

S-25 March, 2013 AC after Circulars from Circular No.153 &amp; onwards

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**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY**  
**CIRCULAR NO. ACAD / NP / T.Y. B.Tech. / Syllabi/184/2013**

It is hereby informed to all concerned that, the syllabus prepared by the Boards of Studies, Committee and recommended by the Faculty of Engineering and Technology, the Hon'ble Vice-Chancellor has accepted the following **REVISED SYLLABI in all Braches of T.Y. B.TECH.** on behalf of the **Academic Council Under Section-14(7) of the Maharashtra Universities Act, 1994** as appended herewith :-

Sr. No.	Revised Syllabi
[1]	Third Year B.Tech. [ CIVIL ],
[2]	Third Year B.Tech. [ MECHANICAL ],
[3]	Third Year B.Tech. [ ELECTRONICS & TELECOMMUNICATION ENGINEERING ],
[4]	Third Year B.Tech. [ COMPUTER SCIENCE & ENGINEERING ],
[5]	Third Year B.Tech. [ AGRICULTURAL ENGINEERING ],
[6]	Third Year B.Tech. [ PLASTICS AND POLYMER ENGINEERING ],
[7]	Third Year B.Tech. [ INSTRUMENTATION & CONTROL ENGINEERING ],
[8]	Third Year B.Tech. [ PRODUCTION ],

This is effective from the Academic Year 2013-2014 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. ACAD/ NP/ T.Y.B.TECH./  
 2013/14059-67

Date:- 15-06-2013.

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*A. Kambkar*  
**Director,** 15-06-2013  
**Board of College and  
 University Development.**

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**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 the above all syllabi on University Website [www.bamu.net].

**Copy to :-**

- 1] The Controller of Examinations,
- 2] The Superintendent, [ Engineering Unit ],
- 3] The Programmer [Computer Unit-1] Examinations,
- 4] The Programmer [Computer Unit-2] Examinations,
- 5] The Superintendent, [ Eligibility Unit ],
- 6] The Director, [E-Suvidha Kendra], in-front of Registrar's Quarter,  
 Dr. Babasaheb Ambedkar Marathwada University,
- 7] The Record Keeper,  
 Dr. Babasaheb Ambedkar Marathwada University.

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



Revised Syllabus of

THIRD YEAR

B. TECH.

ELECTRONICS AND TELECOMMUNICATION  
ENGINEERING

*[ Effective from the Academic Year 2013-14 & onwards ]*

## FACULTY OF ENGINEERING AND TECHNOLOGY

Proposed Revised Structure for 2013-14  
[Third Year –Electronics and Telecommunication]

Sub No.	SEMESTER-V	Contact Hrs / Week				Examination Scheme						
	Subject	L	T	P	Total	CT	TH	TW	P	Total	Credits	Duration of Theory /practical Exam
ETC301	Control Systems	3	1	-	4	20	80	-	-	100	4	3 Hrs
ETC302	Microprocessors and Peripherals	4	-	-	4	20	80	-	-	100	4	3 Hrs
ETC303	Digital Communication	4	-	-	4	20	80	-	-	100	4	3 Hrs
ETC304	Electronic Circuit Design Technology	3	1	-	4	20	80	-	-	100	4	4 Hrs
ETC305	Digital Signal Processing	3	1	-	4	20	80	-	-	100	4	3 Hrs
ETC306	Microelectronics	2	-	-	2	10	40	-	-	50	2	2 Hrs
ETC321	Lab I : Microprocessors and Peripherals	-	-	2	2	-	-	25	25	50	1	3 Hrs
ETC322	Lab II : Digital Communication	-	-	2	2	-	-	25	25	50	1	3 Hrs
ETC323	Lab III: Digital Signal Processing	-	-	2	2	-	-	25	25	50	1	3 Hrs
ETC324	Lab IV Electronic Circuit Design Technology	-	-	2	2	-	-	50	-	50	1	
ETC325	Lab V:Seminar	-	-	2	2	-	-	50	-	50	1	
	<b>Total of semester-V</b>	<b>19</b>	<b>3</b>	<b>10</b>	<b>32</b>	<b>110</b>	<b>440</b>	<b>175</b>	<b>75</b>	<b>800</b>	<b>27</b>	
Sub No.	SEMESTER-VI	Contact Hrs / Week				Examination Scheme						
	Subject	L	T	P	Total	CT	TH	TW	P	Total	Credits	Duration of Theory /practical Exam
ETC351	Microcontroller and Embedded System	3	1	-	4	20	80	-	-	100	4	3 Hrs
ETC352	Information Theory and coding	3	1	-	4	20	80	-	-	100	4	3 Hrs
ETC353	Antenna Theory	3	1	-	4	20	80	-	-	100	4	3 Hrs
ETC354	VLSI Design	4	-	-	4	20	80	-	-	100	4	3 Hrs
	Elective-I	4	-	-	4	20	80	-	-	100	4	3 Hrs
ETC355	Electronics Measurement	2	-	-	2	10	40	-	-	50	2	2 Hrs
ETC371	Lab VI: Microcontroller and Embedded System	-	-	2	2	-	-	25	25	50	1	3 Hrs
ETC372	Lab VII : Antenna Theory	-	-	2	2	-	-	25	25	50	1	3 Hrs
ETC373	Lab VIII : VLSI Design	-	-	2	2	-	-	25	25	50	1	
ETC374	Lab IX : Elective I	-	-	2	2	-	-	50	-	50	1	3 Hrs
ETC375	Radar and Satellite Communication											
ETC376	System Software and Operating System											
ETC377	Neural Network and Fuzzy Logic											
ETC377	LAB X: Project Part –I	-	-	2	2	-	-	50	-	50	1	
	<b>Total of semester-VI</b>	<b>19</b>	<b>3</b>	<b>10</b>	<b>32</b>	<b>110</b>	<b>440</b>	<b>175</b>	<b>75</b>	<b>800</b>	<b>27</b>	
	<b>Grand Total of V &amp; VI</b>	<b>38</b>	<b>6</b>	<b>20</b>	<b>64</b>	<b>220</b>	<b>880</b>	<b>350</b>	<b>150</b>	<b>1600</b>	<b>54</b>	

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

Elective-I

- ETC391 Radar and Satellite Communication
- ETC392 System Software and Operating System
- ETC393 Neural Network and Fuzzy Logic

*W. M. M. M.*

<b>Dr. Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) <b>Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester - V</b>	
<b>Code No.: ETC301</b> <b>Teaching Scheme: 04Hrs/week</b> <b>Theory: 03Hrs/week</b> <b>Tutorial: 01Hr/week</b> <b>Credits:04</b>	<b>Title: Control Systems</b> <b>Class Test (Marks): 20</b> <b>Theory Examination (Duration): 03 Hrs</b> <b>Theory Examination (Marks): 80</b>
<b>Prerequisites</b>	: Laplace Transform, Matrix calculation.
<b>Objectives</b>	: <ul style="list-style-type: none"> <li>• To study basic Control system elements.</li> <li>• To perform mathematical analysis of basic control systems.</li> <li>• To study the characteristics and response of different basic control systems.</li> <li>• To design a control system considering all its performance factors.</li> </ul>
<b>Unit-I</b>	: <b>Basics of control system and representation :</b> Introduction to linear control systems, Definition and elements of control system, open loop and closed loop control system, Feedback and feed forward control system, Linear and nonlinear control system, Transfer function by block diagram reduction technique and by signal flow graph, analysis using Mason's gain formula, Dynamic model of mechanical and RLC network and its response. <div style="text-align: right;"><b>[12 Hours]</b></div>
<b>Unit-II</b>	: <b>Time Domain Analysis of control system :</b> Transient analysis of system, Transient response of first and second order system for various test signals, Steady state analysis of system, time domain performance specifications, Steady state error in proportional control, integral control and derivative control systems. <div style="text-align: right;"><b>[08 Hours]</b></div>
<b>Unit-III</b>	: <b>Stability Analysis of control system :</b> Routh Hurwitz criterion, relative stability and range of stability, root locus concept, system characteristic equation, plotting root loci. <div style="text-align: right;"><b>[10 Hours]</b></div>
<b>Unit-IV</b>	: <b>Frequency Domain analysis of control system :</b> Frequency Response of control system, co-relation between time domain and Frequency domain specifications, Bode plots, Anti-bode plots, Gain margin, Phase margin, Polar Plots, Nyquist criterion, Lead and lag network analysis in frequency domain. <div style="text-align: right;"><b>[12 Hours]</b></div>
<b>Unit-V</b>	: <b>State Space Analysis :</b> State Space Analysis and sampled data control system, State space representation, Conversion of State variable into transfer function and vice versa, state transition matrix, concept of state, state variables, state, state vector, state space, block diagram for state equation transfer matrix, Solution of state equation, digital control system, sampler, sampling process, Z transform, pulse transfer function. <div style="text-align: right;"><b>[09 Hours]</b></div>
<b>Unit-VI</b>	: <b>Control System Components :</b> Characteristics of ON/OFF controller, proportional, derivative, integral control, Proportional plus integral plus derivative control (PID), sensors, error detectors, AC/DC servomotors, synchronous machines, programmable logics controller, relays, actuators and valves <div style="text-align: right;"><b>[09 Hours]</b></div>

<b>Reference Books</b>	:	<ol style="list-style-type: none"><li>1. Nagrath Gopal, "Control Engineering", PHI Publication</li><li>2. Benjamin C Kuo, "Automatic Control System", PHI Publication (7<sup>th</sup> edition)</li><li>3. Ogata, "Modern Control Engineering", PHI Publication</li><li>4. B.S. Manke, "Linear Control System", Khanna Publications</li></ol>
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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/four units in the syllabus shall be divided in two equal parts i.e. 3/2 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.

