

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY**CIRCULAR NO.SU/Engg./T.Y.B.Tech./63/2018**

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 **Academic Council at its meeting held on 30 June & 02 July 2018 has accepted the following syllabi in accordance with Choice Based Credits & Grading System for all Branches T.Y.B.Tech** under the Faculty of Science & Technology as enclosed herewith.

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

This is effective from the Academic Year 2018-2019 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/T.Y.B.TECH./2018/

Date:- 03-07-2018. /10486-96 *****

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W.S. 6/7/18
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,

SCHEME AND DETAILED SYLLABUS

of

T. Y. B. Tech. (Electronics and Telecommunication Engineering)

of

FOUR YEAR DEGREE COURSE IN SCIENCE & TECHNOLOGY



DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

FACULTY OF SCIENCE AND TECHNOLOGY

**Proposed Revised Syllabus w.e.f. 2018-19
T. Y. B. Tech (Electronics and Telecommunication Engineering)**

Course Code	SEMESTER-V	Contact Hrs/Week				Examination Scheme						
	Subject	L	T	P	Total	CT	TH	TW	P	Total	Credits	Duration of Theory Exam
ETC 301	Microprocessors and Microcontroller	4	-	-	4	20	80	-	-	100	4	3Hrs
ETC302	Digital Communication	4	-	-	4	20	80	-	-	100	4	3Hrs
ETC303	Electronic Circuit Design Technology	4	-	-	4	20	80	-	-	100	4	4Hrs
ETC304	Digital Signal Processing	4	-	-	4	20	80	-	-	100	4	3Hrs
ETC305	Control System	4	-	-	4	20	80	-	-	100	4	3Hrs
ETC341-343	Elective II	2	-	-	2	10	40	-	-	50	2	2Hrs
ETC321	Lab I:Microprocessor and Microcontroller	-	-	2	2	-	-	25	25	50	1	
ETC322	Lab II: Digital Communication	-	-	2	2	-	-	25	25	50	1	
ETC323	LabIII: Digital Signal Processing	-	-	2	2	-	-	25	25	50	1	
ETC324	Lab IV:Electronic Circuit Design Technology	-	-	2	2	-	-	50	-	50	1	
ETC325	Minor Project	-	-	2	2	-	-	50	-	50	1	
	Total of semester-V	22	-	10	32	110	440	175	75	800	27	
Course Code	SEMESTER-VI	ContactHrs/Week				ExaminationScheme						
	Subject	L	T	P	Total	CT	TH	TW	P	Total	Credits	Duration of Theory Exam
ETC351	Embedded System Design	4	-	-	4	20	80	-	-	100	4	3Hrs
ETC352	Microwave theory and Techniques	4	-	-	4	20	80	-	-	100	4	3Hrs
ETC353	VLSI Design	4	-	-	4	20	80	-	-	100	4	3Hrs
BSH354	Industrial Management (All)	4	-	-	4	20	80	-	-	100	4	3Hrs
*	Open Elective – I	4	-	-	4	20	80	-	-	100	4	3Hrs
ETC354	Digital Image Processing	2	-	-	2	10	40	-	-	50	2	2Hrs
ETC371	Lab V:Embedded System Design	-	-	2	2	-	-	25	25	50	1	
ETC372	Lab VI: Microwave theory and Techniques	-	-	2	2	-	-	25	25	50	1	
ETC373	Lab VII: VLSI Design	-	-	2	2	-	-	25	25	50	1	
ETC 374	Lab: IV:Circuit Simulation Lab –II	-	-	2	2	-	-	50	-	50	1	
ETC375	ProjectI	-	-	2	2	-	-	-	50	50	1	
**	#Audit Course-I	2			2							
	Total of semester-VI	24	-	10	34	110	440	125	125	800	27	
	Grand Total of V&VI									1600	54	

L:Lecturehoursperweek T:Tutorialhoursperweek

P:Practicalhoursperweek

CT: ClassTest

TH:University Theory Examination TW:TermWork

P:Practical/OralExamination

Elective II:Programming in JAVA (ETC341)

Microelectronics (ETC342)

Optical Fiber Communication (ETC343)

Note: Interested students can opt for any one of the audit course offered by various departments.

#For Audit course, audit pass (NP) and audit fail (NF) grades will be awarded.

***Open Elective-I Courses**

Sr.No.	Name of Course	Department	Course code
1	Remote Sensing and GIS	AED	AED381
2	Professional Ethics and Cyber Security	CSED	CSE381
3	Design for Environment	CED	CED381
4	Robotics and Automation	EED	EED381
5	Internet of Things	ETC	ETC381
6	Costing and Financial Management	MED	MED381
7	Introduction to Nano Technology	PPED	PPE381

****Audit –I Courses**

Sr.No.	Name of Course	Department	Course code
1	Japanese Language module	BSH	BSH801
2	Cyber Crime and Law	CSED	CSE801
3	Road Safety Management	CED	CED801
4	Value Education	BSH	BSH802
5	Smart Cities	ETC	ETC801
6	Rural Community Engagement	MED	MED801
7	German Language Module	BSH	BSH803

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of T. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-V

Code No.: ETC301

Teaching Scheme: 04Hrs/week

Theory: 04Hrs/week

Credits:04

Title: Microprocessor & Microcontroller.

Class Test (Marks): 20

Theory Examination (Duration): 03 Hours

Theory Examination (Marks): 80

Prerequisites	:	Digital electronics
Objectives	:	To understand the applications of Microprocessors & Microcontrollers. To understand need of Microprocessors & microcontrollers. To understand architecture and features of typical Microprocessors & Microcontroller. To learn interfacing of real world input and output devices.
Unit-I	:	Overview to Microprocessor: Overview of 8085 Microprocessor Architecture, pin diagram of 8085, addressing modes, T-state, instruction set, programming, Timing diagram, Delay & delay subroutines, Different data transfer schemes. [8 Hours]
Unit-II	:	Interfacing With 8085: Memory mapping & design, memory mapped I/O and I/O mapped I/O, Need of I/O ports, Introduction to PPI 8255, Interfacing of LED's, 7 Segment display, relays, DC motor, Stepper motor, switch, ADC & DAC with 8255. [8 Hours]
Unit-III	:	Peripherals & Interfacing: USART 8251, Programmable Interval Timer 8253, Programmable Interrupt Controller 8259, 8257 DMA interfacing with 8085. [8 Hours]
Unit-IV	:	Microprocessor 8086 : Architecture of 8086, Pin diagram, Addressing Modes, Memory segmentation, Overview of Instruction Set and Programming. Minimum mode configuration, Maximum mode configuration. Features of advance processors. [8 Hours]
Unit-V	:	Introduction to 8051 Microcontroller: Introduction, Microcontrollers & Microprocessors, CISC and RISC processor, Harvard and Von Neumann architectures, Commercial Microcontroller Devices, selection criteria of microcontroller, Microcontroller 89C51: Architecture, Pin description, memory organization, Addressing Modes, Instruction Set, Programming & flashprogramming. [8 Hours]
Unit-VI	:	89c51 Interfacing: Ports, Interrupts, Timer & Counters, Interfacing: Serial Communication RS232, LED, switches, Relays, DC motor, stepper motor, ADC, DAC, LCD, Keyboard, 8255. [8 Hours]

Reference Books:	<p>Text Books:</p> <ol style="list-style-type: none"> 1. A. P .Godse, D. A. Godse , “Microprocessor Techniques 8085 and 8086 Archetecture,Instructionset,Programming and Interfacing”, Technical Publication Pune, Fourth Revised Edition 2008. 2. Muhammad AMazidi, “The 8051 Microcontroller and Embedded Systems”, Pearson Education Asia, first Indian reprint, 2002. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Ramesh Gaonkar, “Microprocessor, Architecture, Programming and Application”, Willey Eastern Ltd, Fourth Edition. 2. Ray & Bhurchandi, “Advanced Microprocessors and Peripherals”, Tata McGraw Hill 2nd Edition. 3. Raj Kamal, “Embedded Systems Architecture, Programming and Design”, TMH 2nd Edition. 4. Subrata Ghoshal , “8051 Microcontroller-internals,Instructions,Programing & Interfacing” ,Pearson Edition.
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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 80 marks Paper:

1. Minimum 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 and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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(Faculty of Science & Technology)
Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-V

Code No.:ETC302

Teaching Scheme: 04Hrs/week

Theory: 04Hrs/week

Credits:04

Title: Digital Communication

Class Test (Marks): 20

Theory Examination (Duration): 03 Hours

Theory Examination (Marks): 80

Prerequisites	:	Fourier series, Fourier transform, probability theory, Analog communication.
Objectives	:	To study- <ul style="list-style-type: none"> • Fundamentals of digital communication • Pulse modulation and digital modulation techniques • Spread Spectrum Techniques. • Probability theory and random process
Unit-I	:	Digital Baseband Modulation Techniques and Waveform Coding Techniques: Base Band System, Formatting Textual Data, Messages, Characters & Symbols, Formatting Analog Information, PCM, Bandwidth, SNR of PCM, DPCM, DM, ADM. [08 Hours]
Unit-II	:	Probability Theory: Conditional Probability, Statistical Independence, Baye's Theorem, Binomial, Poisson & Normal Distribution, Information transmission on continuous and discrete channel. [08 Hours]
Unit-III	:	Random Process: Introduction to Random variable, Functions of Random Variable, Random Processes, Statistics of Random Process. Transmission of a Random Process Through a LTI Filter, Power Spectral Density. [08 Hours]
Unit-IV	:	Baseband Transmission: Narrow Band Noise, Representation of Narrowband Noise in terms of Phase & Quadrature Components, Concept of line Codes, Representation of Signals through line codes, Response of Linear System to Random Processes, Matched Filter. [08 Hours]
Unit-V	:	Carrier Modulation Techniques: Introduction to Carrier Modulation, FSK, PSK, BPSK, DPSK, QPSK, Coherent Detection and Non Coherent Detection, Error Performance for Binary Systems [08 Hours]
Unit-VI	:	Spread Spectrum Techniques: Pseudo-random Sequence, Direct Sequence Spread Spectrum, Block Details & mathematical treatment, Jamming margin and processing gain, Frequency Hop Spread Spectrum, Applications of DSSS and FHSS. [08 Hours]
Reference Books:	:	<ol style="list-style-type: none"> 1. Bernard Sklar, "Digital Communications fundamentals and Applications" Pearson Education, Second Edition. 2. Simon Haykin "Communication Systems", John Wiley & Sons, Fourth Edition. 3. A.B Carlson, "Principles of communication systems", TMH, Third Edition. 4. Taub Schilling, "Principles of Communication system", TMH, Fourth Edition. 5. John G. Proakis, Masoud Salehi and Gerhard Bauch, "Contemporary Communication System using MATLAB", Cengage learning.

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 80 marks Paper:

1. Minimum 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 and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-V

Code No.: ETC303 Teaching Scheme: 04Hrs/week Theory: 04Hrs/week Credits: 04	Title: Electronic Circuit Design Technology Class Test (Marks): 20 Theory Examination (Duration): 04 Hours Theory Examination (Marks): 80
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Prerequisites	:	Basic Electronics, Electronic Devices & Circuits.
Objectives	:	<ul style="list-style-type: none"> • To study and design electronic circuits, motor driving circuits, measuring instrument (voltmeters and ammeter), modern sensor, noise reduction technique and PCB design.
Unit-I	:	Design of Regulated Power Supply: Design positive power supply using LM7805 voltage regulators, Design negative power supply using LM7905 and LM337 voltage regulators, Design of dual power supply, Concept of DC to DC converter, LM2576 voltage regulator, LM1117 family regulators, Design of constant current source using LM317, Protection circuits for regulators. [8Hours]
Unit-II	:	Design of Electronic Voltmeters and Ammeter : Basic DC voltmeter and ammeter, multi ranges voltmeters, DVM chip IC 7106/07 Based design of voltmeters and ammeter. [6 Hours]
Unit-III	:	Design of Motor & Relay Drivers: Design of Stepper Motor, Driver using MC3479, DC motor driver and speed control using PWM, Servo motor, BLDC motor, L293D, L298, ULN2000 family of driver, Isolation techniques using Opto-coupler PC817, Concept of solid state relay. [10Hours]
Unit-IV	:	Concept of Sensors: Touch sensors: Capacitive, resistive, Velocity and acceleration: Accelerometers, Gyroscopes. Motion & Position sensors: PIR, Ultrasonic, Optical encoder, Pneumatic sensors Environmental sensors: Humidity, Moisture. [8 Hours]
Unit-V	:	Noise Reduction Techniques: Grounding Techniques, Shielding Techniques, Cabling Techniques, Origin of Conducted EMI/EMC, Common and Normal mode Noise, Noise from Power Electronic Systems, Noise Sources, Transient Disturbance. [8 Hours]
Unit-VI	:	PCB Designing: Types of PCBs, selection criteria, Design rules for analog, digital and mixed circuits, Ground rules in PCB Design, Manufacturing process. [8 Hours]
Reference Books:	:	Reference Books: <ol style="list-style-type: none"> 1. R.S. Khandpur, "Printed circuit board: Design, Fabrication, Assembly and Testing" –Tata McGraw-Hill Education 2. D. S. Mantri, & G. P. Jain, " Electronic Circuit Design" , Nikita Publication. 3. Jacob Fraden, "Handbook of Modern Sensors Physics, Designs, and Applications" ,Springer,Fourth Edition. 4. Pavel Ripka, Alois Tipek., "Modern sensors handbook"

