DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

CIRCULAR NO.SU/Engg./S.Y.B.Tech./02/2017

It is hereby informed to all concerned that, the syllabi prepared by the Committees & recommended by the Dean, Faulty of Science & Technology, the **Academic Council at its meeting held on 20 & 21 June 2017 has accepted the following syllabi in accordance with Choice Based Credits & Grading System for all Branches S.Y.B.Tech** under the Faulty of Science & Technology as enclosed herewith.

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

This is effective from the Academic Year 2017-2018 and onwards.

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

University Campus,
Aurangabad-431 004.
REF.NO. SU/S.Y.B.TECH.2017/2173-84

Date:- 28-06-2017.

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Deputy Registrar,
Syllabus Section.

Copy forwarded with compliments to :-

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

Copy to :-

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

SCHEME AND DETAILED SYLLABUS

of

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

(w. e. f. academic year 2017-18)

FOUR YEAR DEGREE COURSE IN SCIENCE & TECHNOLOGY

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

FACULTY OF SCIENCE AND TECHNOLOGY
Revised Structure w.e.f.2017-2018
Second Year B.Tech. (Electronics and Telecommunication Engineering)

Course Code	SEMESTER-III	ContactHrs/Week				ExaminationScheme						
	Course	L	T	P	Total	CT	TH	TW	P	Total	Credits	Duration of Theory Exam
BSH201	EngineeringMathematicsIII	3	1	-	4	20	80	-	-	100	4	3Hrs
ETC202	Network and Lines	3	1	-	4	20	80	-	-	100	4	3Hrs
ETC203	Electronics Devices and Circuits	4	-	-	4	20	80	-	-	100	4	3Hrs
ETC204	Analog Communication	4	-	-	4	20	80	-	-	100	4	3Hrs
ETC205	Digital Electronics	4	-	-	4	20	80	-	-	100	4	3Hrs
ETC206	Data Structures	2	-	-	2	10	40	-	-	50	2	2Hrs
ETC221	Lab I: Electronics Devices and Circuits	-	-	2	2	-	-	25	25	50	1	
ETC222	Lab II: Digital Electronics	-	-	2	2	-	-	25	25	50	1	
ETC223	Lab III:Analog Communication	-	-	2	2	-	-	25	25	50	1	
ETC224	Lab IV:Network and Lines	-	-	2	2	-	-	50	-	50	1	
BSH225	Lab V:Development of Skills-II	-	-	2	2	-	-	50	-	50	1	
	TotalofSemester-III	**20**	**2**	**10**	**32**	**110**	**440**	**175**	**7**	**800**	**27**	

Course Code	SEMESTER-IV	ContactHrs/Week				ExaminationScheme						
	Course	L	T	P	Total	CT	TH	TW	P	Total	Credits	Duration of Theory Exam
BSH251B	EngineeringMathematicsI V	3	1	-	4	20	80	-	-	100	4	3Hrs
ETC252	Signals and Systems	3	1	-	4	20	80	-	-	100	4	3 Hrs
ETC253	Power Devices and Machines	4	-	-	4	20	80	-	-	100	4	3Hrs
ETC254	High Speed Analog Devices	4	-	-	4	20	80	-	-	100	4	3Hrs
ETC291-293	Programme Elective-I	4	-	-	4	20	80	-	-	100	4	3Hrs
ETC255	Electromagnetic Engineering	2	-	-	2	10	40	-	-	50	2	2Hrs
ETC271	Lab VI:High Speed Analog Devices	-	-	2	2	-	-	25	25	50	1	
ETC272	Lab VII:Power Devices and Machines	-	-	2	2	-	-	25	25	50	1	
ETC273	Lab VIII: Fundamentals of PLC Programming	-	-	2	2	-	-	25	25	50	1	
ETC274	Lab IX:Signals and Systems	-	-	2	2	-	-	50	-	50	1	
ETC275	Lab X:DOS-III Circuit Simulation Lab I	-	-	2	2	-	-	50	-	50	1	
	TotalofSemester-IV	**20**	**2**	**10**	**32**	**110**	**440**	**175**	**75**	**800**	**27**	
	GrandTotalofIII&IV									**1600**	**54**	

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

Programme Elective-I

ETC 291: OOPS using C++
ETC 292: Sensors and Measurements
ETC 293: Consumer Electronics

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Engineering & Technology)

Syllabus of S. Y. B. Tech. (All) Semester-III

Course Code: BSH201	**Course: Engineering Mathematics –III**
Teaching Scheme: 04Hrs/week	**Class Test: 20marks**
Theory: 03Hrs/week	**Theory Examination (Duration): 03 Hrs**
Tutorial: 01Hr/week	**Theory Examination (Marks): 80**
Credits:04	

Objectives	**:**	1. The contents aims to develop and apply the knowledge of the student in the direction of solving the practical problem of differential equation in the engineering and technology. 2. To develop Logical understanding of statistics. 3. To study the basic of Laplace transform.
Unit-I	**:**	**Linear Differential Equation**: Solution of linear differential equation of order n with constant coefficients: The complementary function, Method of finding particular integral: Short method, General method, Method of variation of parameters. Equations reducible to linear equations with constant coefficients: i) The Cauchy's linear equation. ii) The Legendre's linear equation. **(10 Hrs)**
Unit-II		**Application of linear differential equations to:** i) Mechanical system. ii) Electrical System iii) Beam and Shafts **(04 Hrs)**
Unit-III	**:**	**Vector Differentiation:** Differentiation of vectors, Radial, Transverse, Normal and tangential components of velocity and acceleration, Scalar and vector point function, Gradient of scalar point function, Divergence and curl of vector point function, Second order differentiation operator, Irrotational and solenoid fields. **(10 Hrs)**
Unit-IV	**:**	**Laplace Transform:** Definition, Laplace Transform of elementary function and its table, Theorem and properties of Laplace Transform: First shifting theorem, Second Shifting Theorem, Multiplication by t, Division by t, Change of scale property, Laplace Transform of integral, Laplace Transform of Derivative. Laplace Transform of some special functions: Periodic function, Heaviside Unit Step Function, Displaced Heaviside Unit Step Function Laplace Transform using Heaviside Unit function, Dirac delta function. Method to find inverse Laplace Transform: i. Use of Laplace Transform table ii. Use of Theorem and properties of Laplace iii. Use of partial fraction iv. Convolution theorem v. Use of development of Heaviside Unit Step Function Application of Laplace Transform to solve linear differential equation **(12 Hrs)**
Unit-V	**:**	**Fourier Transform**: Fourier integral: Complex form of Fourier integral, sine and cosine integral, Fourier transform and inverse transform. D.U.I.S. rule (only statement), Fourier transform and inverse transform for even and odd function, Fourier sine and cosine transform and inverse transform. **(7 Hrs)**

