GANDHI INSTITUTE OF TECHNOLOGY AND MANAGEMENT (GITAM)

(Deemed to be University)

VISAKHAPATNAM * HYDERABAD * BENGALURU

Accredited by NAAC with A^{++} Grade

GITAM School of Technology

CURRICULUM AND SYLLABUS

4 Year Undergraduate Programme
UEECE03: B.Tech. Electronics Engineering
(VLSI Design and Technology)

w.e.f. 2024-25 admitted batch

(Updated on May 2024)

Academic Regulations

Applicable for the Undergraduate Programmes in the School of Technology (except B.Tech.CSBS)

https://www.gitam.edu/academics/academic-regulations

GANDHI INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Vision

GITAM will be an exceptional knowledge-driven institution advancing on a culture of honesty and compassion to make a difference to the world.

Mission

- Build a dynamic application-oriented education ecosystem immersed in holistic development.
- Nurture valuable futures with global perspectives for our students by helping them find their ikigai.
- Drive impactful integrated research programmes to generate new knowledge, guided by integrity, collaboration, and entrepreneurial spirit.
- Permeate a culture of kindness within GITAM, fostering passionate contributors.

Quality Policy

To achieve global standards and excellence in teaching, research, and consultancy by creating an environment in which the faculty and students share a passion for creating, sharing and applying knowledge to continuously improve the quality of education.

VISION AND MISSION OF THE SCHOOL

VISION

To become a global leader in holistic engineering education and research

MISSION

- To impart a strong academic foundation and practical education through a flexible curriculum, state-of-the-art infrastructure, and best learning resources
- To actively pursue academic and collaborative research with industries and research institutions, both in India and abroad
- To build a congenial and innovative eco system by enabling the latest technologies, thus helping the students, to solve the challenges of societal importance
- To provide our students with the appropriate leadership, management, communication skills and professional ethics for career success and to continuously impact the global lives

VISION AND MISSION OF THE DEPARTMENT

VISION

To become a global leader in holistic engineering education and research

MISSION

- Empower the students with knowledge to face real-world challenges for holistic development.
- Conduct multidisciplinary research that makes an impact on society, addressing key challenges through innovative solutions.
- Foster a culture emphasizing empathy, respect, commitment upholding the ethical standards.

UEECE03: B.Tech. Electronics Engineering (VLSI Design and Technology)

(w.e.f. academic year 2024-25 admitted batch)

Programme Educational Objectives (PEOs)

PEO 1	To impart comprehensive knowledge of analytical foundations in Electronics Engineering (VLSI Design and Technology) in terms of different VLSI design methodologies in designing efficient and reliable integrated circuits.
PEO 2	To inculcate critical thinking and problem-solving abilities to handle the real world problems by applying practical skills in different fields of Electronics Engineering (VLSI Design and Technology).
PEO 3	To impart qualities of teamwork, appreciation of collaboration that entails inter-disciplinary endeavors and the potential impact of technology on society.
PEO 4	Develop creativity, Research related skills, self- learning, entrepreneurial, leadership skills and values in order to meet the upcoming needs of the country in semiconductor manufacturing.

PEO Articulation

	PEO1	**PEO2**	**PEO3**	**PEO4**
M1	H	H	M	M
M2	M	H	M	H
M3	L	M	H	M

H – High, M – Medium, L – Low

Programme Outcomes (POs) and Programme Specific Outcomes (PSOs):

At the end of the Programme the students would be able to:

PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12	Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1	Design and research analog, digital and mixed-signal integrated circuits using different VLSI design methodologies involving industry standard tools balancing tradeoffs in area, power, speed and reliability
PSO2	Apply research methods to formulate and solve research problems in integrated circuit design of contemporary societal relevance.
PSO3	Survey and present state of the art circuit/system design procedures for VLSI Design and Fabrication.