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 80 marks Paper:

1. Minimum 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 and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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Syllabus of T. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester- V

Code No.: ETC304

Teaching Scheme: 04Hrs/week

Theory: 04Hrs/week

Credits:04

Title: Digital Signal Processing

Class Test (Marks): 20

Theory Examination (Duration): 03 Hours

Theory Examination (Marks): 80

Prerequisites	:	Knowledge of Signals and Systems
Objectives	:	<ul style="list-style-type: none">• To understand DTFT and DFT.• To understand, analyze and design FIR and IIR filters.• To understand realization of FIR and IIR Filters.• To understand its hardware implementation using DSP Processor
Unit-I	:	Introduction to DSP Systems: Basic Elements of DSP systems, Advantages of DSP over ASP, Introduction to FIR & IIR Systems Realization of FIR and IIR Filters: Introduction, Basic realization blocksdiagram.FIR realization- Direct Form (Non-linear phase and Linear phase), Cascade and Parallel realization.IIR realization- Direct form I and II, Cascade and parallel realization.[8 Hours]
Unit-II	:	Discrete Fourier Transform DFT, Properties of DFT, Circular Convolution and Circular Co-relation using DFT and IDFT,Analysis of LTI System using Circular Convolution, Linear Convolution using Circular Convolution, Fast Convolution: Overlap Save and Overlap add algorithm. Relationship between DTFT, DFT and ZT. FFT Algorithms – Radix 2: DIT-FFT and Radix 2: DIF, Goertzel FFT algorithm and Chirp-Z transform FFT algorithm[8Hours]
Unit-III	:	FIR Filter Design. Characteristics of FIR Filters. Properties of FIR Filters.FIR Design using Windowing Technique [Rectangular Window, Hamming Window and Hamming Window] , FIR Design using Kaiser Window, FIR Design using Frequency Sampling Technique[8Hours]
Unit-IV	:	IIR Filter Design. Introduction to IIR Filters, IIR Filter Designing by using Approximation of Derivatives,Impulse Invariantmethod and Bilinear Z Transformation method, Matched Z Transform Method, Design of Low pass digital Butterworth filter, Frequency Transformation, Comparison of FIR & IIR Filters [8 Hours]
Unit-V	:	Finite word length effects in Digital Filters Binary fixed point and floating point number representations, Comparison - Quantization noise – truncation and rounding – quantization noise power-input quantization error- coefficient quantization error – limit cycle oscillations-dead band- Overflow error-signal scaling. Multirate Signal Processing: Decimation, Interpolation, Sampling rate conversion by rational factor [8 Hours]
Unit-VI	:	DSP Processors. Introduction, Architecture of DSP Processor, TMS320C67XX,Specifications, Comparison between general purpose and DSP Processor,Application of DSP

		Processor in Image Processing & Communication.[8 Hours]
Reference Books:	:	<p>Text Books:</p> <ol style="list-style-type: none"> 1. “Digital Signal Processing Principles, Algorithms and Application” John G Prokis, Manolakis, Pearson Education publication 2. “Digital Signal Processing” Salivahanam, A Vallavaraj, C. Guanapriya, Tata MCGraw Hill. 3. “Digital Signal Processing” P. Ramesh Babu, Scitech Publication <p>Reference Books:</p> <ol style="list-style-type: none"> 1. “Digital Signal Processing”, Tarun Kumar Rawat (Oxford) 2. “Digital Signal Processing – A Computer Based Approach”SanjeetMitra, Tata Mc Graw Hill 3. “Digital Signal Processing”-Ashok Ambardar (Cengage learning) 4. “Digital Signal Processing”, Emmanuel C. Ifeachorand Barrie. W. Jervis, Second Edition, Pearson Education, Prentice Hall, 2002. 5. “Discrete-Time Signal Processing”, A. V. Oppenheim, R. W. Schafer and J.R. Buck, 8th Indian Reprint, Pearson, 2004

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 80 marks Paper:

1. Minimum 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 and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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(Faculty of Science & Technology)

Syllabus of T. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester- V

Code No.: ETC 305

Teaching Scheme: 04Hrs/week

Theory: 04Hrs/week

Credits:04

Title: Control System

Class Test (Marks): 20

Theory Examination (Duration): 03 Hours

Theory Examination (Marks): 80

Prerequisites	:	Laplace Transform , Matrix Operation , Algebra
Objectives	:	<ul style="list-style-type: none">• To study the elements of control system and their modeling using various Techniques• To introduce methods for analyzing the time response, the frequency response and the stability of systems using root locus , bode plot etc• To introduce the state variable analysis method• To introduce concepts of PID controllers and digital and control systems
Unit-I	:	Control System Modeling: Introduction to Control Systems, Basic elements of control system, Open loop and closed loop systems, Feedback & Feed forward control systems, Linear & non linear control systems, Differential Equation & Transfer function representation of Control systems. Transfer function by block diagram reduction technique. Signal flow graph representation of control systems. Transfer function by Mason's formula. Modeling of Transfer Function RLC Network & Mechanical network. [8 Hours]
Unit-II	:	Time Domain Analysis of Control System: Basic time domain test signals for control systems. Transient response of first order system various test signals, Second order system , Transient response of first order system various test signals for undamped, under damped, critically damped & over damped condition. Transient response specification, Steady state error. [8 Hours]
Unit-III	:	Stability of control System: Stable control System. Types of control system based on stability, system characteristic equation. Stability Analysis: Routh-Hurwitz criterion, relative stability & range of stability. Root Locus: Rules for construction of root locus. Plotting of root locus. Root locus and Relative stability. [8 Hours]
Unit-IV	:	Frequency Domain Analysis of Control Systems: Frequency Response of of control systems. Co-relation between time domain & frequency domain specification of control systems. Bode Plot , Gain margin & Phase Margin, Anti Bode Plot, Nyquist plot , Polar plot , Lag Compensator , Lead Compensator , Lead-Lag Compensator [8 Hours]
Unit-V	:	State Space Variables: Introduction to State Variable Model, State variables, State vectors, State space equation, State Transition Matrix & its Properties, Eigen Values & Eigen vectors, Conversion of between state space model into transfer functions & Vice Versa by First Companion Form: SISO Case. Block diagram representation of linear control system described by state space model, Concepts of Controllability and Observability using state equation. [8 Hours]

Unit-VI	: ON OFF Controller: Introduction & characteristics of Proportional, Derivative, Integral, PI, PD & PID controller, concept of Zeigler-Nicholas method. Design of controller by Zeigler-Nicholas method. Digital control systems: The Basic Structure of Digital Control Systems, Special features of digital control systems, Necessity of sample and hold operations for computer control. [8 Hours]
Reference Books:	1. N. J. Nagrath and M. Gopal, "Control System Engineering ", New Age International Publishers, 5th Edition 2. Benjamin C. Kuo , "Automatic control systems", Prentice Hall of India, 7th Edition 1995 3. Ogata, "Modern Control Engineering", PHI Publication 4. B.S. Manke , "Linear Control System", Khanna Publication

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 80 marks Paper:

1. Minimum 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 and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 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 T. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-V

Course Code: ETC341

Course: Programming in JAVA

Teaching Scheme: 02Hrs/week

Theory: 02 hrs/week

Credits: 2

Class Test: 10 Marks.

Theory Examination: 40 Marks

Theory Examination (Duration): 2 hrs

Course Objectives	<ul style="list-style-type: none">• To familiarize the Object Oriented Programming (OOP) concepts, such as abstraction, encapsulation, polymorphism and inheritance.• To recognize similarities and differences between Java and other programming languages.• To understand the syntax of the Java language and able to write programs for given problem.• To develop programs using OOP language constructs.
Unit-I	Introduction Introduction to Java, features of Java, difference between C,C++ and java, data types, variables, Literals, operators, Programming constructs, classes and methods, passing arguments to methods, method overloading, access specifiers, constructor and finalizer [04 Hours]
Unit-II	Inheritance: Introduction to inheritance, Forms of inheritance, overriding, Final and abstract classes, abstract methods. [04 Hours]
Unit-III	Exception handling- Exception handling fundamentals,java's built-in exceptions, try, catch ,finally, throw, throws keywords [04 Hours]
Unit-IV	Interfaces and Packages Defining interfaces, extending interfaces,implementing interfaces. Packages: Putting classes together, using system package, naming convention, creating a package, accessing a package, using a package, adding a class to a package . [04 Hours]
Unit-V	Multithreading Definition of a Thread, States of a Thread, Common Thread methods ,creation of a Thread, Creation of multiple threads, Thread priorities [04 Hours]
Unit-VI	Applets Local and remote applets, How applets differ from application, Preparing to write applets, Building applet code, Applet life cycle, Creating an Executable Applet, Passing parameter to an applet . [04 Hours]

Reference Books	Sr. No.	Title	Authors	Publication
	1	Java 2 : Complete Reference	Herbert Schildt	Tata McGraw-Hill
	2	Java : How to program	Paul Deitel and Harvey Deitel	Pearson Prentice Hall 2014. Tenth Edition,
	3	Programming with Java	E. Balagurusamy	BPB
	4	An Introduction to Object-Oriented Programming	Timothy Budd	Pearson, Third edition
	5	Effective Java: A Programming Language Guide	Joshua Bloch	Pearson, Second Edition, 2008.
	6	Object Oriented Programming in Java	Dr. G. T. Thampy	Dreamtech Press

Section A: Units I, II, III and Section B: Units IV, V, 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 Eight marks each. The Question no.1 and 5 should be of objective nature.
4. Two questions of 6 marks each from remaining questions from each section A and B be asked to solve.

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(Faculty of Science & Technology)

Syllabus of T. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-V

Code No.: ETC 342

Teaching Scheme: 02Hrs/week

Theory: 02Hrs/week

Credits:02

Title: Elective II Microelectronics

Class Test (Marks): 10

Theory Examination (Duration): 02Hours

Theory Examination (Marks): 40

Prerequisites	:	Semiconductor Theory, MOS Transistor.
Objectives	:	<ul style="list-style-type: none">• To study basic MOS transistor and overview of fabrication process.• To establish the basic characteristics of MOS transistors and examines various possibilities for configuring inverter circuits• To highlight the circuit design issues in the context of VLSI technology.• To study fundamentals of VLSI circuit design and implementation using circuit simulators and layout editors.
Unit-I	:	Introduction to MOS Technology: BJT,MOS as a VLSI device , MOS Transistor, definitions of LSI, MSI, VLSI, Overview of MOSFET Technologies – PMOS, NMOS, and CMOS [4 Hours]
Unit-II	:	Introduction to IC Fabrication : MOS & CMOS fabrication processes, Wafer Processing, Photolithography, oxidation, Ion implementation, Deposition and Etching, Device fabrication. [4 Hours]
Unit-III	:	Electrical properties of MOS Circuits : Comparison of NMOS and CMOS fabrication Process, Drain to source current Vs. voltage relationship, Pass Transistor, NMOS Inverter, pull up to pull down ratio for NMOS inverter, CMOS inverter. [4 Hours]
Unit-IV	:	Basic Circuit Concepts : Sheet resistance, area capacitance, delay unit, Inverter delay, Fan in and Fan out characteristics, super buffers, propagation delays, Latch up in CMOS circuits, Scaling factor, limitations of scaling, scaling of wires & interconnections.[4 Hours]
Unit-V	:	Design Processes : MOS layers, Stick diagram, Lambda based design rules, general observations on the design rules, 2 μ m, 1.2 μ m metal, CMOS rules. [4 Hours]
Unit-VI	:	Circuit Simulation : Introduction to Spice/Microwind, Device models, System design methodology & tools, Design of combinational circuits. [4 Hours]
Reference Books:	:	Reference Books: 1. Neil H. E. Waste, David Harris and Ayan Banerjee, “CMOS VLSI Design - A Circuitsand Systems Perspective” Pearson Education, 3rd edition. 2. Eshraghian, Douglas A. Pucknell and Eshraghian, “Essentials of VLSI Circuits andSystems” PHI publication. 3.S.M. Sze, “VLSI technology”. 4. J. Millman and Grabel, “Microelectronics” Tata Mc Gaw Hill publication.