<b>Dr. Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-V	
<b>Code No.:</b> ETC302 <b>Teaching Scheme:</b> 04Hrs/week <b>Theory:</b> 04Hrs/week <b>Credits:</b> 04	<b>Title:</b> Microprocessors & Peripherals <b>Class Test (Marks):</b> 20 <b>Theory Examination (Duration):</b> 03 Hrs <b>Theory Examination (Marks):</b> 80
<b>Prerequisites</b>	: Digital Electronics.
<b>Objectives</b>	: To study- <ul style="list-style-type: none"> <li>• The architecture, instruction set, Programming and applications of the 8 bit microprocessor 8085</li> <li>• Overview of advance processor.</li> </ul>
<b>Unit-I</b>	: <b>Overview to Microprocessor:</b> Overview of 8085 Microprocessor Architecture, pin diagram of 8085, addressing modes, over view of instruction set, programming, need of delay & delay subroutines, Different data transfer schemes, Memory mapping, memory mapped I/O and I/O mapped I/O. <b>[10 Hours]</b>
<b>Unit-II</b>	: <b>Interfacing With 8085:</b> Need of I/O ports, Introduction to PPI 8255, Interfacing of LED's, 7 Segment display, ADC,DAC, relays, DC motor ,Stepper motor ,switch with 8255 <b>[10 Hours]</b>
<b>Unit-III</b>	: <b>Peripherals:</b> USART8251, Programmable Interval Timer 8253, Programmable Interrupt Controller 8259 interfacing with 8085. <b>[10 Hours]</b>
<b>Unit-IV</b>	: <b>Microprocessor 8086 :</b> Pin diagram, Architecture, Addressing Modes, Timing diagram, Instruction Set, Programming Techniques, Interrupt, Assembler Directives, Memory & I/O mapping. <b>[10Hours]</b>
<b>Unit-V</b>	: <b>Multiprocessor Configuration :</b> Minimum mode configuration, Maximum mode configuration, Introduction to NDP 8087, NDP data types, Introduction to IOP 8089, Coprocessor Configuration, Closely Coupled Configuration, Loosely coupled configuration. <b>[10Hours]</b>
<b>Unit-VI</b>	: <b>Advance Processors:</b> Elementary Concepts of 16Bit and 32Bit Microprocessors, like INTEL 80286, 80386, 80486, Pentium and Pentium Pro. <b>[10 Hours]</b>
<b>Reference Books:</b>	: <ol style="list-style-type: none"> <li>1. Ramesh Gaonkar, "Microprocessor, Architecture, Programming and Application", Willey Eastern Ltd, Fourth Edition.</li> <li>2. Sridhar Ghosh , "0000 to 8085" Prentice Hall India.</li> <li>3. B. Ram, "Fundamentals of Microprocessor and Microcomputer", Dhanpat Rai and Sons New Delhi.</li> <li>4. Ray &amp; Bhurchandi, "Advanced Microprocessors and Peripherals", Tata McGraw Hill 2nd Edition.</li> <li>5. Douglas Hall, "Microprocessors and Interfacing", Tata McGraw Hill.</li> </ol>

	<p>Revised 2nd Edition.</p> <p>6. Berry Bray and C.R.Sharma, "The Intel Microprocessors Architecture, Programming &amp; Interfacing" Pearson Education.</p> <p>7. Mohammad Raffiquazaman, "Microprocessor and Microcomputer Based System Design" Universal Book Stall, New Delhi.</p> <p>8. Uffenbeck, "The 8086/8088 Family –Design, Programming and Interfacing", Prentice Hall India.</p> <p>9. Barry B. Brey, "The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Pro Processor, Architecture, Programming and Interfacing", 4th Edition, PHI.</p> <p>10. Ajit pal, "Microprocessor principals and applications".</p>
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<b>Dr. Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-V	
<b>Code No.:</b> ETC303 <b>Teaching Scheme:</b> 04Hrs/week <b>Theory:</b> 03Hrs/week <b>Tutorial:</b> 01Hr/week <b>Credits:</b> 04	<b>Title:</b> Digital Communication <b>Class Test (Marks):</b> 20 <b>Theory Examination (Duration):</b> 03 Hrs <b>Theory Examination (Marks):</b> 80
<b>Prerequisites</b>	: Fourier series, Fourier transform, probability theory, Analog communication.
<b>Objectives</b>	: To study- <ul style="list-style-type: none"> <li>• Digital Communication Techniques.</li> <li>• Spread Spectrum Techniques.</li> </ul>
<b>Unit-I</b>	: <b>Digital Baseband Modulation Techniques and Waveform Coding Techniques:</b> Base Band System, Formatting Textual Data, Messages, Characters & Symbols, Formatting Analog Information, PCM, Uniform and Non Uniform Quantization, Baseband Modulation, Noise Consideration in PCM Systems, DPCM, DM,ADM. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-II</b>	: <b>Probability Theory:</b> Conditional Probability, Statistical Independence, Baye's Theorem, Joint distribution, Binomial, Poisson and Normal distribution, Probability of Stochastic Process, Information, Transmission on discrete Channel and Continuous Channel. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-III</b>	: <b>Random Process:</b> Introduction, Mathematical Definition of a Random Process, Stationary Processes, Mean, Correlation & Covariance Function, Ergodic Processes, Transmission of a Random Process Through a LTI Filter, Power Spectral Density, Gaussian Process, Noise, Narrow Band Noise, Representation of Narrowband Noise in terms of Phase & Quadrature Components. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-IV</b>	: <b>Digital Bandpass Modulation Techniques:</b> Introduction to OOK, FSK, PSK, BPSK, DPSK, MSK, QPSK, 16 bit QAM, Matched Filter. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-V</b>	: <b>Digital Bandpass Transmission:</b> Detection of Signals in Gaussian Noise, Coherent Detection, Non Coherent Detection, Complex Envelope. Error Performance for Binary Systems, M-ary Signaling & Performance, Symbol Error Performance for M-ary Systems for M= 2, 4,8,16. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-VI</b>	: <b>Spread Spectrum Techniques:</b> Pusedo-random Sequence, Direct Sequence Spread Spectrum, Block Details & mathematical treatment, Power Spectrum Density curves, Jamming margin and processing gain, Probability of Error, Frequency Hop Spread Spectrum, Applications of DSSS and FHSS. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Reference Books:</b>	: <ol style="list-style-type: none"> <li>1. Bernard Sklar, "Digital Communications fundamentals and Applications" Pearson Education, Second Edition.</li> <li>2. Simon Haykin "Communication Systems", John Wiley &amp; Sons, Fourth Edition.</li> <li>3. A.B Carlson, "Principles of communication systems", TMH, Third Edition.</li> <li>4. Taub Schilling, "Principles of Communication system", TMH, Fourth Edition.</li> <li>5. John G. Proakis, Masoud Salehi and Gerhard Bauch, "Contemporary Communication System using MATLAB", Cengage learning.</li> </ol>

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

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- 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.

<b>Dr. Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-V	
<b>Code No.: ETC304</b> <b>Teaching Scheme: 04Hrs/week</b> <b>Theory: 03Hrs/week</b> <b>Credits:04</b>	<b>Title: Electronic Circuit Design Technology</b> <b>Class Test (Marks): 20</b> <b>Theory Examination (Duration): 03 Hrs</b> <b>Theory Examination (Marks): 80</b>
<b>Prerequisites</b> :	Basic Electronics, Electronic component understanding, Network and lines.
<b>Objectives</b> :	To study and design <ul style="list-style-type: none"> <li>• Electronic product.</li> <li>• Basic electronic circuits and modern sensor</li> <li>• Motor driving concepts</li> <li>• Voltmeters and Ammeter</li> </ul>
<b>Unit-I</b> :	<b>Introduction to Electronics Design:</b> Design phase and Manufacturing phase, Component packages and symbols SMD, DIP <span style="float: right;"><b>[4 Hours]</b></span>
<b>Unit-II</b> :	<b>Design of Regulated Power Supply:</b> Concept of DC to DC converter, LM2576 voltage regulators, LM3352 Buck-Boost DC/DC converter. Power supply design using TL494, LM1117 family regulators, Design of constant current source using LM317 and LM334. Protection circuits for regulators. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-III</b> :	<b>Design of Electronic Voltmeters and Ammeter :</b> Basic DC voltmeter and ammeter, multi ranges voltmeters, DVM chip IC 7106/07 Based design of voltmeters and ammeter. <span style="float: right;"><b>[6 Hours]</b></span>
<b>Unit-IV</b> :	<b>Design of Motor &amp; Relay Drivers:</b> Design of Stepper Motor, Driver using MC3479, DC motor driver and speed control using PWM, Servo motor, BLDC motor, L293D, ULN2000 family of driver, Isolation techniques using Opto-coupler PC817, Concept of solid state relay. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-V</b> :	<b>Concept of Sensors:</b> Touch sensors: Capacitive, resistive. Motion sensors: Accelerometers, Gravity sensors, Gyroscopes, and Rotational Vector sensors. Environmental sensors: Humidity, Barometers, photometers, and thermometers. Position sensors: Orientation sensors and magnetometers. <span style="float: right;"><b>[8 Hours]</b></span>
<b>Unit-VI</b> :	<b>Noise Reduction Techniques:</b> Grounding Techniques, Shielding Techniques, Cabling Techniques, Origin of Conducted EMI, Common and Normal mode Noise, Noise from Power Electronic Systems, Noise Sources, Transient Disturbance. <span style="float: right;"><b>[8 Hours]</b></span>
<b>Unit-VII</b> :	<b>Product Design and Development:</b> Introduction, An overview of product development, Ergonomic & aesthetic design considerations, Enclosure sizing & supply requirements & materials for enclosure, Thermal management and its types. <span style="float: right;"><b>[8 Hours]</b></span>
<b>Unit-VIII</b> :	<b>PCB Designing:</b> Types of PCBs, selection criteria, Ground rules in PCB Design, Manufacturing process. <span style="float: right;"><b>[6 Hours]</b></span>

<b>Reference Books:</b>	:	<ol style="list-style-type: none"><li>1. Khetan And Goyal, "Monographs On Electronics Design", S.Chand Publications.</li><li>2. D.S. Mantri, "Electronics Circuit Design", Nikita Publication.</li><li>3. Application notes.</li><li>4. R.G.Kaduskar and V.B.Baru, "Electronic Product Design", Wiley India Pvt Ltd. ISBN, 9788126527427.</li><li>5. Dr. T.R. Sontakke and S.N. Talbar, "Electronic Circuit Design", Sadhu-Sudha Publications.</li></ol>
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**Section A:** Includes Unit I, II, III and IV; **Section B:** Includes Unit V, VI, VII and VIII.