Curriculum Structure

(Flexible Credit System)

Minimum Credit Requirements for the Award of Degree

S.No.	Course Category and Category Code	Minimum Credits	% of credits in the Programme
1.	University Core (UC)	19	11.87
2.	Faculty Core (FC)	53	33.12
3.	Programme Core (PC)	49	30.62
4.	Programme Electives (PE)	15	9.37
5.	Open Electives (OE)	24	15.00
	Total	**160**	**100**

University Core (UC) : 19 Credits								
Course code	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
Ability Enhancement Courses								
LANG1201	100	Critical Thinking	2	0	0	0	0	2
LANG1241	100	Communicative English - I	0	0	4	0	0	2
LANG1251	100	Communicative English - II	0	0	4	0	0	2
IENT1051	100	Fundamentals of Entrepreneurship	2	0	0	0	0	2
Skill Enhancement Courses								
CLAD1041	100	Art of Persuasive Communication	0	0	2	0	0	1
CLAD1051	100	Competence in Communication	0	0	2	0	0	1
CLAD1061	100	Life Skills	0	0	2	0	0	1
CLADXXXX	100	Soft Skills - 4	0	0	2	0	0	1
Value Added Courses								
ENVS1003	100	Environmental Studies	3	0	0	0	0	3
POLS1051	100	The Indian Constitution	1	0	0	0	0	1
Pass / Fail Courses (Mandatory)								
FINA1081	100	Personal Financial Planning *	1	0	0	0	0	1
PHPY1011	100	Gandhi and the Contemporary World *	1	0	0	0	0	1
Pass / Fail Courses (Any one course to be chosen)								
DOSP1181	100	Yogasana	0	0	0	2	0	1
MFST1002	100	Health and Wellbeing *	0	0	2	0	0	1
DOSL1081	100	Student Life Activities (Participant)	0	0	0	2	0	1
DOSL1091	100	Student Life Activities (Organizer)	0	0	0	2	0	1
DOSL1101	100	Student Life Activities (Competitor)	0	0	0	2	0	1
DOSL1111	100	Foundations of Student (Leadership)	0	0	0	2	0	1
DOSL1042	100	Community Services – Volunteer	0	0	2	0	0	1
DOSL1052	100	Community Services – Mobilizer	0	0	2	0	0	1
DOSP1003	100	Badminton	0	0	0	2	0	1
DOSP1033	100	Football	0	0	0	2	0	1
DOSP1043	100	Volleyball	0	0	0	2	0	1
DOSP1053	100	Kabaddi	0	0	0	2	0	1
DOSP1073	100	Table Tennis	0	0	0	2	0	1
DOSP1083	100	Handball	0	0	0	2	0	1
DOSP1093	100	Basketball	0	0	0	2	0	1
DOSP1113	100	Throw ball	0	0	0	2	0	1
DOSP1142	100	Cricket	0	0	0	2	0	1
DOSP1132	100	Functional Fitness	0	0	0	2	0	1
DOSP1171	100	Martial Arts/Self Defence	0	0	0	2	0	1

* Massive Open Online Course (MOOC)

FACULTY CORE (FC) : 53 credits								
Course code	**Level**	**Course title**	**L**	**T**	**P**	**S**	**J**	**C**
MATH1341	100	Calculus and Differential Equations	3	1	0	0	0	4
MATH1272	100	Linear Algebra	3	1	0	0	0	4
MATH2581	200	Probability theory and Random process	3	1	0	0	0	4
MATH2591	200	Complex variables & transform techniques	3	1	0	0	0	4
PHYS1001	100	Physics	2	1	2	0	0	4
CHEM1111	100	Engineering chemistry	2	1	2	0	0	4
24CSEN1031	100	Programming for Problem Solving - 1 (Programming with Python)	0	0	6	0	0	3
24CSEN1041	100	Programming for Problem Solving - 2 (Programming with C)	0	0	6	0	0	3
24XXXXXXXX	xxx	Engineering Basket - Choice 1	2	0	2	0	0	3
24XXXXXXXX	xxx	Engineering Basket - Choice 2	2	0	2	0	0	3
MECH1011	100	Engineering Visualization and Product Realization	0	0	4	0	0	2
MECH1041	100	Technology Exploration and Product Engineering	0	0	4	0	0	2
24PROJ4777	400	Capstone Project - Introduction	0	0	0	0	2	1
24INTN3777	300	Internship-1	0	0	0	0	2	1
24PROJ4888/ 24INTN4888/ 24RESH4888	400	Capstone Project - Final / Internship-2 / Research	0	0	0	0	16	8
HSMCH102	100	Universal Human Values 2: Understanding Harmony	2	1	0	0	0	3

Engineering Basket 1 & 2

Six credits have to be chosen from the basket other than Parent Department course.

