

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY
CIRCULAR NO.SU/Engg./B.Tech./02/2019



It is hereby informed to all concerned that, the syllabi prepared by the Board of Studies & recommended by the Dean, Faculty of Science & Technology the **has accepted the following syllabi in accordance with Choice Based Credits & Grading System for all Branches of B.Tech. Final Year** in his emergency powers under section 12(7) of the Maharashtra Public Universities Act, 2016 on behalf of the Academic Council and Management Council as enclosed herewith:-

Sr.No.	Syllabi as per CBC & GS
[1]	Final Year B.Tech.[Civil Engineering],
[2]	Final Year B.Tech. [Mechanical Engineering],
[3]	Final Year B.Tech. [Agricultural Engineering],
[4]	Final Year B.Tech.[Electrical Engineering],
[5]	Final Year B.Tech. [Plastic & Polymer Engineering],
[6]	Final Year B.Tech [Electronics & Telecommunication Engg.],
[7]	Final Year B.Tech. [Computer Science Engineering].

This is effective from the Academic Year 2019-2020 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.No.SU/2019/ 820-30
Date:- 24-07-2019.

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Deputy Registrar,
Syllabus Section

Copy forwarded with compliments to :-

- 1] **The Principals, affiliated concerned Colleges, Dr. Babasaheb Ambedkar Marathwada University.**
- 2] The Director, University Network & Information Centre, UNIC, with **a request to upload this Circular on University Website.**

Copy to :-

- 1] The Director, Board of Examinations & Evaluation,
- 2] **The Section Officer, [Engineering Unit] Examination Branch,**
- 3] The Section officer, [Eligibility Unit],
- 4] **The Programmer [Computer Unit-1] Examinations,**
- 5] **The Programmer [Computer Unit-2] Examinations,**
- 6] The In-charge, [E-Suvidha Kendra],
- 7] The Public Relation Officer,
- 8] The Record Keeper,

**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,
AURANGABAD**

[FACULTY OF SCIENCE AND TECHNOLOGY]



**PROPOSED SYLLABUS
Of
Final Year B. Tech. (Electronics and Telecommunication Engineering)
(w.e.f. academic year 2019-20)**

Dr.Babasaheb Ambedkar Marathwada University,Aurangabad
FACULTY OF SCIENCE AND TECHNOLOGY
Proposed Revised Structure w.e.f. 2019-20
Final Year B. Tech (Electronics and Telecommunication Engineering)

Course Code	SEMESTER-VII	Contact Hrs / Week				Examination Scheme						
	Course	L	T	P	Total	CT	TH	TW	PE	Total	Credits	Duration of Theory Exam
ETC401	Advanced Embedded System Design	4	-	-	4	20	80	-	-	100	4	3 Hrs
ETC402	Antennas and Radiating Systems	4	-	-	4	20	80	-	-	100	4	3 Hrs
ETC403	Computer Networks and Security	4	-	-	4	20	80	-	-	100	4	3 Hrs
*	Open Elective II	4	-	-	4	20	80	-	-	100	4	3 Hrs
ETC441- ETC443	Elective III	4	-	-	4	20	80	-	-	100	4	3 Hrs
ETC444- ETC446	Elective IV	2	-	-	2	10	40	-	-	50	2	2 Hrs
ETC421	Lab: Advanced Embedded systems	-	-	2	2	-	-	25	25	50	1	
ETC422	Lab: Antennas and Radiating Systems	-	-	2	2	-	-	50	-	50	1	
ETC423	Lab: Computer Network and Security	-	-	2	2	-	-	25	25	50	1	
ETC424A- ETC424C	Lab: Elective III	-	-	2	2	-	-	50	50	100	1	
ETC425	Project II	-	-	4	4	-	-	100	100	200	4	
	Total of semester-VII	22	-	12	34	110	440	250	200	1000	30	
Course Code	SEMESTER-VIII	Contact Hrs / Week				Examination Scheme						
	Course	L	T	P	Total	CT	TH	TW	PE	Total	Credits	Duration of Theory Exam
ETC471	In-Plant Training	-	-	-	-	-	-	300	300	600	24	NA
	Total of semester-VIII	-	-	-	-	-	-	300	300	600	24	
	Grand Total of VII & VIII	22	-	12	34	110	440	550	500	1600	54	

L: Lecture hours per week T: Tutorial hours per week P: Practical hours per week CT: Class Test
 TH: University Theory Examination TW: Term Work PE: Practical/Oral Examination

Elective III

Elective	IT	Embedded Systems/VLSI	Communication
Course Code	ETC441	ETC442	ETC443
Course	Python Programming	Artificial Intelligence and Machine Learning	Wireless and Mobile Communication
Lab : Elective III	Python Programming (ETC424A)	Artificial Intelligence and Machine Learning (ETC424B)	Wireless and Mobile Communication (ETC424C)

Elective IV

Elective	IT	Embedded Systems/VLSI	Communication
Course Code	ETC444	ETC445	ETC446
Course	Electronic Product Design	Biomedical Electronics	Enterprise Resource Planning

*Open Elective-II Courses

Sr.No.	Name of Course	Department	Course code
1	Fundamentals of Bioenergy	AED	AED431
2	Big Data Analytics	CSED	CSE431
3	Solid Waste Management	CED	CED431
4	Energy Planning and Conservation	EED	EED431
5	Data Science	ETC	ETC431
6	Operations Research	MED	MED431
7	Polymer Recycling and Waste Management	PPED	PPE431

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(Faculty of Science & Technology)

Syllabus of final year B. Tech. (Electronics and Telecommunication Engineering) Semester-VII

Code No.: ETC401

Teaching Scheme: 04Hrs/week

Theory: 04Hrs/week

Credits:04

Title: Advanced Embedded System Design

Class Test (Marks): 20

Theory Examination (Duration): 03 Hrs

Theory Examination (Marks): 80

Prerequisites	:	.Knowledge of 8 bit Microcontroller, interfacing of different peripherals
Objectives	:	1. To get students familiar with RISC processors and embedded system. 2. To get students familiar with different real world peripherals such as sensors, motors and displays.
Unit-I	:	Introduction to Embedded system: Embedded system definition, Difference between General computing system and Embedded system, Classification of embedded system, Embedded system life cycle ,Core of Embedded system, Examples of embedded systems:-i) Digital thermometer, Navigation system, Software defined radio and RF tags [8 Hours]
Unit-II	:	Introduction to 32 Bit RISC Processor: ARM 7 Block diagram, Big and little endian concept, Operating modes, Programmers model,3 stage pipeline ARM organization, Barrel shifter, ARM instruction set ,Thumb programmers model, Features of ARM9,ARM11. [8 Hours]
Unit-III	:	Interfacing with peripherals: Timers/counters of ARM, Registers related to timers, Watch dog Timer,UART,I2C. Interfacing with External peripherals like GLCD,SD Card, ultrasonic sensor, Accelerometer. Stepper motor and Servo motor(*Use LPC2148 ARM controller) [8 Hours]
Unit-IV	:	Introduction to Cortex-M3 Microcontroller: Meaning of the The term cortex. Difference between ARM7 and Cortex-M3, block diagram, Operating modes, Bit banding concept, Processor core registers ,GPIO configuration, Port bit set/reset register [8 Hours]
Unit-V	:	Programming with Cortex-M3: Instruction set summary, Embedded C programs for blinking of LED, Interfacing of Temperature sensor, Pressure sensor LCD, stepper motor, Servo motor and DC motor. Use of inbuilt ADC. [8 Hours]
Unit-VI	:	RTOS Based embedded system Design: i) Operating system basics-Architecture, Need of RTOS for embedded system, Functions of RTOS Task scheduling:- <ul style="list-style-type: none">• Non preemptive scheduling:-i)LIFS ii)LCFS iii)Shortest Job first iv) Priority Based• Preemptive scheduling:-i)Shortest job first/Shortest remaining Time ii)Round robin Scheduling iii)Priority based Scheduling Task Communication:-

		<p>a) Concept of shared memory:- i) Pipes ii) Memory mapped objects b) Message passing:-i) Message queue ii) Mailbox iii) Signaling</p> <p>Introduction to Vxworks and MicroC/OS-II: Features, Difference between Vxworks and MicroC/OS-II Task creation and management in MicroC/OS-II [8 Hours]</p>
Reference Books:	:	<p>Text Books: i)Introduction to Embedded systems by Shibu K.V., McGraw Hill Publication ii) ARM assembly language programming and architecture by Mazidi and Mazidi iii) Embedded and Real time system by K.V.K.Prasad</p> <p>References:i) Cortex-M3 Technical reference manual ii) A definitive guide to Cortex-M3 by YIU iii) Embedded systems –A contemporary design Tool by James Peckol ,Willey Publication iv) Embedded system design by Frank Wahid</p>

Section A: Units I, II and III; **Section B:** Units IV, V, and VI

Pattern of Question paper:

The 6 units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 Marks Paper:

1. Ten questions.
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section for 10 marks each.
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5. Any two questions of 15 marks from remaining questions in each section are to be solved.