Unit-VI	**:**	**Statistics:** Measures of central tendency: Mean, Median, Quartiles and Mode. Measures of dispersion: Quartile deviation, Mean deviation, Standard deviation, coefficient of variation. **(5 Hrs)**
Reference Books:	**:**	1. A Text Book of Applied Mathematics Volume-III by P.N. Wartikar J.N.Wartikar, Pune Vidyarthi Griha Prakashan. 2. Advanced Engineering Mathematics by H. K. Dass, S. Chand and Co. Ltd. 3. Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers. 4. Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publishing Co. Ltd. 5. Solution to Higher Engineering Mathematics Volume –III by C. P. Gandhi

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

Pattern of Question Paper:

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

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Science& Technology)
Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-III

Code No.: ETC202 | **Title: Network & Lines**
Teaching Scheme:4 hrs / Week | **Class Test: 20**
Theory: 3 | **Theory Examination (Duration): 3 Hrs**
Tutorial: 1 | **Theory Examination (Marks): 80**
Credits:4

Objectives	**:**	1. To study various lumped and Distributed components of Networks and transmission lines 2. To understand different Network Theorems for analysis of AC networks. 3. To study and understand basic designing of different types of Networks and
Unit-I	**:**	**AC Network Theorems :** Voltage and Current laws (KVL/KCL). Network Analysis: Mesh, Super mesh, Node and Super Node analysis. Source transformation and source shifting. Network Theorems: Superposition, Thevenin's, Norton's and Maximum Power Transfer Theorem, Tellegen's Theorem and Duality theorem. **(12 Hrs)**
Unit-II	**:**	**Resonance** : Significance of Quality factor. Series Resonance: Impedance, Phase angle variations with frequency, Voltage and current variation with frequency, Bandwidth, Selectivity. Effect of Rg on BW & Selectivity. Magnification factor. Parallel resonance: Resonant frequency and admittance variation with frequency, Bandwidth and selectivity. General case: Resistance present in both branches. Comparison of series and parallel resonant circuits. **(04 Hrs)**
Unit-III	**:**	**Networks :** Networks: Classifications: Symmetrical and Asymmetrical networks. Properties of two port Network: (i) Symmetrical Networks (T and π only). Z0 and γ in terms of circuit components, open and short circuit parameters , Characteristic impedance of symmetrical networks, Properties of symmetrical networks (ii) Asymmetrical Networks: Image Impedance and Iterative Impedance (L-Section only), Half section (L-section). Introduction of ABCD parameters. Attenuators: Brief idea about Attenuators and its types with designing equations. Equalizers: Brief Idea about Equalizers and its types. (No Derivations) **(08 Hrs)**
Unit-IV	**:**	**Filters:** Filter fundamentals, Pass and stop bands, Characteristic impedance, Constant K low pass filter, Constant K high pass filter, m - derived T section, m -π derived Section, Variation of characteristic impedance over the pass band, Termination with m-derived half section, Band pass filters , Composite filter **(10 Hrs)**

Unit-V	**:**	**Basics of Transmission Line:** Different Types of transmission Lines, Parameters of Transmission lines and their implications, (including 300 ohms antenna feeder cable, 75 ohm coaxial cable), Brief of Transmission lines as cascade of T (T network). Primary and secondary constant and their relation, General solution of transmission lines, Physical significance of the equation and infinite line . Meaning of reflection coefficient, Wavelength and velocity propagation. Waveform distortion, Condition for minimum distortion , Distortion less transmission line, Reflection on a line not terminated by Z_o, Transfer impedance, Reflection factor and reflection loss, T & π section equivalent to lines. Introduction to modern transmission lines. **(8Hrs)**
Unit-VI	**:**	**The Line at Radio Frequencies:** Standing waves & standing wave ration on a line, VSWR, Relation between VSWR and voltage reflection coefficient , Quarter wave Line , The smith chart, Application of Smith chart, Single Stub matching & Double stub matching. **(06 Hrs)**
Reference Books:	**:**	1. Network , Lines and Fields by J.D. Ryder, Prentice Hall of India New Delhi, 2003 2. Network Analysis by M. E. Vanvalkanburg , Prentice Hall of India New Delhi, 2005 3. Transmission Lines and Networks by Umesh Sinha , Satya Prakashan , 5th Edition, 2007
Additional Reference Books	**:**	1. Ramo, Whineery and Van Duzer: "Fields and Waves in Communication Electronics" John Wiley. 2. M.E. Van Valkenburg,"An Introduction to Modern Network Synthesis",Wiley Eastern 3. W.H. Hayt & Jack E-Kemmerly," Engineering Circuit analysis" Tata McGraw Hill.

Section A: Includes Unit I, II and III;
Section B: Includes Unit IV, V and VI.
All units carry equal weightage

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.