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

Pattern of Question Paper:

The six/four 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 Question no.1 and 5 should be of objective nature.
4. Two questions of 7 marks each from remaining questions from each section A and B be asked to solve

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(Faculty of Science & Technology)

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

Code No.: ETC343

**Title: Elective –II Optical Fiber
Communication**

Teaching Scheme: 02Hrs/week

Class Test (Marks): 10

Theory: 02Hrs/week

Theory Examination (Duration): 02 Hrs

Credits:02

Theory Examination (Marks): 40

Prerequisites	:	Electromagnetic theory.
Course Objectives	:	<ul style="list-style-type: none">To expose the students to the basics of signal propagation through optical fibers, fiber impairments, components and devices and system design.
Unit-I	:	Overview of Optical Fiber Communication: Forms of communication systems, Electromagnetic spectrum, Elements of optical fiber transmission link, Importance of optical fiber for communication. [4Hours]
Unit-II	:	Light propagation through fiber: Types of optical fibers, Optical fiber fabrication, Propagation of light in fiber, ray model, Modes of propagations in step index fiber and graded index fiber, fiber material. [4 Hours]
Unit-III	:	Signal Degradation in Optical Fiber : Various degradation mechanisms: Attenuation, scattering, bending, Dispersion- Intermodal and Intramodal, Pulse broadening, Mode coupling, Coupling losses, Fiber splicing. [4 Hours]
Unit-IV	:	Optical Sources: Light-emitting diodes, Laser diodes, Power Launching and Coupling, Source to fiber power launching, fiber-to-fiber joints, LED coupling to single-mode fibers. [4 Hours]
Unit-V	:	Photo detectors: Physical principles of photodiodes, Review of PIN diode: structure and performance, hetero-junction diode, avalanche photodiodes. Fiber connectors and couplers. [4 Hours]
Unit-VI	:	System Design Considerations and Applications: Analog link, Digital link, point to point link, System Consideration, Link power budget, rise time budget, wavelength division multiplexing, OTDR. [4 Hours]
Reference Books:	:	Text Books: 1. J. Keiser, Fiber Optic communication, McGraw-Hill, 2nd Ed. 1992. Reference Books: 2. John M Senior, Optical Fiber Communications 2nd Edition: EEE

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 Question no.1 and 6 should be of objective nature.
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 T. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-V	
Lab: I Title: Microprocessor & Microcontroller Teachers Assessment: 25 Marks Credits: 01	
Code No.: ETC321 Teaching Scheme: 02Hrs/week Practical: 25 Marks	
Course Objectives	: To enhance Programming Techniques of 8 bit microcontroller and to understand System Peripheral and Interface.
List of Practical	: 8085 Microprocessor: <ol style="list-style-type: none"> 1. Study of 8085 Microprocessor Kit used in laboratory. 2. Write a program to transfer a block of 10 bytes. 3. Write a program to multiply two 8-bit numbers. 4. Write a program to find largest/smallest numbers from the array. 5. Write a program for data sorting in ascending and descending order. 6. Write a program for Addition, Subtraction, Multiplication and division of 8 bit numbers for 8086. 89C51 Microcontroller : <ol style="list-style-type: none"> 1. Write a program for Addition, Subtraction, Multiplication and division of 8 bit numbers in assembly. 2. Interface RS 232 and write a program to send characters "YES" to PC with baud rate of 9600 using Serial Communication. 3. Interface LED and write a program for flashing of LED, generate given time delay using Timer/Counter. 4. Interface ADC & DAC 0808 and write a program to generate various analog Waveform. 5. Interface LCD display and write a program to display message. 6. Interfacing 4X4 keypad and displaying key pressed on LCD.
List of Reference Books	: <ol style="list-style-type: none"> 1. Ramesh Gaonkar, "Microprocessor, Architecture, Programming and Application", Willey Eastern Ltd, Fourth Edition. 2. Ray & Bhurchandi, "Advanced Microprocessors and Peripherals", Tata McGraw Hill 2nd Edition. 3. A. P. Godse, D. A. Godse, "Microprocessor Techniques 8085 and 8086 Architecture, Instruction set, Programming and Interfacing", Technical Publication Pune, Fourth Revised Edition 2008. 4. Muhammad AMazidi, "The 8051 Microcontroller and Embedded Systems", Pearson Education Asia, first Indian reprint, 2002. 5. Raj Kamal, "Embedded Systems Architecture, Programming and Design", TMH 2nd Edition.
List of Equipments /Instruments	: Hardware: 8085 Microprocessor and 89c51 Microcontroller Trainer kits, CRO, Power supply. Software: KeilµVision3, Flash Magic,

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 T. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-V Lab II:		
Code No.: ETC322 Teaching Scheme: 02Hrs/week Practical: 25 Marks		Title: Digital Communication Teachers Assessment: 25 Marks Credits: 01
Course Objectives	:	To understand modulation techniques in digital communication.
List of Practical	:	1. Verification of Sampling theorem. 2. Study of Pulse code Modulation and Demodulation. 3. Study of Delta Modulator and Demodulator. 4. Generation & reception of BPSK & its spectral analysis. 5. Generation & reception of ASK & its spectral analysis. 6. Generation & reception of FSK & its spectral analysis 7. Generation & reception of PSK & its spectral analysis 8. Generation & reception of QPSK & its spectral analysis. 9. Generation & reception of DPSK & its spectral analysis. 10. Spectral analysis of line codes. 11. Simulation of any digital communication system using Scilab/ MATLAB.
List of Reference Books	:	1. Taub Schilling, “Principles of Communication system”, TMH, Fourth Edition. 2. John G. Proakis, MasoudSalehi, and Gerhard Bauch, “Contemporary Communication System using MATLAB”, Cengage learning.
List of Equipments /Instruments	:	DSO, Trainer kits, Power Supply, Function Generator, and MATLAB Software.

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

1. Continuous assessment
2. Performing the experiments in the laboratory
3. 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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(Faculty of Science & Technology)

Syllabus of T.Y . B. Tech. (Electronics and Telecommunication Engineering) Semester- V

Lab: III

Code No.: ETC323

Title: Digital Signal Processing

Teaching Scheme: 02Hrs/week

Teachers Assessment: 25 Marks

Credits: 01

Practical: 25 Marks

Course Objectives	:	<ul style="list-style-type: none">•To understand Digital Signal Processing Concept using MATLAB/ Software•Study of Digital Signal Processor using Code Composer Studio
List of Practical	:	<ol style="list-style-type: none">1.MATLAB based program to study discrete time system described by difference equation.2.MATLAB based program to find N point DFT & IDFT.3.MATLAB based program to calculate circular convolution using DFT & IDFT.4.MATLAB based program to calculate linear convolution using DFT & IDFT.5.MATLAB based program to design FIR filter using hamming &hanning windowing techniques.6.MATLAB based program to design FIR filter using rectangular windowing technique.7.MATLAB based program to design FIR filter using frequency sampling technique.8.MATLAB based program to design & implementation of IIR filter using bilinear transformation9.MATLAB based program to design & implementation of IIR filter using impulse invariance Method10 MATLAB based program to study interpolation & decimation.11.Familiarization with Code Composer Studio12.Study of FFT, Linear Convolution, Factorial implementation using DSP TMS320C6713
List of Reference Books	:	<ol style="list-style-type: none">1. Ingle, John G. Proakis,"Digital Signal Processing MATLAB, Asia Edition, Thomson
List of Equipments /Instruments	:	MATLAB Software, DSP Processor, Code Composer Studio

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 T. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-V

Code No.: ETC324

Title: Electronic Circuit Design Technology

Teaching Scheme: 02Hrs/week

Teachers Assessment: 50 Marks

Practical: 02 Hrs/week

Credits: 01

Course Objectives	:	<ul style="list-style-type: none">To study and design electronic circuits, motor driving circuits, measuring instrument (voltmeters and ammeter), modern sensor, noise reduction technique and PCB design.
List of Practical	:	<ol style="list-style-type: none">Design of PCB layout using software.Design DC power supply using LM2576.Design constant current source using LM317Design DC voltmeter using ICL7106/7.Design stepper motor driver using MC3479.Design isolated relay driver board using ULN2003 and PC817.Design DC motor driver using L293D.Design motor driver circuit using L298.Design battery charger for lead-acid battery.To Study of various sensors.To Study of relay switching noise and its effects on electronic system.
List of Reference Books	:	<ol style="list-style-type: none">R.S. Khandpur, "Printed circuit board: Design, Fabrication, Assembly and Testing" –Tata McGraw-Hill EducationD. S. Mantri& G. P. Jain, " Electronic Circuit Design" , Nikita Publication.Jacob Fraden, "Handbook of Modern Sensors Physics, Designs, and Applications", Springer,Fourth Edition.Pavel Ripka, AloisTipek., "Modern sensors handbook", ISTEDr. T.R. Sontakke and S.N. Talbar, "Electronic Circuit Design", Sadhu-Sudha Publications.KhetanAnd Goyal, "Monographs On Electronics Design", S.Chand Publications.Datasheet and Application note
List of Equipments /Instruments	:	Proteus circuit simulation software, Eagle PCB layout design software, Multimeter, Power Supply, Connecting wires, Patch chord, Copper clad, Solder metal, Zero PCB, Solder gun, Flux, PCB drilling machine, Drill beats, Etching machine, Etching solution, Photo-printing machine.

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

- Continuous assessment
- Performing the experiments in the laboratory

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 T. Y. B. Tech. (All) Semester-V

Code No.: ETC325

Teaching Scheme: 02 Hrs/week

Practical: 02Hrs/week

Credits:01

Title: Minor Project

Term Work:50 Marks

Course Objectives	:	<ul style="list-style-type: none">• To plan for various activities of the project and distribute the work amongst team members.• To develop the ability to define and design the problem and lead to its accomplishment with proper planning.• To understand the importance of document design by compiling Technical Report on the Minor Project work carried out.• To develop student's abilities to transmit technical information clearly and test the same by delivery of Seminar based on the Minor Project.
Guidelines	:	<ol style="list-style-type: none">1. Students should select a problem which addresses some basic home, office or other real life applications.2. Projects which will address the social issues will be given due weightage.3. It is desirable that the systems developed by the students have some novel features.4. The batch size shall not exceed TWO students per batch.5. The students have to select a suitable problem, design, prepare the drawings, produce the components, assemble and commission the project.6. Institute may arrange demonstration with poster presentation of all mini projects developed by the students at the end of semester.7. At the end of the semester, the students have to prepare and present 20-25 pages project report.8. Final evaluation shall be based on continuous internal assessment followed by Viva-Voce.

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Syllabus of T. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-VI

Code No.: ETC351

Teaching Scheme: 04Hrs/week

Theory: 04Hrs/week

Credits:04

Title: Embedded System Design

Class Test (Marks): 20

Theory Examination (Duration): 03 Hours

Theory Examination (Marks): 80

Prerequisites	:	Digital electronics, Microprocessor based systems.
Objectives	:	<ul style="list-style-type: none">• To understand the applications of Microcontrollers.• To understand need of microcontrollers in embedded system.• To understand architecture and features of typical Microcontroller.• To learn interfacing of real world input and output devices.• To study various hardware & software tools for developing applications.
Unit-I	:	PIC18F4550 Microcontroller Architecture: PIC family PIC 10, PIC12, PIC16, PIC18 ,PIC18F4550:Features, architecture, registers, memory organization and types, stack, Pin description, oscillator options, BOD, power down modes and configuration bit settings, Port structure with programming, timer and its programming. All programs in embedded C. [8Hours]
Unit-II	:	Programming Concepts and Embedded Programming in C: Comparison of Software Programming in Assembly language and in high level language 'C', C program elements: Header and source files and processor directives, data types, data structures, modifiers, statements, loops, pointers, object oriented programming. [8 Hours]
Unit-III	:	PIC18F4550 Interfacing: Interrupt Structure (Legacy and priority mode) of PIC18F with SFRS. Use of timers with interrupts, CCP modes: Capture, Compare and PWM generation, Sensor interfacing using ADC, LCD (4&8 bits), DC Motor speed control with CCP, MSSP structure (SPI & I2C), Enhanced USART(LIN), RTC(DS1306) with I2C and EEPROM with SPI : All programs in embedded C. [8 Hours]
Unit-IV	:	Arduino Uno R3: Introduction, The Arduino Platform, Block diagram, Atmel ATmega328/AVR family, Architecture, Pin functions, overview of main features such as I/O Ports, Timers, interrupts, serial port, PWM, ADC. [8 Hours]
Unit-V	:	Arduino Basic programming: Arduino Control structure, Functions, operators, Sketch Structure, Variables, Data types, Constants, flow control, Analog and digital I/O, time, math, random, serial. Programming- I/O Ports, Timers, interrupts, serial port, PWM, ADC, 7 Segment display [8Hours]
Unit-VI	:	Interfacing with Arduino: LCD, DAC, PWM motor speed controller, IR Sensor, Ultrasonic Sensor (HC-SR04), Temperature and Humidity Sensor (DHT11), SPI, wifi ESP8266, Bluetooth HC-05. [8 Hours]