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<b>Dr.Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-V	
<b>Code No.: ETC305</b> <b>Teaching Scheme: 04Hrs/week</b> <b>Theory: 03Hrs/week</b> <b>Tutorial: 01Hr/week</b> <b>Credits:04</b>	<b>Title: Digital Signal Processing</b> <b>Class Test (Marks): 20</b> <b>Theory Examination (Duration): 03 Hrs</b> <b>Theory Examination (Marks): 80</b>
<b>Prerequisites</b>	Signals and Systems, Basics of Mathematics.
<b>Objectives</b>	<ul style="list-style-type: none"> <li>• To introduce the concepts of Digital signal processing</li> <li>• To study Fast Fourier Transform (FFT) Algorithms.</li> <li>• To provide a thorough understanding and working knowledge of design, implementation, analysis and comparison of digital filters for processing of discrete time signals.</li> <li>• To study about the basics of DSP architecture and the features of TMS 320C50 processor and TMS 320C54 processor.</li> </ul>
<b>Unit-I</b>	<b>Review Of Signals And Systems:</b> Basic Elements of DSP Systems, Advantages of Digital Signal Processing over Analog Signal Processing, Analog to Digital and Digital to Analog Conversion : Discrete time signals, Discrete time systems, Analysis of discrete time systems, Analysis of Linear Time Invariant Systems, Classification of Discrete Time systems, block diagram and signal flow graphs, Structure for realization of IIR systems: Direct form I structure, Direct form II structure, Cascade form realization, Parallel form realization, Structure for realization of FIR systems, Fourier Transform of Discrete time signals, frequency response of LTI System. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-II</b>	<b>The Discrete Fourier Transform, It's Properties And Applications:</b> Frequency Domain Sampling and Reconstruction of Discrete Time Signals, The Discrete Fourier Transform ( DFT ) : The DFT as a Linear Transformation, Relationship of DFT to The Z Transform, Properties of The DFT : Multiplication of Two DFTs and Circular Convolution, Problems Based on DFT Properties Linear Filtering Methods Based on DFT, Filtering of Long Data Sequences : Overlap Add Method , Overlap Save Method, Fast Fourier Transform (FFT) Algorithms : Divide And Conquer Approach ,Radix 2 FFT Algorithms, Decimation in Time FFT, Decimation in Frequency FFT, Computation of Inverse DFT using FFT algorithms, Gortzel Algorithms. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-III</b>	<b>IIR Filter Design :</b> Infinite Impulse Response ( IIR ) Filters and Its Properties, Design of IIR Filters From Analog Filters : IIR Filter Design By Approximation of Derivatives, Impulse Invariance Method, Bilinear Transformation Method, The Matched Z- Transformation Specification of low pass filter : Design of Low pass Digital Butterworth Filter, Design of Low pass Chebyshev filter, Frequency Transformations in analog Domain, Frequency Transformations in Digital Domain. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-IV</b>	<b>FIR Filter Design:</b> Introduction, Symmetric And Anti symmetric FIR Filters, Stability of Optimal FIR Filters, Design Methods of FIR Filters: Design of Linear Phase FIR Filters Using Fourier series method, using Windows & Using Frequency Sampling Method. <span style="float: right;"><b>[10 Hours]</b></span>

<b>Unit- V</b>	:	<b>Finite Word Length Effects In Digital Filters:</b> Introduction Rounding and Truncating Errors, Quantization effects in Analog to digital Conversion of signals, Output Noise Power from a digital system, Coefficient quantization effect in Direct Form Realization of IIR filters, Coefficient quantization effect in Direct Form Realization of FIR filters, Limit Cycle Oscillations, Product quantization, Scaling, quantization Errors in the computation of DFT <b>Introduction To Multirate Signal Processing:</b> Introduction, Decimation by a factor D, Interpolation by a factor I, Sampling rate conversion by rational factor I/D. <b>[12 Hours]</b>
<b>Unit-VI</b>	:	<b>Introduction To DSP Processor :</b> Overview of Digital Signal Processors, Selecting Digital Signal Processors, Application of PDSPs, Computer architecture, Multiply Accumulate Unit(MAC), Pipelining, Overview of TMS320C54X Architecture of TMS320C54X. <b>[08 Hours]</b>
<b>Reference Books:</b>	:	<ol style="list-style-type: none"> <li>1. John G. Proakis and Dimitris G. Manolakis, "Digital Signal Processing, Principles, Algorithms, and Applications", 4th Edition, PHI, 2007.</li> <li>2. Sanjit K Mitra, "Digital Signal Processing: A Computer-Based Approach", 3rd Edition, McGraw- Hill.</li> <li>3. B.Venkataramani and M.Bhaskar, "Digital Signal Processors, Architecture, Programming and Application", Tata McGraw Hill, New Delhi, 2003.</li> <li>4. Salivahanan, Vallavraj and Gnanapriya, "Digital Signal Processing", Tata McGraw Hill.</li> <li>5. Rabiner and Gold, "Theory and Applications of Digital Signal Processing", Prentice Hall</li> </ol>

**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:**

- 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.

<b>Dr.Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) <b>Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester – V</b>	
<b>Code No.: ETC 306</b> <b>Teaching Scheme: 02Hrs/week</b> <b>Theory: 02Hrs/week</b> <b>Credits:02</b>	<b>Title: Microelectronics</b> <b>Class Test (Marks): 10</b> <b>Theory Examination (Duration): 02 Hrs</b> <b>Theory Examination (Marks): 40</b>
<b>Prerequisites</b>	: Semiconductor Theory, MOS Transistor.
<b>Objectives</b>	: <ul style="list-style-type: none"> <li>• To study microstructures in transistors.</li> <li>• To explore aspects of electronics at semiconductor physics level.</li> <li>• To provide information about big happenings in small structures.</li> </ul>
<b>Unit-I</b>	: <b>Review of Bipolar &amp; MOS Technology :</b> Basics of BJT & its technological structure, Parasitic effects in BJT's, Transistor Logic families, Basic MOS Transistor, VI characteristics of Depletion & Enhancement mode MOSFET, Overview of MOSFET Technologies – PMOS, NMOS, and CMOS. <b>[05 Hours]</b>
<b>Unit-II</b>	: <b>Introduction to IC Fabrication :</b> General classification of Monolithic Circuits, definitions of LSI, MSI, VLSI, Thermal aspect of Processing, production of masks, MOS & CMOS fabrication processes. <b>[05 Hours]</b>
<b>Unit-III</b>	: <b>Electrical properties of MOS Circuits :</b> Parameters of MOS transistor, Pass Transistor, NMOS Inverter, pull up to pull down ratio for NMOS inverter, CMOS inverter, MOS Transistor circuit model. <b>[05 Hours]</b>
<b>Unit-IV</b>	: <b>Basic Circuit Concepts :</b> 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. <b>[05 Hours]</b>
<b>Unit-V</b>	: <b>Design Processes :</b> MOS layers, Stick diagram, Lambda based design rules. <b>[05 Hours]</b>
<b>Unit-VI</b>	: <b>Circuit Simulation :</b> Introduction to Spice/Microwind, Device models, System design methodology & tools, case study on combinational circuits. <b>[05 Hours]</b>
<b>Reference Books</b>	: <ol style="list-style-type: none"> <li>1. Neil H. E. Waste, David Harris and Ayan Banerjee, "CMOS VLSI Design - A Circuits and Systems Perspective" Pearson Education, 3<sup>rd</sup> edition.</li> <li>2. Eshraghian, Douglas A. Pucknell and Eshraghian, "Essentials of VLSI Circuits and Systems" PHI publication.</li> <li>3. S.M. Sze, "VLSI technology".</li> <li>4. J. Millman and Grabel, "Microelectronics" Tata Mc Gaw Hill publication.</li> </ol>

**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. 3/2 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:**

- Minimum eight questions
- Four questions in each section
- 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.
- Two questions of 7 marks each from remaining questions from each section A and B be asked to solve.

<b>Dr.Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-V	
<b>Code No.: ETC321</b> <b>Teaching Scheme: 02Hrs/week</b> <b>Practical: 25 Marks</b>	
<b>Lab1:</b> <b>Title: Microprocessor &amp; Peripherals</b> <b>Teachers Assessment: 25 Marks</b> <b>Credits: 01</b>	
<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>• To enhance Programming Techniques of Microprocessor 8085 &amp; 8086.</li> <li>• To understand Microprocessor System Peripheral and Interface.</li> </ul>
<b>List of Practical</b>	<ol style="list-style-type: none"> <li>1. Study of 8085 Microprocessor Kit used in laboratory.</li> <li>2. Write a program to transfer a block of 10 bytes.</li> <li>3. Write a program to find largest/smallest numbers from the array.</li> <li>4. Write a program to multiply two 8- bit numbers.</li> <li>5. Write a program for data sorting in ascending and descending order.</li> <li>6. Write a program for Code conversions like Binary to gray/Binary to BCD</li> <li>7. Interfacing of 8255 study card with microprocessor 8085.</li> <li>8. Interfacing of 8253 study card with microprocessor 8085</li> <li>9. Interfacing of 8259 study card with microprocessor 8085</li> <li>10. Interfacing of LED with 8085 through 8255 in mode 1/mode2 8085</li> <li>11 .Interfacing of A/D converter with microprocessor 8085</li> <li>12. Interfacing of D/A converter with microprocessor 8085</li> <li>13. Study of 8086 Microprocessor Kit used in laboratory.</li> <li>14. Write a program to add and Subtract two 16- bit number using 8086.</li> <li>15. Write a program to multiply and divide two 16- bit number using 8086.</li> </ol>
<b>List of Reference Books</b>	<ol style="list-style-type: none"> <li>1. B. Ram, "Fundamentals of Microprocessor and Microcomputer", Dhanpat Rai and Sons.</li> <li>2. K.M.Bakwad and S.R.Patil, "Microcomputer Systems Microprocessor II".</li> </ol>
<b>List of Equipments /Instruments</b>	8085 kits, SMPS, Study cards, and 8086 kits.

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

<b>Dr.Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-V	
<b>Lab II:</b> <b>Title: Digital Communication</b> <b>Teachers Assessment: 25 Marks</b> <b>Credits: 01</b>	
<b>Code No.: ETC322</b> <b>Teaching Scheme: 02Hrs/week</b> <b>Practical: 25 Marks</b>	
<b>Course Objectives</b>	: To understand digital modulation techniques and digital communication systems.
<b>List of Practical</b>	: <ol style="list-style-type: none"> <li>1. Verification of sampling theorem.</li> <li>2. Study of PCM with uniform &amp; non uniform quantization, SNR measurement for PCM system with uniform quantization.</li> <li>3. Study of DM &amp; ADM Systems.</li> <li>4. Generation &amp; reception of BPSK &amp; its spectral analysis.</li> <li>5. Generation &amp; reception of ASK &amp; its spectral analysis.</li> <li>6. Generation &amp; reception of FSK &amp; its spectral analysis</li> <li>7. Generation &amp; reception of PSK &amp; its spectral analysis</li> <li>8. Generation &amp; reception of QPSK &amp; its spectral analysis.</li> <li>9. Generation &amp; reception of DPSK &amp; its spectral analysis.</li> <li>10. Spectral analysis of line codes.</li> <li>11. Simulation of any digital communication system using COMPSIM/MATLAB.</li> </ol>
<b>List of Reference Books</b>	: <ol style="list-style-type: none"> <li>1. Taub Schilling, "Principles of Communication system", TMH, Fourth Edition.</li> <li>2. John G. Proakis, Masoud Salehi, and Gerhard Bauch, "Contemporary Communication System using MATLAB", Cengage learning.</li> </ol>
<b>List of Equipments /Instruments</b>	: DSO, Trainer kits, Power Supply, Function Generator, and MATLAB Software.

