LORDS INSTITUTE OF ENGINEERING & TECHNOLOGY

(Autonomous)

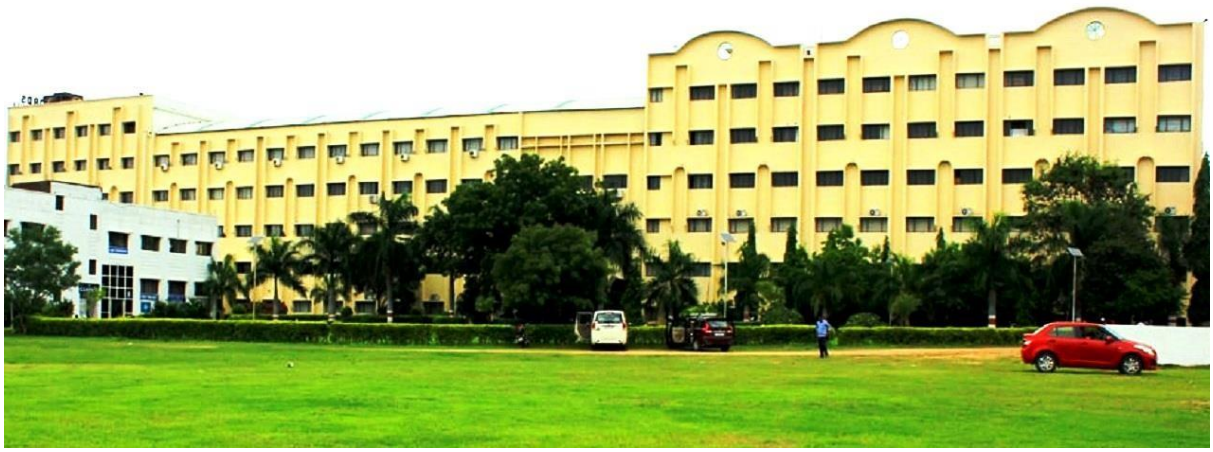
Approved by AICTE | Recognized by Government of Telangana | Affiliated to Osmania University

Accredited by NBA | Accredited with 'A' grade by NAAC | Accredited by NABL

Four Year Course Structure and First Year Syllabus

Department of Electronics and Communication Engineering

(With effect from the Academic Year 2023-24)



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LORDS INSTITUTE OF ENGINEERING AND TECHNOLOGY
(An Autonomous Institution)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTION & EXAMINATIONS [LR-23]
AICTE Model Curriculum
B.E. VII-Semester (2026-2027)

S. No.	Course Code	Category	Course Title	Scheme of Instructions				Scheme of Examination			CREDITS
				L	T	P/D	Contact Hours/Week	Maximum Marks		Duration in Hours	
								CIE	SEE		
Theory Course											
1	U23EC701	PCC	Microwave Engineering	3	1	0	3	40	60	4	4
2	U23EC702	PCC	Cellular and Wireless Communication	3	0	0	3	40	60	3	3
3	U23EC703	PCC	Data Communication and Computer Networks	3	0	0	3	40	60	3	3
4	--	PEC	Professional Elective – III	3	0	0	3	40	60	3	3
5	--	OEC	Open Elective – III	3	0	0	3	40	60	3	3
Practical/ Laboratory Course											
6	U23EC7L1	PCC	Microwave Engineering Lab	0	0	2	2	25	50	2	1
7	U23EC7P1	PROJ	Technical Seminar	-	-	4	-	50	-	2	2
8	U23EC7P3	PROJ	Major Project (Phase-1)	0	0	6	6	50		-	3
Total				**15**	**1**	**12**	**24**	**325**	**350**	**20**	**22**

L: Lecture*(Hrs/Wk/Sem)* **T**: Tutorial *(Hrs/Wk/Sem)* **P**: Practical / **D**: Drawing *(Hrs/Wk/Sem)*

CIE: Continuous Internal Evaluation **SEE**: Semester End Examination

PEC: Professional Electives **PROJ:** Project

OEC: Open Electives **PCC**: Program core course

Note:

1. Each contact hour is a Clock Hour.
2. The duration of the practical class is three hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

Course Code	Course Title						Core/Elective
U23EC701	MICROWAVE ENGINEERING						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Antennas and Wave Propagation	3	1	-	-	40	60	4

Course Objectives

Upon completion of this course, students will be able to:

1. Explain the concept of Microwave signal propagation.
2. Comprehend Microwave signal generation and amplification techniques
3. Evaluate the parameters of various components used in Microwave design.