Reference Books:	: Reference Books: <ol style="list-style-type: none"> 1. Mazidi, “PIC microcontroller & embedded system”, 3rd Edition ,Pearson 2. Peatman John B., “Design with PIC Microcontrollers”, Pearson Edition. 3. Tim Wilmshurst, “Designing Embedded Systems with PIC Microcontrollers: Principles and Applications” 2nd Edition, Kindle Edition ,Nerwnes 4. Brain .W. Eveans, “Arduino Programming Notebook”, First edition August 2007 5. Jeremy Blum,“Exploring Arduino Tools and Techniques for Engineering”, Wizardry 1st Edition. 6. Simon Monk, “ Programming Arduino: Getting Started with Sketches”, Second Edition 2nd Edition.
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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 80 marks Paper:

1. Minimum 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 and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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

Code No.: ETC352

Teaching Scheme: 04Hrs/week

Theory: 04Hrs/week

Credits:04

Title: Microwave Theory and Techniques

Class Test (Marks): 20

Theory Examination (Marks): 80

Theory Examination(Duration): 03 Hours

Prerequisites	:	Fundamentals of Analog and Digital Communication, Electromagnetic Theory, Network Theory
Objectives	:	<ul style="list-style-type: none">To expose students to the basics of microwave communication, transmission media, their sources, detectors, measurements and applications.
Unit-I	:	Microwave Transmission line: Introduction, Microwave bands, applications, General solution for TEM, TE and TM waves, rectangular and circular waveguide, excitation of modes, power transmission and losses, Strip-lines: Structural details and applications of Strip-lines, Micro-strip line, Parallel Strip line, Coplanar Strip line, Shielded Strip Line smith chart[8 Hours]
Unit-II	:	Microwave Components: Microwave cavity resonator, Multi port junctions: Construction and operation of E-plane, H-plane, Magic Tee and Directional couplers. Ferrites components: - Ferrite Composition and characteristics, Faraday rotation, Construction and operation of Gyrator, Isolator, Circulator, Phase shifter, Attenuators [8 Hours]
Unit-III	:	Microwave network Analysis: Impedance, Equivalent voltages and currents, Impedance and Admittance matrices, The Transmission (ABCD) matrix, Scattering Matrix:-Significance, formulation and properties. S-Matrix calculations for-2 port network junction, E plane, H-plane and E-H (Magic Tee) Tees, Directional coupler, Isolator and Circulator[8 Hours]
Unit-IV	:	Microwave solid state devices: Varactor Diode, PIN Diode, Shottky Barrier Diode, Tunnel Diode, TEDs, Gunn Diodes, IMPATT diode, TRAPATT diode. Microwave transistors, Structural details, Principle of operation, various modes, specifications and applications of all these devices [8 Hours]
Unit-V	:	Microwave tubes: O and M type classification of microwave tubes, reentrant cavity and velocity modulation. O type tubes Two-cavity Klystron: Construction and principle of operation, velocity modulation and bunching process,Applegate diagram. Reflex Klystron: Construction and principle of operation, velocity modulation and bunching process, Applegate diagram, Oscillating modes, o/p characteristics, efficiency, electronic & mechanical tuning. M-type tubes Magnetron: Construction and Principle of operation of 8 cavity cylindrical travelling wave magnetron, hull cutoff condition, modes of resonance, PI mode operation, o/p characteristics, Applications. Slow wave devices Advantages of slow wave devices, Helix TWT: Construction and principle of operation, Applications. [8 Hours]

Unit-VI	:	Microwave Measurements: Measurement devices: Slotted line, Tunable detector, VSWR meter, Power Meter. Measurements: S-parameter, frequency , Power, Attenuation , Phase shift , VSWR, Impedance, Q of cavity resonator [8 Hours]
Text Books and Reference Books:	:	Text Books: 1. Samuel Y. Liao, “Microwave Devices and Circuits”, 3rd edition, Pearson 2. M. Kulkarni, “Microwave and Radar Engineering”, 3rd edition, Umesh Publications Reference Books: 1. David M. Pozar, “Microwave Engineering”, Fourth edition, Wiley 2. M.L. Sisodia& G.S. Raghuvamshi, “Microwave Circuits and Passive Devices” Wiley, 1987

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 80 marks Paper:

1. Minimum 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 and should be set for ten marks each. The Question No.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section-**A** and **B**, be asked to solve.

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Syllabus of T. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-VI

Code No.: ETC353

Teaching Scheme: 04Hrs/week

Theory: 04Hrs/week

Credits:04

Title: VLSI Design

Class Test (Marks): 20

Theory Examination (Duration): 03 Hours

Theory Examination (Marks): 80

Prerequisites	:	Combinational and Sequential Circuit Design.
Objectives	:	<ul style="list-style-type: none">To study Fundamental concepts in classical and modern digital circuits using design tools.To study Programming of PLD's.
Unit-I	:	Introduction to VHDL: Introduction to Computer-aided design tools for digital systems. Hardware description languages, Introduction to VHDL, Data objects, Classes and data types, Operators, Overloading, Logical operators. Types of delays, Entity and Architecture Declaration.Introduction to behavioral, dataflow and structural models. [8Hours]
Unit-II	:	VHDL Statements: Sequential and Concurrent Statements, Assignment statements, Conditional statements, Array and loops, Resolution functions, Functions & Procedures, Packages & Libraries Subprograms, Generics, Configurations, Attributes, Test Bench. [8Hours]
Unit-III	:	Combinational & Sequential Circuit Design: VHDL models and simulation of combinational circuits such as adder, Subtractor,Multiplexer, Encoder, Decoders, Code converters, Comparators, VHDL model and simulation of sequential circuits,Shift registers,Couners etc. [8Hours]
Unit-IV	:	Simulation & Synthesis: Fundamental of simulation, Simulation Process, Types of simulation, Simulation process types, Simulation and Simulators, Introduction to Synthesis, Design flow, Tools,Optimization, Model Optimization [8Hours]
Unit-V	:	Sequential Circuit Design: State Diagram, Moore and Mealy state model, Synchronous and asynchronous FSMdesign, Basic Design steps, State Encoding techniques, Algorithmic state machines(ASM) charts. [8 Hours]
Unit-VI	:	Circuit Design & Testability: Introduction to Programmable Logic Devices: PAL, PLA, PLD, CPLD, FPGA. Need ofdesign for testability, Introduction to fault coverage, Need of boundary scan check, JTAGtechnology, Test Access Port (TAP) controller. [8Hours]
Reference Books:	:	<ol style="list-style-type: none">1. J.Bhasker, "VHDL Primer", PHI2. D.Perry, "VHDL", 2nd Edition, Mc Graw Hill.3. Charles Roth,"Digital Design with VHDL", Thomson Learning, India Edition.4. Brown and Vranesic, "Fundamentals of Digital Logic with VHDL Design", TMH5. R.P.Jain, "Modern Digital Electronics" 3rd Edition, TMH6. IEEE Standard VHDL Language Reference Manual (1993)

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 80 marks Paper:

1. Minimum 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 and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 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 T. Y. B. Tech. (All) Semester-VI

Code No.: BSH 354

Teaching Scheme: 04Hrs/week

Theory: 04Hrs/week

Credits:04

Title: Industrial Management

Class Test (Marks): 20

Theory Examination (Duration): 03 Hours

Theory Examination (Marks): 80

Objectives	:	<ul style="list-style-type: none">• The students should get introduced to industrial management and its implementation.• The students should understand system concept and its relevance with management.• The students should understand the role of MIS in management.• The students should understand latest management techniques such as JIT, TPM, Six-Sigma and its implementation.
Unit-I	:	Introduction to Management: Definition, history, need, science or art, types of business organizations, types of organizational structures. [8 Hours]
Unit-II	:	Manufacturing Systems: Flexible Manufacturing System, Flexible Manufacturing Cell and Reconfigurable Manufacturing System. [4 Hours]
Unit-III	:	Management Techniques: Just In Time, Lean, Total Productive Maintenance, Supply Chain Management, Agile Manufacturing. [12 Hours]
Unit-IV	:	Management Information System: Definition, Data, Information, Data Processing, Need of Database, Role of MIS in organization. [6 Hours] Decision Making: Definition, Decision making process, Decision making tools [4 Hours]
Unit-V	:	Methods Engineering: Value engineering, value types, value analysis, waste, types of wastes, kaizen, five why process, process reengineering, pokayoke, workplace layout & design, Single Minute Exchange of Die. [6 Hours]
Unit-VI	:	Six Sigma: Overview, Six Sigma-basics and history of the approach, methodology and focus, the application of Six Sigma in production and in service industries, linking Six Sigma project goals with organizational strategy. [8 Hours]
Reference Books:	:	<ol style="list-style-type: none">1. O. P. Khanna, "Industrial Engineering and Management", 2nd Edition, Dhanpat Rai, 2004.2. Korgaonkar M.G. 'Just In Time Manufacturing', Laxmi Publication.3. Besterfield Dale H., Besterfield Carol, Total Quality Management 3rd Edn.4. Chopra Sunil, Meindl Peter, Kalra D.V., Supply Chain Management : Strategy Planning & Operation 6th Edn., Pearson.5. S. S. Patil & N K Hukeri, Industrial Engineering and Production and Operations Management, Electrotech Publication6. S. Sadagopan, Management Information System, PHI Learning.7. Craig W Baird, The six Sigma Manual for small and Medium Business.

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 80 marks Paper:

1. Minimum 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 and should be set for ten marks each. The Question No.1 and 6 should be of objective nature.
4. Two questions of 15 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 T. Y.B. Tech.(All) Semester- VI

Code No.: AED381

Teaching Scheme: 04Hrs/week

Theory: 04 Hrs/week

Credits : 4

Title: Open Elective-I (Remote Sensing & GIS)

Class Test: 20 Marks

Theory Examination (Duration): 03 Hours

Theory Examination (Marks): 80

Objectives	<p>:</p> <ul style="list-style-type: none"> • To develop applications of environmental remote sensing and GIS which can directly enhance service delivery on land use management, ground water management/prospects, agriculture, forestry, food and water security, disaster management. Present subject is designed for fulfillment of following objectives • To understand the fundamental principles and applications of Remote Sensing and Geographical Information Systems. • To increase awareness about RS and GIS among students for various researches pertaining to watershed management • To describe how geographical information is used and managed.
Unit-I	<p>: Remote Sensing: Definition, Historical Development, remote sensing system, Multi concept of remote sensing. Advantages and disadvantages in remote sensing, general applications of remote sensing [8Hours]</p>
Unit-II	<p>: Electromagnetic radiation: Electromagnetic energy, energy interaction with atmosphere and earth surface, resolutions in remote sensing [8Hours]</p>
Unit-III	<p>: Sensors and Platforms: Classification, Land observation satellites, Weather satellites, Satellite data reception, transmission and processing, Data products, Standard products, Digital data products. [8Hours]</p>
Unit-IV	<p>: Image interpretation: Procedure, elements, techniques, equipments for image interpretation, basic principles of image interpretation, factors governing the quality of an image, factors governing interpretability, visibility of objects, digital image processing, digital image, steps, remote sensing in agriculture progress and prospects, microwave radiometry for monitoring agriculture crops and hydrologic forecasting, aerial photo interpretation for water resources development and soil Conservation survey.[8Hours]</p>
Unit-V	<p>: Geographical Information System: History of development of GIS definition, basic components, GIS input data and output product, general application.[8Hours]</p>
Unit-VI	<p>: GIS data: type, representation, source, data sets, acquisition, data structure, data base management systems (DBMS), GIS application. [8Hours]</p>
Reference Books:	<p>:</p> <ol style="list-style-type: none"> 1. Remote sensing and Geographical Information System by A. M. Chandra & S. K. Ghosh, Narosa Publishing House, New Delhi 2. Remote Sensing- Principals and Applications by B. C. Panda, Viva book Publication, New Delhi 3. Basics of Remote Sensing & GIS by S. Kumar, an online book published by Laxmi Publications, New Delhi 4. Remote Sensing & GIS by Basudeb Bhatta, an online book published by OUP India

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

Pattern of Question Paper:

The six/four 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. Minimum 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 and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr.BabasahebAmbedkarMarathwada University, Aurangabad

(Faculty of Science and Technology)