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

<b>Dr.Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-V	
<b>Code No.:</b> ETC323	<b>Lab III:</b>
<b>Teaching Scheme:</b> 02Hrs/week	<b>Title:</b> Digital Signal Processing
<b>Practical:</b> 25 Marks	<b>Teachers Assessment:</b> 25 Marks
	<b>Credits:</b> 01
<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>• To understand Digital Signal Processing concept using MATLAB/C software</li> <li>• Study of Digital Signal Processor using Code Composer Studio</li> </ul>
<b>List of Practical</b>	<ol style="list-style-type: none"> <li>1. MATLAB/C based program to study discrete time system describe by difference equation.</li> <li>2. MATLAB/C based program to find N point DFT &amp; IDFT.</li> <li>3. MATLAB/C based program to calculate circular convolution.</li> <li>4. MATLAB/C based program to perform convolution using overlap save &amp; overlap add method.</li> <li>5. MATLAB/C based program to find the poles and zeros of transfer function.</li> <li>6. MATLAB/C based program to design Butterworth IIR lowpass filter.</li> <li>7. MATLAB/C based program to design Chebyshev lowpass filter.</li> <li>8. MATLAB/C based program to design &amp; implementation of IIR filter using bilinear transformation.</li> <li>9. MATLAB/C based program to design FIR filter using windowing technique.</li> <li>10. MATLAB/C based program to design FIR filter using frequency sampling method.</li> <li>11. MATLAB/C based program to study interpolation &amp; decimation.</li> <li>12. MATLAB/C based program to see the effect of down sampling &amp; up sampling in frequency domain.</li> <li>13. Familiarisation with C54X Code Composer Studio.</li> <li>14. Study of an IIR/FIR filter (LPF,BPF,HPF,BSF) design using DSP Simulator (C50/C54/C62X).</li> <li>15. Study of FFT implementation using DSP simulator (C54/C50/C64X).</li> </ol>
<b>List of Reference Books</b>	<ol style="list-style-type: none"> <li>1. Ingle, John G. Proakis, "Digital Signal Processing using MATLAB", Asia Edition, Tomson.</li> <li>2. Sanjit K Mitra, "Digital Signal Processing: A Computer-Based Approach", 3rd Edition, McGraw-Hill.</li> <li>3. Code composer studio reference manual.</li> </ol>
<b>List of Equipments /Instruments</b>	MATLAB/C Software, Digital Signal Processor hardware, 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

<b>Dr.Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-V <b>Lab IV:</b> <b>Title: Electronic Circuit Design Technology</b> <b>Teachers Assessment: 50 Marks</b> <b>Credits: 01</b>		
<b>Code No.:</b> ETC324		
<b>Teaching Scheme:</b> 02Hrs/week		
<b>Course Objectives</b>	:	<ul style="list-style-type: none"> <li>• Understand concepts of various circuits.</li> <li>• Estimate power requirement and circuit performance.</li> </ul>
<b>List of Practical</b>	:	<ol style="list-style-type: none"> <li>1. To design DC power supply using LM2576.</li> <li>2. To design DC power supply using TL494.</li> <li>3. To design constant current source using LM317 and LM334,</li> <li>4. To design DC voltmeter using ICL7106/7.</li> <li>5. To design stepper motor driver using MC3479.</li> <li>6. To design isolated relay driver board using ULN2003 and PC817.</li> <li>7. To design DC motor driver using L293D.</li> <li>8. Study of various sensors.</li> <li>9. To design battery charger for lead-acid battery.</li> <li>10. Study of relay switching noise and its effects on electronic system.</li> <li>11. To design enclosure and front panel of a consumer electronic product.</li> <li>12. PCB design.</li> </ol>
<b>List of Reference Books</b>	:	<ol style="list-style-type: none"> <li>1. Data sheets</li> <li>2. Texas Instrument www.ti.com</li> <li>3. National Semiconductor Manual</li> </ol>
<b>List of Equipments /Instruments</b>	:	Multimeter, PCB designing equipments, DSO, CRO, Connecting wires, Bread Boards, Electronic Components.

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

<b>Dr.Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-V	
<b>Lab V:</b> <b>Title: Seminar</b> <b>Teachers Assessment: 50 Marks</b> <b>Credits: 1</b>	
<b>Code No.: ETC325</b> <b>Teaching Scheme: 02Hrs/week</b>	
<b>Course Objectives</b>	: <ol style="list-style-type: none"> <li>1. To create awareness amongst pre final year students for latest technological Aspects</li> <li>2. To improve presentation and communication skills</li> <li>3. To inculcate qualities of team work and team spirit</li> <li>4. To motivate for research work in the respective areas</li> <li>5. To have common platform where interaction between various groups of students will take place on the various advanced and emerging topics of technology</li> <li>6. To improve skills related to search on the internet</li> <li>7. To realize importance of basic technological aspects</li> </ol>

#### Guidelines for students and faculty

1. Seminar topics may be chosen by the students with advice from the guide/Industry persons, which shall be finalized by guide and approved by concerned head of the department. Students are to be exposed to the following aspects of the seminar presentation.
  - a. Literature Survey / Review
  - b. Organization of the material
  - c. Preparing for presentation
  - d. Technical writing
2. Each student is required to-
  - a. Submit one page synopsis before the seminar talk for display on the notice board and
  - b. Give a 20 minutes presentation through OHP, PC, and Slide projector followed by a 10 minute question answer session.
3. For award of Sessional marks:
  - a. 25 marks - based on the assessment done by internal guide during semester and the involvement of student in the work assigned related to the seminar topic
  - b. Remaining 25 marks based on the examination at final presentation. Student is to be examined on the basis of an oral and written presentation by at least two examiners, one of them shall be guide and other as an external examiner appointed by the principal of the institute.

***Seminar Report Format***

1. The Seminar Report shall be typed on A-4 size white bond paper.
2. Typing shall be with spacing of 1.5 using one side of the paper.
3. Margins :-
  - (i) Left 37.5 mm.
  - (ii) Right, top and bottom 25 mm.
4. Binding: - Hard with golden embossing on the front cover of brown colour.
5. Front cover of hard bound report: - It should be identical to first title page.
6. Default font size TNR-12.
7. Format for title page (First Page) (Centre justified)

Report of Seminar (TNR-14, Bold)

In (TNR-12)

{Title}(TNR-18, Bold)

By (TNR-12)

{Name of student}(TNR-16, Bold)

(Roll No:     ) (TNR-12)

Submitted in partial fulfillment of the requirement for (TNR-12)

Degree of Bachelor of Technology (Branch Name) (TNR-14, Bold)

of (TNR-12)

Dr. Babasaheb Ambedkar Marathwada University,

Aurangabad. (TNR-14, Bold)

Department of \_\_\_\_\_ Engineering, (TNR-14, Bold)

Maharashtra Institute of Technology, (TNR-16, Bold)

Aurangabad. (TNR-14, Bold)

200- 200 (Academic Year) (TNR 14)

**Format for Certification page (Second page)****CERTIFICATE (TNR-16, Bold)**

This is to certify that the Seminar Report (TNR-12)

Submitted by (TNR-12)

(Name of Student) (TNR-14, Bold)

(Roll No: \_\_) (TNR-12)

Is completed as per the requirement of the Dr. Babasaheb Ambedkar Marathwada University,  
Aurangabad in partial fulfillment of (TNR-12)

Degree of Bachelor of Technology (Branch Name) (TNR-14, Bold)

For the academic Year 20\_\_ - 20\_\_(TNR-12)

(Name)	(Name)	(Name)
Guide	Head of Department	Principal (TNR -12, Bold)

8. The third page will be certificate issued by the industry regarding the completion of Seminar if applicable.
9. The fourth page would be for acknowledgement, which would be followed by index page (Fifth page).
10. Sketches should be drawn on separate sheet (minimum A4 size) and be inserted at proper places. The sketches should be drawn in black ink and be numbered.
11. Tables should preferably type in the text only.
12. The mathematical symbol should be typed or neatly written so as to match darkness of the text.
13. The last item on the index should be references.
14. Page number must appear on the right hand top corner of each page starting after index page.
15. The contents of the seminar can be decided by the internal guide / department and student.
16. Minimum number of copies = 5 Copies (Central Library + Department + Internal Guide + External Examiner + Student). The copy of External Examiner will be submitted by the student after completion of Seminar.

# SAMPLE COPY

**Report of Seminar**

in

**Remote Sensing through Satellite System**

by

**Mr. A.B.C**

(Roll No: T3103)

Submitted in partial fulfillment of the requirement for

**Degree of Bachelor of Technology (Electronics and Telecommunication Engineering),**

of

**Dr. Babasaheb Ambedkar Marathwada University**

**Aurangabad**

**Department of Electronics and Telecommunication Engineering,**

**Maharashtra Institute of Technology,**

**Aurangabad.**

**2013 - 2014**

# SAMPLE COPY

## CERTIFICATE

This is to certify that the Seminar Report

Submitted by

**Mr. A.B.C**

(Roll No: T3103)

Is completed as per the requirement of the Dr. Babasaheb Ambedkar Marathwada University,  
Aurangabad in partial fulfillment of

**Degree of Bachelor of Technology**

**(Electronics and Telecommunication Engineering)**

For the academic Year 201 -1

**(Name)**

**Guide**

**(Name)**

**Head of Department**

**(Name)**

**Principal**

**General Attributes**

- Chapter heading -All Capital—TNR 14 Font (Bold)
- Heading –All Capital- TNR 12 Font (Bold)
- Subheading–Title case- TNR12 Font (Bold)
- Text – TNR11 Font
- Title of the Report should not be more than two lines
- Page numbers are at right hand corner at ½ inch from right and top side.
- Page number should be allotted only from Chapter no. 1 onwards.

**References**

Last chapter of the report is references including the addresses of websites.

