timeline or milestone of the project. It should clearly indicate deliverables/outcomes of the project.
4. Components required with approximate cost
5. References
6. Plagiarism check is compulsory for mini project report as per the plagiarism policy of GRIET.

**External Evaluation: (70 Marks)**

The mini project report is presented before PRC along with the supervisor and the same is evaluated for 70 marks. At the end of the semester the mini project report is evaluated by PRC.

**Guidelines to award 70 marks:**

S.No	Date	Review/ PRC report	Marks
<b>External Evaluation Marks (70)</b>			
1	Last week of the semester	Final Presentation and report Submission	10
2	Project report: Project report should be written as per IEEE guidelines.	Verified by PRC	20
3	Project Deliverables <ul style="list-style-type: none"> <li>• Hardware prototype</li> <li>• Simulation in any authorized software</li> <li>• Submission of research articles in any Scopus Indexed conference /Journal</li> </ul>	Verified by PRC	30
4	Results and Discussion	Verified by PRC	10

**j) Dissertation (Phase I & Phase II):****Internships/Seminars/Dissertation :****i.Dissertation Phase I:**

The Dissertation Phase I, the department help the students to do the projects supported by the industry and is evaluated for 100 marks. Out of 100 marks, 30 marks are for internal evaluation and 70 marks are for external evaluation.

**Internal Evaluation:** For internal evaluation,10 Marks are given by the PRC based on project reviews and 5 marks for the quality of report and abstract submitted. The supervisor continuously assesses the student performance for 15 marks. Tentative presentation dates and marks distribution of the Dissertation Phase I.

S.No	Date	Review	Marks
<b>Internal Marks (30)</b>			
1	1st week of the semester	Abstract submission*	5
2	Mid of the semester	Second review	10
3	Last week of the semester	Last review	15

\*Following are the guidelines for the abstract submission

The faculty are requested to check the document submitted in the first review and should contain following

1. Title of the project and the literature review.
2. Schematic/Block diagram which gives the broad idea of the entire project.
3. Time line or mile stone of the project. It should clearly indicate deliverables/outcomes of the project.
4. Components required with approximate cost.
5. Possibility to develop Product.
6. Plagiarism check is compulsory for Dissertation Phase I and Phase II as per the plagiarism policy of GRIET.

**External Evaluation: (70 Marks)**

The Dissertation Phase I report is presented before PRC along with the supervisor and the same is evaluated for 70 marks. At the end of the semester the Dissertation Phase I report is evaluated by PRC.

**Guidelines to award 70 marks:**

S.No	Date	Review/ PRC report	Marks
<b>External Evaluation Marks (70)</b>			
1	Last week of the semester	Final Presentation and report Submission	10
2	Project report submission- Project report should be written as per IEEE guidelines.	Verified by PRC	20
3	Project Deliverables <ul style="list-style-type: none"> <li>• Hardware prototype</li> <li>• Simulations in any authorized software</li> <li>• Submission of research articles in any Scopus indexed conference /Journal</li> <li>• Product development</li> <li>• Industry Support</li> </ul>	Verified by PRC	30
4	Results and Discussion	Verified by PRC	10

**ii. Dissertation Phase II:**

The Dissertation Phase II, the department help the students to do the project a industry and is evaluated for 100marks.Outof100marks, 30 marks are for internal evaluation and 70 marks are

for external evaluation. It is expected that along with the project he will be placed in the company.

**Internal Evaluation:** For internal evaluation, 10 Marks are given by the PRC based on project reviews and 5 marks for the quality of report and abstract submitted. The supervisor continuously assesses the student performance for 15marks. Tentative presentation dates and marks distribution of the Dissertation Phase II.

S.No	Date	Review	Marks
<b>Internal Marks (30)</b>			
1	1st week of the semester	Abstract submission*	5
2	Mid of the semester	Second review	10
3	Last week of the semester	Last review	15

\*Following are the guidelines for the abstract submission

The faculty are requested to check the document submitted in the first review and should contain following

1. Title of the project and the literature review.
2. Schematic/Block diagram which gives the broad idea of the entire project.
3. Timeline or milestone of the project. It should clearly indicate deliverables/outcomes of the project.
4. Components required with approximate cost.
5. Possibility to develop Product and IPR.
6. Plagiarism check is compulsory for Dissertation Phase I and Phase II as per the plagiarism policy of GRIET.