Syllabus of T.Y.B. Tech. (All) Semester-VI

Code No.: CSE 381

Title: Open Elective-I Professional Ethics and Cyber Security

Teaching Scheme:04 Hrs/week

Class Test: 20

Theory: 04 Hours per week

Theory Examination (Duration): 03 Hours

Credits:04

Theory Examination (Marks): 80

Objectives	<ul style="list-style-type: none">• To make students familiar with the fundamental concepts of computer ethics.• To know the linkage between computer, professional ethics and ethical decision making• To know the ethical concepts and ethical theories• To Know the privacy and cyberspace• To know concept of cyber security.• To know the practice of administrating using Cyber Security.
Unit-I	: Introduction: Why Computer Ethics? The Standard Account: New Possibilities, a Vacuum of Policies, Conceptual Muddles• An Update to the Standard Account. Ethical Decision making: Ethical dilemma, Guidelines for dilemma(Formal and Informal), Solving ethical dilemma , Socio technical Computer Ethics, Micro- and Macro-Level Analysis , Intellectual Property: Copy right, Trade mark, Trade Secret, Patent [8Hours]
Unit-II	: Professional Ethics, Codes of Conduct, and Moral Responsibility Professional Ethics: Profession, Professional, Computer/ IT Professional , Computer/IT Professionals Special Moral Responsibilities: Safety-Critical Software, Professional Codes of Ethics and Codes of Conduct: Purpose of Professional Codes, Criticisms of Professional Codes, Defending Professional Codes, Conflicts of Professional Responsibility: Employee Loyalty and Whistle-Blowing , Whistle-Blowing Issues, Strategy for Understanding Professional Responsibility [8Hours]
Unit-III	: Ethical Concepts and Ethical Theories: Establishing and Justifying A Moral System Ethics and Morality: Morality, Rules and Principles of a Moral System, Ethical Theories: Consequence-Based :Utilitarianism , Duty-Based:Deontology, Contract-Based , Rights-Based Contract , Character-Based : Moral Person vs. Following Moral Rules, Acquiring the “Correct” Habits , Integrating Aspects of Classical Ethical Theories into a Single Comprehensive Theory: Moor’s Just-Consequentiality Theory and Its Application to Cyber technology. [8Hours]
Unit-IV	: Privacy and Cyberspace Cyber technology Unique or Special, Personal Privacy: Accessibility Privacy, Decisional Privacy, Informational Privacy, Comprehensive Account of Privacy, Privacy as “Contextual Integrity”, Privacy Important: Intrinsic Value, Social Value. Gathering Personal Data: Dataveillance Techniques, Internet Cookies , RFID Technology, Cyber technology and Government Surveillance, Exchanging

		Personal Data: Merging Computerized Records, Matching Computerized Records . Protecting Personal Privacy in Public Space: Search Engines and the Disclosure of Personal Information, Accessing Online Public Records. [8Hours]
Unit-V	:	Security Basics Security Basics: Introduction, Elements of Information security, Security Policy, Techniques, steps, Categories, Operational Model of Network Security, Basic Terminologies in Network Security. Intrusion and Firewall: Introduction, Intrusion detection, IDS: Need, Methods, Types of IDS, Password Management, Limitations and Challenges, Firewall Introduction, Characteristics and types, Benefits and limitations. Trusted Systems, Access Control. [8Hours]
Unit-VI	:	Security perspective of Hacking and its counter majors Remote connectivity and VoIP hacking, Wireless Hacking, Mobile Hacking, HackingHardware, Application and data Hacking, Mobile Hacking, Counter majors: GeneralStrategies, Example Scenario's: Desktop, Servers, Networks, Web, Database, Mobile. [8Hours]
Reference Books:	:	1. Computer Ethics by Deborah Johnson 4th edition 2. Ethics and Technology Controversies, Questions, and Strategies for Ethical Computing by Herman T. Tavani, 4 th Edition, Wiley publication 3. Dr. V.K. Pachghare, Cryptography and Information Security, 4. Nina Godbole,SunitBelapure, Cyber Security, Wiley India

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

Pattern of Question Paper:

The six/four 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. Minimum 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 and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 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 T. Y. B. Tech. (All) Semester-VI

Code No.: CED381

Teaching Scheme: 04Hrs/week

Theory: 04Hrs/week

Credits:04

Title: Open Elective-I : Design for Environment

Class Test (Marks): 20

Theory Examination (Duration): 03 Hrs

Theory Examination (Marks): 80

Objectives	:	This course has been designed to teach about environmental engineering, energy and economy through the use of case studies, computer software tools, and seminars from the point of view of sustainable development and changing societal, industrial demands. Case studies provide the basis for group projects as well as individual
Unit-I	:	Review of physical, chemical, ecological, and economic principles used to examine interactions between humans and the natural environment. Modeling concepts, applications in all engineering domains [7 Hours]
Unit-II	:	Mass balance concepts are applied to ecology, chemical kinetics, hydrology, and transportation; energy balance concepts are applied to design, ecology, and climate change; and economic and life cycle concepts are applied to resource evaluation and engineering design. [7 Hours]
Unit-III	:	Design for Environment (DfE) concepts, applications, and Case studies [10 Hours]
Unit-IV	:	Assessment, Monitoring and control of Rural, Urban and Industrial Pollutions using CDTs [8 Hours]
Unit-V	:	Numerical models are used to integrate concepts and to assess environmental impacts of human activities. Problem sets involve development of MATLAB and GIS models for engineering applications in all domains. [8 Hours]
Unit-VI	:	Emphasis on the principles of infrastructure planning with a focus on appropriate and sustainable technologies incorporating technical, socio-cultural, public health, and economic factors into the planning and design of urban, industrial systems. [8 Hours]
Reference Books:	:	<ol style="list-style-type: none">1. Ecological Water Quality (Water Treatment and Reuse) – Kostas Voudouris and Dimitra Voutsas.2. Wastewater Engineering- Metcalf and Eddy, McGraw Hill Publication.3. MATLAB for Engineering Application- Williams J. Palm, Tata McGraw Hill Publication.4. Application of GIS and Remote Sensing in Environmental Management- S. A. Abbasi, DPH Publications.5. Harte, John "Consider a Cylindrical Cow: More Adventures in Environmental Problem Solving." Mill Valley, CA: University Science Books, 2001.6. Fay, James A., and Dan S. Golomb. Energy and the Environment. New York, NY: Oxford University Press, 20027. Etter, Dolores. Introduction to MATLAB for Engineers and Scientists.

	<p>Upper Saddle River, NJ: Prentice Hall, 1996</p> <p>8. Etter, Dolores, David Kuncicky, and Holly Moore, "Engineering Problem Solving with MATLAB" . Upper Saddle River, NJ: Prentice Hall, 2006.</p> <p>9. Howard S. Peavy, Donald R. Rowe, George Tchobanoglous "Environmental Engineering" Mcgraw Higher Ed.</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. 3units 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. Minimum 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 and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 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 T. Y. B. Tech. (All) Semester-VI

Code No.: EED381	Title: Open Elective-I: Robotics and Automation
Teaching Scheme: 04hrs/week	Class Test (Marks): 20
Theory: 04 hrs/week	Theory Examination (Duration): 3 Hours
Credits: 04	Theory Examination (Marks): 80

Objectives	:	<ul style="list-style-type: none"> • Describe the history and early beginnings of automated manufacturing & Robotics. Ability to recognize industrial control problems. • Aims to Develop understanding Robotics Components. • Apply creative approaches to practical applications, identify technological opportunities in robotics. • An over view of technology of advanced topics such as CNC Machines, Human Robot Interaction. • The ability to provide Automation solution.
Unit-I	:	<p>Introduction to Automation: Types of Automation; Architecture of Industrial Automation Systems, Advantages and limitations of Automation, Effects of modern developments in automation on global competitiveness. Introduction of CNC Machines: Basics and need of CNC machines, NC, CNC and DNC (Direct NC) systems, Structure of NC systems, Applications of CNC machines in manufacturing, Advantages of CNC machines. [8Hours]</p>
Unit-II	:	<p>Robotics: Robot anatomy-Definition, law of robotics, History and Terminology of Robotics-Accuracy and repeatability of Robotics-Simple problems Specifications of Robot-Speed of Robot-Robot joints and links-Robot classifications-Architecture of robotic systems-Robot Drive systems Hydraulic, Pneumatic and Electric system. [8Hours]</p>
Unit-III	:	<p>Robot Transformation, Sensors & End effectors: Transformation types: 2D, 3D. Translation- Homogeneous coordinates multiple transformation-Simple problems. Sensors in robot – Touch sensors-Tactile sensor – Proximity and range sensors Robotic vision sensor-Force sensor-Light sensors, Pressure sensors End effectors : Mechanical grippers-Slider crank mechanism, Screw type, Rotary actuators, cam type-Magnetic grippers- Vacuum grippers-Air operated grippers-Gripper force analysis-Gripper design-Simple problems. [8Hours]</p>
Unit-IV	:	<p>Kinematics: Rigid body Kinematics, Inverse Kinematics, Rotation matrix, Homogenous transformation matrix, Denavit - Hartenberg convention, Euler angles, RPY representation, Direct and inverse Kinematics for industrial robots for position and orientation Redundancy, Manipulator, Jacobian Joint, End effector, velocity – direct and inverse velocity analysis. Control: Individual joint computed torque. [8Hours]</p>
Unit-V	:	<p>Dynamics: Lagrangian Dynamics, link inertia tensor and manipulator inertia tensor, Newton-Euler Dynamics of Robot, Newton-Euler formulation for RR & RP manipulators, Dynamics of systems of Interacting Rigid Bodies, D-H Convention, Trajectory planning for Flexible Robot, Cubic polynomial linear segments with parabolic blending, static force and moment transformation, solvability, stiffness, Singularities. [8Hours]</p>

Unit-VI	:	Robot Control & Applications 6L Control approaches: oscillatory based time varying control law, control law based on vector field orientation approach. Advanced strategies of control: conventional aerial vehicle, Bidirectional X4-flyer. Applications of Fuzzy Logic and Neural network in Robot Control, Neural controllers, Implementation of Fuzzy controllers: Trajectory tracking controller. Applications of Robotic system: complex control system, vision system in complex control system. Human Robot Interaction: Architecture. [8 Hours]				
Text books	:	Sr. No.	Title	Author	Publication	Edition
		1	Robotics And Automation Handbook	Thomas R. Kurfess,	CRC Press	2004, ISBN 0-8493-1804-1
Reference Books	:	2	Robot Motion and Control(Recent Developments)	M.Thoma& M. Morari		2018
		3	Welding Robots - Technology, System Issues and Applications	J. Norberto Pires, AltinoLoureiro and Gunnar Bölmsjo	Springer-Verlag	2006, ISBN-10:1852339535
		4	Robotics : Designing the Mechanisms for Automated Machinery	Ben-Zion Sandler,	Academic Press,	2nd ed.1999

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 80 marks Paper:

1. Minimum 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 and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve

Dr.BabasahebAmbedkarMarathwada University, Aurangabad

(Faculty of Science & Technology)

Syllabus of T. Y. B. Tech. (All) Semester-VI

Code No.: ETC 381

Teaching Scheme: 04Hrs/week

Theory: 04Hrs/week

Credits:04

Title: Open Elective-I: Internet of Things

Class Test (Marks): 20

Theory Examination (Duration): 03 Hours

Theory Examination (Marks): 80

Prerequisites	:	Python Fundamentals, basics of electronics, Networking fundamentals, WWW terminology
Objectives	:	<ul style="list-style-type: none">• To understand IOT value chain structure (device, data cloud), application areas and technologies involved• To understand IOT sensors and technological challenges faces by IoT devices.• Explore and learn about Internet of things with the help of projects
Unit-I	:	Introduction to IoT: Definition of IOT- Evolution of IOT and related terms, hardware, software, network stack for IoT, Business Scope, SAAS Model, Industry 4.0. [8Hours]
Unit-II	:	Elements of IoT: Introduction to elements of IOT, Basic Architecture of an IOT application sensors, and Actuators – Edge Networking (WSN) – Gateways – IOT Communication Model – WPAN and LPWA, 6LoPAN, Sigfox, Introduction to basis looping and conditional statements, basics of HTML. [8Hours]
Unit-III	:	IoT Sensors: Node MCU ESP 8266- hardware specification, GPIO programming, WIFI connectivity programming, Access Point Programming. . [8Hours]
Unit-IV	:	Communication and Connectivity Technologies: Introduction to: TCP/IP, UDP, NTP, MQTT, Network and Sockets, WIFI. Cloud Computing in IOT - IOT Communication Model – Cloud Connectivity, Things speak, ‘100’, HCR. [8Hours]
Unit-V	:	Data Analytics and IOT Platforms: Basics of statistics, Descriptive statistics and probability distributions. Big Data Analytics - Hadoop, Data Visualization – radar charts, – IOT Platforms- Microsoft Azure and Amazon Web Services, IBM Watson, Google Home and Amazon’s Alexa [8Hours]
Unit-VI	:	Preparing IoT Projects (Creating the sensor project with Node MCU ESP 8266 - Sensor libraries - Interacting with the hardware, Internal representation of sensor values - Persisting data - External representation of sensor values - Exporting sensor data - Creating the actuator project Hardware - Interfacing the hardware - Creating a controller - Representing sensor values - Parsing sensor data - Calculating control states. [8Hours]