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

<b>Dr. Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-VI	
<b>Code No.: ETC351</b> <b>Teaching Scheme: 04Hrs/week</b> <b>Theory: 03Hrs/week</b> <b>Tutorial: 01Hr/week</b> <b>Credits: 04</b>	<b>Title: Microcontroller &amp; Embedded System.</b> <b>Class Test (Marks): 20</b> <b>Theory Examination (Duration): 03 Hrs</b> <b>Theory Examination (Marks): 80</b>
<b>Prerequisites</b>	: Digital electronics, Microprocessor based systems.
<b>Objectives</b>	: To study the fundamentals of microcontroller and embedded system.
<b>Unit-I</b>	: <b>Introduction to Microcontrollers &amp; Embedded Systems:</b> Introduction, Microcontrollers & Microprocessors, History of Microcontrollers & Microprocessors, Embedded versus External memory devices, 8 bit and 16 bit microcontrollers, CISC and RISC processor, Harvard and Von Neumann architectures, Commercial Microcontroller Devices, selection criteria of microcontroller, Embedded Systems, Embedded hardware units and devices in a system, embedded software in a system, examples of embedded systems, design process in embedded system, classification of embedded systems, Development phases of a microcontroller-based system, software development cycle and applications, software development tools, Emulator and In circuit Emulator, Target Board, Device Programmer. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-II</b>	: <b>Microcontroller 89C51:</b> Architecture, Pin description, Addressing Modes, Instruction Set, Programming & flash programming. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-III</b>	: <b>8051 Peripherals &amp; Communication Interfaces:</b> Interrupts, Timer & Counters, Ports, Serial Communication, serial communication interface RS232, 422, 485, I2C, CAN. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-IV</b>	: <b>Real World Interfacing:</b> Interfacing of LED, ADC, DAC, LCD, Keyboard, 8255, stepper motor, DC motor, Relays with 8051. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-V</b>	: <b>Programming Concepts and Embedded Programming in C:</b> 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. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-VI</b>	: <b>Real Time Operating System (RTOS):</b> Interprocess Communication and Synchronization of Processes, Tasks and threads, Clear-cut distinction between Functions, ISRs and tasks by their characteristics, Concept of Semaphores, Problems of sharing data by multiple tasks, Need of RTOS, features, categories, OS Services, Kernel, Process Management, Timer Functions, Event Functions, Memory Management, Device, File and IO subsystem Management, Interrupt Routines in RTOS Environment, RTOS Task Scheduling model, Interrupt Latency and Response times of the tasks, Introduction to Real time operating system Programming: Micro/OS-II, Embedded Systems in Automobile. <span style="float: right;"><b>[10 Hours]</b></span>

<b>Reference Books:</b>	: <ol style="list-style-type: none"> <li>1. Kenneth Ayala, "The 8051 Microcontrollers Architecture, Programming &amp; Applications", Penram International (India).</li> <li>2. Muhammad A Mazidi, "The 8051 Microcontroller and Embedded Systems", Pearson Education Asia, first Indian reprint, 2002.</li> <li>3. Frank Vahid and Tony Givargus, "Embedded System Design", Willey Publication.</li> <li>4. Raj Kamal, "Embedded Systems Architecture, Programming and Design", TMH 2nd Edition.</li> <li>5. Raj Kamal, "Microcontroller", 2nd Indian Print.</li> <li>6. Dr. K. V. K. K. Prasad, "Embedded Real Time Systems: Concepts, Design and Programming (Black Book)", Dreamtech Press.</li> <li>7. Ajay Deshmukh, "Microcontrollers: Theory and Applications", TMH Publication.</li> </ol>
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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/four units in the syllabus shall be divided in two equal parts i.e. 3/2 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.

<b>Dr. Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-VI	
<b>Code No.: ETC352</b> <b>Teaching Scheme: 04Hrs/week</b> <b>Theory: 03Hrs/week</b> <b>Tutorial: 01Hr/week</b> <b>Credits:04</b>	<b>Title: Information Theory and Coding</b> <b>Class Test (Marks): 20</b> <b>Theory Examination (Duration): 03 Hrs</b> <b>Theory Examination (Marks): 80</b>
<b>Prerequisites</b>	: Digital Communication, Matrix algebra.
<b>Objectives</b>	: <ul style="list-style-type: none"> <li>• To give inputs regarding Information Theory &amp; coding techniques.</li> <li>• Understand the structures of the code and appreciate the applications in signal processing.</li> <li>• To know the transform coding basics.</li> </ul>
<b>Unit-I</b>	: <b>Information Theory &amp; Source Coding:</b> Introduction, Information & Entropy, Probability & Markov models; Uniquely decodable codes, Prefix codes, Source Coding Theorem, Shannon Fanon, Huffman codes, optimality of Huffman Codes, Extended Huffman codes, adaptive Huffman codes, the Lempel-Ziv algorithm, Discrete Memory less Channel & Mutual Information. [12 Hours]
<b>Unit-II</b>	: <b>Channel capacity:</b> Channel Models, Capacity, Coding, Information, Capacity Theorem, Shannon Limit, channel capacity for MIMO system and random selection of Codes. [08 Hours]
<b>Unit-III</b>	: <b>Linear Block Code for Error Correction:</b> Basic definitions, matrix description, parity check code, decoding, and syndrome decoding, hamming code. [10 Hours]
<b>Unit-IV</b>	: <b>Cyclic Code :</b> Polynomials, matrix description, quasi-cyclic code, shortened cyclic code, burst error Correction, fire codes, Glory code, and CRC code. [10 Hours]
<b>Unit-V</b>	: <b>Convolution Codes:</b> Bose-Chaudhari Hocquenghem (BCH) code, Tree code, Trellis Codes, Viterbi decoding. [10 Hours]
<b>Unit-VI</b>	: <b>Cryptography :</b> Introduction, Overview, Operations, Algorithm, Data Encryption Standards, Symmetric Cryptography, Asymmetric Cryptography, Secure Communication Using Chaos Functions, Biometric Encryption. [10 hours]
<b>Reference Books:</b>	: <ol style="list-style-type: none"> <li>1. Ranjan Bose, "Information Theory, Coding and Cryptography", TMH.</li> <li>2. J. G. Proakis, "Digital Communication", MGH International: 4th Edition.</li> <li>3. Simon Haykin, "Communication Systems", 3E.</li> </ol>

**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. 3/2 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.

<b>Dr.Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-VI	
<b>Code No.:</b> ETC353 <b>Teaching Scheme:</b> 04Hrs/week <b>Theory:</b> 03Hrs/week <b>Tutorial:</b> 01Hr/week <b>Credits:</b> 04	<b>Title:</b> Antenna Theory <b>Class Test (Marks):</b> 20 <b>Theory Examination (Duration):</b> 03 Hrs <b>Theory Examination (Marks):</b> 80
<b>Prerequisites</b>	: Electromagnetic Engineering and Vector Analysis.
<b>Objectives</b>	: To study various types of practical antennas and plot its radiation pattern and its characteristics.
<b>Unit-I</b>	: <b>Fundamental Parameters of Antennas:</b> Introduction, Isotropic radiators, Radiation pattern, Gain, Directive gain, Directivity, Reciprocity theorem & its applications, effective aperture, radiation resistance, terminal impedance, noise temperature, elementary ideas about self & mutual impedance, front-to-back ratio, beam width, bandwidth, beam efficiency, beam area or beam solid angle, polarization, temperature. <b>[10 Hours]</b>
<b>Unit-II</b>	: <b>Linear Wire Antennas:</b> Current distribution of a thin wire antenna, Infinitesimal dipole, small dipole, finite length dipole, half wavelength dipole and ground effects. <b>Loop Antennas:</b> Introduction, Small circular loop antennas, circular loop of constant current, ground and earth curvature effects for circular loops, polygonal loop antennas <b>[08 Hours]</b>
<b>Unit-III</b>	: <b>Arrays: Linear, planar and circular: Two element array:</b> Radiation patterns of centre fed horizontal dipoles, Radiation patterns of vertical dipoles, Two-element uniform array, Uniform linear arrays, Field strength of a uniform linear array, First side lobe ratio (SLR), Broadside and End-fire arrays, Patterns of array of non-isotropic radiators, Binomial arrays, Effect of earth on vertical patterns, Effect of earth on radiation resistance, Methods of excitation, Impedance matching techniques, Transmission loss between transmitting and receiving antennas - FRIIS formula, Antenna temperature and signal-to-noise ratio. <b>[12 Hours]</b>
<b>Unit-IV</b>	: <b>Frequency independent Antennas:</b> Theory Log- Periodic antennas, Yadi Uda Antennas and apertures antennas. <b>Microstrip Antennas:</b> Rectangular patch antennas, circular patch, quality factor, bandwidth and efficiency, input impedance, coupling, circular polarization, arrays and feed network. <b>[10 Hours]</b>
<b>Unit-V</b>	: <b>Horn Antennas:</b> E and H- plane sectoral horn, pyramid horn, conical horn, corrugated horn, aperture matched horn, multimode horn and their aperture fields, radiated fields and phase centre. <b>[10 Hours]</b>
<b>Unit-VI</b>	: <b>Reflector Antennas:</b> Introduction, plane reflector, corner reflector, parabolic reflector, spherical reflector, front feed parabolic reflector and cassegrain feed parabolic reflector. Introduction to smart antennas <b>[10 Hours]</b>
<b>Reference Books:</b>	1. C. Balanis, "Antenna Theory: Analysis and design", Wiley India. 2. G.S.N. Raju, "Antenna and wave propagation", Pearson Education. 3. J.D.Krauss, "Antennas for all applications", 3rd Edition, TMH.

	4. Jordan and Balmain, "Electromagnetic wave & radiating systems", PHI Publication. 5. K.D. Prasad, "Antenna & Wave Propagation", Satyaprakash 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/four units in the syllabus shall be divided in two equal parts i.e. 3/2 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.

<b>Dr. Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-VI	
<b>Code No.: ETC354</b> <b>Teaching Scheme: 04Hrs/week</b> <b>Theory: 04Hrs/week</b> <b>Credits: 04</b>	<b>Title: VLSI Design</b> <b>Class Test (Marks): 20</b> <b>Theory Examination (Duration): 03 Hrs</b> <b>Theory Examination (Marks): 80</b>
<b>Prerequisites</b>	: Combinational and Sequential Circuit Design.
<b>Objectives</b>	: To study- <ul style="list-style-type: none"> <li>• Fundamental concepts in classical and modern digital circuits using design tools such as VHDL.</li> <li>• Programming of PLD's.</li> </ul>
<b>Unit-I</b>	: <b>Introduction to VHDL:</b> 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. <span style="float: right;"><b>[10Hours]</b></span>
<b>Unit-II</b>	: <b>VHDL Statements:</b> Sequential and Concurrent Statements, Assignment statements, Conditional statements, Array and loops, Resolution functions, Functions & Procedures, Packages & Libraries, Subprograms, Generics, Configurations, Attributes, Test Bench. <span style="float: right;"><b>[10Hours]</b></span>
<b>Unit-III</b>	: <b>Combinational &amp; Sequential Circuit Design:</b> VHDL models and simulation of combinational circuits such as adder, Subtractor, Multiplexer, Encoder, Decoders, Code converters, Comparators, Implementation of Boolean functions. VHDL model and simulation of sequential circuits, Shift registers, Counters etc. <span style="float: right;"><b>[10Hours]</b></span>
<b>Unit-IV</b>	: <b>Simulation &amp; Synthesis:</b> Fundamental of simulation, Simulation Process, Types of simulation, Simulation process types, Simulation and Simulators, Introduction to Synthesis, Design flow, Tools, Optimization, Model Optimization. <span style="float: right;"><b>[10Hours]</b></span>
<b>Unit-V</b>	: <b>Sequential Circuit Design:</b> State Diagram, Moore and Mealy state model, Synchronous and asynchronous FSM design, Basic Design steps, State Encoding techniques, Algorithmic state machines (ASM) charts. <span style="float: right;"><b>[10Hours]</b></span>
<b>Unit-VI</b>	: <b>Circuit Design &amp; Testability:</b> Introduction to Programmable Logic Devices: PAL, PLA, PLD, CPLD, FPGA. Need of design for testability, Introduction to fault coverage, Need of boundary scan check, JTAG technology, Test Access Port (TAP) controller. <span style="float: right;"><b>[10Hours]</b></span>
<b>Reference Books:</b>	1. J.Bhasker, "VHDL Primer", PHI 2. D.Perry, "VHDL", 2 <sup>nd</sup> 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", TMH 5. R.P.Jain, "Modern Digital Electronics" 3 <sup>rd</sup> Edition, TMH 6. 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/four units in the syllabus shall be divided in two equal parts i.e. 3/2 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.