Course Outcomes

At the end of the course students will be able to

1. Explain the fundamentals of guided wave propagation and propagation modes in parallel-plane waveguides
2. Describe the structure and characteristics of rectangular and circular waveguides and cavity resonators.
3. Calculate waveguide, resonator, and scattering parameters of microwave components.
4. Analyze the operation and characteristics of microwave tubes and microwave network components
5. Evaluate the performance of microwave solid-state devices for various microwave applications.

UNIT-I

Guided Waves: Electromagnetic waves between parallel plates, Propagation of Transverse Electric (TE), Transverse Magnetic (TM) and Transverse Electro Magnetic (TEM) waves between parallel planes. Microwave frequency bands, Applications and Advantages of Microwaves.

UNIT-II

Waveguides: Transverse Electric (TE) and Transverse Magnetic (TM) waves in rectangular and circular waveguides, Wave Impedance, Characteristic Wave Impedance, Attenuation and Quality factor of waveguides. Cavity resonators, resonant frequency and Q. Applications of cavity resonator.

UNIT-III

Microwave Components: Introduction to scattering parameters and their properties, S parameters for reciprocal. E and H Plane Tees, Magic Tee and their properties, Directional coupler, Types of Attenuators, Types of Phase Shifters, Isolators and circulators.

UNIT-IV

Micro wave Tubes: High frequency limitations of conventional tubes, Types of microwave tubes. Bunching and velocity modulation, mathematical theory of bunching, principles and operation of two cavity, multi cavity and Reflex Klystron. Theory of crossed field interaction**:** Principles and operation of magnetrons and crossed field Amplifiers, TWT and BWO.

UNIT-V

Microwave Solid State Devices: Principles of operation, characteristics and applications of Varactor, PIN diode, GUNN diode and IMPATT diode. Elements of strip lines, micro strip lines, slot lines and fin–lines and their applications.

Suggested Readings:

1. Annapurna Das and Sisir K. Das '*Microwave Engineering* ', McGraw Hill Education 3rd Edition 2014.
2. Kulkarni, *Microwave and Radar Engineering*, 5/E, Umesh publications.
3. E. C. Jordan & Keith G. Balmain, '*Electromagnetic Waves and Radiating Systems'*, 2nd edition, Pearson Education, 2006. Networks, Lines and Fields – JD Ryder, PHI, 2nd Edition, 2009.
4. Samuel Y. Liao, '*Microwave Devices and Circuits'*, 3rd edition, Pearson Education, 2003.
5. R. E. Collins, "*Foundations for Microwave Engineering*", 2nd edition, Wiley India Pvt. Ltd., 2012.

Course Code	Course Title						Core/Elective
U23EC702	CELLULAR AND WIRELESS COMMUNICATION						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Digital Communication	3	-	-	-	40	60	3

Course Objectives:

Upon completion of this course, students will be able to :

1. Illustrate the concept of basic cellular system and acquire knowledge on various mobile radio propagation parameters.
2. Analyze the various concepts in various Mobile Communication Technologies and Wireless Standards.
3. Apply concepts of wireless networks to analyze modern communication systems like Wi-Fi, Bluetooth, and satellite communication

Course Outcomes:

After completing this course, the student will be able to:

1. Outline the method of selection and reuse of a set of frequency channels.
2. Comprehend the methods of mobile radio propagation models.
3. Identify the different methods of mobile access technologies and which of them suitable for mobile cellular solutions.
4. Interpret the features and operational details of wireless systems and standards.
5. Compare and contrast the development and limitations of different wireless communication Technologies.