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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.
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Dr.Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Science& Technology)

Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-III

Code No.: ETC 203	**Title: Electronics Devices and Circuits**
Teaching Scheme:	**Class Test: 20**
Theory: 04Hrs/week	**Theory Examination (Duration): 3hrs**
Credits:4	**Theory Examination (Marks): 80**

Objectives	**:**	Study solid state semiconductor devices in depth along with mathematical modeling of each, operation, characteristics and linear application of each device that plays an important role as a basic building block in electronic field.
Unit-I	**:**	**Bipolar Junction Transistor:** BJT Biasing and basic amplifier configurations: Need, types of biasing and its analysis, stability factors, bias compensation for different types of biasing circuits for BJT, its mathematical derivation. Bias compensation, thermal resistance **(8 Hrs)**
Unit-II	**:**	**Multistage Amplifier:** Concept of frequency response of amplifier, RC coupled amplifier, frequency response of an single stage Common Emitter RC coupled stage, bandwidth, cut off frequency, importance of half power point(3 dB level frequency), effect of emitter bypass capacitor and emitter resistor on frequency response, Multistage amplifiers, frequency response of two stage cascaded CE transistor stage. **(8 Hrs)**
Unit-III	**:**	**Hybrid Parameters:** Low frequency hybrid parameters, derivation of voltage gain, current gain, input impedance and output impedance. Comparison of hybrid parameters of all configurations (CB, CE, CC). **(8 Hrs)**
Unit-IV	**:**	**Power Amplifiers:** Classification of power amplifiers – Class A, Class B, Class AB, An overview and applications of Class C and Class D amplifiers. Class A with resistive load, Transformer coupled class A amplifier, Class B Push-pull, Class AB, Complementary symmetry and Quasi-complementary configurations. Efficiency analyses for Class A transformer coupled amplifier, Class B push-Pull amplifiers, Comparison of efficiencies of other configurations, Noise and distortion in amplifiers, concept of Total Harmonic Distortion (THD). Bootstrapping in complementary symmetry and bias compensation used in push pull amplifiers **(7 Hrs)**
Unit-V	**:**	**Field Effect Transistors:** An overview of different types of FETs viz. JFET, MOSFET, MESFET, Peculiarities of these types and their application areas. JFET: JFET V-I Characteristics, Transfer Characteristics (Shockley's Equation), Cut-off & Pinch-off voltages, Tran conductance, Input resistance & Capacitance. Drain to Source resistance, Universal JFET bias curve. Biasing arrangements for JFET – Biasing against device variation, biasing for zero current drift. JFET as voltage controlled current source. JFET data sheet specifications – IDSS. Vp, gm, rd, RDS or RD(ON)JFET Amplifiers: CS, CD, CG amplifiers, Their analysis using small signal JFET model. **(10 Hrs)**
Unit-VI	**:**	**MOSFETs:**

		N-MOS, p-MOS and CMOS devices. D and E-MOSFET characteristics & parameters, non ideal voltage current characteristics viz. Finite output resistance, body effect, sub threshold conduction, breakdown effects and temperature effects. MOSFET Biasing, Introduction to MOSFET as basic VLSI device, Power MOSFET : construction power MOSFET, VMOSFET drive requirement **(7 Hrs)**
Reference Books:	**:**	Integrated Electronics Millman and Halkais Electronic Devices and Circuits David Bell Electronic Devices Thomas Floyd Electronic Circuit Analysis and Design Donald Neamem
Additional Reference Books	**:**	Electronics Devices and Circuits Millman and Halkais Electronic Devices and Circuit Theory Bolystead and Nashelsky

Section A: Includes Unit I, II and III;
Section B: Includes Unit IV, V and VI.
All units carry equal weightage

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

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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(Faculty of Science& Technology)

Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-III

Code No.: ETC204	**Title: Analog Communication**
Teaching Scheme: 04Hrs/week	**Class Test (Marks): 20**
Theory: 04Hrs/week	**Theory Examination (Duration): 03 Hrs**
Credits:04	**Theory Examination (Marks): 80**

Prerequisites	**:**	Basic Electronics.
Objectives	**:**	1. To introduce the students with analog communication, AM, FM modulation techniques, their analysis, bandwidth calculations. 2. Introduction of electronic communication systems including transmitters and receivers. 3. It also focuses on the performance analysis of analog communicationssystems under the presence of noise and finally introduces the Analog pulse modulation techniques.
Unit-I	**:**	**Noise:** Elements of communication system, types, base band signals and base band transmission, transmitter and receiver block diagram, Need for modulation. Sources of noise, Types of noise White noise, shot noise, thermal noise, partition noise, low frequency or flicker noise, burst noise, avalanche noise, signal to noise ratio, SNR of tandem connection. Noise Figure, Noise Temperature, noise calculation in resistor, reactance& amplifier, signal to noise ratio, noise factor & noise temperature. (**8 Hours)**
Unit-II	**:**	**Amplitude Modulation:** Equation of AM wave, modulation index, average power, effective voltage & current for sinusoidal wave, frequency spectrum, and time and frequency domain signals, BW, phase representation of AM wave. Generation of AM: low level and high level modulation, AM transmitters, AM broadcast transmitters, SSB communication: balance modulators using diode, FETs and IC, suppression techniques. AM transmitters: Block of low level DSBFC, High level DSBFC, Evolution and descriptions of SSB, Suppression of carrier using balanced modulator, Suppression of unwanted sideband, Methods: Filter system, phase shift & third method Vestigial sideband(VSB). (**8 Hours)**
Unit-III	**:**	**AM Receiver:** AM Receivers: Types of receivers: Tuned Radio Frequency(TRF) , Super heterodyne, problems in TRF receivers, characteristics of Radio receivers: selectivity, sensitivity, fidelity, BW, dynamic range, tracking, image frequency and its rejection, double spotting, AM receivers Circuits: RF amplifiers, mixer stage, local oscillator, Intermediate Frequency amplifier, AM detectors, distortions in AM detectors, Automatics gain control: simple and delayed AGC. AM detection types: using diode, practical Diode detector, distortion in diode detector. Negative peak clipping & Diagonal clipping, Demodulation of SSB using: product demodulator & diode balanced modulator. **(8 Hours)**
Unit-IV		**Angle Modulation:** FM theory, characteristics of FM: modulation index, deviation ratio, frequency spectrum, bandwidth requirement, percentage modulation, FM modulators: FET reactance modulators, Transistor reactance modulators, FM with varactor diode, pre-emphasis, de-emphasis, Automatic frequency control, Introduction to phase modulation: indirect method of FM modulation, wide