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Syllabus of final year B. Tech. (Electronics and Telecommunication Engineering) Semester-VII

Code No.: ETC402

Teaching Scheme: 04Hrs/week

Theory: 04Hrs/week

Credits:04

Title: Antennas and Radiating Systems

Class Test (Marks): 20

Theory Examination (Duration): 03 Hrs

Theory Examination (Marks): 80

Prerequisites	:	Electromagnetic Engineering and Vector Analysis.
Objectives	:	<ol style="list-style-type: none">1. Make students aware of the fundamentals of Antenna system in order to reach the desire industry skills sets.2. Introduce the students about various Antenna types to know their applications in various domains.3. Prepare the students for Emerging Technologies hardware using fundamentals of design concepts.4. Design, fabricate and measurement of various types of antennas5. Motivate about design & fabrication process & its allied material knowledge
Unit-I	:	Fundamentals: Definitions, Antenna Parameters (radiation resistance, types of patterns, beam area, radiation intensity, efficiency, directivity and gain, antenna aperture, and radar cross sections, Radio Communication Link (Friis formula), polarization co polarization Vs Cross polarizations and types, antenna heights, Types of Towers, radiation mechanism. [08 Hours]
Unit-II	:	Wire antenna: Half wavelength dipole Dipole Vs Monopole, Type of ground plane, folded dipole Yagi- Uda, Small circular loop antennas, rectangular loop. Broadband antennas: Principles of frequency independent antennas & study of Log - periodic antennas. Helix [08 Hours]
Unit-III	:	Microwave antennas: Huygen's principle, E and H- plane, pyramid horn, conical horn Reflector Antennas: Introduction, plane reflector, corner reflector, parabolic reflector, spherical reflector. Planar antennas: Micro strip antennas, basic characteristics, feeding methods, rectangular patch, circular patch, Planar Inverted F antenna (PIFA), Introduction to smart antennas. [08 Hours]
Unit-IV	:	Antenna measurements: Measurements of different antenna parameters like Directional pattern, Gain, Reciprocity, polarization, impedance, efficiency, Specific absorption rate (SAR). Introduction to Open area Test Vs Chamber Test Measurement. [08 Hours]
Unit-V	:	Design, Modeling fabrication and testing of Antenna: Introduction to Antenna material, connectors, cables, Software, LNBC. Fabrication process of wired and planar antennas. Design equitation's assignment for various antenna RMSA folded dipole, Yagi, helix. [08 Hours]

Unit-VI	:	Introduction to antenna array Arrays: Feed technique in array antenna. Pattern multiplication concept Broadside array and End-fire arrays, Design of Binomial arrays. [08 Hours]
Reference Books:	:	<p>Text Books:</p> <ol style="list-style-type: none"> 1. G.S.N. Raju, "Antenna and wave propagation", Pearson Education. 2. J.D.Krauss, "Antennas for all applications", 3rd Edition, TMH. 3. R K Shegonkar, "Electromagnetic Waves", Tata McGraw-Hill Education India 4. K.D. Prasad, "Antenna & Wave Propagation", Satyaprakash Publications. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. C. Balanis, "Antenna Theory: Analysis and design", Wiley India.

Section A: Units I, II and III; **Section B:** Units IV, V, and VI

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(Faculty of Science & Technology)

Syllabus of Final Year B. Tech. (Electronics and Telecommunication Engineering) Semester-VII

Code No.: ETC403

Title: Computer Network and Security

Teaching Scheme: 4 Hrs / Week

Class Test: 20

Theory: 4 Hrs / Week

Theory Examination (Duration): 3 Hrs

Credits: 4

Theory Examination (Marks): 80

Prerequisites	:	Digital Communication, Information theory and coding.
Course Objectives	:	1. To interpret the layering concepts in computer networks. 2. To understand internals of protocols such as HTTP, FTP, SMTP, TCP, UDP, IP 3. To study different security techniques & its algorithms.
Unit-I	:	Introduction to Computer Networks : Components of Communication Networks, topologies, LAN, MAN, WAN, Broadcast and Point to Point networks. Overview of network model: ISO - OSI and TCP/IP. Network design issues, service primitives and relationships of services to protocols. [8 Hours]
Unit-II	:	Physical Layer & Data Link Layer : Communication Media: Twisted pair, coaxial cables, fiber optic cables, Wireless Communication. circuit switching, message switching, packet switching network, framing, error detection and correction, CRC, Elementary protocols – stop and wait, stop and wait ARQ, Go-Back-NARQ, Selective repeat, Sliding window. [8 Hours]
Unit-III	:	Networks, Transport Layer, Application layer : Virtual circuits, and datagram networks, Routing algorithms, Congestion control. Quality of Service, DNS, Voice over IP, Video on demand, M-Bone – Multicast backbone. [8 Hours]
Unit-IV	:	TCP/IP Protocol Suite : IP Addressing, Classes, IPv4 v/s IPv6, FTP, SMTP, SNMP, ICMP, IGMP, ARP, RARP. [8 Hours]
Unit-V	:	Overview of Network Security: Fundamentals, security services, attacks, overview of cryptography Substitution ciphers, transposition ciphers, Authentication protocols, Authentication based on a shared secret key, Diffie Hellman key exchange, Authentication based on KDC, Authentication using Kerberos. [8 Hours]
Unit-VI	:	Digital signatures & IP security : Certificates, symmetric key signatures, public key signatures, message digests, MD-5, SHA-1, public key infrastructures, application of IPsec, IPsec protocols, VPN. [8 Hours]
Text Books	:	1. A.S.Tanenbaum, “Computer Networks” PHI 2. Behrouz A Forouzan, “Data Communications & Networking” TMH
References e-books, e- Journals	:	1. William Stallings, “Data & Computer Communication” Pearson 2. William Stallings, “Cryptography & Network Security” Pearson

Section A: Units I, II and III; **Section B:** Units IV, V, and VI

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Syllabus of Final Year B. Tech. (All) Semester-VII

Course Code: AED431

Course: Open Ele- II (Fundamentals of Bioenergy)

Teaching Scheme:

Theory: 4 hrs/week

Credits: 4

Class Test: 20 marks

Theory Examination: 80 Marks

Theory Examination (Duration): 3 hrs

Objectives	<p>1. Understand bioenergy technologies, processes, reactions and energy conversion rates for Anaerobic Digestion, gasification, pyrolysis (fast, intermediate and slow) and combustion To study the wells, bore wells and well development.</p> <p>2. Know what constitutes a suitable feedstock for bioenergy applications</p>
Unit-I	<p>Introduction to bioenergy- Introduction ,Unit of Energy and Introduction of Bioenergy, How Biomass Formed on the Earth, Road Map of Bioenergy, Basic Biomass Technology (Resources and Production) Exploration of Photosynthesis Process, In Photosynthesis Oxygen Comes from Water Molecule [08 Hrs]</p>
Unit-II	<p>Bioethanol- Basic concept of Cellulosic Bioethanol Process, Pretreatment and Enzyme treatment of Cellulosic Bioethanol Process, Fermentation and Distillation in Cellulosic Bioethanol Production, Basic concept of Plant Design, Pilot Plant and Scale-up [08 Hrs]</p>
Unit-III	<p>Biogas- Basic concept in anaerobic digestion and biogasification, Biochemical methane potential assay and calculations for biogasification feasibility analysis, Design and operation of biogasification systems, Biogas utilization, Biomass production System and their Categorization, Important Parameters for Selecting Biomass Crops, Factors Determining the Conversion Process - I [08 Hrs]</p>
Unit-IV	<p>Biodiesel- Biodiesel production processes, Biodiesel characterization , Biodiesel feedstocks , Environmental permitting and safety considerations for biodiesel production [08 Hrs]</p>
Unit-V	<p>Thermo Chemical Processes: Basic concepts in gasification and pyrolysis, Gasification and pyrolysis systems, Spark Ignition Engine, Compression Ignition Engine, Gasification Types - Up Drift Gasifier [08 Hrs]</p>
Unit-VI	<p>Bioenergy distribution and end use for a sustainable future - Down Draft and cross flow gasifier, operation and performance of gasifier , fluidized bed gasification, its operation and performance, Biological root of gasification [08 Hrs]</p>

	S. No.	Title	Authors	Publication
Reference Books	1	Introduction to Bioenergy (Energy and the Environment)	Vaughn C. Nelson (Author), Kenneth L. Starcher	-
	2	Bioenergy: Biomass to Biofuels	Anju Dahiya	-
	3	Bioenergy: Principles and Applications	Yebo Li and Samir Kumar Khanal	-
	4			

Section A: Units I, II and III; **Section B:** Units IV, V, and VI

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(Faculty of Science and Technology)

Syllabus of Final Year B. Tech. (All) Semester-VII

Code No.: CSE431

Teaching Scheme:04 Hours per week

Theory: 04 Hours per week

Credits:04

Title: Open Elective II- Big Data Analytics

Class Test: 20

Theory Examination (Duration): 03 Hrs

Theory Examination (Marks): 80

Prerequisites	Knowledge of Programming Language (Java preferably), SQL	
Objectives	<ol style="list-style-type: none"> 1. To understand the Big Data Platform and its Use cases 2. To understand the basics of Apache Hadoop and HDFS 3. To apply analytics on Structured, Unstructured Data. 	
Unit-I	: FUNDAMENTALS OF BIG DATA The Evolution of Data Management, Understanding the Waves of Managing Data, Defining Big Data, Four Vs , Big Data Management Architecture. Big Data Types: Defining Structured Data, Defining Unstructured Data, Big Data Applications.	(08 Hrs)
Unit-II	: BIG DATA TECHNOLOGY LANDSCAPE: Big Data Technology Components: Exploring the Big Data Stack, Virtualization, Understanding the Basics of Virtualization, Managing Virtualization with the Hypervisor, Abstraction and Virtualization, Implementing Virtualization to Work with Big Data.	(08 Hrs)
Unit-III	: DATA ANALYTICS: Predictive Analytics: Linear Regression, Logistic Regression, Decision Trees, Descriptive Analytics: Association Rules, Sequence Rules, Segmentation, Social Network Analytics: Social Network Definitions, Social Network Metrics, Social Network Learning, Relational Neighbor Classifier, Business Process Analytics, Web Analytics	(08 Hrs)
Unit-IV	: HADOOP AND MAP REDUCE: History of Hadoop, Analyzing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, Hadoop Storage, Common Hadoop Shell commands, Hadoop Architecture, Hadoop MapReduce Paradigm: Map and Reduce tasks , Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats	(08 Hrs)
Unit-V	: HDFS(Hadoop Distributed File System) The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Sqoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.	(08 Hrs)
Unit-VI	: Hadoop Eco System Pig : Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators. Hive : Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions. Hbase : HBasics, Concepts, Clients, Example, Hbase Versus RDBMS.	(08 Hrs)
Reference Books:	<ol style="list-style-type: none"> 1. Big Data Analytics by Seema Acharya, Subhasini Chellappan,Wiley 2015. 2. Hadoop: The Definitive Guide by Tom White, Third Edit on, O'reily Media, 2012. 3. Analytics in a Big Data World: The Essential Guide to Data Science and its Applications by Bart Baesens, Wiley, 2014, ISBN: 978-1-118-89270-1 4. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007. 5. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012. 6. Glen J. Myat, "Making Sense of Data", John Wiley & Sons, 2007 7. Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013. 	