UNIT-I

BASIC CELLULAR CONCEPTS

Basic Cellular system, Performance Criteria, Operation of Cellular System, Concept of Frequency reuse, Channel assignment strategies, Interference and System Capacity, Trunking and Grade of Service, Improving coverage and capacity in cellular Systems, Various types of Handoff Strategies.

UNIT-II

MOBILE RADIO PROPAGATION- LARGE SCALE PATH LOSS:

Free space propagation model, the three basic propagation mechanisms, Ground reflection two ray model, Outdoor propagation models- Durkin's model, Hata model and Indoor propagation model-partition losses models, Log distance path loss models.

UNIT-III

MOBILE RADIO PROPAGATION-SMALL SCALE PATH LOSS:

Small scale multipath propagation, Parameters of Mobile multipath channels, Types of small scale, fading, Fading effects due to Doppler's spread, Traffic Routing in wireless networks, CSMA, CSMA CD, Pure Aloha, Slotted Aloha, Reservation Aloha.

UNIT-IV

WIRELESS SYSTEMS AND STANDARDS

GSM: Services and Features, System architecture, Radio Sub system, Channel Types, Frame structure and Signal processing. CDMA: Digital Cellular standard IS-95, Forward Channel, Reverse Channel.

UNIT-V-

WIRELESS COMMUNICATION TECHNOLOGIES

Comparison of Mobile communication Technologies: 1G, 2G and 2.5G, technology Features of 3G 4G and 5G, WLAN, WLL, Bluetooth, Paging System, PAN, ISDN.

Suggested Readings:

1. Nishith D. Tripathi and Jeffrey H. Reed,"*Cellular Communications A Comprehensive and Practical Guide*" Wiley 2014.
2. T.L. Singhal, "*Wireless Communication Systems*", 1/e, TMH Publications, 2010.
3. Theodore S. Rappaport, *Wireless Communications*, Prentice Hall PTR, 2002
4. William C.Y. Lee, *Mobile Cellular Telecommunications*, Second Edition, Tata McGraw- Hill Edition 2006.
5. K. Feher, *Wireless Digital Communication*, Prentice Hall of India, New Delhi, 1995.

	Course Title						Core/Elective
U23EC703	DATA COMMUNICATION AND COMPUTER NETWORKS						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Digital Communication	3	-	-	-	40	60	3

Course Objectives :

Students will be able to:

1. Elaborate different types of data communication networks and their functions.
2. Acquire knowledge on various mobile radio propagation parameters.
3. Analyze the various concepts in various Mobile Communication Technologies and Wireless Standards.

Course Outcomes :

Upon completing this course, the student will be able to

1. Know the Categories and functions of various Data communication Networks
2. Design and analyze various error detection techniques.
3. Demonstrate the mechanism of routing the data in network layer
4. Know the significance of various Flow control and Congestion control Mechanisms
5. Know the Functioning of various Application layer Protocols.

UNIT-I

Introduction to Data Communications: Components, Data Representation, Data Flow, Networks-Distributed Processing, Network Criteria, Physical Structures, Network Models, Categories of Networks Interconnection of Networks, Network Models, Layered Tasks, OSI model, Layers in OSI model, TCP/IP Protocol Suite, Addressing Introduction.

UNIT-II

Data Link Layer: LANs- Introduction to the Link Layer, The Services Provided by the Link Layer, Types of errors, Redundancy, Detection vs Correction, Forward error correction Versus Retransmission Error-Detection and Correction Techniques, Parity Checks, Check summing Methods, Cyclic Redundancy Check (CRC) , Framing, Flow Control and Error Control protocols.

UNIT-III

The Network Layer: Introduction, Forwarding and Routing, Network Service Models, Datagram Networks, Origins of VC and Datagram Networks, inside a Router-Input Processing, Switching, Output Processing, Queuing, The Routing Control Plane, The Internet Protocol (IP): Forwarding and Addressing in the Internet- Datagram format, Ipv4 Addressing, Internet Control Message Protocol (ICMP), IPv6

UNIT-IV

Transport Layer: Introduction and Transport Layer Services: Relationship between Transport and Network Layers, Overview of the Transport Layer in the Internet, Multiplexing and Demultiplexing, Connectionless Transport: UDP -UDP Segment Structure, UDP Checksum, Principles of Reliable Data Transfer-Building a Reliable Data Transfer Protocol.