		band and narrow band transmission. Advantages and disadvantages of FM transmission, comparison of AM and FM transmission. **(8 Hours)**
Unit-V		**FM Receiver:** FM receivers, block diagram, Various stages of FM receiver , RF amplifier, Mixer ,IF amplifier, limiters, , use of AGC & double limiting, FM demodulator ,slope detector, balance slope detector, foster Seeley discriminator, ratio detector, Quadrature detector, comparison of AM and FM detection ,noise triangle in FM ,capture effect. **(8 Hours)**
Unit-VI	**:**	**Pulse Modulation:** Introduction, Sampling theorem: Occurrence of aliasing error, Mathematical proof of sampling theorem, PAM: Generation of PAM, Channel BW for PAM, Natural Sampling,Flat-top Sampling, PAM and TDM signal recovery, Uses of PWM, Generation of PWM and PPM. **(8 Hours)**
Text Books:	**:**	**Text Books:** 1. George Kennedy, "Electronic Communications", McGraw Hill Kennedy. 2. Wayne Tomasi 'Electronics Communication System' -Fundamentals through Advanced.- Vth Edition- Pearson Education. 3. V. Chandra Sekar, "Analog Communication", OXFORD University press..
Reference Books		**Reference Books:** 1. B.P. Lathi, "Analog and Digital Communication", OXFORD University press.. 2. Simon Haykin, "An introduction to analog & digital communications", John Wiley &Sons. 3. R P Singh, S D Sapre 'Communication System-Analog & Digital' IInd Edition –Tata McGraw Hill Publication. 4. Blake"Electronic Communication Systems",2nd Edition CENGAGE learning. 5. Louis E. Frenzel, "Principals of electronic communication system", IIIrd Ed., TMH Publication.

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

Pattern of Question Paper:

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

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(Faculty of Science& Technology)

Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-III

Code No.: ETC205	**Title: Digital Electronics**
Teaching Scheme: 04Hrs/week	**Class Test (Marks): 20**
Theory: 04Hrs/week	**Theory Examination (Duration): 03 Hrs**
Credits:04	**Theory Examination (Marks): 80**

Prerequisites	**:**	Basic Electronics
Objectives	**:**	To Study 1.Number systems with its conversions 2.Boolean laws and its use in logic functions minimization 3.Combinational Circuits 4.Sequential circuits 5.Logic families
Unit-I	**:**	**Number system and coding techniques :** Introduction, Number systems: Binary, Octal, Decimal and Hexadecimal, and their Conversion methods, Signed Binary numbers : 1's and 2's complement representation, Binary Arithmetic, complement Arithmetic, Codes: BCD code, Excess-3 code, Gray code, Alphanumeric code, Error detecting and correcting code. **(08 Hrs)**
Unit-II	**:**	**Logic Gates, Boolean algebra and minimization techniques:** Introduction, Digital Signals, Basic Digital circuits: AND, OR, NOT, NAND, NOR, Exclusive-OR and Exclusive-NOR,Boolean Algebra, De-Morgan's theorems, Simplification using Boolean algebra, Standard representation for logical functions,SOP and POS form, Karnaugh map representation and minimization of logical functionsupto 4-variables, Don't care conditions, Quine Mc-Cluskyminimization technique. **(08 Hrs)**
Unit-III	**:**	**Combinational Logic Circuits:** Design Examples: Arithmetic Circuits, BCD - to - 7 segment decoder, Code converters: Binary to Gray code converter, Gray to Binary code converter, Adders and their use as subtractors, parallel adder , look ahead carry, BCD Adder, ALU, Digital Comparator, Parity, generators /checkers, Static and dynamic hazards for combinational logic, Multiplexers and their use in combinational logic designs, multiplexer trees, Demultiplexers and their use in combinational logic designs, Demultiplexer trees, decoder, encoder **(08 Hrs)**
Unit-IV		**Sequential Logic Circuits :** Bit Memory Cell, Clocked SR, JK, Master Slave J-K flip flop, D and T flip-flops, Excitation Table for flip flops. Conversion of flip flops, Application of Flip flops, Shift Registers: Introduction, Data formats, Register classification, buffer register, modes of operation of shift register, Bidirectional shift register, universal shift register, ring counter, Twisted ring counter **(08 Hrs)**
Unit-V		**Counters:**Ripple or asynchronous counter, modulus of counter, introduction to general purpose 74/54 series. Asynchronous ICs , cascading of ripple counter ICs, Synchronous counter, design principals, UP/DOWN counter , Introduction to general purpose 74/54 series synchronous ICs **(08 Hrs)**

Unit-VI	**:**	**Digital Logic Families** : Classification of logic families , Characteristics of digital ICs-Speed of operation , power dissipation, figure of merit, fan in, fan out, current and voltage parameters, noise immunity, operating temperatures and power supply requirements. TTL-operation of TTL NAND gate, active pull up, wired AND, open collector output, unconnected inputs. Tri-State logic, CMOS logic - CMOS inverter, NAND, NOR gates, unconnected inputs, wired logic, open drain output, Interfacing CMOS and TTL, Comparison table of Characteristics of TTL, CMOS, ECL, RTL, I2L, DCTL **(08 Hrs)**
Reference Books:	**:**	1. R.P.Jain,"Modern Digital Electronics",Tata Mc-Graw hill, Fourth Edition. 2. M. Marris Mano, Digital Logic and Computer Design, PHI, New Delhi, 2001 3. Malvino and Leach, Digital Principles and Application, TMH, New Delhi, 1995, 4th Edition 4. Anandkumar,"Fundamentals of Digital Circuits",PHI,Second Edition 5 W Gothman,"Digital Electronics",an introduction to theory and practice.