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Syllabus of Final Year B. Tech. (All) Semester VII

Code No: CED 431 Teaching Scheme: 04 Hrs/week Theory: 04 Hrs/week Credits: 04	Title: Solid Waste Management Class Test: 20 Marks Theory Examination (Duration): 03 Hrs Theory Examination (Marks): 08 Marks
Course Objective	To get introduced to the generation, collection and management of the various types of solid waste and different waste management techniques.
UNIT-I	Introduction to Solid Waste Management (SWM): Need and Objectives of SWM, Waste Management Hierarchy, Functional elements, Environmental impact of mismanagement. Solid waste: Sources, types, Composition, Quantities, Physical, chemical and Biological properties. [08 Hours]
UNIT-II	Generation of solid waste: Factors affecting. Storage and collection: General considerations for waste storage at source, Types of collection systems. Collection System, Transfer station: Meaning, Necessity, Transportation of solid waste: Means and Methods, Routing of vehicles [08 Hours]
UNIT-III	Segregation and Material Recovery: Objectives, Stages of segregation, sorting operations, Guidelines for sorting for materials recovery, E waste management, Biomedical waste management [08 Hours]
UNIT-IV	Waste processing: processing technologies: Composting, thermal conversion technologies incineration, treatment of biomedical wastes. Energy recovery from solid waste: Parameters affecting energy recovery, Bio-methanation, Fundamentals of thermal processing, Pyrolysis, Incineration, Advantages and disadvantages of various technological options. [08 Hours]
UNIT-V	Disposal: Landfills and its introduction, Definition, Essential components, Site selection, Land filling methods, Leachate analysis and landfill gas management, treatment & disposal, Determination of capacity of landfill disposal site. [08 Hours]
UNIT-VI	Hazardous waste management: Types of hazardous waste (such as nuclear, biomedical and industrial waste,), problems and issues related to hazardous waste management, Need for hazardous waste management, Legislations on management and handling of HW, Hazardous Characteristics, reduction of wastes at source, Recycling and reuse, labeling and handling of hazardous wastes, incineration, solidification and stabilization of hazardous waste. [08 Hours]

Recommended Books:

1. Hilary Theisen and Samuel A, Vigil, George Tchobanoglous, Integrated Solid Waste Management, McGraw- Hill, New
2. York, 1993 2.
3. CPHEEO, Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organization, Government of India, New Delhi, 2000 3.
4. Michael D. LaGrega, Philip L Buckingham, Jeffrey C. E vans and Environmental 4.

5. Resources Management, Hazardous waste Management, Mc-Graw Hill International edition, New York, 2001. 5.
6. Vesilind P.A., Worrell W and Reinhart, Solid waste Engineering, Thomson Learning Inc., Singapore, 2002. 6.
7. Charles A. Wentz, Hazardous Waste Management, Second Edition, Pub: McGraw Hill International Edition, New York, 1995.

Section A: Units I, II and III; **Section B:** Units IV, V, and VI

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Syllabus of Final Year B. Tech. (All) Semester – VII

Course Code: EED431
(Conservation)

Course: Open Elective-II (Energy Planning and

Teaching Scheme

Class Test: 20 Marks

Theory: 04 Hrs/week

Theory Examination Duration: 3Hrs

Credits: 04

Theory Examination: 80 Marks

Prerequisites	:	Should have knowledge of Electrical/ Mechanical Appliances, various types of energy utilization.
Objectives	:	1. Identify the demand supply gap of energy in Indian scenario. 2. Understanding basics of energy audit. 3. Understand various opportunities in energy saving for industry
Unit-I	:	Energy Policy: National & State Level Energy Issues, National & State Energy Policy, Industrial Energy Policy, Energy Security, Energy Vision. Energy Pricing & Impact of Global Variations. Energy Productivity (National & Sector wise productivity). [08Hrs]
Unit-II	:	Energy action planning: Energy Action Planning: Key elements, Force field analysis, Energy policy purpose, perspective, Contents, Formulation, Ratification, Organizing - location of energy management, Top management support, Managerial function, Roles and responsibilities of energy manager, Accountability. Motivating-motivation of employees. [08 Hrs]
Unit – III	:	Importance of Energy management: Energy Management: Definition, Energy audit- need, Types of energy audit, Energy management (audit) approach-understanding energy costs, Bench marking, Energy performance. [08 Hrs]
Unit – IV	:	Elements of Energy conservation: General energy problem, , Scope for energy conservation and its benefits, Energy conservation Principle – Maximum energy efficiency, Maximum cost effectiveness, Mandatory provisions of

		Energy Conservation act 2001, Features of Energy Conservation act-Standards and labelling, designated consumers, Energy Conservation Building Codes (ECBC). [08 Hrs]			
Unit –V	:	Energy Audit and Measuring Instruments Basic measurements – Electrical measurements, Light, Pressure, Temperature and heat flux, Velocity and Flow rate, Vibrations. Instruments Used in Energy systems: Load and power factor measuring equipments, Wattmeter, flue gas analysis, Temperature and thermal loss measurements, air quality analysis etc. [8 Hrs]			
Unit –VI	:	Lighting and Lighting System: Lightings Levels, Fixtures Lighting techniques – Natural, CFL, LED lighting sources and fittings, Day lighting, Timers, Energy Efficient Windows. [08 Hrs]			
Text Books, Reference Books, e-books, e-journals	:	Sr. No.	Title	Author	Publication
		1.	Bureau of Energy efficiency hand books No 1 & 2	BEE OF INDIA	BEE OF INDIA
		2.	Energy Management Handbook	Wayne C. Turner	Tata McGraw Hill
		3.	Energy management	Paul O Callaghan	
		4.	Bureau of Energy efficiency hand books No 3,	BEE OF INDIA	BEE OF INDIA
Additional References	:	1. https://www.beeindia.gov.in/content/energy-auditors information as & when available.			

Section A: Units I, II and III; **Section B:** Units IV, V, and VI

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For 80 Marks Paper:

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Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of final year B. Tech. (All) Semester-VII

Code No.: ETC431

Teaching Scheme: 04Hrs/week

Theory: 04Hrs/week

Credits:04

Title: Open Elective - II (Data Science)

Class Test (Marks): 20

Theory Examination (Duration): 03 Hrs

Theory Examination (Marks): 80

Prerequisites	:	Programming Concepts, Data Structure, Basic Linear Algebra, Basic Probability and Statistics
Objectives	:	1. Give an introduction to data science and its applications. 2. Understand use of statistics in data science 3. Use data science to analyze large and unstructured data with different tools.
Unit-I	:	Introduction: Introduction, big data and data science hype, datafication, current landscape of perspective. [8 Hours]
Unit-II	:	Statistical Inference and Exploratory data analysis: Populations and samples, statistical modelling, probability distributions, fitting a model, Introduction to R. Basic Tools (Plots, Graphs and summary statistics) of EDA, philosophy of EDA, the data science process, Case Study. [8 Hours]
Unit-III	:	Machine Learning Algorithm and its Usage: Linear Regression, k-nearest Neighbors(k-NN), k-means. Spam filtering, naïve Bayes and its application for spam filtering, Data Wrangling: Tools and API for scrapping the web. . [8 Hours]
Unit-IV	:	Feature Generation and Selection: Feature generations algorithms, feature selection algorithms: filters, wrappers, decision trees, random forest. Algorithmic ingredients of a recommendation engine, dimensionality reduction, singular value decomposition, principal component analysis. [8 Hours]
Unit-V	:	Mining Social Network: Social Networks as graphs, clustering of graphs, direct discoveries of communities in graphs, portioning of graphs, neighborhood properties of graphs. [8 Hours]
Unit-VI	:	Data visualization and ethical issues: Basic principles, ideas and tools for data visualization, creation of visualization for complex data set. Case study. Privacy, security and ethics of data science. [8 Hours]

Reference Books:	: Text Books: Cathy O’Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O’Reilly. 2014 Reference Books: <ul style="list-style-type: none"> • Jure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press. 2014. • Kevin P. Murphy. Machine Learning: A Probabilistic Perspective. MIT Press, Second Edition 2013. • Foster Provost and Tom Fawcett. Data Science for Business: What You Need to Know about Data Mining and Data-analytic Thinking. Shroff, First Edition, 2013
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Section A: Units I, II and III; **Section B:** Units IV, V, and VI

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Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of Final Year B. Tech. (All)

Course Code: MED-431

Course: Open Elective-II (Operations Research)

Teaching Scheme:

Class Test: 20 marks

Theory: 04 Hrs/week

Theory Examination (Duration): 03 Hrs

Credits: 04

Theory Examination (Marks): 80

Objectives	:	1. To familiarize the students with formal quantitative approach to problem solving 2. To formulate real life engineering problems 3. To solve engineering problems using various Operations Research Techniques
Unit-I	:	Introduction to Operations Research : Basics definition, scope, objectives, phases, models, applications and limitations of Operations Research. <p align="right">02 Hrs</p>
Unit-II	:	Linear Programming Problem : Formulation of LPP, Graphical solution of LPP, Simplex Method, Artificial variables, Big-M method, two-phase method, degeneracy and unbound solutions. <p align="right">12 Hrs</p>
Unit-III	:	Transportation Model : Transportation Problem: Formulation, solution, unbalanced Transportation problem. Finding basic feasible solutions – Northwest corner rule, least cost method and Vogel’s approximation method. Optimality test – the stepping stone method or MODI method. Degeneracy in Transportation Problem. Assignment Problem: Hungarian Method to solve Assignment Problem, Travelling Salesman as an Extension of Assignment Problem. <p align="right">10 Hrs</p>
Unit-IV	:	Inventory Control, Replacement Analysis and Theory of Games : Inventory Models: Economic Order Quantity Models, Quantity Discount Models, Stochastic Inventory Models, Multi Product Models, Inventory Control Models in Practice. Replacement Analysis: Replacement of Items that Deteriorate, Replacement of Items that Fail Suddenly. Theory of Games: Introduction, Minimax and Maximin Principle, Solution of Game with Saddle Point, Solution by Dominance. <p align="right">08 Hrs</p>
Unit-V	:	Queuing model and Sequencing model : Queuing Systems And Structures, Notation Parameters, Single Server and Multi