UNIT-V-

Application Layer: Principles of Networking Applications – Network Application Architectures, Transport Services Provided by the File Transfer: FTP - FTP Commands and Replies, Electronic Mail in the Internet-STMP, Comparison with HTTP, DNS-The Internet's Directory Service – Service Provided by DNS.

Suggested Readings:

1. Achyut S. Godbole & Atul Kahate, *Data Communications and Networks*, McGraw Hill.
2. Data communication and Networks - Bhusan Trivedi, Oxford university press, 2016.
3. Data Communications and Networking Behrouz A. Forouzan 4th Edition McGraw-Hill Education.
4. Computer Networks -- Andrew S Tanenbaum, 4th Edition, Pearson Education.
5. Data and Computer Communications - William Stallings, 10th Edition, Pearson Education.

U23EC7L1	MICROWAVE ENGINEERING LAB						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
MWE,AWP	-	-	-	2	25	50	1

Course Objectives

Upon completion of this course, students will be able to:

1. Realize the characteristics of Reflex Klystron Oscillator and Gunn oscillator.
2. Understand measurement of frequency and wavelengths.
3. Calculate measurement of VSWR various TEES.

Course Outcomes

At the end of the course students will be able to

1. Explain the operating characteristics of microwave sources such as Reflex Klystron and Gunn diode oscillators...
2. Measure microwave parameters such as frequency, guide wavelength, VSWR, and impedance using microwave test benches and related instrument
3. Analyze the scattering parameters and performance characteristics of microwave components including directional couplers, tees, and circulators
4. Analyze the radiation characteristics of microwave antennas by measuring radiation pattern, gain, bandwidth, and beam width.
5. Design, simulate, and evaluate micro strip and dipole antennas using electromagnetic simulation software.

List of experiments

1. To find and verify characteristics of Reflex Klystron oscillator, mode numbers and efficiencies of different modes
2. To find and verify characteristics of Gunn diode oscillator, Power Output Vs Frequency, Power Output Vs Bias Voltage
3. To measure and verify frequency and guide wavelength calculation using microwave bench setup.
4. To measure low and high VSWR of different components like matched terminations.
5. To measure impedance of horn antenna.
6. To measure and verify the S-parameters of Directional coupler.
7. To measure and verify the S-parameters of Tees: E plane, H plane and Magic Tee.
8. To measure and verify the S-parameters of Circulator.
9. To measure radiation patterns for basic microwave antennas like horn and parabolic reflectors in E-plane and H-plane. Also to finding the gain, bandwidth and beam width these antennas.
10. To design, Simulate and Analyze the Dipole Antenna Structure by using EM simulation software
11. To design, Simulate and Analyze a Micro strip Rectangular Patch Antenna by using EM simulation software
12. To design, Simulate and Analyze a Probe Feed Patch Antenna by using EM simulation software
13. To design, Simulate and Analyze a The Triangular Micro strip Antenna by using EM simulation software

Course Code	Course Title						Core / Elective
U23EC7P1	**Technical Seminar**						PROJ
Prerequisite	Contact Hours Per Week				CIE	SEE	Credits
	L	T	D	P			
Student should have knowledge of all the subjects of ECE	-	-	-	4	50	-	2

Course Objectives:

Upon completion of this course, students will be able to:

1. Explain the concepts and recent trends in a selected area of specialization.
2. Apply literature survey methods to gather and organize technical information.
3. Analyze contemporary technologies and research contributions in the selected domain and to present findings through a technical report and seminar presentation.