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

Pattern of Question Paper:

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

For 80 marks Paper:

1Minimum ten questions.

2. Five questions in each section.

3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.

4.Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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(Faculty of Science& Technology)

Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-III

Code No.: ETC206	**Title: Data Structures**
Teaching Scheme: 02Hrs/week	**Class Test (Marks): 10**
Theory: 02Hrs/week	**Theory Examination (Duration): 02 Hrs**
Credits:02	**Theory Examination (Marks): 40**

Prerequisites	**:**	Computer Fundamentals and Programming
Objectives	**:**	To study 1. C language and pointers in depth. 2.Useof pointers for data manipulation. 3 Data structures Concepts
Unit-I	**:**	**Introduction to Data structures** Introduction to Data Structures: Concept of data, Data object, Data structure, Abstract Data Types (ADT), Concept of Primitive and non primitive, linear and Non-linear, static and dynamic, persistent and ephemeral data structures. **(4 Hrs)**
Unit-II	**:**	**Searching and sorting techniques** Need of searching and sorting, why various methods of searching and sorting, Searching methods: Linear and binary search. Sorting methods : Bubble, insertion, selection, merge, quick, bucket, Time complexity of each searching and sorting algorithm. **(4 Hrs)**
Unit-III	**:**	**Linear data structures using sequential organization** Concept of sequential organization, Concept of Linear data structures, Concept of ordered list, Storage representations of ordered list such as row major, column major and their address calculation. **(4 Hrs)**
Unit-IV		**Linear data structures using linked organization** Concept of linked organization, Comparision with sequencial organization, Types of Linked List- singly linked list, doubly linked list, circular linked list. **(4 Hrs)**
Unit-V		**Stack and queues** Concept of Stack and Queue, circular queue, Implementation of stacks and queue **(4 Hrs)**
Unit-VI	**:**	**Tree and Graphs** Difference in linear and non-linear data structure, Trees and binary trees-concept and terminology, B-tree and B+tree , AVL -tree, Graph-concept and terminology **(4 Hrs)**
Reference Books:	**:**	1. R. Gilberg, B. Forouzan, "Data Structures: A pseudo code approach with C", Cenage Learning, ISBN 9788131503140. 2.Samirkumar bandhopadhay ,Kashnath Dey, "Data structures using C",Pearson publication 3.A.K.Sharma ,"Data structures using C" Pearson publication,ISBN 978-81-317-5566-2 4. Yashwant Kanitkar,"Let us C & Pointer in C",BPB Publication**.** 5. Aaron M. Tenenbaum, "Data structure using C",Pearson Publication

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

Pattern of Question Paper:

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

For 40 marks Paper:

- Minimum eight questions
- Four 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 six marks each. The Question no.1 and 6 should be of objective nature.

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

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(Faculty of Science and Technology)

Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-III

Code No.: ETC221	**Title: Electronic Devices and Circuits**
Teaching Scheme: 02Hrs/week	**Teachers Assessment (Marks): 25**
Practical (Marks):25	**Credits: 1**

Course Objectives	**:**	To study the practical aspects of semiconductor devices and circuits
List of Practicals (Not Less than 10)	**:**	1. Input, output and transfer characteristics of CE, CB, CC configuration. 2. Comparison of CB, CE and CC configuration in terms of h parameters. 3. To plot frequency responses of CE amplifier with and without emitter bypass resistor & capacitor. 4. To plot DC load line and derive Stability factor of voltage dividerbiasing circuit. 5. To plot frequency response of Class A, B push pull power amplifier. 6. To plot frequency response of Class C power amplifier. 7. Drain characteristics and transfer characteristics of JFET. 8. To find Av, Ri, and Ro of Common source JFET amplifier. 9. JFET biasing arrangement and plotting dc load line. 10. Drain characteristics and transfer characteristics of MOSFET. 11. Design test, simulate and build CE transistor circuit using circuit maker. 12. Design test, simulate and build CS FET, MOSFET circuit using circuit maker.
List of Reference Books	**:**	Integrated Electronics Millman and Halkais Electronic Devices and Circuits David Bell Electronic Devices Thomas Floyd Electronic Circuit Analysis and Design Donald Neamem
List of Equipments /Instruments	**:**	Function Generator, Cathode Ray Oscilloscope, Regulated Power Supply, Digital Multimeter, and experimental boards

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

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

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

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

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(Faculty of Science& Technology)

Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester- III

Code No.: ETC222	**Title: Digital Electronics**
Teaching Scheme: 02Hrs/week	**Teachers Assessment (Marks): 25**
Practical (Marks):25	**Credits: 01**

Course Objectives	**:**	To Study • Number systems with its conversions • Boolean laws and its use in logic functions minimization • Combinational Circuits • Sequential circuits • Logic families
List of Practical	**:**	1. Study of logic gates, verification by truth table. 2. Realization of half and full adder using gates. 3. Realization of half and full subtractor using gates. 4. Implementation of given Boolean function using logic gates in SOP& POS form 5. Design and realization of Binary to Gray code converter. 6. Design and realization of Gray to Binary code converter. 7. Design and implementation of BCD to seven segment decoder. 8. Study and Verification of multiplexer 9. Study and Verification of demultiplexer. 10. Study and verification ofJ-K, T and D Flip-flop. 11. Design and implementation of Asynchronous counter using IC's 12. Design and implementation of Synchronous counter using IC's
List of Reference Books	**:**	1. R.P.Jain,"Modern Digital Electronics",Tata Mc-Graw hill, Fourth Edition. 2. M. Marris Mano, Digital Logic and Computer Design, PHI, New Delhi, 2001
List of Equipments /Instruments	**:**	D.E. Kits, IC's and Connecting wires.