<b>Dr.Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-VI <b>Elective-I</b>	
<b>Code No.: ETC391</b> <b>Teaching Scheme: 04Hrs/week</b> <b>Theory: 04Hrs/week</b> <b>Credits:04</b>	<b>Title: Radar &amp; Satellite Communication</b> <b>Class Test (Marks): 20</b> <b>Theory Examination (Duration): 03 Hrs</b> <b>Theory Examination (Marks): 80</b>
<b>Prerequisites</b>	: Communication Systems, Digital communication.
<b>Objectives</b>	: To study- <ul style="list-style-type: none"> <li>• Radar Basics.</li> <li>• Types of Radar</li> <li>• Orbital aspects</li> <li>• Satellite subsystems &amp; application.</li> </ul>
<b>Unit-I</b>	: <b>Introduction To Radar System :</b> Basic Principle, Block Diagram and Operation of Radar, Range Equation PRF's and Range Ambiguities, Applications of Radar. <span style="float: right;"><b>[ 6 Hours]</b></span>
<b>Unit-II</b>	: <b>Doppler Radar :</b> Doppler determination of Velocity, CW Radar and its limitations, FMCW Radar, MTI Radar, Delay Line can Cellars, blind speed and staggered PRF. <span style="float: right;"><b>[8 Hours]</b></span>
<b>Unit-III</b>	: <b>Scanning &amp; Tracking Techniques:</b> Various scanning methods such as Horizontal, Vertical, Spiral, Palmer, Raster and Nodding, Angle Racking Systems such as Load, Switching, Conical Scan, Mono Pulse Range Tracking System, Doppler Velocity Tracking Systems. <span style="float: right;"><b>[6 Hours]</b></span>
<b>Unit-IV</b>	: <b>Introduction to Satellite Communication:</b> Brief history, Elements of Satellite Communication, Orbital aspects, Kepler's Law, frequency bands used in Satellite Communication, procedure of locating the satellite in orbit, Geostationary & other orbits, Slant range & coverage area evaluation. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-V</b>	: <b>Satellite Sub System &amp; Satellite Launch:</b> Structure of a Satellite, Satellite Telemetry, Tracking & command sub systems Transponder Structure, Solar Panel design for Power Management, Attitude & Orbit control system, Satellite Stabilization three axis and Spin methods of Stabilization. Launch Vehicles, Launch Process, Pre Launch and Post Launch Operations. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-VI</b>	: <b>Earth Station:</b> Design aspects, Transmit Chain, and Receive chain LNA, HPA, losses in Satellite Communication. <span style="float: right;"><b>[6 Hours]</b></span>
<b>Unit-VII</b>	: <b>Satellite Access:</b> FDMA, TDMA and CDMA Techniques for multiple access construction, working and design aspects related to satellite link. <span style="float: right;"><b>[6 Hours]</b></span>
<b>Unit-VIII</b>	: <b>Satellite Applications:</b> VSAT System, Remote Scanning, Weather Forecasting, Satellite Phones, GPS System. <span style="float: right;"><b>[8 Hours]</b></span>

<b>Reference Books:</b>	:	<ol style="list-style-type: none"><li>1. Merrill Skolnik, "Introduction to Radar Systems", TMH publication.</li><li>2. Robert M. Gagliardi, "Satellite Communication", CBS Publication.</li><li>3. K.N. Raja Rao, "Fundamentals of Satellite Communication", PHI.</li><li>4. K.C. Gupta, "Microwave Engineering".</li><li>5. Pratt and Boston, "Satellite Communication", TMH.</li><li>6. W.L. Pritchard and R. Nelson, "Satellite Communication Systems", Pearson Publication.</li></ol>
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**Section A:** Includes Unit I, II, III and IV; **Section B:** Includes Unit V, VI, VII, VIII.

**Pattern of Question Paper:**

The six/four units in the syllabus shall be divided in two equal parts i.e. 3/2 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.

<b>Dr.Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-VI	
<b>Code No.: ETC392</b> <b>Teaching Scheme: 04Hrs/week</b> <b>Theory: 04Hrs/week</b> <b>Credits: 04</b>	<b>Elective - I</b> <b>Title: System Software and Operating System</b> <b>Class Test (Marks): 20</b> <b>Theory Examination (Duration): 03 Hrs</b> <b>Theory Examination (Marks): 80</b>
<b>Prerequisites</b>	: Computer Organization and concept of data structures.
<b>Objectives</b>	: To learn the various aspects of operating systems such as process management, memory management, and I/O management.
<b>Unit-I</b>	: <b>Assemble Language:</b> Introduction to assembly language, Description of functional characteristics, Addressing Modes, Data types and instruction structure, Registers, Indexing, Instruction set description Macros Recursive macros, Stacks, Procedures, Exception Handling. <b>[08 Hours]</b>
<b>Unit-II</b>	: <b>Assemblers and Macro Assemblers:</b> Overview of assembly process, Processing of imperative, declarative and assembler directive statements, Relocation, linking and loading concepts, One and two pass assembler, Symbol table organization, program sections, output forms. Macro-assembler Macro definitions and parameters, Macro call expansion, Macro definition and macro call within a macro, Conditional assembly macro-processor. <b>[10 Hours]</b>
<b>Unit-III</b>	: <b>Loaders and Compilers:</b> Review of Loading, Linking and Relocation, Absolute, Dynamic and Direct loading schemes, Program linking schemes and Resolution of external references, Optional features in loaders and linkage editors, Overlay structures and Dynamic Loading. Introduction to Compiler, Phases and Passes, Bootstrapping, Lexical analysis, Syntax analysis, Bottom-up and Top-down parsers, Translation, Code optimization, Code generation. <b>[12 Hours]</b>
<b>Unit-IV</b>	: <b>Operating systems :</b> Concepts of Batch-Processing, Multi-programming, Timesharing, Real-Time Operations, Resource manager view, Process view and Hierarchical view of an OS. 8.0 Memory Management Partitioning, Paging, Demand-paging, Page Replacement. <b>[08 Hours]</b>
<b>Unit-V</b>	: <b>Processor Management:</b> Multiprocessing and Interactive systems, Precedence graphs, Critical section problem, Semaphores, Producer consumer problems, Classical process coordination problems, Inter process communication, Conditional critical region, Concurrent languages, Deadlock principle, prevention, avoidance strategies. <b>[10 Hours]</b>
<b>Unit-VI</b>	: <b>Memory Management and I/O and File Management :</b> Memory Management requirements, Memory partitioning: Fixed ,dynamic, partitioning, Buddy System Memory allocation Strategies (First Fit, Best Fit, Worst Fit, Next Fit), Fragmentation, Swapping, Segmentation , Paging, Virtual Memory, Demand paging, Page Replacement Policies (FIFO, LRU, Optimal, clock) ,Thrashing, Working Set Model. I/O Management and Disk Scheduling: I/O Devices, Organization of I/O functions, Operating System Design issues, I/O Buffering, Disk Scheduling (FCFS, SCAN, C-SCAN, SSTF), Disk Caches. File Management: Overview, File Organization and access, File Directories, File Sharing, Security issues, Record Blocking, Secondary Storage Management. Comparative study of Windows and Linux file system. <b>[12 Hours]</b>

<b>Reference Books:</b>	<ol style="list-style-type: none"><li>1. William Stalling, "Operating Systems", Pearson Education 6<sup>th</sup> Edition.</li><li>2. Mialm Milenkovic, "Operating Systems Concepts and Design", TMGH.</li><li>3. Andrew S. Tanenbaun, "Modern Operating Systems", 3<sup>rd</sup> Edition.</li><li>4. John Donovan, "System Programming", TMGH.</li><li>5. M .J. Bach, "The Design of The Unix Operating System", PHI.</li><li>6. D.M Dhamdhere, "System Programming and Operating System", TMGH 2<sup>nd</sup> Edition.</li></ol>
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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/four units in the syllabus shall be divided in two equal parts i.e. 3/2 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.

<b>Dr.Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-VI	
<b>Code No.: ETC393</b> <b>Teaching Scheme: 04Hrs/week</b> <b>Theory: 04Hrs/week</b> <b>Credits:04</b>	<b>Elective-I</b> <b>Title: Neural Network and Fuzzy Logic</b> <b>Class Test (Marks): 20</b> <b>Theory Examination (Duration): 03 Hrs</b> <b>Theory Examination (Marks): 80</b>
<b>Prerequisites</b>	: Any High Level Language and digital system design concepts.
<b>Objectives</b>	: To gain knowledge of Neural network & fuzzy logic and apply it in engineering field.
<b>Unit-I</b>	: <b>Fundamental Concepts of Neural Networks:</b> Feed Forward and Feedback Networks, Learning Rules, Perceptron learning rule, Delta, Window-Hoff learning rule, Hebbian learning rule. Classification model, features and decision regions, training and classification using Discrete Perceptron, Algorithm, single layer continuous Perceptron Networks for linearly separable classification. [10 Hours]
<b>Unit-II</b>	: <b>Multilayer Feed forward network and single layered feedback network:</b> Linearly non separable pattern classification, delta learning for multi perceptron, generalized delta learning rule, error back propagation training, learning factors, basic concepts of single layer feedback network, Hopfield networks and training. [10 Hours]
<b>Unit-III</b>	: <b>Associative Memories and Self Organizing Networks:</b> Linear association, basic concepts of Recurrent Associative Memories, Storage Algorithm, Directional Associative memory, Architecture, Association Encoding and Decoding and Stability. Supervised learning and Unsupervised learning, Data Checking and validation. [10 Hours]
<b>Unit-IV</b>	: <b>Classical and Fuzzy Sets:</b> Overview of Classical Sets, Membership Function, a-cuts, properties of a-cuts, Decomposition, Theorem, Extension Principles, Compliment, Intersection, Unions, Combinations of Operations, Aggregation Operation. [10 Hours]
<b>Unit-V</b>	: <b>Fuzzy Arithmetic and Relations:</b> Fuzzy numbers, Linguistic Variable, Arithmetic Operations on Intervals and Numbers, Lattice of Fuzzy Numbers and Fuzzy Equation, Crisp and Fuzzy Relations, Projections and Cylindrical Extension, Binary Fuzzy Relations on Single Set, Equivalence, Compatibility and Ordering Relations, Morphisms, Fuzzy Relation Equations. [10 Hours]
<b>Unit-VI</b>	: <b>Fuzzy Logic and Applications of Fuzzy logic:</b> Fuzzy measures, De fuzzification Techniques, Basic Fuzzy Interference Algorithm, Application of Fuzzy Logic, Fuzzy System Design Implementation, useful tools supporting design. Applications in Soft Computing and Control System.[10 Hours]
<b>Reference Books:</b>	<ol style="list-style-type: none"> <li>1. Riza C. Berkan and Sheldon L. Trubatch, "Fuzzy systems Design Principles", Standard Publishers and Distributors. Delhi</li> <li>2. Abraham Kandel and Gideon Langholz, "Fuzzy Control Systems", CRC Press- Boca Raton</li> <li>3. J.S.R Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft computing", Prentice Hall of India. Pvt. Ltd; New Delhi</li> <li>4. Simon Haykin, "Neural Networks", Pearson Education.</li> <li>5. James A. Freeman and David M. Strapetuns, "Neural Networks" Prentice Hall.</li> <li>6. Bart Kosko, "Neural Network &amp; Fuzzy System", PHI.</li> </ol>

	7. Rajshekar & Pai, "Neural Networks Fuzzy Logic & Genetic Algorithms", Prentice Hall.
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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/four units in the syllabus shall be divided in two equal parts i.e. 3/2 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.