Reference Books:	: Text Books: <ul style="list-style-type: none"> • The Internet of Things: Applications and Protocols, Wiley publications. Author(s): Oliver Hersent, David Boswarthick, Omar Elloumi • Architecting the Internet of Things, Springer publications. Author(s): Dieter Uckelmann, Mark Harrison, Florian Michahelles • Internet of Things with Arduino Cookbook, Packt Publications. Author(s): Marco Schwatz Reference Books: <ul style="list-style-type: none"> • Internet of Things and Data Analytics, Wiley Publications
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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 80 marks Paper:

1. Minimum 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 and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 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 T. Y. B. Tech. (All) Semester-VI

Course Code: MED 381

Course: Open Elective-I: Costing and Financial Management

Teaching Scheme: 04 Hrs/week

Class Test: 20 marks

Theory: 04 Hrs/week

Theory Examination (Duration): 03 Hours

Credits: 04

Theory Examination (Marks): 80

Objectives	: <ol style="list-style-type: none">1. To understand the basic concepts and processes used to determine product costs,2. To be able to analyze and evaluate information for cost ascertainment, planning, control and decision making, and3. To develop ability to analyze and interpret various tools of financial analysis and planning,4. To gain knowledge of management and financing of working capital,5. To understand concepts relating to financing and investment decisions
Unit-I	: <p>Costing Methods of costing and elements of cost. Material Cost Different methods of pricing of issue of materials. Labour Cost Different methods, wages and incentive plans. Principles of good remunerating system, labour turnover. Depreciation Concept, importance and different methods of depreciation [8Hours]</p>
Unit-II	: <p>Overheads Classification, collection of overheads, Primary and Secondary apportionment of overheads, absorption of overheads- Machine hour and labour hour rate. Under and over absorption of overheads. [8Hours]</p>
Unit-III	: <p>Standard costing: Concept, development and use of standard costing, variance analysis. Marginal Costing Use of Marginal Costing in decision-making. Capital Budgeting Control of Capital Expenditure, techniques of capital budgeting –Pay Back Method, Accounting rate of return, Internal Rate of Return, DCF, Net Present Value and profitability index. [8Hours]</p>
Unit-IV	: <p>Introduction To Financial Management Concept of business finance, Goals & objectives of financial management, Sources of financing - LONG TERM: shares, debentures, term loans, lease & hire purchase, retained earnings, public deposits, bonds (Types, features & utility), SHORT TERM: bank finance, commercial paper, trade credit & bills discounting, INTERNAL: Retained earnings, Cost of Capital & Means of Finance. [8Hours]</p>
Unit-V	: <p>Financial Statement Preparation, analysis & Interpretation Preparation of financial statement and Profit & Loss Account, Balance Sheet. Ratio Analysis Classification, Ratio Analysis and its limitations, Index Statement & Common Size Statement. [8 Hours]</p>

Unit-VI	:	Working Capital Management Concept and design of Working Capital, types of working capital, sources of working capital, Time value of money, definition of cost and capital, Cash management, creditors management, debtors management. [8 Hours]
Text Books	:	<ul style="list-style-type: none"> • Bhattacharya A. K., “Principles and Practice of Cost Accounting”, Prentice Hall India. • B K Bhar, “Cost Accounting – Methods and Problems”, Academic Publishers • Khan M. Y., Jain P. K., “Financial Management”, Tata McGraw Hill • Pariasamy P., “Financial , Cost & Management Accounting”, HH Publication
Reference Books	:	<ul style="list-style-type: none"> • Colin Drury, “Management and Cost Accounting”, English Language Book Society, Chapman and Hall London. • Tulsian P. C., “Financial Management”, S. Chand.

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 80 marks Paper:

- Minimum ten questions
- Five questions in each section
- 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 and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
- Two questions of 15 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 T. Y. B. Tech. (All) Semester-VI

Code No.: PPE 381

Teaching Scheme: 04hrs/week

Theory: 04 hrs/week

Credits: 04

Title: Open Elective-I: Introduction to Nanotechnology

Class Test (Marks): 20

Theory Examination (Duration): 3 hrs

Theory Examination (Marks): 80

Objectives	:	1. To study the introduction to nanomaterials and the factors affecting it. 2. To study the types and synthesis methods of nanomaterials. 3. To study the characterizations and properties of nanomaterials. 4. To study the different applications of nanomaterials.
Unit-I	:	Introduction: Introduction to nanotechnology, conventional microvs.nano-material properties, role of size in properties of nano-materials, length scale and surface to volume concept, and uniqueness of nanostructured materials; health hazards and handling of nanomaterials. [4 Hours]
Unit-II	:	A) Types of Nano-Materials: Montmorillonite, Layer double hydroxide (LDH), Carbon nanofibers (CNFs) – vapour grown carbon fibers (VGCFs), Polyhedral Oligomeric Sisoquioxane (POSS), Carbon nanotubes, Nanosilica, Nanoaluminium oxide, Nanotitanium oxide, Nano-hybrids . [4 Hours] B) Synthesis: Bottom-up and Top-down approach for nano materials synthesis, Methods: Ball Milling, Chemical vapor deposition, Pressure vapor deposition, Ultrasound assisted, Minimulsion, Microemulsion, Nanoemulsion, Hydrothermal, Sol-gel, Miscellaneous techniques. [8 Hours]
Unit-III	:	Properties of Nanomaterials in terms of Structure Property Relationship: Thermal properties, Mechanical properties, Gas barrier properties, Flame retardant properties, Electrical and electrochemical properties, Electronic properties, Optical properties, Magnetic properties, Biodegradable properties, Antimicrobial properties, Catalytic properties. [8 Hours]
Unit-IV	:	Preparation of Polymer Nanocomposites: Solution intercalation, Melt intercalation, Roll Milling, Emulsion Polymerization, In-Situ Polymerization. [6 Hours]
Unit-V	:	Characterization of Nanomaterials and Nanocomposites: X ray diffraction (XRD), Dynamic light scattering (DLS), Scanning electron microscopy (SEM), Transmission electron microscopy (TEM), Energy dispersive x-ray spectroscopy (EDS), Atomic force microscopy (AFM), Small angle X ray scattering (SAXS), Differential scanning calorimetry (DSC), Thermo gravimetric analysis (TGA). [10 Hours]

Unit-VI	:	Application of Nanomaterials and Nanocomposites: Biomedical-Drug delivery, Bone replacement; Sensors – gas sensor, Metal adsorption and recovery, Bio-molecule detectors; Energy storage and conversion - Super capacitors, Solar cells, Energy generators; Electronics; Self cleaning&Self healing paints, Nano-engineering of cement-based materials,Agricultural Nanotechnologies.				[8 Hours]
Reference books	:	Sr. No.	Title	Author	Publication	Edition
		1	Polymer Nanocomposites Processing, Characterization, and Applications	Joseph H. Koo	McGraw-Hill Nanoscience and Technology Series	1 st 2006
		2	Encyclopedia of Nanoscience and Nanotechnology	Hari singhNalwa	American Scientific publishers	-
		3	Nanoparticle Technology Handbook	M Hosokawa, K Nogi, M Naito, T Yokoyama	Elsevier	-
		4	The Science of Nanotechnology: An introductory text	Luanne Tilstra et al	Nova Science Publishers, Inc.	-
		5	Polymer-Layered Silicate and Silica Nanocomposites	Y.C. Ke, P. Stroeve	Elsevier	2005
		6	Nanotechnology in concrete – A review	Florence Sanchez, Konstantin Sobolev	Construction and Building Materials, Elsevier	24 (2010) 2060–2071
		7	Agricultural Nanotechnologies: What are the current possibilities?	Claudia Parisi et al	Nano Today, Elsevier	2014

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 80 marks Paper:

1. Minimum 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 and should be set for 10 marks each. The Question no.1 and 6 should be of objective nature.

4. Two questions of 15 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 T. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-VI

Code No.: ETC 354

Teaching Scheme: 02Hrs/week

Theory: 02Hrs/week

Credits:02

Title: Digital Image Processing

Class Test (Marks): 10

Theory Examination (Duration): 02 Hours

Theory Examination (Marks): 40

Prerequisites	:	Knowledge of digital signal processing, probability and understanding of basic programming concepts is required.
Course Objectives	:	<ul style="list-style-type: none">• To understand basics of digital image formation• To understand the concepts of quantization, sampling, and special frequency• To understand the color image foundations• To implement special and frequency-domain image filtering
Unit-I	:	Introduction: Digital image representation, fundamental steps in image processing, elements of digital image processing systems, solid state cameras and image sensors, sampling and quantization some basic relationship between pixels [4 Hours]
Unit-II	:	Image Transforms: 2-D Fourier transform, Other separable transforms, Walsh-Hadamard Transform, Discrete Cosine Transform, Wavelet Transform and their applications [4 Hours]
Unit-III	:	Image Enhancement: Basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Enhancement by point processing, spatial filtering, Enhancement in the frequency domain. [4 Hours]
Unit-IV	:	Image Restoration: Degradation model, algebraic approach to restoration, inverse filtering, least mean square (wiener) filter, invariant restoration, Color image processing. [4 Hours]
Unit-V	:	Colour Image Processing: Colour fundamentals, Colour models, Colour transformation, Smoothing and Sharpening [4 Hours]
Unit-VI	:	Image Analysis: Segmentation, Detection of discontinuities, edge linking and boundary detection, Thresholding, region-oriented segmentation [4 Hours]
Reference Books:	:	Text Books: 1. R. C. Gonzalez, R. E. Woods, "Digital Image Processing", Pears Education. 2. W. K. Pratt, "Digital Image Processing", Prentice Hall, 1989 3. Anil K. Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India. 4. Pratt W.K. "Digital Image Processing", Third Edition, John Wiley & Sons, 2001 Reference Books: 1. B. Chanda & D. Dutta Majumder, "Digital Image Processing and Analysis", 2001

		2. A. Bovik, "Handbook of Image & Video Processing", Academic Press, 2000
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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. The Question no.1 and 6 should be of objective nature.
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 T. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-VI Lab: V Code No.: ETC371 Teaching Scheme: 02Hrs/week Practical: 25 Marks Title: Embedded System Design Teachers Assessment: 25 Marks Credits: 01	
Course Objectives	: To enhance Programming Techniques of 8 bit microcontroller and to understand System Peripheral and Interface.
List of Practical	: <p>89C51 Microcontroller :</p> <ol style="list-style-type: none"> 1. Write a program for Addition, Subtraction, Multiplication and division of 8 bit numbers in assembly. 2. Interface RS 232 and write a program to send characters "YES" to PC with baud rate of 9600 using Serial Communication using "C" 3. Interface LED and write a program for flashing of LED, generate given time delay using Timer/Counter "C". 4. Interface DAC 0808 and write a program to generate various analog Waveform. 5. interface LCD display and write a program to display message. 6. Interfacing 4X4 keypad and displaying key pressed on LCD. <p>PIC18F4550 Microcontroller :</p> <ol style="list-style-type: none"> 1. Write a program for interfacing button, LED, relay & buzzer to PIC18F4550 as follows: <ol style="list-style-type: none"> a) when button 1 is pressed, relay and buzzer is turned ON and LED s start chasing from left to right. b) when button 2 is pressed, relay and buzzer is turned OFF and LED start chasing from right to left. 2. Interface a DC motor and write a program to control speed and direction using PWM. 3. Interface Seven Segment Display to display 0 to 99. 4. Serially transfer the data on PC using serial port of PIC18F4550. 5. Generate square wave using timer with interrupt for PIC18F4550 6. Interface temperature sensor to internal ADC and display value on LCD. 7. Interface DS1307 RTC chip using I2C and display date and time on LCD.
List of Reference Books	: <ol style="list-style-type: none"> 1. Muhammad AMazidi, "The 8051 Microcontroller and Embedded Systems", Pearson Education Asia, first Indian reprint, 2002. 2. Raj Kamal, "Embedded Systems Architecture, Programming and Design", TMH 2nd Edition. 3. Mazidi, "PIC microcontroller & embedded system", 3rd Edition, Pearson 4. Peatman John B., "Design with PIC Microcontrollers", Pearson Edition.
List of Equipments /Instruments	: Hardware: 89c51 and PIC18F4550 Microcontroller Trainer kits, CRO, Power supply. Software: Keil μ Vision3, MPLAB IDE, Flash Magic,

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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(Faculty of Science & Technology)

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

Lab: VI

Code No.: ETC372

Title: Microwave Theory and Techniques

Teaching Scheme: 02 Hrs/week

Teachers Assessment: 25 Marks

Practical: 25 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">Study of Microwave components used at X-Band FrequencyStudy of the characteristics of the Reflex Klystron tubeStudy of Gunn Oscillator characteristicsMeasurement of frequency of microwave source and demonstrate relationship among frequency, free space wavelength and guided wavelength.Measurement of coupling factor and directivity of directional couplerMeasurement of insertion loss and isolation loss of three port circulatorMeasurement of insertion loss and isolation loss of isolator.Measurement of S-parameter of Magic Tee.Measurement of standing wave ratio and reflection coefficient.Measurement of attenuation/insertion loss of attenuator.
List of Reference Books	:	G.S. Raghuvanshi, "Microwave Engineering", CENGAGE Learning
List of Equipments /Instruments	:	Microwave test bench including slotted line, VSWR meter, Klystron power supply, Gunn power supply, CRO/DSO