**External Evaluation: (70 Marks)**

The Dissertation Phase II report is presented before PRC along with the supervisor and the same is evaluated for 70 marks. At the end of the semester the Dissertation Phase II report is evaluated by PRC.



**Guidelines to award 70 marks:**

S.No	Date	Review/ PRC report	Marks
<b>External Evaluation Marks (70)</b>			
1	Last week of the semester	Final Presentation and report Submission	10
2	Project report submission- Project report should be written as per IEEE guidelines.	Verified by PRC and External Examiner	20
3	Project Deliverables <ul style="list-style-type: none"><li>• Hardware prototype</li><li>• Simulations in any authorized software</li><li>• Submission of research articles in any Scopus indexed conference /Journal</li><li>• Product development</li><li>• Industry Support</li></ul>	Verified by PRC and External Examiner	30
4	Results and Discussion	Verified by PRC and External Examiner	10

**Rules and regulations related to Internships/Seminars/Mini Project/Dissertation Phase I and II:**

The student must 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 Program Coordinator, where as external guide is allotted by the industrial organization in which the project is undertaken.

- 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 24%.
- Two hardcopies and one soft copy of the project work (dissertation) certified by the research supervisors shall be submitted to the College/Institute.
- The thesis shall be adjudicated by one external examiner selected by the Institute out of 3-member panel, submitted by the department.
- In external evaluation, the student shall score at least 40% marks and an aggregate of 50% marks to pass in the project work. If the project report is satisfactory, 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.

- In case the student doesn't pass through the project work, he/she must 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 program 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 unfavorable again, the project shall be summarily rejected.
- If a student gets a chance to work in industry for one year (placement through internship) then he/she should take permission from Principal, Dean of examinations, Dean of Placements, Dean Academics, Department HOD and program coordinator. He/she should complete the credits in 3<sup>rd</sup> semester in consultation with course instructor and program coordinator.

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 Points	Percentage of marks
<b>O (Outstanding)</b>	<b>10</b>	<b>Marks <math>\geq</math> 90</b>
<b>A+ (Excellent)</b>	<b>9</b>	<b>Marks <math>\geq</math> 80 and Marks <math>&lt;</math> 90</b>
<b>A (Very Good)</b>	<b>8</b>	<b>Marks <math>\geq</math> 70 and Marks <math>&lt;</math> 80</b>
<b>B+ (Good)</b>	<b>7</b>	<b>Marks <math>\geq</math> 60 and Marks <math>&lt;</math> 70</b>
<b>B (Above Average)</b>	<b>6</b>	<b>Marks <math>\geq</math> 50 and Marks <math>&lt;</math> 60</b>
<b>F (Fail)</b>	<b>0</b>	<b>Marks <math>&lt;</math> 50</b>
<b>Ab (Absent)</b>	<b>0</b>	

#### 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-C. 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  $k^{\text{th}}$  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, i.e.,

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

Where  $C_i$  is the number of credits of the  $i^{\text{th}}$  course and  $G_i$  is the grade point scored by the student in the  $i^{\text{th}}$  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
13.1	First Class With Distinction	CGPA $\geq$ 7.75
13.2	First Class	CGPA $\geq$ 6.75 and CGPA $<$ 7.75
13.3	Second Class	CGPA $\geq$ 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 PG 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.

- 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.



**Gokaraju Rangaraju Institute of Engineering and Technology**  
**Department of Electronics and Communication Engineering**  
**M.Tech in VLSI**

**I M. Tech (VLSI) - 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	ECE	PC	GR20D5071	Digital System Design using HDL	3	0	0	3	3	0	0	3	30	70	100
2	ECE	PC	GR20D5072	Digital CMOS IC Design	3	0	0	3	3	0	0	3	30	70	100
3	ECE	PE I	GR20D5073	Digital System Design	3	0	0	3	3	0	0	3	30	70	100
			GR20D5074	Nano Fabrication and Wafer Technology											
			GR20D5075	Scripting Languages for VLSI											
4	ECE	PE II	GR20D5076	Device Modeling	3	0	0	3	3	0	0	3	30	70	100
			GR20D5077	Internet of Things (IoT)											
			GR20D5078	VLSI Technology and Design											
5	ECE	PC	GR20D5079	HDL Simulation Lab	0	0	2	2	0	0	4	4	30	70	100
6	ECE	PC	GR20D5080	Digital CMOS IC Design Lab	0	0	2	2	0	0	4	4	30	70	100
7	ENG	BS	GR20D5011	Research Methodology and IPR	2	0	0	2	2	0	0	2	30	70	100
8		AC		Audit Course I	0	0	0	0	2	0	0	2	30	70	100
<b>TOTAL</b>					<b>14</b>	<b>0</b>	<b>4</b>	<b>18</b>	<b>16</b>	<b>0</b>	<b>8</b>	<b>24</b>	<b>240</b>	<b>560</b>	<b>800</b>