Course Outcomes:

After completing the course, the student will be able to:

1. Interpretation and Solution of real life engineering problems by applying Knowledge.
2. Conduct literature survey on a current topic based on peer reviewed literature & Identify research gap in the literature
3. Develop presentation slides / report, compile the content and prepare comprehensive report.
4. Demonstrate skills required for preparation of a technical report Present seminar and Write precise technical reports in a nutshell.
5. Participates effectively in multi-disciplinary and heterogeneous teams exhibiting team work, Inter-personal relationships, conflict management and leadership quality.

Technical Seminar helps the students to gather, organize, summarize and interpret technical literature with the purpose of formulating a proposal in final year. Students had also submitted a technical report summarizing state-of-the-art on an identified domain and topic. The students seminar work can be application oriented and/or will be based on some innovative/ theoretical and practical work. The student is expected to submit the seminar presentation and report in standard format approved by the internal evaluation committee. The topic for the seminar should essentially base on Journal publication and relevant to the latest trends in Electronics and Communication Engineering. The technical seminar will be undertaken preferably by a group of individual students. Each student is expected to present at least twice during the semester and the student is evaluated based on that.

The technical seminar must be distinctly structured and the students should include the following in their power point presentation aspects:

1. Introduction to the Technical Seminar topic field
2. Literature survey of the Field
3. Problem definition / statement / Objectives of the field and Specifications.
4. Methodology / Experimental Procedure/ Analysis of field
5. Consolidation of available information
6. Results and Discussions
7. Advantages / Disadvantages/ Applications
8. Conclusions
9. Future scope
10. References

Instructions to students:

1. Submit a one page synopsis of the seminar talk for display on the noticeboard.
2. Deliver the seminar for a maximum duration of 30 minutes, where the presentation Should be for 20 minutes in PowerPoint, followed by question and answers session for 10minutes.
3. Submit the detailed report of the seminar in spiral bound in a précised format as suggested by the department.

Seminars are to be scheduled from 3rd week to the last week of the semester and any change in schedule shall be discouraged. For the award of sessional marks students are judged by three (3) faculty members and are based on oral and written presentations as well as their involvement in the discussions during the oral presentation.

Guidelines for awarding the marks:		
Sl no.	Description	Max Marks
1.	Contents and relevance	10
2.	Presentation skills	10
3.	Preparation of PPT slides	05
4.	Questions and answers	05
5.	Report in a prescribed format	20
Total Marks		**50**

Course Code	Course Title						Core / Elective
U23EC7P2	Major Project Phase -1						PROJ
Prerequisite	Contact Hours Per Week				CIE	SEE	Credits
	L	T	D	P			
Mini Project	-	-	-	6	50	-	3

Course Objectives:

Upon completion of this course, students will be able to:

1. Enhance practical and professional skills
2. Familiarize tools and techniques of systematic literature survey and documentation
3. Expose the students to industry practices and team work.

Course Outcomes:

After completing the course, the student will be able to:

1. Demonstrate the ability to synthesize and apply the knowledge and skills acquired in the academic program to real world problems.
2. Evaluate different solutions based on economic and technical feasibility.
3. Analyze various modules pertaining to the sub routines of the projects.
4. Effectively plan a project and confidently perform all aspects of project management.
5. Demonstrate effective written and oral communication skills.

The department can initiate the project allotment procedure at the end of VI semester and finalize it in the first two weeks of VII semester. The department will appoint a project coordinator who will coordinate the following:

1. Collection of project topics/ descriptions from faculty members (Problems can also be invited from the industries)
2. Grouping of students (max 3 in a group)
3. Allotment of project guides

The aim of project work is to develop solutions to realistic problems applying the knowledge and skills obtained in different courses, new technologies and current industry practices. This requires students to understand current problems in their domain and methodologies to solve these problems. To get awareness on current problems and solution techniques, the first 4 weeks of VII semester will be spent on special lectures by faculty members, research scholars, post graduate students of the department and invited lectures by engineers from industries and R&D institutions. After completion of these seminars each group has to formalize the project proposal based on their own ideas or as suggested by the project guide. Seminar schedule will be prepared by the coordinator for all the students from the 5th week to the last week of the semester which should be strictly adhered to.