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

- assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term workmentioned above

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

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

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Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-III

Code No.: ETC223	**Title: Analog Communication**
Teaching Scheme: 02Hrs/week	**Teachers Assessment (Marks): 25**
Practical (Marks):25	**Credits: 01**

Course Objectives	**:**	• To develop the basics of Analog modulation and demodulation Techniques by practical demonstration. • To develop the basics of Analog pulse modulation and demodulation Techniques by practical demonstration.
List of Practical	**:**	1. To obtain Amplitude modulated Envelope and determine depth of modulation 2. To detect the AM waveform using AM diode detector .measure & observe its distortion. 3. To obtain Frequency modulated wave and measure frequency deviation modulation depth,. 4. Generation of single side band signal using balanced modulator and demodulation of SSB Using product detector. 5. To generate a FM Signal and measure Depth of modulation. 6. To Study Super heterodyne AM receiver and measurement of receiver parameters viz.sensitivity, selectivity & fidelity. 7. Study & prove sampling theorem. 8. To study & perform PAM and demodulation. 9. To study & perform PWM and demodulation. 10. To study & perform PPM and demodulation. 11. MATLAB Programs for, • Signal generation. • Noise effect on signal. • AM generation. • FM generation
List of Reference Books	**:**	1. George Kennedy, "Electronic Communications", McGraw Hill Kennedy. 2. Wayne Tomasi 'Electronics Communication System' -Fundamentals through Advanced.- Vth Edition- Pearson Education. 3. R P Singh, S D Sapre 'Communication System-Analog & Digital' IInd Edition –Tata McGraw Hill Publication.
List of Equipments /Instruments	**:**	AM and FM kits and its demodulators , SMPS, CRO, Superhertodyne transmitter and receiver, Function generators and PAM ,PWM and PPM generation kits and its demodulators 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 workmentioned above

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

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Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-III

Code No.: ETC224 **Title : Network and Lines**
Teaching Scheme: Practical **Teachers Assessment: TW (Marks)-50**
Practical/Term Work: 2Hrs /Week **Credits: 1**

Course Objectives	:	• To understand basics concept of Network Theory and Transmission Lines. • To perform practicals by applying knowledge of different laws/ Network Theorems and interpret the data. • To perform practicals by applying knowledge of resonance and interpret the data. • To perform practicals by applying knowledge of transmission networks / Transmission Lines and interpret
List of Practicals (Not Less than 10)		1. To Verify Superposition Theorem. 2. To Verify Reciprocity Theorem 3.To Verify Thevenins and Norton' Theorem. 4.To Verify Maximum Power Transfer theorem. 5.To plot Frequency response of series resonance circuit. 6.To plot Frequency response of parallel resonance circuit 7.To plot Frequency response of Low Pass filter. (Active/Passive) 8.To plot Frequency response of High Pass filter. (Active/Passive) 9.To plot Frequency response of band pass filter. (Active/Passive) 10.To measure input Impedance of Transmission Line. 11.To measure attenuation of Transmission Line. 12.To Calculate Phase displacement between the current & voltage at input of Transmission line.
Reference Books:		1. Network , Lines and Fields by J.D. Ryder, Prentice Hall of India New Delhi,2003 2. Network Analysis by M. E. Vanvalkanburg , Prentice Hall of India New Delhi, 2005 3. Transmission Lines and Networks by Umesh Sinha , Satya Prakashan , 5th Edition,2007
List of Equipments/ Instruments/Components		Bread Board, Active and passive components, cathode Ray Oscilloscope, Function Generators, CRO Probes, patch chords, Power supply, Multimeter, Ammeter, Voltmeter ,single stand wire/ multistand wire.

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

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Syllabus of S. Y. B. Tech. (All) Semester-III

Code No.: BSH225 **Title: Lab V: Development of Skills-II**
Teaching Scheme: Practical Termwork: 50 marks
Practical/Term Work: 2Hrs /WeekCredits: 01

Objectives	1.Students will be able to apply communicative English Grammar in communication. 2.Students will be able to enhance the level of English vocabulary. 3.Students will be able to pronounce and articulate words as well as sentences accurately. 4.Students will be able to understand and apply correct body language eventually. 5.Students will be able to develop life skills. 6.Students will be able to develop placeability skills and business correspondence.

	Sr. No.	**Section**	**Contents**	**Duration hrs**
List of Practical	1	English Communicative Grammar	Structure of sentences, types of sentences, clauses, grammatical common errors in English	4 hrs
	2	Vocabulary Building	Usage of words in sentences, common errors in spelling of words, synonyms, antonyms, phrases and idioms	2 hrs
	3	Phonetics	Syllables, Stress, intonation, pronunciation of words, phonetic transcription - conversion of words to phonetic symbols and from phonetic symbols to words, British and American English (basic difference in vocabulary, spelling, pronunciation and structure), non-verbal language.	4 hrs
	4	Non-verbal Communication (Body language)	Posture, gesture, eye contact, facial expression, proxemics, chronemics, appearance and symbols.	2 hrs
	5	Soft Skills	Personality development, self analysis through SWOT, Johari window, interpersonal skills, perception and attitude, values and ethics, career planning.	2 hrs
	6	Placeability Skills	Job application, resume writing, analytical and reasoning test, debate, group discussion, demo presentation and interview skills.	4 hrs
	7	Business Correspondence	Letter writing at work place (hard copy and soft copy), telephone and Email etiquette, report writing.	2 hrs

List of Reference Books	**Sr. No.**	**Title**	**Author**	**Publication**
	1	The Essence of Effective Communication	Adrian Budday, Ron Ludlow and Fergus' Panton	Prentice Hall of India-Private Ltd.
	2	Communicating in Style	Yateendra Joshi	The energy Resource