	<p>Server Models, Poisson Input, Exponential Service, Constant Rate Service, Infinite Population</p> <p>Sequencing Model: Introduction, n jobs through two machines, n jobs through three machines, two jobs through m machines and n jobs through m machines.</p> <p>08 Hrs</p>																																								
Unit-VI	<p>: Network Models: Fulkerson's rule, concept and types of floats, float calculations, CPM and PERT, Crashing cost and crashing Network</p> <p>08 Hrs</p>																																								
Reference Books, e- books, e- Journals	<table border="1"> <thead> <tr> <th>Sr. No.</th> <th>Title</th> <th>Author</th> <th>Publication</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Operations Research</td> <td>Taha H.A.</td> <td>Ninth Edition, Prentice Hall Of India.</td> </tr> <tr> <td>2</td> <td>Introduction to Operations Research</td> <td>Frederick S. Hillier and Gerald J. Lieberman</td> <td>Seventh Edition, Tata McGraw-Hill</td> </tr> <tr> <td>3</td> <td>Operations Research</td> <td>P.K. Gupta, D.S Hira</td> <td>Fourth Edition S. Chand & Co.</td> </tr> <tr> <td>4</td> <td>Operations Research</td> <td>Man Mohan, P. K. Gupta, Kanti Swarup</td> <td>12th Edition, S. Chand & Co.</td> </tr> <tr> <td>5</td> <td>Operations Research Principles and Practice</td> <td>Ravindran, Phillips and Solberg</td> <td>Second Edition, Mc. WSE Willey</td> </tr> <tr> <td>6</td> <td>Operations Research: Applications and Algorithms</td> <td>Wayne L. Winston, Jeffrey B. Goldberg</td> <td>Fourth edition, Thomson Brooks</td> </tr> <tr> <td>7</td> <td>Operations Research: Theory, Methods and Applications</td> <td>S. D. Sharma, Himanshu Sharma</td> <td>Kedar Nath Ram Nath</td> </tr> <tr> <td>8</td> <td>PERT and CPM: Principles and Applications</td> <td>L. S. Srinath</td> <td>Third Edition, affiliated East-West Press Private Limited,</td> </tr> <tr> <td>9</td> <td>Project Planning and Control with PERT & CPM</td> <td>Dr. B.C. Punmia & K.K. Khandelwal</td> <td>Fourth Edition, Firewall Media</td> </tr> </tbody> </table>	Sr. No.	Title	Author	Publication	1	Operations Research	Taha H.A.	Ninth Edition, Prentice Hall Of India.	2	Introduction to Operations Research	Frederick S. Hillier and Gerald J. Lieberman	Seventh Edition, Tata McGraw-Hill	3	Operations Research	P.K. Gupta, D.S Hira	Fourth Edition S. Chand & Co.	4	Operations Research	Man Mohan, P. K. Gupta, Kanti Swarup	12 th Edition, S. Chand & Co.	5	Operations Research Principles and Practice	Ravindran, Phillips and Solberg	Second Edition, Mc. WSE Willey	6	Operations Research: Applications and Algorithms	Wayne L. Winston, Jeffrey B. Goldberg	Fourth edition, Thomson Brooks	7	Operations Research: Theory, Methods and Applications	S. D. Sharma, Himanshu Sharma	Kedar Nath Ram Nath	8	PERT and CPM: Principles and Applications	L. S. Srinath	Third Edition, affiliated East-West Press Private Limited,	9	Project Planning and Control with PERT & CPM	Dr. B.C. Punmia & K.K. Khandelwal	Fourth Edition, Firewall Media
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Section A: Units I, II and III; **Section B:** Units IV, V, and VI

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Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of Final Year B. Tech. (All) Semester-VII

Code No.: PPE431

Title: Open Elective-II: Polymer Recycling and Waste Management

Teaching Scheme: 4 hrs/week

Class Test (Marks): 20

Theory: 4 hrs/week

Theory Examination (Duration): 3 hrs

Tutorial: -

Theory Examination (Marks): 80

Credits: 4

Objective	:	1. To learn the need for polymer recycling, techniques employed and applications. 2. To learn the need and various methods/techniques involved in polymer waste management.
Unit-I	:	Significance of recycling: Global plastics production and composition, global plastics waste composition, quantities and disposal, identification codes of plastics for recycling. Recycling process: collection, sorting and segregation of waste, recycling methods: Primary, secondary, tertiary and quaternary recycling, landfilling. (08 hrs)
Unit-II	:	Recycling equipment/machinery: Equipment for primary and secondary recycling: shredder, granulator, pulverizer, cutter, extruder. Classification and types of reactors for tertiary recycling. (09 hrs)
Unit-III	:	Recycling of plastics from urban waste: Rheology, density and mechanical behavior of recycled plastics, hydrolytic treatment of plastics waste containing paper, processing of mixed plastics waste, recycling additives. (07 hrs)
Unit-IV	:	Recycling techniques: Recycling techniques of PE packaging films and woven sacks, PET bottles and films, PP battery cases, PVC products and thermosetting plastics. (08 hrs)
Unit-V	:	Municipal solid waste management and treatment techniques: Collection, storage, transportation and disposal of municipal solid waste, sorting of MSW, types of vehicles and equipment for primary collection, secondary collection and transport. Different treatment techniques: a) Composting: techniques such as windrow, aerated static pile, in vessel, decentralized, bin and vermicomposting. b) Bio-methanation: merits, applicability, process and types of anaerobic digester systems. c) Refuse derived fuel: classification, composition, production process and uses. d) Sanitary landfilling: requirements, layout, leachate management, waste placement and inspection. (11 hrs)
Unit-VI	:	Tools for combating polymer waste: Combating tools for waste management: extended producer responsibility, product stewardship, shared producer responsibility, usage of green products and usage of biodegradable or environmentally degradable polymers for waste reduction. (05 hrs)

Reference Books	Sr. No.	Title	Author	Publication	Edition
	1	Plastics Fabrication and Recycling	Manas Chanda and Salil K. Roy	CRC Press	4 th , 2007
	2	Introduction to Plastics Recycling	Vannessa Goodship	Smithers Rapra	2 nd , 2006
	3	Recycling of Polymers	Raju Francis	Wiley-VCH	1 st , 2016
	4	Recycling of Plastic Materials	Francesco Paolo La Mantia	Chemtec Publishing	2 nd , 1993
	5	Feedstock Recycling and pyrolysis of waste plastics	John Schiers & W. Kaminsky	John Wiley and Sons	1 st , 2006
	6	Mixed Plastic Recycling Technology	B. Hegberg, G. Brenniman	Noyes Data Corporation	1 st , 1992
	7	Plastics Waste: Recovery of Economic value	Jacob Leidner	Marcel Decker Inc.	2 nd , 2001
	8	Management of municipal solid waste	T. V. Ramchandra	TERI Press	1 st , 2009
	9	Waste Management	Martin F. Lehmann	I. A. Publishers	1 st , 2008
	10	Environmental Waste Management	Ram Chandra	CRC Press	1 st , 2015
	11	Plastic Waste	Jacob Leidner	Marcel Decker Inc.	1 st , 1981

Section A: Units I, II and III; **Section B:** Units IV, V, and VI

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(Faculty of Science & Technology)

Syllabus of final year B. Tech. (Electronics and Telecommunication Engineering) Semester-VII

Code No.: ETC441

Teaching Scheme: 04Hrs/week

Theory: 04Hrs/week

Credits:04

Title: Python Programming

Class Test (Marks): 20

Theory Examination (Duration): 03 Hrs

Theory Examination (Marks): 80

Prerequisites	:	Basic Mathematics
Objectives	:	<ol style="list-style-type: none">1. The course introduces basic constructs of python programming language.2. The course will build up understanding on python data types and their operations.3. The course will uncover basic aspects of object-oriented programming in python
Unit-I	:	Introduction to Python Programming: Python Language- history, features, advantages, comparison with other programming languages. Installing python- on Linux, installing Pycharm IDE. Getting python help online. Structure of Python Program, data types, simple arithmetic operations. [8Hours]
Unit-II	:	Control Flow: Conditional Statements- if, else, elif. Loops- if, while. Control Transfer Statements- pass, break, return. Programming using Python conditional and loops block. [8Hours]
Unit-III	:	Functions & Modules: Python Functions- creating, calling, function parameters, recursive functions. Python Module- naming, defining, using, variables in module, import, dir() function. [8Hours]
Unit-IV	:	Lists & Sets: Python List- syntax: add-remove item, access, modify, slice, loop through list; predefined list methods with example, application. Python Set- syntax: add-remove, item access, modify, predefined list methods. Compare list and set. [8Hours]
Unit-V	:	Tuples & Dictionary: Python Tuple- syntax: add-remove, access, change value, loop through tuple, predefined tuple methods. Python Dictionary- syntax: add-remove, access, change value, loop through values, levels of dictionary, predefined dictionary methods, applications of dictionary. [8Hours]
Unit-VI	:	Object-Oriented Programming in Python: Python Classes and Objects, creating class, initialize object, <code>_init_()</code> function, self, delete object. . Inheritance in python. [8Hours]
Reference Books:	:	Text Books: <ol style="list-style-type: none">1. Think Python 2nd Edition, 2016 by Allen B. Downey, O'Really Publication. Reference Books: <ol style="list-style-type: none">1.Dive into Python 3, 2nd Edition, 2012 by Mark Pilgrim, Apress Publication2.Learning with Python 1st edition, 2015 by Allen B. Downey Dreamtech Press.