Each group will be required to:

1. Submit a one-page synopsis before the seminar for display on notice board.
2. Give a 30 minutes' presentation followed by 10 minutes' discussion.
3. Submit a technical write-up on the talk.

At least two teachers will be associated with the Project Seminar to evaluate students for the award of sessional marks which will be on the basis of performance in all the 3 items stated above.

The seminar presentation should include the following components of the project:

Problem definition and specification

2, Literature survey

3. Broad knowledge of available techniques to solve a particula r problem.

4. Planning of the work, preparation of bar (activity) charts

5. Presentation- oral and written.

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTION & EXAMINATIONS [LR-23]
AICTE Model Curriculum (Tentative)
B.E. VIII-Semester (2026-2027)

S. No.	Course Code	Category	Course Title	Scheme of Instructions				Scheme of Examination			CREDITS
				L	T	P/D	Contact Hours/Week	Maximum Marks		Duration in Hours	
								CIE	SEE		
Theory Course											
1.	--	PEC	Professional Elective – IV	3	0	0	3	40	60	3	3
2.	--	OEC	Open Elective – IV	3	0	0	3	40	60	3	3
3.	U23EC8P1	PROJ	Major Project (Phase-2)	0	0	18	18	-	150	-	9
Total				**6**	**0**	**18**	**24**	**80**	**270**	**6**	**15**

L: Lecture*(Hrs/Wk/Sem)* **T**: Tutorial *(Hrs/Wk/Sem)* **P**: Practical / **D**: Drawing *(Hrs/Wk/Sem)*

CIE: Continuous Internal Evaluation **SEE**: Semester End Examination

OEC: Open Elective Course **PROJ**: Project **PEC:** Professional Elective

Note:

1. Each contact hour is a Clock Hour.
2. The duration of the practical class is three hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

Course Code	Course Title						Core /Elective
U23EC8P1	MAJOR PROJECT –PHASE-2						PROJ
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Major Project Phase-1	-	-	18	-	--	150	9

Course Objectives:

Upon completion of this course, students will be able to:

1. To familiarize tools and techniques of systematic literature survey and documentation
2. To expose the students to industry practices and team work
3. To encourage students to work with innovative and entrepreneurial ideas.

Course Outcomes:

After completing the course, the student will be able to:

1. Demonstrate the ability to synthesize and apply the knowledge and skills acquired in the academic program to the real-world problems
2. Evaluate different solutions based on economic and technical feasibility.
3. Effectively plan a project and confidently perform all aspects of project management
4. Demonstrate effective written and oral communication skills
5. Find relevant sources (e.g., library, Internet, experts) and gathers information for preparing reports and other relevant documentation.

Project work aims to implement and evaluate the proposal made as part of Project Work. Students can also be encouraged to do full-time internships as part of project work- based on the common guidelines for all the departments. The students placed in internships need to write a new proposal in consultation with the industry coordinator and project guide within two weeks from the commencement of instruction.

The department will appoint a project coordinator who will coordinate the following:

1. Re-grouping of students - deletion of internship candidates from groups made as part of project Work
2. Re-allotment of internship students to project guides.
3. Project monitoring at regular intervals.

All re-grouping/re-allotment has to be completed by the 1st week of VIII semester so that students get sufficient time for completion of the project. All projects (internship and departmental) will be monitored at least twice in a semester through student presentation for the award of sessional marks. Sessional marks are awarded by a monitoring committee comprising of faculty members as well as by the supervisor. The first review of projects for 25 marks can be conducted after completion of five weeks. The second review for another 25 marks can be conducted after 12 weeks of instruction. Common norms will be established for the final documentation of the project report by the respective departments. The students are required to submit draft copies of their project report within one week after completion of instruction.