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

- Performance of the experiments in the laboratory
- Write-ups for each experiment, written by the students
- 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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(Faculty of Science & Technology)

Syllabus of T. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-VI

Lab: VII

Code No.: ETC373

Title: VLSI Design

Teaching Scheme: 02Hrs/week

Teachers Assessment: 25 Marks

Practical: 25 Marks

Credits: 01

Course Objectives	:	<ul style="list-style-type: none">• To emphasize on writing VHDL code for different circuits.• To simulate, Synthesize and Test the functionality of designed circuit on Hardware.
List of Practical	:	<ol style="list-style-type: none">1. Implement VHDL code for all logic gates.2. Implement VHDL code for XOR gate using other basic gates.3. Implement VHDL code for Half-Adder and Full Adder.4. Implement VHDL code for multiplexer .5. Implement VHDL code for Demultiplexer.6. Implement VHDL code for priority encoder .7. Implement VHDL code for 4 Bit Binary to Grey code Converter.8 Implement VHDL code for all Flip-flops.9. Implement VHDL code for decade counter/ binary counter .10.Implement VHDL code for shift register.
List of Reference Books	:	<ol style="list-style-type: none">1. J.Bhasker, “VHDL Primer”, PHI2. D.Perry, “VHDL”, 2nd Edition, McGraw Hill.3. Charles Roth, “Digital Design with VHDL”, Thomson Learning, India Edition.
List of Equipments /Instruments	:	Xilinx ISE Software, FPGA/CPLD Board

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 T. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-VI

Code No.: ETC 374

Teaching Scheme: 02Hrs/week

Credits: 01

Title: Lab: DOS IV: Circuit Simulation Lab –II

Teachers Assessment (Marks): 50

Course Objectives	:	<ul style="list-style-type: none">To get basic fundamental programming knowledge in LabVIEW
List of Practical	:	<ol style="list-style-type: none">1. Introduction to LabVIEW Environment.2. To study tools Palette, controls Palette and indicators in LabVIEW.3. To perform arithmetic, Boolean operations using LabVIEW.4. To study for loop, while loop, case structure in LabVIEW.5. To perform array, strings operations using LabVIEW.6. To perform cluster operations in LabVIEW.7. Introduction to NI ELVIS –II.8. Design and simulation of Analog/ Digital Circuit using NI ELVIS-II in LabVIEW.9. Data acquisition of sensor using LabVIEW and Arduino.10. Miniproject using LabVIEW.
List of Reference Books	:	<ol style="list-style-type: none">1. LabVIEW 2009 student edition, by National Instrument2. Virtual Instrumentation Using LabVIEW, 2nd Edition by Sanjay Gupta, Joseph John3. LabVIEW for Engineers by RONALD W. LARSEN
List of Equipments /Instruments	:	Windows based i3 and 3 GB and more RAM configured Computer Software: NI-LabVIEW, NI ELVIS-II, Arduino UNO Board, Resistors, digital logic gates ICs, Sensor For eg. LM35 (Temperature sensor)

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 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 T. Y. B. Tech. (All) Semester – VI

Code No.: ETC375

Teaching Scheme: 02 Hrs/week

Practical: 02 Hrs/week

Title: Project I

Practical Examination (Marks): 50

Credits: 01

Objectives	:	The Projects in the undergraduate study of engineering aims at developing in the student, knowledge and skills to match the current and projected needs of industry, society or user systems and to create social awareness and professional attitudes. Apart from monitoring the engineering processes and maintenance of engineering work, machines and equipments, an engineer has to do investigate survey, collect data, refer handbooks/datasheets, prepare estimates and design the systems.
Contents	:	<ul style="list-style-type: none">• The completion of project is to be carried out in two semesters i.e. in T.Y. Sem. VI and final year B. Tech Sem. VII.• The students shall form project group of maximum 3 students for within department projects and maximum of 6 students in case of interdepartmental projects of their choice.• The students groups shall collect the information on the topic/area of interest and submit brief synopsis to Project Coordinator.• The Project Coordinator shall allot the Project Guide depending upon the area or specialization of eligible faculty members from the department.• The individual student from the project group shall maintain the project diary and update weekly by taking remark of respective guide.• The industry sponsored projects and inter departmental projects shall be encouraged and in case of inter departmental projects, students of maximum 3 different departments/disciplines shall work together by forming the group. The guide allotment and internal/external assessment of such groups shall be done by the respective departments.• The projects addressing issues related to environmental, rural development and societal issues shall be preferred.• The selected project shall help to promote participation in government approved schemes like Unnat Maharashtra Abhiyaan (UMA) and Unnat Bharat Abhiyaan (UBA).• The students shall aim to promote their project work in project exhibitions/competitions, paper presentation/publication in reputed journals and conferences.• The relevance of project and implementation including details of attainment of POs and PSOs addressed through the projects with justification must be clearly stated. <p>Phases of Project Part- I: Phase I: Problem Identification, Literature survey, data collection, deciding scope of topic and objectives of the project. Phase II: Confirmation of block diagram or layout of the proposed project. Phase III: Submission of small report of project work.</p>

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Syllabus of T.Y.B. Tech. (All) Semester-VI

Code No.: BSH801

Title: Audit I: Japanese Language module

Teaching Scheme: 02 Hours per week

Examination Scheme

Theory: 02 Hours per week

Total Marks: 50 (Continuous

Assessment)

Objectives	<ul style="list-style-type: none">• Students will be able to apply communicative Japanese Grammar in communication.• Students will be able to enhance the level of Japanese vocabulary.• Students will be able to pronounce and articulate words as well as sentences accurately.• Students will be able to understand and apply Japanese language eventually.• Students will be able to develop Japanese language skills.• Students will be able to manage situational communication in Japanese.
Unit-I	: Kana scripts Hiragana & Katakana [2 Hours]
Unit-II	: Chinese characters Kanji- Pictograms with stroke order [2 Hours]
Unit-III	: Grammar Parts of speech, articles, word order or syntax, demonstratives & interrogatives, counters, verbs and verb conjugation, adjectives, adverbs, comparisons, giving and receiving, requests and commands, potential and conditionals, possessive, direct indirect speech, various other form, etc [8 Hours].
Unit-IV	Vocabulary Nouns, verbs tenses-past and present, adjectives, adverbs, expressions of time, expression and phrases etc. [5 Hours]
Unit-V	Situational conversations and practice drills Self-introduction, numbers, day and date, time, location and presence, possession of objects, time expressions and their usage, visiting people, accepting and receiving objects, hospital, asking direction, asking price of objects etc. [5 Hours]
Unit-VI	Introduction to the history of Japan and its cultural Aspects Ikebana, origami, calligraphy, kabuki etc [2 Hours]

List of Reference	Sr. No.	Title	Author	Publication
Books	1	Japanese Kanji for Beginners	Timothy G. Stout and Kaori Hakone	Tuttle Publishing
	2	Essential Japanese Grammar: A Comprehensive Guide to Contemporary Usage	Masahiro Tanimori and Eriko Sato Ph.D.	Tuttle Publishing
	3	15-Minute Japanese: Learn in Just 12 Weeks	D.K. Goel and Rajesh Goel	Amazon.in
	4	Oxford Japanese Grammar and Verbs (Dictionary)	Bunt Jonathan	Oxford Publication
	5	Read and write Japanese scripts: Teach yourself	Helen Gilhooly	Teach Yourself
	6	Complete Japanese Beginner to Intermediate Book and Audio Course: Learn to read, write, speak and understand a new language with Teach Yourself	Helen Gilhooly	Teach Yourself

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Syllabus of T.Y.B. Tech. (All) Semester-VI

Code No.: CSE801

Teaching Scheme: 02 Hours per week

Theory: 02 Hours per week

Title: Audit I: Cyber crime and law

Examination Scheme

Total Marks: 50 (Continuous Assessment)

Objectives	<ul style="list-style-type: none"> • To introduce the cyber world and cyber law in general. • To enhance the understanding of problems arising out of online transactions and provoke them to find solutions. • To examine the effects of cyber crime through the experiences of victims and law enforcement. • To know the technologies that stand behind certain cyber crimes. • To identify and analyze statutory, regulatory, constitutional, and organizational laws that affect the information technology professional. • To distinguish between Copyright Law, Patent Law and Trademarks.
Unit-I	<p>: Introduction Overview of Computer and Web Technology, Need for Cyber Law, Cyber Jurisprudence at International and Indian Level [4 Hours]</p>
Unit-II	<p>: Jurisdictional Aspects in Cyber Law Issues of jurisdiction in cyberspace, Types of jurisdiction, The Test evolved, Minimum Contacts Theory, Sliding Scale Theory, Jurisdiction under IT Act, 2000. [4 Hours]</p>
Unit-III	<p>: Cyber Crimes & Legal Framework Cyber Crimes against Individuals, Institution and State, Hacking, Digital Forgery, Cyber Stalking/Harassment, Identity Theft & Fraud, Cyber Terrorism, Right to Privacy and Data Protection on Internet, Different offences under IT Act, 2000 [4 Hours]</p>
Unit-IV	<p>: Digital signature and Electronic Signature and Data Protection Concept of public key and private key, Certification authorities and their role, Creation and authentication of digital signature, Concept of electronic signature certificates, Electronic Governance [4 Hours]</p>
Unit-V	<p>: E Contracting & E Commerce Salient features of E-contract, Formation of E-contract and types, E-mail Contracting, Indian Approach on E-contracts, E-commerce-Salient Features and advantages, Models of E-commerce like B2B, B2C, Indian Laws on E-commerce [4 Hours]</p>
Unit-VI	<p>: Intellectual Property Issues in Cyber Space Copyright Law, Patent Law, Trademarks & Domain Names Related issues, Dispute Resolution in Cyberspace [4 Hours]</p>
Reference Books:	<p>: 1. Karnika Seth, Computers, Internet and New Technology Laws, Lexis Nexis Butterworths Wadhwa Nagpur. 2. Chris Reed & John Angel, Computer Law, OUP, New York, (2007). 3. Cyber Crime An Introduction by Prasad R.S. 4. Cyber Laws by Ed. Kumar Krishna</p>

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Syllabus of T. Y. B. Tech. (All) Semester –VI

Code No.: CED801

Title: Audit I: Road Safety Management Audit

Teaching Scheme: 02 Hours per week

Examination Scheme

Theory: 02 Hours per week

Total Marks: 50 (Continuous Assessment)

Course Objectives	:	<ul style="list-style-type: none">• To acquire knowledge and understanding of the road environment.• To inculcate decision making and behavioural skills necessary to survive in the road environment.• To impart knowledge and understanding of the causes and consequences of accidents.• To understand roles and responsibilities in ensuring road safety.
Unit-I	:	Introduction to Road Safety & Planning. Road traffic accidents scenario in India and in world. Road Safety and its importance. Traffic Rules and Driving Behaviour. Characteristics of accidents, accidents vs. crash. Need of Road Safety. Awareness about rules and regulations of traffic. Assisting Traffic control authorities. Multidisciplinary approach to planning for traffic safety and injury control. Vulnerable road users: crashes related to pedestrian and bicyclists, their safety, provision for disabled. [4 Hours]
Unit-II	:	Traffic Signs, signals & traffic furniture & Role of traffic signals. Warning, cautioning & Informing sign. Location of Road sign, Traffic signals. Road Marking: Colour of road marking, kerb marking, night driving aid, traffic light signals. Types of Signals. Road safety tips for different categories of Road users. Causes of accidents, prevention & 1 st aid to accident victim. Rules on road. Necessity of traffic lights. Major violations leading to accidents. [4 Hours]
Unit-III	:	Responsibility of Road accidents and Safety measures. People responsible for accident prevention: Police, Politicians, Community members, Policy makers, Teachers, Parents, Infrastructure authorities, Drivers and Official road safety body. Reasons of students/ children have accidents. 4 E's of Accidents Prevention: 1. Engineering - by altering the environment 2. Enforcement - by imposing laws 3. Encouragement - by the use of publicity campaigns 4. Education - by gaining and using knowledge. [4 Hours]
Unit-IV	:	Road Safety Education & Events. Introduction to Road Safety Education. 5 P's of Road safety education: 1. Pre-school road safety education 2. Practical rather than theory education 3. Principles of own development about road safety education 4. Presentations on road safety education 5. Place for road safety education in syllabus. Discussions on efforts done by Government on Road Safety. Workshop on Road Safety week/ Organization of seminar on Road Safety. [4 Hours]
Unit-V	:	Traffic Flow Analysis. Macroscopic, Microscopic & Mesoscopic approach Types of Flow, Traffic stream characteristics, Space, Time diagram, Relationship between speed, flow & density, Level of service & capacity analysis, Shockwave theory. [4 Hours]
Unit-VI	:	Road Safety Audit.