Section A: Units I, II and III; **Section B:** Units IV, V, and VI

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(Faculty of Science & Technology)

Syllabus of final year B. Tech. (Electronics and Telecommunication Engineering) Semester-VII

Code No.: ETC442

Title: Artificial Intelligence and Machine Learning

Teaching Scheme: 04Hrs/week

Class Test (Marks): 20

Theory: 04Hrs/week

Theory Examination (Duration): 03 Hrs

Credits:04

Theory Examination (Marks): 80

Prerequisites	:	.
Objectives	:	<ol style="list-style-type: none">1. Understanding Human learning aspects.2. Understanding primitives and methods in learning process by computer.3. Provide understanding of the techniques, mathematical concepts, and algorithm used in machines learning .
Unit-I	:	Introduction to Intelligent Systems , History, Foundations and Mathematical treatments, Problem solving with AI, AI models, Learning aspects in AI, Intelligent Agents, types of Agents. [8 Hours]
Unit-II	:	Informed Search Methods: Search Techniques: Uninformed search, heuristic search, adversarial search and game trees; Solution of constraint satisfaction problems using search, Hill Climbing, Best First Search. [12 Hours]
Unit-III	:	Knowledge Representation: Representation and mapping, Knowledge Based Agent, First Order Predicate Logic, Forward and Backward Chaining,resolution. AI Programming Language: Introduction to AI Programming language, Concept and Programming. [8 Hours]
Unit-IV	:	Introduction of Machine Learning: Basic Concept and Examples of Machine Learning with applications, Cross-Validation techniques. [4 Hours]
Unit-V	:	Concepts of Machine learning : Supervised, unsupervised learning System Supervised learning: Linear Regression (with one variable and multiple variables), Gradient Descent, Classification (Logistic Regression, Over fitting, Artificial Neural Networks (Perceptrons, Multilayer networks). Unsupervised learning: Clustering (K-means, Hierarchical), Dimensionality reduction. [10 Hours]
Unit-VI	:	Clustering and Classification: Distance measures clustering methods Iterative distance-based clustering; Dealing with continuous, categorical values in K-Means Constructing a hierarchical cluster K-Models, Bayes Classifier Model Assumptions, Probability estimation Required data processing M-estimates, Feature selection. [6 Hours]
	:	Text Books: 1. Artificial Intelligence and Machine Learning By Vinod Chandra S.S. Anand

	<p>Hareendran S</p> <ol style="list-style-type: none"> 2. Stuart J. Russell and Peter Norvig, "Artificial Intelligence A Modern Approach "Second Edition" Pearson Education 3. Tom M. Mitchell. "Machine Learning" McGraw-Hill, 1997. 4. Ethem Alpaydin "Introduction to machine learning" 2nd ed. The MIT Press, 2010 <p>Reference Books:</p> <ol style="list-style-type: none"> 1.Elaine Rich and Kevin Knight "Artificial Intelligence "Third Edition 2.Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning",Addison Wesley, N.Y., 1989 3.Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997. 4.Introduction to Machine Learning Edition 2, by Ethem Alpaydin
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(Faculty of Science& Technology)

Syllabus of B. Tech. (Electronics and Telecommunication Engineering) Semester-VII

Code No.: ETC443

**Title: Wireless and Mobile
Communication**

Teaching Scheme: 04Hrs/week

Class Test (Marks): 20

Theory: 04Hrs/week

Theory Examination (Duration): 03 Hrs

Credits:04

Theory Examination (Marks): 80

Prerequisites	:	Digital Communication
Objectives	:	<ol style="list-style-type: none">1. To expose the students to understand mobile radio communication principles and to study the recent trends adopted in cellular systems2. To Provide information about radio propagation and equalization, diversity techniques3. To provide an overview of Wireless Communication networks & standards..
Unit-I	:	Fundamentals of Communication: Fundamentals of Wireless communication • Advantages, Limitations and Applications Frequency Spectrum, Types of Wireless Communication with Applications: IR Wireless Communication, Satellite communication, broadcast radio, microwave radio, Bluetooth, Zigbee, Li-Fi, Cognitive radio. WLAN,WPAN [8 Hours]
Unit-II	:	Wireless Technology: The cellular concepts: Frequency Reuse, Channel assignment strategies, Handoff strategies Interference and System Capacity. Evolution of cellular networks GSM: System Architecture, Radio Subsystem, Channel Types, GSM frame structure [8 hours]
Unit-III	:	Mobile radio propagation: Introduction to radio propagation, three basic propagation mechanisms: reflection, diffraction, scattering; practical link budget design using path loss model, indoor and outdoor models, penetration into building, small scale and large scale fading, multipath fading channels types and measurement [8 Hours]
Unit-IV	:	Equalization, Diversity and channel coding: Fundamentals of equalization , adaptive equalizers, non linear equalizer, Diversity techniques, RAKE receiver, interleaving, Coding, VOCODERS, Linear Predictive Coders, GSM codec, USDC codec [8 Hours]
Unit-V	:	Wireless Sensor Networks and Standards: Wireless Sensor Network Architecture, WSN Network Topologies, Types of WSNs: Terrestrial WSNs, Underground WSNs, Underwater WSNs, Multimedia WSNs, Mobile WSNs, Limitations and Applications of Wireless Sensor Networks, Wireless Standards: IS-54 and IS-136 standard, Global System for Mobile (GSM),CDMA Digital Cellular Standard IS -95, General Packet Radio Service (GPRS),Introduction to LTE Architecture [8 Hours]
Unit-VI	:	Multiple Antenna Techniques: MIMO systems – Spatial multiplexing - System model -Pre-coding - Beam forming - transmitter diversity, receiver diversity- Channel state information-capacity in fading and non-fading channels [8 Hours]

Reference Books:	Text Books: <ol style="list-style-type: none"> 1. Theodore Rappaport , “Wireless Communications: Principles and Practice” 2nd Edition 2. Lee W.C.Y, “Mobile Cellular Telecommunication Systems” McGraw Hill Publication 3. J.G Proakis and M.Salehi , “Communication System Engineering” Prentice Hall 4. John Schiller , “Mobile Communications” 2nd Edition Pearson Education 5. V.K Garg and J.E Wilkes , “Principles and Application of GSM” Pearson Education Reference Books: <ol style="list-style-type: none"> 1.2.Wireless Sensor Networks: Technology and ApplicationsAuthor/s: Mohammad Matin (ed.), Publisher: InTech , 2012
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(Faculty of Science & Technology)

Syllabus of B. Tech. (Electronics and Telecommunication Engineering) Semester-VII

Code No.: ETC444

Teaching Scheme: 02Hrs/week

Theory: 02Hrs/week

Credits:02

Title: Electronic Product Design

Class Test (Marks): 10

Theory Examination (Duration): 02 Hrs

Theory Examination (Marks): 40

Prerequisites	:	<ul style="list-style-type: none">Students should be familiar with Circuit design and PCB design
Objectives	:	<ol style="list-style-type: none">To understand the stages of product (hardware/ software) design and development.To be acquainted with methods of PCB design and different tools used for PCB Design.To understand the importance of testing in product design cycle.To understand the processes and importance of documentation.
Unit-I	:	Introduction to Electronic product Design: Difference between circuit design and product design, Classification of products, Development stages of product design. Five elements of successful design, cognition, ergonomics. Packaging and factors. <p align="right">[4 Hours]</p>
Unit-II	:	Hardware Design and Testing: Design process, Requirement of System, Functional design, architectural design, Functional model verses architectural model. Module debug and test: black box test, white box test, grey box test. Case study: Detail design of Power amplifier: i)Specification ii)Component Design(Calculations) ii) Circuit design iv) Testing of power amplifier <p align="right">[4 Hours]</p>
Unit-III	:	Fundamentals of PCB and PCB design: Important terms related to PCB, Types of PCBs, PCB Design elements, PCB design Steps, Requirements of artwork, Layout rules, , PCB Design rules for analog circuits,PCB design for digital circuits, Component assembly Techniques <p align="right">[4 Hours]</p>
Unit-IV	:	Software Design : Waterfall model of software development, Phases of Software design, Goals of software design, Design of structured program, Testing and debugging of program, Case study: Design software for controller traffic signal for specific condition. <p align="right">[4 Hours]</p>
Unit-V	:	Product Testing: Environmental Testing, Temperature testing Humidity testing, Various test on enclosures, EMI and EMC related testing, Importance of standards, Classification of standards, IEC standards <p align="right">[4 Hours]</p>
Unit-VI	:	Product Documentation: Need of documentation, Types of documentation, Manual, Types of manual, Study of one typical manual, Bill of Material-examples <p align="right">[4 Hours]</p>
Reference Books:	:	Text Books: i) Electronic Product Design: R.G.Kaduskar ,Wiley Publication ii) Printed circuit board by R.S.Khanpur, Tata MacGraw Hill publication

	<p>Reference Books: i) James K. Peckol, "Embedded Systems – A Contemporary Design Tool", Wiley publication ii) J C Whitakar, "The Electronics Handbook", CRC press.</p>
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Section A: Includes Unit I, II and III; **Section B:** Includes Unit IV, V and VI.

Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 40 marks Paper:

1. Minimum eight questions
2. Four questions in each section
3. Question no 1 from section A and Question no 5 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each. The
4. Two questions of 7 marks each from remaining questions from each section A and B be asked to solve

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of final year B. Tech. (Electronics and Telecommunication Engineering) Semester-VII

Code No.: ETC 445

Teaching Scheme: 02Hrs/week

Theory: 02Hrs/week

Credits:02

Title: Biomedical Electronics

Class Test (Marks): 10

Theory Examination (Duration): 02 Hrs

Theory Examination (Marks): 40

Prerequisites	:	Basics of sensors, Transducer and Digital image processing.
Objectives	:	<ol style="list-style-type: none">1. To evaluate systems and devices that can measure, test and/or acquire biological information from the human body.2. To cover various signals of biological origin obtained, biosensors, transducers, bioelectrodes used to acquire such signals, and amplifiers
Unit-I	:	Basic Transducer Principle: Principles of transduction and measurement, Characteristics of Transducer, Transducer for Biomedical Applications e.g., Force, Flow, Pressure, Temperature Transducer. [4 Hours]
Unit-II	:	Bio Potential Electrodes: Electrodes, Electrolyte Interface, Half-Cell Potential, Polarizable and Non Polarizable Electrodes, Calomel Electrode, Electrode Circuit Model. [4 Hours]
Unit-III	:	Cardiovascular Measurement: Cardiac output Measuring techniques – Dye Dilution method, Thermo dilution method, BP method - Blood Flow measuring Techniques: Ultrasound Blood Flow meter, Electromagnetic Type, ECG [4 Hours]
Unit-IV	:	Auditory Instrumentation: Mechanism of Hearing, Sound Conduction System - Basic Audiometer, Pure tone-audiometer, Hearing Aids [4 Hours]
Unit-V	:	X-RAY and computed TOMO IMAGING Principles and production of soft X-rays and hard X-rays- Details of radiographic and fluoroscopic images in X-Ray systems, Evolution of CT machines, CT image formation- Conversion of X-ray data into scan image [5 Hours]
Unit-VI	:	Patient monitoring system ICU, post operative, ICCU, Digital central monitoring systems for patient monitoring. Computer based arrhythmia detection system. [3 Hours]
Reference Books:	:	Text Books: <ul style="list-style-type: none">• R. S. Khandpur, “Handbook of Biomedical Instrumentation”, 3rd Edition, Tata McGraw Hill, 2014• Leslie Cromwell, “Biomedical Instrumentation and Measurements Second Edition, Prentice Hall India Reference Books: <ul style="list-style-type: none">• Geddes and Baker, “Principles of Applied Biomedical Instrumentation”, 3rd Edition John Wiley, 1989• Joseph J. Carr and John M. Brown, “Introduction to Biomedical Equipment Technology”, 4th edition, Pearson Education, 2001

Section A: Includes Unit I, II and III; **Section B:** Includes Unit IV, V and VI.

Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 40 marks Paper:

1. Minimum eight questions
2. Four questions in each section
3. Question no 1 from section A and Question no 5 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each.

Two questions of 7 marks each from remaining questions from each section A and B be asked to solve

Dr.Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of final year B. Tech. (Electronics and Telecommunication Engineering) Semester-VII

Code No.: ETC 446

Teaching Scheme: 02Hrs/week

Theory: 02Hrs/week

Credits:02

Title: Enterprise Resource Planning

Class Test (Marks): 10

Theory Examination (Duration): 02 Hrs

Theory Examination (Marks): 40

Prerequisites	:	Database Management Systems
Objectives	:	<ol style="list-style-type: none">1. Differentiate between Data, Information and Knowledge2. Importance of Data Warehouse and Business Intelligence3. E-Business : Organization, Character and Process4. Concept of Enterprise and Management
Unit-I	:	Information, Knowledge, Business Intelligence and Data Warehouse: Information Concepts, Information: A Quality Product, Classification of the Information, Method of Data and Information Collection, Value of the Information, General Model of a Human as a Information Processor, Knowledge and Knowledge management systems, Business intelligence, Data in data Warehouse, Architecture of Data Warehouse, Organization and Management of Data Warehouse [4 Hours]
Unit-II	:	E-Business Technology: Introduction to E-Business, Models of E-Business, Internet and World Wide Web, Intranet/Extranet, Security in E-Business, Electronic Payment Systems, Impact of Web on Strategic Management, Web Enabled Business Management, Enterprise: Content Management Systems (CMS), MIS in Web Environment. [4 Hours]
Unit-III	:	Enterprise Management Systems: Enterprise Management System (EMS), Enterprise Resource Planning (ERP) System, ERP Model and Modules, Benefits of ERP, ERP Product Evaluation, Supply Chain Management (SCM), Information Management in SCM, Customer Relationship Management (CRM), [4 Hours]
Unit-IV	:	Business Process Re-Engineering (BPR): Introduction, Business Process, Process Model of the Organization, Value Stream Model of the Organization, Relevance of Information Technology (IT), What Delays the Business Process?, MIS and BPR [4 Hours]
Unit-V	:	ERP and E-commerce: Future Directives in ERP, ERP and Internet, Critical Factors Guiding Selection and Evaluation of ERP, Strategies for Successful [4 Hours]
Unit-VI	:	ERP Implementation: Critical Success Factors in ERP Implementation, Failure Factors in ERP Implementation, Integrating ERP into Organization. [4 Hours]
Reference Books:	:	Text Books: <ol style="list-style-type: none">1. Management Information Systems, a Digital Firm Perspective by Waman S. Jawadkar, 4th Edition , Publisher: Pearson.2. Management Information Systems, Managing the Digital Firm by Ken Laudon, Jane Laudon, Rajanish Dass, 11th Edition, Publisher: Pearson

	<p>3. Manufacturing Resource Planning (MRP II) with Introduction to ERP; SCM; and CRM by Khalid Sheikh, Publisher: McGraw-Hill</p> <p>4. The Impact of Enterprise Systems on Corporate Performance: A study of ERP, SCM, and CRM</p> <p>5. ERP and Supply Chain Management by Christian N. Madu, Publisher: CHI</p> <p>6. Implementing SAP ERP Sales & Distribution by Glynn C. Williams, Publisher McGraw-Hill</p> <p>.</p>
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Pattern of Question Paper:

The six units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 40 marks Paper:

1. Minimum eight questions
2. Four questions in each section
3. Question no 1 from section A and Question no 5 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each.

Two questions of 7 marks each from remaining questions from each section A and B be asked to solve

Dr.Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of final year B. Tech. (Electronics and Telecommunication Engineering) Semester-VII

Code No.: ETC421

Teaching Scheme: 02Hrs/week

Practical: 25 Marks

Title: Advanced Embedded system Design

Teachers Assessment: 25 Marks

Credits: 01

Course Objectives	:	<ol style="list-style-type: none">1. To get the knowledge of embedded system using ARM7 and ARM cortex microcontroller2. To get aware with Vxworks and MicroC RTOS
List of Practical	:	<ol style="list-style-type: none">1. Write a program to Turn on the LED for specific time using ARM 21482. Write a program to display a message on LCD using 4 bit mode and using I2C module3. Write a program to display a message using GLCD4. Write a program to rotate stepper motor clockwise and anticlockwise with specific degree rotation5. Write a program to rotate Servo motor clockwise and anticlockwise with specific degree rotation.6. Design a digital thermometer using STM32 Microcontroller(Cortex-M3)7. Design a system using accelerometer to find the angle of tilt (Use STM32 fxx)8. Design a system for obstacle detection using Ultrasonic sensor and STM32Fxx Microcontroller.9. Design a system for heart rate monitoring using pulse sensor and STM32Fxx)10. Interfacing of Servo motor with STM32fxx11. Demonstrate basic multi-tasking capabilities of μC/OS-II Ten task display a number between 0 to 9 at random location on the screen.12. Create a mailbox using μC/OS-II
List of References	:	<ol style="list-style-type: none">i) ARM7 LPC 2148 Data sheetii) STM32fxx Data sheet
List of Equipments /Instruments	:	ARM7 Development board,,Cortex-M3 board, accelerometer, Temperature sensor, Servo motor, Stepper motor, LCD, Pulse sensor, Ultrasonic sensor and stepper motor

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

The assessment of practical examination shall be on the following criteria:

The practical examination shall consist of performing an experiment based on the practical work done during the course, the record of the experiments submitted by the candidate and viva -voce based on the syllabus.

Dr.Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of final year B. Tech. (Electronics and Telecommunication Engineering) Semester-VII

Code No.: ETC422

Teaching Scheme: 02Hrs/week

Lab:

Title: Antennas and Radiating Systems

Teachers Assessment: 50 Marks

Credits: 01

Course Objectives	:	<ul style="list-style-type: none">In this course students will learn to measure and analyze characteristics of microwave devices
List of Practical	:	<ol style="list-style-type: none">Plot the radiation pattern of dipole antenna and measure parameters.Plot the radiation pattern of folded dipole antenna and measure parameters.Plot the radiation pattern of Helical antenna and measure parameters.Plot the radiation pattern of Array antenna and measure parameters.Plot the radiation pattern of Yagi Uda antenna and measure parameters.Plot the radiation pattern of Log periodic antenna and measure parameters.Plot the radiation pattern of microstrip antenna and measure parameters.Plot the radiation pattern of reflector antenna and measure parameters.Design and test microstrip antenna using simulation software.Design, fabricate and test wire antenna.
List of Reference Books	:	<ol style="list-style-type: none">C. Balanis, Wiley, "Antenna Theory: Analysis and design", India.G.S.N. Raju, "Antenna and wave propagation", Pearson Education
List of Equipments /Instruments	:	Types of antennas, RF generators, dB meter, Spectrum analyzers, Digital Storage Oscilloscope.

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

The assessment of practical examination shall be on the following criteria:

The practical examination shall consist of performing an experiment based on the practical work done during the course, the record of the experiments submitted by the candidate and viva -voce based on the syllabus

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
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Syllabus of Final Year B. Tech. (Electronics and Telecommunication Engineering) Semester VII

Code No: ETC423

Lab:

Title: Computer Network and Security

Teachers assessment:25 Marks

Teaching Scheme:

Practical: 02 Hrs/week

Practical:25 Marks

Credits: 01

Course Objectives	:	<ul style="list-style-type: none"> In this laboratory students will learn various aspects of computer network and security issues using simulation tools
List of Practical	:	<ol style="list-style-type: none"> Configure network topology using packet tracer software. Study LAN transmission medias and interconnection devices. Design and analyze network and backbone using simulation tools. Design web page using HTML. Configure a network using routing information protocol. Study LAN and its specifications Analyze Address Resolution Protocol. To Study FTP & SMTP,SNMP protocols. Write error detection and correction code. Analyze Digital Signatures.
List of Reference Books	:	<ol style="list-style-type: none"> A.S.Tanenbaum , “Computer Networks” PHI Behrouz A Forouzan, “Data Communications & Networking” TMH William Stalling , “Data & Computer Communication” Pearson William Stalling , “Cryptography & Network Security” Pearson

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

The assessment of practical examination shall be on the following criteria:

The practical examination shall consist of performing an experiment based on the practical work done during the course, the record of the experiments submitted by the candidate and viva -voce based on the syllabus.