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTION & EXAMINATIONS [LR-23]
(W. e. f Academic Year 2023-24)
PROFESSIONAL ELECTIVE COURSES

S. No.	Course Code	Category	Course Title	Scheme of Instructions				Scheme of Examination			CREDITS
				L	T	P/D	Contact Hours/Week	Maximum Marks		Duration in Hours	
								CIE	SEE		
Theory Course											
1	U23EC505	PEC 1	Global Systems for Mobile Communication	3	0	0	3	40	60	3	3
	U23EC506		Digital Image Processing	3	0	0	3	40	60	3	3
	U23EC507		Advanced Micro Controllers	3	0	0	3	40	60	3	3
	U23EC508		Digital IC Design	3	0	0	3	40	60	3	3
2	U23EC605	PEC 2	Wireless Communication	3	0	0	3	40	60	3	3
	U23EC606		Digital Signal Processor Architectures	3	0	0	3	40	60	3	3
	U23EC607		Introduction to IOT	3	0	0	3	40	60	3	3
	U23EC608		Digital System Design through Verilog	3	0	0	3	40	60	3	3
3	U23EC704	PEC 3	Satellite Communication	3	0	0	3	40	60	3	3
	U23EC705		Multirate Signal Processing	3	0	0	3	40	60	3	3
	U23EC706		IOT Protocols and its Applications	3	0	0	3	40	60	3	3
	U23EC707		Low power VLSI Design	3	0	0	3	40	60	3	3
4	U23EC801	PEC 4	5G Communication	3	0	0	3	40	60	3	3
	U23EC802		Analog and Mixed signal Design	3	0	0	3	40	60	3	3
	U23EC803		Principles and Architecture of Artificial Intelligence.	3	0	0	3	40	60	3	3
	U23EC804		CPLD and FPGA Architecture	3	0	0	3	40	60	3	3

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SCHEME OF INSTRUCTION & EXAMINATIONS [LR-23]
(W. e. f Academic Year 2023-24)

OPEN ELECTIVE COURSES

S. No.	Course Code	Category	Course Title
01	U23CS508		Fundamentals Of Database Management System
	U23IT506		Data Structures
	U23ME509		Basics of Mechanical Engineering
	U23ME510		Modern Manufacturing Processes
	U23CE510		Disaster Preparedness and Management
	U23CE511		Civil Engineering Principles and Practices
	U23EC509		Principles of Electronics Communication
	U23EC510		Introduction to Internet of Things
	U23MB501		Business Communication
	U23MB502		Managerial Science and Theory
	U23SH501		History of Science & Technology
	U23SH502		Economic Policies in India

S. No.	Course Code	Category	Course Title
	U23CS607		Introduction To Programming In Java
	U23IT606		Operating Systems
	U23ME608		Basics Of 3-D Printing
	U23ME609		Optimization Methods for Engineers
	U23CE609		Construction Materials
	U23CE610		Engineering Geology
	U23EC609		Principles of Data Communication and Computer Networks
	U23EC610		Introduction to Micro Processors & Micro Controllers
	U23MB602		Total Quality Management
	U23MB603		Innovation Management
	U23SH601		Indian Music System
	U23SH602		Introduction to Art and Aesthetics

S. No.	Course Code	Category	Course Title
	U23CS711		Data Sciences
	U23IT705		Basics of Artificial Intelligence
	U23ME711		Renewable Energy Resources
	U23ME712		Cooling of Electronic Components
	U23CE711		Environmental Systems
	U23CE712		Urban Transportation System
	U23EC708		IOT and its applications
	U23EC709		Fundamentals of Wireless Communication
	U23MB702		Supply Chain Management
	U23MB703		Start Up Management
	U23SH701		Display Devices
	U23SH702		Comparative Study of Literature

S. No.	Course Code	Category	Course Title
	U23CS806		Basics of Machine Learning
	U23IT802		Cloud computing
	U23ME806		Automobile Engineering
	U23ME807		Power Plant Engineering
	U23CE806		Green Building Technology
	U23CE807		Environmental Impact Assessment
	U23EC805		Embedded Systems
	U23EC806		5G Communications
	U23MB802		Entrepreneurship
	U23MB803		Digital Marketing
	U23SH801		Corrosion Science and Technology
	U23SH802		Introduction To Philosophical Thoughts