<b>Dr.Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-VI	
<b>Code No.:</b> ETC355 <b>Teaching Scheme:</b> 04Hrs/week <b>Theory:</b> 02Hrs/week <b>Credits:</b> 02	<b>Title:</b> Electronic Measurements <b>Class Test (Marks):</b> 10 <b>Theory Examination (Duration):</b> 02 Hrs <b>Theory Examination (Marks):</b> 40
<b>Prerequisites</b> :	Basic Instrumentation, Sensors and Transducers.
<b>Objectives</b> :	To study theory and applications of measurements of Electronic systems.
<b>Unit-I</b> :	<b>Qualities of Measurements:</b> Measurement and Error: Generalized Measurement System, Accuracy and Precision, Significant Figures, Types of Errors, Statistical Analysis, Probability of Errors, Limiting Errors. Definition and Classification of Transducers, Performance Characteristics, Static Characteristics, Dynamic Characteristics, Statistical Analysis, Standard, Electrical Standards. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-II</b> :	<b>Voltmeter, Ammeter &amp; Miliammeter:</b> DC Ammeter, Multirange Ammeters, Aryton Shunt, basic meter DC voltmeter, Multirange Voltmeter, TVM, True RMS meter, Multirange AC voltmeter, Digital Voltmeters and Multimeters, Automation in Voltmeters, Accuracy of DVM, Guarding Techniques. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-III</b> :	<b>Oscilloscope:</b> Block Diagram of Oscilloscope, Delay Line in Triggered Sweep, Dual Beam CRO, three method of Frequency Measurement and Phase Measurement by Lissajous method, Delayed Sweep, Digital Storage Oscilloscope, Power Scope, Curve Tracer, Analog, Digital Recorders. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-IV</b> :	<b>Signal Generators:</b> Fixed and Variable frequency AF oscillator, AF Sine and Square Wave Generator, Function Generator, Square and Pulse Generator, Random Noise Generator, TV Sweep Generator, Beat Frequency Oscillator, Standard Specifications of a Signal Generator. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-V</b> :	<b>Bridges and Measuring Instruments:</b> Wheatstone Bridge, Kelvin Bridge, Maxwell Bridge, Hay Bridge, Schering Bridge, Wien Bridge, Microprocessor controlled bridge, Sroboscope, Phase Meter, Vector Impedance meter, Q-meter, LCR bridge, RX Meter, Transistor Tester, Digital IC Tester , Spectroscope, Data Acquisition Cards and Plug-in Instruments, IEEE 488 based instruments. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Unit-VI</b> :	<b>Wave Analyzers:</b> Wave analyzer, Harmonic Distortion Analyzer, Spectrum Analyzer and Logic Analyzer; Construction and operation of Signal Analyzer, Measurement System Architecture. <span style="float: right;"><b>[10 Hours]</b></span>
<b>Reference Books:</b>	1. H.S. Kalsi, "Electronics Instrumentation", TMH 2 <sup>nd</sup> edition. 2. Oliver Cage, "Electronics Instrumentation Measurement", MGH. 3. Terman and Petit, "Electronics Instrumentation Measurement". 4. Dhir S.M, "Applied Electronics & Instrumentation", TMH. 5. Clyde F. Coombs, "Electronic Instruments Handbook", McGraw Hills

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

**Pattern of Question Paper:**

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**For 40 marks Paper:**

- Minimum eight questions
- Four questions in each section
- 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.
- Two questions of 7 marks each from remaining questions from each section A and B be asked to solve.

<b>Dr. Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-VI <b>Lab VI:</b> <b>Code No.: ETC371</b> <b>Teaching Scheme: 02Hrs/week</b> <b>Practical: 25 Marks</b> <b>Title: Microcontroller &amp; Embedded System</b> <b>Teachers Assessment: 25 Marks</b> <b>Credits: 01</b>	
<b>Course Objectives</b>	: To enhance Programming Techniques of 8 bit microcontroller and to understand System Peripheral and Interface.
<b>List of Practical</b>	: <ol style="list-style-type: none"> <li>1. Study of 8051 Microcontroller Kit used in laboratory</li> <li>2. Study of flash programming in Atmel 89C51</li> <li>3. Write a program for Addition, Subtraction of 8 bit numbers</li> <li>4. Write a program for Multiplication and division of 8 bit numbers</li> <li>5. Write a program for finding average of 5 numbers</li> <li>6. WAP to send characters "YES" to PC with baud rate of 9600 using Serial Communication using "C"</li> <li>7. Configure timer control register of 8051 and develop a program to generate given time delay using "C"</li> <li>8. Interface LED and Write a program for flashing of LED</li> <li>9. Write a program to generate the Ramp Waveform using DAC with microcontroller</li> <li>10. Write a program to interface the ADC</li> <li>11. Write a program to control a stepper motor in direction, speed and number of steps</li> <li>12. Write a program to interface LCD display</li> <li>13. Write a program to interface Keyboard</li> </ol>
<b>List of Reference Books</b>	: <ol style="list-style-type: none"> <li>1. Muhammad A Mazidi, "The 8051 Microcontroller and Embedded Systems", Pearson Education Asia, first Indian reprint, 2002.</li> <li>2. Ajay Deshmukh, "Microcontrollers: Theory and Applications", TMH Publication.</li> </ol>
<b>List of Equipments /Instruments</b>	: 89C51 D- Board, RIDE software, Crossware C compiler software, Flash Magic Software.

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

<b>Dr. Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-VI <b>Lab VII:</b>	
<b>Code No.:</b> ETC372	<b>Title:</b> Antenna Theory
<b>Teaching Scheme:</b> 02Hrs/week	<b>Teachers Assessment:</b> 25 Marks
<b>Practical:</b> 25 Marks	<b>Credits:</b> 1
<b>Course Objectives</b>	: To study various types of practical antennas and plot its radiation pattern and its characteristics
<b>List of Practical</b>	: <ol style="list-style-type: none"> <li>1. To study and plot the radiation pattern of monopole, dipole antenna.</li> <li>2. To study and plot the radiation pattern of Yagi –Uda antenna.</li> <li>3. To study and plot the radiation pattern of Log periodic antenna.</li> <li>4. To study and plot the radiation pattern of Helical antenna.</li> <li>5. To study and plot the radiation pattern of folded dipole antenna.</li> <li>6. To study and plot the radiation pattern of reflector antenna.</li> <li>7. To study and plot the radiation pattern of micro strip antenna.</li> <li>8. To study and plot parabolic antenna.</li> <li>9. To design and test Yagi -antenna using simulation software</li> <li>10. To design and test dipole antenna using simulation software.</li> </ol>
<b>List of Reference Books</b>	: <ol style="list-style-type: none"> <li>1. C. Balanis, Wiley, “Antenna Theory: Analysis and design”, India.</li> <li>2. G.S.N. Raju, “Antenna and wave propagation”, Pearson Education</li> </ol>
<b>List of Equipments /Instruments</b>	: Types of antennas, RF generators, dB meter, Spectrum analyzers, Digital Storage Oscilloscope.

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

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

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

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

<b>Dr.Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-VI <b>Lab VIII:</b>	
<b>Code No.:</b> ETC373	<b>Title:</b> VLSI Design
<b>Teaching Scheme:</b> 02Hrs/week	<b>Teachers Assessment:</b> 25 Marks
<b>Practical:</b> 25 Marks	<b>Credits:</b> 01
<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>• To emphasize on writing VHDL code for different circuits.</li> <li>• To simulate, Synthesize and Test the functionality of designed circuit on Hardware.</li> </ul>
<b>List of Practical</b>	<ol style="list-style-type: none"> <li>1. To write VHDL code for all logic gates.</li> <li>2. To write VHDL code for XOR gate using other basic gates.</li> <li>3. To write VHDL code for Half-Adder and Full Adder.</li> <li>4. To write VHDL code for Half Subtractor and Full Subtractor</li> <li>5. To write VHDL code for multiplexer and check the waveforms</li> <li>6. To write VHDL code for Demultiplexer and check the waveforms</li> <li>7. To write VHDL code for priority encoder and check the waveforms</li> <li>8. To write VHDL code for decoder and check the waveforms</li> <li>9. To write VHDL code for 4 Bit Binary to Grey code Converter and check the waveforms</li> <li>10. To write VHDL code for 4 Bit Binary to BCD Converter and check the waveforms</li> <li>11. To write VHDL code for 8 Bit parity generator and check the waveforms</li> <li>12. To write VHDL code for all Flip-flops and check the waveforms</li> <li>13. To write the VHDL code for decade counter/ binary counter and check the waveforms</li> <li>14. To write VHDL code for shift register and check the waveforms</li> <li>15. To write VHDL code for read and write operations of RAM.</li> </ol>
<b>List of Reference Books</b>	<ol style="list-style-type: none"> <li>1. J.Bhasker, "VHDL Primer", PHI</li> <li>2. D.Perry, "VHDL", 2nd Edition, McGraw Hill.</li> <li>3. Charles Roth, "Digital Design with VHDL", Thomson Learning, India Edition.</li> </ol>
<b>List of Equipments /Instruments</b>	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

<b>Dr.Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-VI	
<b>Elective - I</b> <b>Code No.: ETC374</b> <b>Teaching Scheme: 02Hrs/week</b>	<b>Lab IX:</b> <b>Title: Radar and Satellite Communication</b> <b>Teachers Assessment: 50 Marks</b> <b>Credits: 1</b>
<b>Course Objectives</b>	: To study Radar systems & analyze different parameters of satellite link.
<b>List of Practical</b>	: <ol style="list-style-type: none"> <li>1. Design and Performance analysis of Doppler Radar system.</li> <li>2. Design and Performance analysis of Radar Scanning and Tracking Systems.</li> <li>3. Satellite Communication Link design.</li> <li>4. Measurement of Base Band analog signal parameters in satellite link</li> <li>5. Measurement of signal parameters in analog FM/FDM TV Satellite link.</li> <li>6. Measurement of C/N Ratio.</li> <li>7. Measurement of S/N Ratio.</li> <li>8. Performance evaluation of Satellite MODEM.</li> <li>9. Measurement of Digital Base Band signal parameters in satellite communication link.</li> <li>10. To send the telecommand and to receive the telemetry data using CODEC.</li> <li>11. Structure of various INSAT &amp; ISRO satellite systems.</li> <li>12. Studies of CDMA Encoder and Decoder.</li> <li>13. Study of specifications of telemetry, tracking and command systems.</li> <li>14. Studies of Satellite Launch Vehicles.</li> <li>15. Study of satellite Earth station antenna system.</li> </ol>
<b>List of Reference Books</b>	: <ol style="list-style-type: none"> <li>1. Merrill Skolnik, "Introduction to Radar Systems", TMH publication.</li> <li>2. Robert M.Gagliardi, "Satellite Communication", CBS Publication.</li> <li>3. K.N.Raja Rao, "Fundamentals of satellite communication", PHI.</li> </ol>
<b>List of Equipments /Instruments</b>	: Satellite Trainer kit, DSO, Power Supply, Function Generator.