Dr.Babasaheb Ambedkar Marathwada University, Aurangabad (Faculty of Science & Technology) Syllabus of final year B. Tech. (Electronics and Telecommunication Engineering) Semester-VII		
Code No.: ETC424A Teaching Scheme: 02Hrs/week Practical: 50 Marks		Lab: Title: Lab Elective III Teachers Assessment: 50 Marks Credits: 01
Course Objectives	:	<ul style="list-style-type: none"> Course will enable students to develop programs in python programming language and identify use of various data structures available in python.
List of Practical	:	<ol style="list-style-type: none"> Develop program for shop billing system Develop program using function recursion. Develop Word scramble program. Develop program to demonstrate operations on python lists Develop program to demonstrate operations on python tuple Develop program to demonstrate operations on python sets Develop program using python strings Develop program to demonstrate operations on python dictionary Develop simple class in Python. Develop program for inheritance in Python (Vehicle/Animal categories). Use python programming for simple sensor programming Build simple application for IOT using Python Programming
List of Reference Books	:	Text Books: <ol style="list-style-type: none"> Think Python 2nd Edition, 2016 by Allen B. Downey, O'Really Publication. Reference Books: <ol style="list-style-type: none"> Dive into Python 3, 2nd Edition, 2012 by Mark Pilgrim, Apress Publication Learning with Python 1st edition, 2015 by Allen B. Downey, Dreamtech Press.
List of Equipment /Instruments	:	Pycharm IDE Python 2.0 or above

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

The assessment of practical examination shall be on the following criteria:

The practical examination shall consist of performing an experiment based on the practical work done during the course, the record of the experiments submitted by the candidate and viva -voce based on the syllabus

Dr.Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of final year B. Tech. (Electronics and Telecommunication Engineering) Semester-VII

Lab : Artificial Intelligence and Machine Learning

Code No.:ETC424 B

Teaching Scheme: 02Hrs/week

Teachers Assessment: 50 Marks

Practical: 50 Marks

Credits: 01

Course Objective	:	<ul style="list-style-type: none">• Course will enable students to develop artificial intelligence programs and machine learning based program.
List of Practical	:	<ol style="list-style-type: none">1.Study of AI Programming language2. Perform Logic programming with C/Matlab/Python3. Perform All Arithmetic operation programming with C/Matlab/Python4.Training and testing using Artificial Neural Network with C/Matlab/Python5.To convert uppercase into lowercase string and vice-versa with C/Matlab/Python6. Write a program in C/Matlab/Python for medical diagnosis system.7. Study Logistics and introduction to machine learning.8. Case Study: Intelligent Washing Machine Design9. Write a generalized program to process the data by using the feed-forward neural network10. Case Study: Cancer Detection or Character Recognition or Iris Clustering
List of Reference Books	:	<ol style="list-style-type: none">1. Introduction to Artificial Neural Systems, J. M. Zurada, Jaico Publication House 1997.2. Introduction to Turbo PROLOG, Carl Townsend, BPB Publication.3. Neural Networks: A Comprehensive Foundation, S. Haykin, Pearson Education, New Delhi, 2002.
List of Equipments /Instruments	:	Computer Systems, C Language Software, Matlab13 onward, Python.

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

The assessment of practical examination shall be on the following criteria:

The practical examination shall consist of performing an experiment based on the practical work done during the course, the record of the experiments submitted by the candidate and viva -voce based on the syllabus

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Syllabus of final year B. Tech. (Electronics and Telecommunication Engineering) Semester-VII

Lab: Elective-III

Code No.: ETC424C

Title: Wireless and Mobile Communication

Teaching Scheme: 02 Hrs/week

Teachers Assessment: 50 Marks

Practical: 50 Marks

Credits: 01

Course Objectives	:	To understand the basic principles of modern mobile and wireless communication systems
List of Practical	:	<ol style="list-style-type: none">1. To understand the Basic circuit of Mobile phone (Transmitter, Receiver and Base band control Section)and SIM card detection.2. To study transmitter and receiver signals3. Study and observe Transmitted (I & Q) /Received (I & Q) signals constellations.4.Study of PWM signal at Buzzer in mobile -4G LTE Smart Phone TechBook5.Study of switch faults in User Interface Section of 4G LTE Smart Phone Tech Book6.Study of AT commands and their use.7. To understand the cellular frequency reuse concept fulfilling the following objectives: Finding the co-channel cells for a particular cell.2.Finding the cell clusters within certain geographic area.8. To simulate the zero forcing and LMS algorithms equalizer using MATLAB simulation tool.9. To set up an active satellite link and demonstrate link fail operation10.Simulating a Wireless Sensor Network using Virtual lab11.Small project based on wireless Communication.
List of Reference Books	:	Theodore Rappaport , “Wireless Communications: Principles and Practice” 2 nd Edition
List of Equipments /Instruments	:	Any ten experiments Insruments:4G LTE Smart Phone Tech Book ,Virtual Lab

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

The assessment of practical examination shall be on the following criteria:

The practical examination shall consist of performing an experiment based on the practical work done during the course, the record of the experiments submitted by the candidate and viva -voce based on the syllabus

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Science and Technology)

Syllabus of Final Year B. Tech. (Electronics and Telecommunication Engineering) Semester VII

Code No: ETC425

Title: Project-II

Teaching Scheme:

Term Work (Marks): 100

Practicals: 06 Hrs/week

Credits: 04

Practical Examination (Marks): 100

Course Objectives	:	<ol style="list-style-type: none">1. The practical implementation of theoretical knowledge gained during the study to till date is important for engineering education. The student should be able implement their ideas/real time industrial problem / current application of their engineering branch which they have studied in curriculum.2. To motivate students for creativity.3. To create awareness regarding latest technology4. To have common platform for interaction about emerging technology.5. To inculcate qualities of team work.6. To explore related information using books, research papers, journals & websites.7. To improve presentation and communication skills.
List of Practical	:	<p>Guidelines For Students And Faculty:</p> <ol style="list-style-type: none">1. Students shall complete the Project-II in continuation of the work planned in third year under the course Project-I2. Each student/group is required to-<ol style="list-style-type: none">a. Submit a report with latest status of the project work.b. Give a 10 minutes presentation through OHP, PC, and Slide projector followed by a 10 minute discussion in the second week of their academic semester.c. Submit a report on the project topic with a list of required hardware, software or other equipment for executing the project in the third week of their academic semester.d. Start working on the project and submit initial development and CPM/PERT planning drawing in the fourth week of their academic semester.e. Preparation of PCB layout, wiring diagram, purchase of components, software demo, flowchart, algorithm, program/code, assembling, testing, etc. should be submitted by student/s within next five/Six weeks and minimum one page report should be there for each major activity.f. Overall assembling, wiring, code writing, testing, commissioning along with performance analysis, should be completed within next two weeks.g. In the last week, student/group will submit final project report to the guide.3. Every assigned faculty/s should maintain record of progress of each student or group. <p>The format and other guidelines for the purpose of the Project Submission in hard bound copies should be as follows,</p> <p>REPORT STRUCTURE Index/Contents/Intent List of Figures List of Tables</p>

	<p>List of Symbols / Abbreviations</p> <ol style="list-style-type: none"> 1. Introduction 2. Literature survey 3. System development 4. Performance analysis 5. Conclusions <p>References Appendices Acknowledgement</p>
	<ol style="list-style-type: none"> 1. INTRODUCTION <ol style="list-style-type: none"> 1.1 Introduction 1.2 Necessity 1.3 Objectives 1.4 Theme 1.5 Organization 2. LITERATURE SURVEY Literature Survey Related information available in standard Books, Journals, Transactions, Internet Websites <i>etc.</i> till date (More emphasis on last three to five years) 3. SYSTEM DEVELOPMENT Model Development <ul style="list-style-type: none"> • Mechanical / Fabricated • Analytical • Computational • Experimental • Mathematical • Software <p>(out of above methods at least one method is to be used for the model development) Some mathematical treatment or related information is required to be embodied</p> 4. PERFORMANCE ANALYSIS <ul style="list-style-type: none"> • Analysis of system developed either by at least two methods depending upon depth of standard • These methods normally used are Analytical /Computational/Statistical/Experimental/ or Mathematical • Results at various stages may be compared with various inputs • Output at various stages with same waveforms or signals or related information/parameters • Comparison of above results by at least two methods and justification for the differences or error in with theory or earlier published results 5. CONCLUSIONS <ol style="list-style-type: none"> 5.1 Conclusions 5.2 Future Scope 5.3 Applications <p>Contributions (if any,) The innovative work/invention/new ideas generated from the analysis of the work which can be taken from the conclusions</p>

	<p>REFERENCES</p> <ul style="list-style-type: none"> • Author, “Title”, Name of Journal/Transactions/ Book, Edition/Volume, Publisher, Year of Publication, page to page (pp.____). <p>These references must be reflected in text at appropriate places in square bracket In case of web pages complete web page address with assessing date has to be enlisted List of references should be as per use in the text of the report</p> <p>APPENDICES</p> <p>Related data or specifications or referred charts, details computer code/program, <i>etc.</i></p> <p>ACKNOWLEDGEMENTS</p> <p>Expression of gratitude and thankfulness for helping in completion of the said task with name & signed by the candidate</p>
	<ul style="list-style-type: none"> • General Guidelines <p>Text should be printed on front and correct side of the watermark on quality bond paper Paper size- A4, 75 to 85 gsm paper Left Margin-1.5” Right Margin-3/4” Top Margin-1” Bottom Margin-1”</p> <ul style="list-style-type: none"> • Pagination <p>First page of every chapter need not be printed but counted, second page onwards page number to printed at bottom center place. All Greek words must be italic</p> <p>Report Heading -ALL CAPITAL—16 Font Chapter heading -ALL CAPITAL—14 Font Subchapter –Title Case-12 Font Sub-Subchapter –First Alphabet Capital case-12 Font Page numbers for Index/Contents/Intent should be in roman All text should be in times new roman Cover page should have complete symbol of institute Suitable flap (bookmark) with name of the candidate, Department and Institute name and symbol can be used with nylon strip.</p>
	<p>For more information and sample of hard copy please contact the respective Head of the Department.</p>

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Science and Technology)

Syllabus of Final Year B. Tech. (Electronics and Telecommunication Engineering) Semester VIII

Code No: ETC471

Title: Inplant Training

Teaching Scheme:

Term Work (Marks): 300

Credits: 24

Practical Examination (Marks): 300

Rationale	(a)	The techniques and processes of production of goods and services do not demand only technical skills, but also a cluster or conglomerate of skills. A significant part of which is related to the total humanistic growth of the man. Such conglomerate skills technical and humanistic cannot obviously be acquired through pure academic learning of concepts in formalized and institutional courses and in isolation of the actual work situation. It, therefore, naturally follows that no technical education will be complete till it has two components, one learning of concepts vis-a vis acquiring conceptual skill and other application of the concepts in real work situation vis-a vis acquiring manipulative or practicing skills. Technical education needs to have a complement of learning of the techniques of applying the concepts within the industry and business.
Objectives	(b)	1) The students of B.Tech course shall get an opportunity to work on live problems of the industry. 2) He/She shall apply his learning concepts in the real work situation. 3) He/She shall get an exposure to the industrial environment and thereby enable himself/herself to appreciate the other related aspects of industry viz, human, economic, commercial and regulatory. 4) He/She shall identify career paths taking into account their individual strengths and aptitude. 5) He/She shall contribute for the achievement of economic goals and aspirations of the industry and our country as a whole.
	(c)	The curriculum for B.Tech students of Final Year Course of Part-II shall consist of; 1) Inplant training for a period of one full term, and the period of the term shall be as prescribed by the university from time to time 2) A project on live problems of the industry shall be undertaken by the student/group of students undergoing training in the same establishment. 3) The term work shall consist of the inplant training record-daily diary, work diary, progress report, a record containing the literature survey in the field of appropriate branch of Engineering, a preliminary report related to project work etc. 4) Seminars will be arranged after successful completion of period specified in the scheme of semester VIII of B.Tech. The date and times will be decided according to the convenience of guide and student.
	(d)	Memorandum of understanding: Maharashtra Institute of Technology, Aurangabad will enter into an agreement with the industry through 'Memorandum of Understanding' for creating facilities of inplant training in the appropriate branch of Engineering according to the Course Curriculum and keep this agreement for a period of 10 years to foster a healthy industry- institute interaction for mutual benefits of both.
		Admission to inplant training: No student will be deputed for inplant training unless he produces testimonial of having

	<p>kept one term for the subject under B Tech Semester –VIII of final year course satisfactorily in Maharashtra Institute of Technology after passing the TY B Tech Examination (in the appropriate branch).</p>
	<p>Period of inplant training: The period of Inplant training will be the period of one term for the subject under B Tech course semester-VIII, which will be notified by Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.</p>
	<p>Contract of Inplant Training :</p> <ul style="list-style-type: none"> • The student of Maharashtra Institute of Technology shall enter into a contract of inplant training with the employing industry. • The inplant training shall be deemed to have commenced on the date, on which the contract of inplant training has been entered into. • Every contract of inplant training will contain the Terms and Conditions to be agreed by both the parties. • Every contract of inplant training shall be registered with the Maharashtra Institute of Technology within 15 days from entering into the contract.
	<p>Violation of contract: Where an employer, with whom a contract for inplant training has been entered into, is for any reason, unable to fulfill his obligation under the contract, the contract end with the consent of Maharashtra Institute of Technology. It is agreed between the employer, the student and any other employer that the student shall be engaged as an “inplant trainee” under the other employer till the expiry period of the inplant training. The agreement on registration with Maharashtra Institute of Technology shall be deemed to be the contract of inplant training between the student and other employer, and from the date of such registration, the contract of inplant training with the first employer shall terminate and no obligation under that contract shall be enforceable at the instance of any party to contract against the other party thereto.</p>
	<p>Termination of Contract: The contract of inplant training shall terminate on the expiry of the period of inplant training. Either party to the contract of inplant training make an application to Maharashtra Institute of Technology, Aurangabad for the termination of the contract. After considering the content of the application, and objection, Maharashtra Institute of Technology by order in writing, will terminate the contract, if it is satisfied that the parties to the contract have/has failed to carry out the Terms and Conditions of the contract. Provided that where a contract is terminated-</p> <ul style="list-style-type: none"> • For the failure on the part of the Employer, Maharashtra Institute of Technology will depute students to another Employer for providing facilities of inplant training to the remaining period of training. • For the failure on the part of the student, the student will not be allowed to continue his/her inplant training in that term. The student shall be deputed for inplant training in the next coming term.
	<p>Expectation from the Employer / Industry / Establishment: The following expectations are derived for effective inplant training.</p> <ol style="list-style-type: none"> 1. To provide legitimate facilities for the training and learning of all the processes.

	<p>2. To guide the student for understanding a project of immense importance to industry and to help him/her for his/her career advancement.</p>
	<p>Obligation of Students:</p> <ul style="list-style-type: none"> • To learn his/her subject field in Engineering or Technology conscientiously and diligently at his place of training. • To carry out all orders of his Employer and the Superior in the establishment. • To abide by the Rules and Regulations of the Industry/Establishment in all matters of conduct and discipline. • To carry out the obligation under the contract of inplant training. • The student shall maintain a report of his work during the period of his inplant training in a proforma (form no: 2) made available in Annexure. • Except in case of extreme urgency, the B.Tech student shall submit an application for all other leaves except the medical leave to the Manager/Gen. Manager (Personnel) of the concerned industry, where he is undergoing an inplant training and obtain sanction before the leave is taken. In case of Medical Leave, he shall submit an application to Maharashtra Institute of Technology, Aurangabad. The shortage in attendance will be subjected to extending the period of inplant training in which case, the student may not be allowed to appear for the test, project seminar and assessment of term work etc. which will be held immediately after successful completion of the inplant training.
	<p>Maintenance of Record: Every student of B.Tech course shall maintain a daily record of the work done by him/her relating to the inplant training in the proforma (Annexure).</p>
	<p>Industry Sponsored Student Projects: The scheme envisages working out suitable programme for B.Tech students. They are required to complete their inplant training in a given period. During this period, they shall be familiar with the understanding of the shop process and activities. The students can be asked to solve the mini-shop problem, which will make them think and try out short experiments as an improvement in the process, tools and equipment. The student here is not expected to acquire the skills in operating machines values. He should appreciate the application of theory learnt. The students in a group alone can undertake a project of immense importance for the benefit of the industry and also useful for the students for their advancement of career. Industry staff and Maharashtra Institute of Technology faculty can plan in advance to effectively complete the practical training with the project for preliminary studies on the floor. The projects should aim mainly-</p> <ul style="list-style-type: none"> • Cost reduction • Reducing cycle time • Enhancing productivity • Energy conservation measures • Process Improvement technique • Inventory control • Quality control Technique • Improvement in Material handling system • Bottlenecks in material flow system and so on. • Live problems in the industry.

	<ul style="list-style-type: none"> • Application development using electronics related knowledge. • Identifying and solving social problems using electronics and telecommunication knowledge. • Design and development in the fields of electronics and telecommunication.
	<p>What will form a good project? Through the project, it is hoped to provide the students an exciting experience in solving line problems under practical constraints. Hence it is desired that the project should be a well-defined problem, which can be completed and implemented within the project period. It may be a problem, evolving analysis, design, fabrication and / or testing.</p>
	<p>Time Schedule for the Project: The following time schedule should be planned by each student or groups of students, who undertake the project.</p> <ul style="list-style-type: none"> • Proposal to be received before specified date. • Project acceptance before. • Commencement of the project. • Completion of the project.
	<p>Commitment on the part of the Institute:</p> <ul style="list-style-type: none"> • Providing a faculty member to supervise the project. • Providing the Institute facilities to complete the project. • Coordinator from industry will be invited to participate in the stage wise assessment of the students performance.
	<p>Assistance for completion of the Project: All the projects undertaken by the students are time bound. Although, every attempt results may not be achieved within the period available for the student. In such cases, the services of the associated faculty members can be sought for the completion of the same on mutually agreed terms.</p>
	<p>Monitoring of Inplant Training: The B.Tech students are expected to follow all the rules and discipline of the industry. However, because of other academic requirements and the nature of the project, the student may have to work in other places outside the industry. The faculty and Industry supervisor will work out a suitable arrangement to review the progress of the work from time to time. Maharashtra Institute of Technology, Aurangabad will monitor the progress of inplant training in association with industry authority.</p>
	<p>Conduct and Discipline: In all matters of the conduct and discipline, B.Tech student shall be governed by the rules and regulations (applicable to employees of the corresponding category) in the Establishment, where he/she is undergoing a training.</p>
	<p>B.Tech Students are Trainees and not Workers:</p> <ul style="list-style-type: none"> • Every B.Tech student undergoing an inplant training in the respective branch of Engineering & Technology in any Establishment shall be treated as a trainee and not a worker and- • The provision of any law with respect to labour will not apply to such a trainee.
	<p>Settlement of Disputes: Any disagreement or dispute between an industry and a B.Tech student trainee arising</p>

	<p>out of the contract of inplant training shall be resolved both by Maharashtra Institute of Technology and the industry with mutual cooperation. The decision of both Maharashtra Institute of Technology and the industry shall be final.</p>
	<p>Holding of Test and Grant of Certificate: The progress in inplant training of every student shall be assessed by the industry and Maharashtra Institute of Technology faculty from time to time. Every B.Tech student undergoing an inplant training shall be issued a certificate of Proficiency on completion of his training to the satisfaction of the industry.</p>
	<p>Offer of Stipend / Other Welfare Activities and Employment: It shall not be obligatory on the part of the Employer / Industry to offer any stipend and other welfare amenities available, if any, to the students of B.Tech courses undergoing an inplant training. However, if the industry desirous to do so, it will be a privilege for the students and also for Maharashtra Institute of Technology in view of the bonding of better understanding and cooperation forever.</p>
(e)	<p>PRACTICAL EXAMINATION The Practical examination will be conducted after successful completion of the inplant training for which guide will be internal examiner and external examiner will be appointed by the university. The date of practical examination will be same for the students of a branch and will be notified by the university. The assessment of the practical examination shall consist of</p> <ol style="list-style-type: none"> 1. Seminar Performance 2. An oral on the project work done. 3. Assessment of the term work / report.