**I M. Tech (VLSI) - 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	ECE	PC	GR20D5081	Analog CMOS IC Design	3	0	0	3	3	0	0	3	30	70	100
2	ECE	PC	GR20D5082	ASIC Design	3	0	0	3	3	0	0	3	30	70	100
3	ECE	PE III	GR20D5083	Micro-Electro-Mechanical Systems (MEMS) Design	3	0	0	3	3	0	0	3	30	70	100
			GR20D5084	System on Chip Architecture											
			GR20D5085	Design for Testability											
4	ECE	PE IV	GR20D5086	Digital Signal Processors and Architecture	3	0	0	3	3	0	0	3	30	70	100
			GR20D5087	CAD for VLSI											
			GR20D5088	Low Power VLSI Design											
5	ECE	PC	GR20D5089	Analog CMOS IC Design Lab	0	0	2	2	0	0	4	4	30	70	100
6	ECE	PC	GR20D5090	ASIC Design Lab	0	0	2	2	0	0	4	4	30	70	100
7	ECE	PW	GR20D5143	Mini Project	2	0	0	2	2	0	0	2	30	70	100
8		AC		Audit Course II	0	0	0	0	2	0	0	2	30	70	100
<b>TOTAL</b>					<b>14</b>	<b>0</b>	<b>4</b>	<b>18</b>	<b>16</b>	<b>0</b>	<b>8</b>	<b>24</b>	<b>240</b>	<b>560</b>	<b>800</b>

## II M. Tech (VLSI) - I Semester

Sl. No	Group	Course Code	Subject	Hours			Total Hours	Credits	Int. Marks	Ext. Marks	Total Marks
				L	T	P					
1	PE V	GR20D5091	Advanced Computer Architecture	3	0	0	3	3	30	70	100
		GR20D5092	CPLD and FPGA Architecture								
		GR20D5093	CMOS Mixed Signal Circuit Design								
	OE	GR20D5146	1. Cost Management of Engineering Projects	3	0	0	3	3	30	70	100
		GR20D5147	2. Industrial Safety								
		GR20D5148	3. Operations Research								
		GR20D5149	4. Artificial Neural Networks and Fuzzy Systems								
		GR20D5150	5. Cyber Security								
		GR20D5151	6. Internet of Things Architecture and Design Principles								
3	PW	GR20D5144	Dissertation Phase - I	0	0	20	20	10	30	70	100
<b>Total</b>				<b>6</b>	<b>0</b>	<b>20</b>	<b>26</b>	<b>16</b>	<b>90</b>	<b>210</b>	<b>300</b>

### OPEN ELECTIVE

S. No.	BOS	Group	Course Code	Course
1	CE	OE	GR20D5146	Cost Management of Engineering Projects
2	EEE	OE	GR20D5147	Industrial Safety
3	ME	OE	GR20D5148	Operations Research
4	ECE	OE	GR20D5149	Artificial Neural Networks and Fuzzy Systems
5	CS	OE	GR20D5150	Cyber Security
6	IT	OE	GR20D5151	Internet of Things Architecture and Design Principles

## II M. Tech (VLSI) - 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	ECE	PW	GR20D5145	Dissertation Phase - II	0	0	16	16	0	0	32	0	30	70	100
<b>TOTAL</b>					<b>0</b>	<b>0</b>	<b>16</b>	<b>16</b>	<b>0</b>	<b>0</b>	<b>32</b>	<b>0</b>	<b>30</b>	<b>70</b>	<b>100</b>

## Audit Courses I & II

1	GR20D5152	English for Research Paper Writing
2	GR20D5153	Disaster Management
3	GR20D5154	Sanskrit for Technical Knowledge
4	GR20D5155	Value Education
5	GR20D5156	Indian Constitution
6	GR20D5157	Pedagogy Studies
7	GR20D5158	Stress Management by Yoga
8	GR20D5159	Personality Development through Life Enlightenment Skills