	<p>Global & Local perspective, Road safety issues, Road safety programmes, types of RSA, planning, design, construction & operation stage audits ,Methodology , Road safety audit measures. [4 Hours]</p>
<p>Text Books :</p>	<ol style="list-style-type: none"> 1. Traffic Flow Theory & Control- D. R. Drew- McGraw Hill, New York, 1968. 2. Traffic Engineering and Transport Planning- L.R. Kadiyali- Khanna Publishers, New Delhi, 2002. 3. Transportation Engineering-An Introduction- C. J. Khisty- Prentice-Hall, NJ, 2005 4. Traffic Flow Fundamentals- A. D. May- Prentice – Hall, Inc., New Jersey, 1990. 5. Highways- Traffic Planning & Engineering- C. A. O’Flaherty- Edward Arnold, UK 6. Traffic Engineering – Theory & Practice- L. J. Pignataro- John Wiley, 1985. 7. Highway Traffic Analysis and Design, R. J. Salter, N. D. Hounsel- Macmillan, London, 1996. 8. Traffic Engineering & Transport Planning- L. R. Kadiyali- Khanna Publishers, 2003.

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Syllabus of T. Y. B. Tech. (All) Semester –VI

Code No.: BSH802

Title: Audit I: Value Education

Teaching Scheme: 02 Hours per week

Examination Scheme

Theory: 02 Hours per week

Total Marks: 50 (Continuous Assessment)

Course Objectives	: The students will be able to: <ul style="list-style-type: none">• Understand the need of values and its classification in contemporary society.• Appreciate the values needed for peaceful society like democratic, secular, and socialist etc.• Become aware of role of education in building value as dynamic social reality.• Know the importance of value education towards personal, national and global development.
Unit-I	: Introduction to Value Education: Value Education, Purpose of Value Education as specifying the present deterioration in the value system in the fast changing world trends. [4 Hours]
Unit-II	: Importance of Values in Life: What is a Value system? What kinds of values need to be inculcated? Eg.. Ethical, moral and spiritual instead of materialistic values, value inculcation, trend of values such as a permissive culture. [4 Hours]
Unit-III	: Character Building: Advantages of good character, importance of trust, honesty, integrity, morality, and reliability as qualities of a good character. Building Relationship-Group Behaviour, limitations of a relationship. How to be a better person, better manager and better Engineer? [4 Hours]
Unit-IV	: The Purpose of Life & Education: Meaning, purpose of one's life, Destination success - why are you here? How to make everyday worth living? [4 Hours]
Unit-V	: Values For Personal Life & Professional Life: Self sovereignty-Discernment-Decision making-Self-actualization, Caring-Patience-Honesty-Forgiveness, Competence-Co-operation-Perseverance, Flexibility-Reliability-Tolerance-Unity-Knowledge Thirst, Sincerity in Profession, Regularity, Punctuality, Faith [4 Hours]
Unit-VI	: Value Education towards National and Global Development: <ul style="list-style-type: none">• Constitutional Values: Sovereign, Democracy, Socialism, Secularism, Equality, Justice, Liberty, Freedom, Fraternity• Social Values: Pity and Probity, Self-Control, Universal Brotherhood.• Religious and Moral Values: Tolerance, Wisdom, character.• Aesthetic Values: Love and Appreciation of literature, fine arts and respect for the same.• Environmental Ethical Values• National Integration and international understanding.• Need of Humanistic value for espouse peace in the society• Conflict of cross-cultural influences, cross-border education [4 Hours]

Reference:	:	<ol style="list-style-type: none">1. Sharma, S.P. Moral and Value Education; Principles and Practices, Kanishka publishers, 2013.2. Kiruba Charles & V. Arul Selvi. Value Education: Neelkamal Publications, New Delhi, 2012.3. Passi, B.K. and Singh, P. Value Education. National Psychological Corporation, Agra. 2004.4. Chitakra, M.G.: Education and Human Values, A.P.H. Publishing Corporation, New Delhi. 2003.5. Monica J. Taylor. Values in Education and Education in Value. Routledge. 1996.6. Neil Postman. The End of Education: Redefining the Value of School. Vintage publisher. 1996.7. http://cbseportal.com/exam/e-books/download-free-ncert-e-book-education-for-values-in-school-a-framework\8. http://cbseacademic.in/web_material/ValueEdu/Value%20Education%20Kits.pdf
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(Faculty of Science & Technology)

Syllabus of T. Y. B. Tech. (All) Semester-VI

Code No.: ETC801

Title: Audit-I: Smart Cities

Teaching Scheme: 02 Hours per week

Examination Scheme

Theory: 02 Hours per week

Total Marks: 50 (Continuous Assessment)

Objectives	:	<ul style="list-style-type: none">To identify urban problems.To study Effective and feasible ways to coordinate urban technologies.To study models and methods for effective implementation of Smart Cities.To study new technologies for Communication and Dissemination.To study new forms of Urban Governance and Organization.
Unit-I		Understanding Inclusive Planning Definition and components; urban consultations; basic principles of urban consultation, process of urban consultations; urban strategic planning, good urban governance, subsidiarity, equity, efficiency, transparency and accountability, civic engagement and citizenship, security; valuing difference and working with diversity; livable cities [4 Hours]
Unit-II		Participatory Planning Process and Policies, Programmes and Legislation Methods, role of stakeholders (including civil society organizations), etc.; Related Acts, Five year plans, policies and programmes at various levels [4 Hours]
Unit-III		Smart Cities Innovation economy (Innovation in industries, clusters, districts of a city; Knowledge workforce: Education and employment; Creation of knowledge-intensive companies) [4 Hours]
Unit-IV		Smart Cities Urban Infrastructure (Transport, Energy/ Utilities, protection of the environment and safety); Governance (Administration services to citizens, participatory and direct democracy, services to the citizen, quality of life) [4 Hours]
Unit-V		Planning interventions-I Inclusive zoning, development and building regulations, Slum Improvement; drafting strategic urban development plans – objectives and key actors; planning framework for actions, process of drafting the plan, key considerations. [4 Hours]
Unit-VI		Planning interventions-II Urban design and decision-making; city transport for all; water supply and sanitation, urban disaster management, management through decentralization [4 Hours]
Reference		1. Jo Beall (1997); "A city for all: valuing differences and working with

Books:	:	<p>diversity”; Zed books limited,London (ISBN: 1-85649-477-2)</p> <ol style="list-style-type: none"> 2. UN-Habitat; “Inclusive and sustainable urban planning: a guide for municipalities”; Volume 3:Urban Development Planning (2007); United Nations Human Settlements Programme (ISBN: 978-92-1-132024-4) 3. Arup Mitra; “Insights into inclusive growth, employment and wellbeing in India”; Springer (2013),New Delhi (ISBN: 978-81-322-0655-2) 4. William J. V. Neill (2004); “Urban Planning and cultural identity”; Routledge, London (ISBN: 0-415-19747-3) 5. John S. Pipkin, Mark E. La Gory, Judith R. Balu (Editors); “Remaking the city: Social scienceperspective on urban design”; State University of New York Press, Albany (ISBN: 0-87395-678-8) 6. Giffinger, Rudolf; Christian Fertner; Hans Kramar; Robert Kalasek; NatašaPichler-Milanovic; Evert Meijers (2007). "Smart cities – Ranking of European medium-sized cities". Smart Cities.Vienna: Centre of Regional Science 7. "Draft Concept Note on Smart City Scheme". Government of India - Ministry of UrbanDevelopment (http://indiansmartcities.in/downloads/CONCEPT_NOTE_-3.12.2014__REVISED_AND_LATEST_.pdf)
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(Faculty of Engineering & Technology)

Syllabus of T. Y. B. Tech. (All) Semester-VI

Code No.: MED801

**Title: Audit I:Rural Community
Engagement**

Teaching Scheme:02 Hours per week

Examination Scheme

Theory: 02 Hours per week

Total Marks: 50 (Continuous Assessment)

Objectives	:	1. To provide practical opportunities for students for participation in rural community mobilization, service engagement and empowerment activities. 2. To promote preparation of strategies for building resilience and community responding system in nutrition, water, food safety and healthcare.
Unit-I	:	Dynamics Of Rural Society, Panchayat Raj System: Social, Economic, Political and Cultural Community Goal Setting : SAGY, MPLADS, UMA and UBA(4 Hours)
Unit-II		Approaches and Methods, Community Project Proposal and Project Management, Concept and Steps, Thematic Maps, Social Map Transect Walk, Seasonal Map, Natural and Human Resource Mapping and Management, Ethnographic Research(4 Hours)
Unit-III		Vulnerability, Rural Resilience - Risk Reduction, Role and Responsibilities Rehabilitation: Social, Physical and Psychological Aspect Increasing Efficiency in Water, Energy, Sanitation and Waste (Solid and Liquid) Management (4 Hours)
Unit-IV		Engagement With School for Competency Enhancement/Health Centre/Panchayat/Gram Sabha/SHGs Awareness: Rural Health Management, Indigenous or Folk Medicine and Hygiene/ Sports/ Rights/ Policies and Programs/ Transparency/Corruption/Social Benefits, addressing Issue In inclusive and Inclusive Identification of Beneficiaries, Improving Implementation Efficiencies While Plugging Leakages In Benefits Scheme, Direct Benefit Transfer (4 Hours)
Unit-V		Making of Gram Panchayat Development Plan Including Aspects and Process of Preparation of Village Disaster Management Plan(4 Hours)
Unit-VI		Village Livelihoods, Rural Tourism, Entrepreneurship, Appropriate Technology Access Including Digitized Transaction.(4 Hours)
Reference Books:	:	1. Katar Singh "Rural development- Principles, Policies and Management" SAGE Publication 1999. 2. AgoramorthyGovindaswamy "Sadguru Model of Rural Development: Elevates Food Security and Ease Poverty" Daya Publishing House, a division of Astral International Pvt. Limited, 2016 3. V. GopalkrishnanAsari "Technological Change for Rural Development in India". B.R. Publisher 4. B.S. Gautam "Cooperatives And Rural Development In India" Radha Publications

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science and Technology)

Syllabus of T.Y.B. Tech. (All) Semester-VI

Code No.: BSH803

Title: Audit I: Japanese Language module

Teaching Scheme: 02 Hours per week

Examination Scheme

Theory: 02 Hours per week

Total Marks: 50 (Continuous Assessment)

Objectives	<ul style="list-style-type: none">• Students will be able to apply communicative Japanese Grammar in communication.• Students will be able to enhance the level of Japanese vocabulary.• Students will be able to pronounce and articulate words as well as sentences accurately.• Students will be able to understand and apply Japanese language eventually.• Students will be able to develop Japanese language skills.• Students will be able to manage situational communication in Japanese.
Unit-I	: Kana scripts Hiragana & Katakana [2 Hours]
Unit-II	: Chinese characters Kanji- Pictograms with stroke order [2 Hours]
Unit-III	: Grammar Parts of speech, articles, word order or syntax, demonstratives & interrogatives, counters, verbs and verb conjugation, adjectives, adverbs, comparisons, giving and receiving, requests and commands, potential and conditionals, possessive, direct indirect speech, various other form, etc [8 Hours].
Unit-IV	Vocabulary Nouns, verbs tenses-past and present, adjectives, adverbs, expressions of time, expression and phrases etc. [5 Hours]
Unit-V	Situational conversations and practice drills Self-introduction, numbers, day and date, time, location and presence, possession of objects, time expressions and their usage, visiting people, accepting and receiving objects, hospital, asking direction, asking price of objects etc. [5 Hours]
Unit-VI	Introduction to the history of Japan and its cultural Aspects Ikebana, origami, calligraphy, kabuki etc [2 Hours]

List of Reference	Sr. No.	Title	Author	Publication
Books	1	Japanese Kanji for Beginners	Timothy G. Stout and Kaori Hakone	Tuttle Publishing
	2	Essential Japanese Grammar: A Comprehensive Guide to Contemporary Usage	Masahiro Tanimori and Eriko Sato Ph.D.	Tuttle Publishing
	3	15-Minute Japanese: Learn in Just 12 Weeks	D.K. Goel and Rajesh Goel	Amazon.in
	4	Oxford Japanese Grammar and Verbs (Dictionary)	Bunt Jonathan	Oxford Publication
	5	Read and write Japanese scripts: Teach yourself	Helen Gilhooly	Teach Yourself
	6	Complete Japanese Beginner to Intermediate Book and Audio Course: Learn to read, write, speak and understand a new language with Teach Yourself	Helen Gilhooly	Teach Yourself