				Institute
	3	Effective Technical Communication	Anne Eisenberge	Mc Graw Hill International Editors
	4	Professional Communication Skills	A. K. Jain, Pravin, S. R. Bhatia, A. M. Sheikh	S. Chand & Company Ltd.
	5	Business Communication	Urmila Rai, S. M. Rai	Himalya Publishing House
	6	Developing Communication Skills	Krishna Mohan and Meera Banerjee	Macmillan India Limited
	7	Better English Pronunciation	J.D.O'Connor.	Cambridge Publication
	8	Professional Communication Skill	Pravil S.R. Bhatia, S.Bhatia	S. Chand & Co
	9	Living English Structure	Allan Walter	Pearson Education India
	10	Communication Techniques & Skill	R.K. Chadha	
	11	Technical Communication-Principles and Practice	Meenakshi Raman & Sangeeta Sharma	Oxford University Press
	12	A course in Phonetics & Spoken English	J.Sethi,P.V.Dharmatma	PHI publication
	13	Communication Skills for Engineers	Sunita Mishra, C. Murli Krishna	Pearson Education
	14	Communication Skills	Leena Sen	PHI
	15	Technical Communication A Reader Centered Approach	Paul V. Anderson	Thomson Publication
	16	Grammar of Spoken and Written English	Dauglas Biber, Geoffrey Leech	Longman
	17	A Practical English Grammar	A.J. Thomson & A.V. Martinet	Oxford University Press
	18	Oxford English Grammar	Sydney Greenbaum	Oxford University Press
	19	Developing Graduate Employability Skills: Your Pathway to Employment	Mercy V. Chaita	Universal Publishers

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.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty of Engineering & Technology)

Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-IV

Course Code: BSH251B	**Credits: 04**
Course: Engineering Mathematics -IV	**Class Test: 20 marks**
Teaching Scheme: 04 Hrs/week	**Theory Examination (Duration): 03 Hrs**
Theory: 03 Hrs/week	**Theory Examination (Marks): 80**
Tutorial: 01 Hr/week	

Objectives	**:**	1) To develop the mathematical skills of the student related to function of complex variable and Vectors. 2) To study and apply various types of transforms. 3) To provide Numerical techniques for solving the practical problem in engineering and technology.
Unit-I	**:**	**Function of complex variable** : Introduction , Analytic function ,Cauchy-Riemann equation in Cartesian and polar coordinates ,Harmonic function, orthogonal system, Integration in complex plane: Line integral, Contour integral, Cauchy's integral theorem, Cauchy's integral formula, Extension of Cauchy's theorem on multiply connected region, Singularities, Residues, Cauchy's residue theorem. (**12 Hrs)**
Unit-II	**:**	**Application of Complex Variable:** Evaluation of real integrals: Integration along unit circle and along the upper half semi-circle, Conformal Transformation, Bilinear transformation. (**5 Hrs**)
Unit-III	**:**	**Vector Integration:** Line integral, Surface integral, Gauss divergent theorem, Stoke's theorem, Green's theorem. (**7 Hrs**)
Unit-IV	**:**	**Numerical Method:** Solution of algebraic and transcendental equation, Newton Raphson method, Lagrange's interpolation, Solution of linear simultaneous equation by Gauss Elimination method, Gauss-Seidel method, Solution of ordinary differential equations: Taylor series method, Fourth order Runge-Kutta method.(**10 Hrs**)
Unit-V	**:**	**Probability** Introduction, Probability Distribution: Binomial Distribution, Poisson Distribution, Normal Distribution. **(6 Hrs)**
Unit-VI	**:**	**Z- transform :** Definition, Z-transform of elementary function, properties of Z-transform, Inverse Z-transform: Partial fraction method, inversion integral method (Residue method), Solution of Difference equation by using Z-transform. **(8 Hrs)**
Reference Books:	**:**	1. A Text Book of Applied Mathematics Volume-III BY P.N. Wartikar J.N.Wartikar, Pune Vidyarthi Griha Prakashan. 2. Advanced Engineering Mathematics BY H. K. Dass, S. Chand and Co. Ltd. 3. Higher Engineering Mathematics BY Dr. B. S. Grewal, Khanna Publishers. 4. Higher Engineering Mathematics BY B. V. Ramana, Tata McGraw-Hill Publishing Co. Ltd. 5. Solution to Higher Engineering Mathematics Volume –III BY C. P. Gandhi

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

Pattern of Question Paper:

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

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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(Faculty of Science & Technology)
Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-IV

Code No.: ETC252 | **Title: Signals and Systems**
Teaching Scheme: 04 Hrs/week | **Class Test (Marks): 20**
Theory: 03 Hrs/week | **Theory Examination (Duration): 03 Hrs**
Tutorial : 01 Hrs/week | **Theory Examination (Marks): 80**
Credits:04

Prerequisites	**:**	Knowledge of mathematical transforms.
Objectives	**:**	• To describe basic signals mathematically and understand mathematical operations on signals. • To understand systems classification, properties & apply skills to solve problems. • To understand the Fourier series & Transforms for representation of periodic and aperiodic signals. • To analyze systems in time & frequency domain by applying knowledge of Fourier and Z-Transforms.
Unit-I	**:**	**An introduction to Signals and Systems:** **Introduction to Signals:** Definitions of Signals, Continuous time signals & discrete time, Analog & Digital signals, Basic CT & DT signals: unit impulse, unit step, unit ramp, complex exponential & sinusoidal, sinc, rectangular, triangular and signum, Operations on signals: Time Scaling and Folding, Time Shifting, Amplitude Scaling, Addition, Multiplication, Classification of Signals: even & odd signals, periodic & non-periodic, energy & power, deterministic & non-deterministic **Introduction to Systems:** Definitions of Systems, System Representation, continuous time Systems & discrete Systems, system with and without memory (static and dynamic), causal and non-causal system, linear and non-linear system, Time-invariant and time-variant system, Stable and Unstable system, Invertible Systems**.** **(8 Hrs)**
Unit-II	**:**	**LTI Systems and Convolution:** **Linear time-invariant systems:** The representation of signals in term of impulses, discrete time LTI systems, continuous time-LTI systems, properties of CT- LTI and DT-LTI systems. **Convolution:** Convolution integral & its properties, convolution sum & its properties, Systems described by differential, difference equations, block diagram representation of LTI systems described by differential difference equations, Correlation- Autocorrelation and Cross-correlation of CT and DT signals, Correlation properties. **(8 Hrs)**
Unit-III	**:**	**Fourier Series for Continuous Time & Discrete Time Signals:** Continuous time Fourier series: Trigonometric and exponential Fourier series, Relation between trigonometric and exponential Fourier series. Discrete time Fourier Series, properties of Fourier series. **(8 Hrs)**
Unit-IV		**Fourier Transform:** **Continuous time Fourier Transform:** From Fourier series to Fourier Transform, Fourier Transform of arbitrary signals and standard signals. Properties of Fourier transform: linearity, time shifting, frequency scaling,