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

<b>Dr.Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-VI <b>Elective - I</b> <b>Code No.: ETC375</b> <b>Teaching Scheme: 02Hrs/week</b>		<b>Lab IX:</b> <b>Title: System Software &amp; Operating System</b> <b>Teachers Assessment: 50 Marks</b> <b>Credits: 01</b>
<b>Course Objectives</b>	:	To study various operations of Windows and Linux operating system.
<b>List of Practical</b>	:	1. Study of WINDOWS 2000 Operating System. 2. Administration of WINDOWS 2000 (including DNS,LDAP, Directory Services) 3. Study of LINUX Operating System (Linux kernel, shell, basic commands pipe & filter 4. Administration of LINUX Operating System. 5. Writing of Shell Scripts (Shell programming). 6. AWK programming. 7. Write a program to create a linked list & perform operations such as insert, delete, update, reverse in the link list using Linux 8. Write the program for implementation of a file and performing operations such as insert, delete, update a record in the file using Linux. 9. Write a program for implementing creating an directory and adding, deleting the directory. 10. Study of Linux operating system for creating partition in memory and formatting the system.
<b>List of Reference Books</b>	:	1. William Stalling, "Operating Systems", Pearson Education 6 <sup>th</sup> Edition. 2. Mialm Milenkovic "Operating Systems Concepts and Design", TMGH. 3. Andrew S. Tanenbaun "Modern Operating Systems", 3 <sup>rd</sup> Edition. 4. John Donovan, "System Programming", TMGH.
<b>List of Equipments /Instruments</b>	:	Operating system Linux, Windows 2000, XP professional.

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

<b>Dr.Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y. B. Tech. (Electronics and Telecommunication) Semester-VI <b>Elective - I</b> <b>Code No.: ETC376</b> <b>Teaching Scheme: 02Hrs/week</b>		<b>Lab IX:</b> <b>Title: Neural Network &amp; Fuzzy Logic</b> <b>Teachers Assessment: 50M</b> <b>Credits: 01</b>
<b>Course Objectives</b>	:	Implementation of Fuzzy Logic using Mat Lab
<b>List of Practical</b>	:	1. Write a program to test functioning of neuron with binary and continuous actuation function 2. Write a program to process data using feed forward network. 3. Write a program to process data using feedback network. 4. Write a program to study the effect of different network parameters on the performance of neural networks. 5. Write a program to generate different membership functions. 6. Write a program to perform different fuzzy operations like fuzzy relations. 7. Develop an experimental set up to control temperature of a water tub using fuzzy logic 8. Develop an experimental set up to control temperature of a water tub using neural network. 9. Study of supervised learning methods. 10. Study of Un supervised learning methods
<b>List of Reference Books</b>	:	1. Riza C. Berkan and Sheldon L. Trubateh, "Fuzzy systems Design Principles", Standard Publishers and Distributors, Delhi. 2. Abraham Kandel and Gideon Langholz, "Fuzzy Control Systems", CRC Press, Boca Raton. 3. J.S.R Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft computing", Prentice Hall of India. Pvt. Ltd; New Delhi. 4. Simon Haykin, "Neural Networks", Pearson Education
<b>List of Equipments /Instruments</b>	:	Simulation Software MATLAB, Lab-View.

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

<b>Dr. Babasaheb Ambedkar Marathwada University, Aurangabad</b> (Faculty of Engineering & Technology) Syllabus of T. Y.B. Tech. Semester-VI	
<b>Code No: ETC377</b>	<b>Title: Lab-X (Project-I)</b>
<b>Teaching Scheme: 2 Hrs Practical/TA (Internal)</b>	<b>Teachers Assessment : 50 Marks Credits: 01</b>
<b>Course Objectives</b>	: The practical implementation of theoretical knowledge gained during your study to till date is important for Engineering Education. The student should be able implement their ideas/real time industrial problem/ current application of their engineering branch which they have studied in curriculum. This will definitely help in building the confidence in the student what he has learnt theoretically. The dependent study of the state of the art topics in a broad area of his/her specialization.

**Guidelines for students and faculty:**

1. Students have to finalize their project title based on Industrial Assignments.
2. The projects selected should be such so as to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The term work will consist of a report prepared by the student on the project allotted to them.
3. Project topics may be chosen by the student or group of students (maximum 3 students) with advice from the faculty members.
4. To design a project at adequate scale level for the following applications- It may be based (i) Entirely on study and analysis of a typical Instrumentation and Control System, (ii) Experimental verification, or (iii) Design, fabrication, testing and calibration of an Instrumentation system. The software based project can be considered based on its application for instrumentation and control purpose. The students are required to submit the report based on project work done.
5. Use appropriate tools (Microsoft Word/Latex) for the preparation of the report.
6. Each student/group is required to-
  - c. Submit a one page synopsis before the project talk for display on the notice board in the first week of their academic semester.
  - d. Give a 10 minutes presentation through OHP, PC, and Slide projector followed by a 10 minute discussion in the second week of their academic semester.
  - e. Submit a report on the project topic with a list of required hardware, software or other equipment for executing the project in the third week of their academic semester.
  - f. Start working on the project and submit initial development and CPM/PERT planning drawing in the fourth week of their academic semester.
  - g. Preparation of PCB layout, wiring diagram, purchase of components, software demo, flowchart, algorithm, program/code, assembling, testing, etc. should be submitted by student/s within next five/Six weeks and minimum one page report should be there for each major activity.
  - h. Overall assembling, wiring, code writing, testing, commissioning, should completed within next two weeks.
  - i. At the last but one week of end of academic semester the internal assessment of project will be done by panel of internal faculties and they will decide marks out 25 marks for term work (TA).
  - j. In the last week, student/group will submit final project report to guide and thereafter guide will finalize marks out of the remaining 25 marks for term work (TA).

7. Projects are to be scheduled in the weekly scheduled time-table during the semester and any change in schedule should be discouraged.
  8. Every assigned faculty/s should maintain separate file for evaluating progress of each student or group.
  9. Award 50 TA, Sessional marks based on the assessment done by internal guide and panel during semester and the involvement of student/group in the work assigned related to the topic and its application.
10. The format and other guidelines for the purpose of the Project Submission in hard bound copies should be as follows,

- Report Structure

- Index/Contents/Intent

- List of Abbreviations

- List of Figures

- List of Graphs

- List of Tables

- and List of if any other inclusion

- 1. Introduction

- 2. Literature survey

- 3. System development

- 4. Performance analysis

- 5. Conclusions

- References

- Appendices

- Acknowledgement

## 1. INTRODUCTION

### 1.1 Introduction

- 1.2 Necessity

- 1.3 Objectives

- 1.4 Theme

- 1.5 Organization

## 2. LITERATURE SURVEY

Related information available in standard Books, Journals, Transactions, Internet Websites *etc.* till date (More emphasis on last three to five years)

## 3. SYSTEM DEVELOPMENT

Model Development

Analytical

Computational

Experimental

Mathematical

Statistical

(Out of above methods at least one method is to be used for the model development)

Some mathematical treatment or related information is required to be embodied

## 4. PERFORMANCE ANALYSIS

Analysis of system developed either by at least two methods depending upon depth of standard

These methods normally used are Analytical /Computational/Statistical/Experimental/ or Mathematical

Results at various stages may be compared with various inputs

Output at various stages with same waveforms or signals or related information/parameters

Comparison of above results by at least two methods and justification for the differences or error in with theory or earlier published results

## 5. CONCLUSIONS

5.1 Conclusions

5.2 Future Scope

5.3 Applications

Contributions (if any,)

The innovative work/invention/new ideas generated from the analysis of the work which can be taken from the conclusions

### References

Author, "Title", Name of Journal/Transactions/ Book, Edition/Volume, Publisher, Year of Publication, page to page (pp.\_\_\_\_).

These references must be reflected in text at appropriate places in square bracket

In case of web pages complete web page address with assessing date has to be enlisted

List of references should be as per use in the text of the report

### Appendices

Related data or specifications or referred charts, details computer code/program, *etc.*

(1 Page)

Expression of gratitude and thankfulness for helping in completion of the said task with name

Signed by the candidate

- General Guidelines

Text should be printed on front and correct side of the watermark on quality bond paper

Paper size- A4, 75 to 85 gsm paper

Left Margin-1.5"

Right Margin-3/4"

Top Margin-1"

Bottom Margin-1"

- First page of first chapter need not be printed anywhere ,second page onwards at right hand corner at ½ inch from right and top side from second chapter onwards starting page number of chapter should be printed at bottom center place report total pages –around.  
All Greek words must be italic

Report Heading -All Capital—16 Font

Chapter heading -All Capital—14 Font

Subchapter –title case-12 Font

Sub-Subchapter –First Alphabet Capital case-12 Font

Page numbers for Index/Contents/Intent should be in roman

Title of the Report should not be more than two lines

Text pages should be in times new roman

The page of the Index/Contents/Intent heading should be below the words for appropriate sub chapter or sub-sub chapter as shown in sample copy

Cover page should have (Mission statement of Institute) in inverted commas, Symbol of Institute, Name of Department, and Institute

Suitable flap with name of the candidate, Department and Institute name and symbol can be used with nylon strip.

*For more information and sample of hard copy please contact the respective Head of the Department*