Course code	**Level**	**Course title**	**L**	**T**	**P**	**S**	**J**	**C**
24EECE2221	200	Fundamentals of Sensors and Internet of Things	2	0	2	0	0	3
24EECE2211	200	Fundamentals of Electrical and Electronics Engineering	2	0	2	0	0	3
24EECE2231	200	Foundations of Electrical and Electronics Engineering	3	0	2	0	0	4
24MECH1001	100	Introduction to Mechanical Engineering	2	0	2	0	0	3
24CIVL1001	100	Introduction to Civil Engineering	2	0	2	0	0	3
24BTEN1021	100	Biotechnology and Bioengineering	2	0	2	0	0	3
24BTEN1031	100	Introduction to Biomedical Engineering	2	0	2	0	0	3
24CSEN2261	200	Data Structures and Algorithms	2	0	2	0	0	3

Programme Core (PC) : 49 credits								
49 credits to be earned through programme core courses.								
Course code	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
24EECE1001	100	Network Theory and Analysis	2	1	0	0	0	3
24EECE2011	200	Signals and Systems	2	1	0	0	0	3
24EECE2001	200	Electronic Devices and Circuits	3	0	2	0	0	4
24EECE2291	200	Digital Logic Design	3	0	2	0	0	4
24EECE2071	200	Analog Circuits	3	0	2	0	0	4
24EECE3271	300	Introduction to Digital Integrated Circuits	2	1	0	0	0	3
24EECE3281	300	Introduction to Analog Integrated Circuits	3	0	2	0	0	4
24EECE3041	300	Control Systems	2	1	0	0	0	3
24EECE3071	200	Digital Signal Processing	3	0	2	0	0	4
24EECE2081	200	Introduction to Electronic Systems Packaging	3	0	0	0	0	3
24EECE3061	300	Microprocessors and Microcontrollers	3	0	2	0	0	4
24EECE2091	200	Modeling and Design with HDLs	2	0	2	0	0	3
24EECE4141	400	Digital VLSI Design	3	0	2	0	0	4
24EECE2101	200	Semiconductor Fabrication Principles	3	0	0	0	0	3

Programme Elective (PE) : 15 credits								
Course code	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
24EECE3291	300	Semiconductor Device Modeling and Simulation	3	0	0	0	0	3
24EECE3301	300	Linear Integrated Circuits	3	0	0	0	0	3
24EECE3311	300	Data Converters	3	0	0	0	0	3
24EECE3321	300	Circuits for Analog System Design	3	0	0	0	0	3
24EECE4151	400	CMOS RFIC Design	3	0	0	0	0	3
24EECE4161	400	Algorithms for VLSI Design Automation	3	0	0	0	0	3
24EECE3051	300	Computer Organization and Design	3	0	0	0	0	3
24EECE4171	400	Low Power VLSI Design	3	0	0	0	0	3
24EECE3331	300	Digital System Design	2	1	0	0	0	3
24EECE4181	400	Digital VLSI Testing	3	0	0	0	0	3
24EECE2111	200	Electromagnetic Waves and Transmission Lines	2	1	0	0	0	3
24EECE2121	200	Linux Programming and Scripting	2	0	2	0	0	3
24EECE2131	200	RTL Design and Verification	3	0	0	0	0	3
24EECE3341	300	C-Based VLSI Design	2	0	2	0	0	3
24EECE3351	300	Static Timing Analysis	3	0	0	0	0	3
24EECE3361	300	Introduction to Nanotechnology	3	0	0	0	0	3
24EECE3371	300	EMI/EMC of ICs	3	0	0	0	0	3
24EECE3381	300	Nanoelectronics Materials and Devices	3	0	0	0	0	3
24EECE3391	300	MEMS and Microsystems	3	0	0	0	0	3

Open Electives (OE)

A minimum of 24 credits are to be earned under this category of courses, out of which 9 credits are from other departments from the School of Technology and the remaining 15 credits are from schools other than the School of Technology.

The current list of courses offered under OE will be available through the registration portal. Refer here for the tentative list of courses offered under OE category

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