		time scaling, time reversal, duality, differentiation in time domain, convolution, multiplication and Parseval's relation**,** Energy Spectral Density(ESD), Power Spectral Density(PSD), ESD and PSD Properties, Relation of ESD and PSD to Autocorrelation**.** **(8 Hrs)**
Unit-V		**Z- transform:** Introduction of Z-transform, Relation between Laplace and Z-transform, ROC, properties of ROC, Unilateral Z-transform, properties of Z transform: linearity, time shifting, time reversal, time scaling, convolution, differentiation, multiplication, Parseval's theorem, initial value & final value theorem. Inverse Z-transform:long division method, Partial Fraction Expansion method. **(8 Hrs)**
Unit-VI	**:**	**Solution of Linear Constant Coefficient Difference Equation:** DT-LTI system representation using difference equation, Difference equation solving methods, Direct method, Solution of LCCDE by homogeneous solution and particular solution, Determination Impulse response, Transfer function (Poles & Zeros), Comment on stability and causality. **(8 Hrs)**
Reference Books:	**:**	1. A.V. Oppenheim, A.S. Wilsky, S.H. Nawab, *Signals* and *Systems*, Prentice Hall, 1997 2. Hsu, "Signals & system" (Schaum's outlines), Tata McGraw Hill 3. Ramesh Babu, "Signals & system", SciTech Publication 4. Simon Haykin, Barry Van Veen, "Signals & system", Wiley publication 5. Michael J. Roberts, "Fundamentals of signals & systems", Tata McGraw Hill

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

Pattern of Question Paper:

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

For 80 marks Paper:

1. Minimum ten questions.

2.Five questions in each section.

3.Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.

4.Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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(Faculty of Science&Technology)

Syllabus of S. Y. B. Tech. (Electronics & TelecommunicationEngineering) Semester-IV

Code No.: ETC 253 **Title: Power Devices and Machines.**

Teaching Scheme: 04 Hrs/week **Class Test (Marks): 20**

Theory: 04 Hrs/week **Theory Examination (Duration): 03 Hrs**

Credits: 04Theory Examination(Marks): 80

Course Objectives	**:**	1. To understand power devices with their application. 2. To understand concept of Thyristor triggering and commutation. 3. To understand the principles of operation of power electronic converters. 4. To study various basic AC and DC machines: construction, operation, characteristics, losses and advantages disadvantages.
Unit-I	**:**	**Power Electronic Devices** Construction, Principle of operation - Static and dynamic characteristics of Power diodes, SCR, TRIAC, DIAC, GTO, power BJT, power MOSFET and IGBT**.** **(8 Hrs)**
Unit-II	**:**	**Thyristor firing and Commutation Circuits:** **Thyristor firing Circuits:** Main features of firing circuits, Resistance and Resistance-Capacitance firing circuits, UJT relaxation oscillator. **Thyristor Commutation Circuits:** Class A Commutation : Load commutation, Class B Commutation : Resonant pulse commutation, Class C Commutation : Complementary commutation, Class D Commutation : Impulse commutation, Class E Commutation : External pulse commutation, Class F Commutation : Line commutation. **(8 Hrs)**
Unit-III	**:**	**Power Converters:** **Controlled Rectifier:** single phase semi converter and full converter with Resistive load and Inductive Load. **Choppers:** Basic principle of operation, Step up Chopper and Step down Chopper. **Inverters:** Single Phase and three phase bridge Inverter. **AC Voltage Controller:** Basic principle of operation of AC voltage controller. **Cycloconverter:** Basic Principle of operation Cycloconverter. **(8 Hrs)**
Unit-IV	**:**	**DC Generator:** Operating principal and Types, Construction, EMF equation, Armature reaction and Commutation, Characteristics, Losses, application, Power stages, Efficiency. **DC Motor:** Types, Back EMF,Voltage Equation, Torque equation, Characteristics, Starting and Speed control, application, Numerical Power stages, Efficiency, (Numerical treatment) **(8 Hrs)**
Unit-V	**:**	**Induction Motor** - Three phase Induction Motor-Operating principle, Construction, Squirrel cage and Slip ring type, Torque equation, Torque-slip Characteristics, Power stages, Speed control, Starting Methods ,efficiency. (Numerical Treatment) **Single phase Induction Motor** - Construction, Double field revolving theory, Torque/Speed Characteristics, Types – Capacitor start, Capacitor start-capacitor run, Shaded pole, split phase. **(8Hrs)**

Unit-VI	**:**	**Special Machines**: Working principle and application of Servomotor (DC and AC), Stepper motor (Variable reluctance type, permanent magnet type and Hybrid type). **Transformer**: Working Principle and Construction of Three phase Transformer- Various transformer connections (Y/Y, Y/Δ ,Δ/Y, Δ/Δ) (Only theoretical treatment**)** **(8 Hrs)**
Text Books	**:**	1. Power Devices – S.D. Valunjkar, Sarswati Prakashan 2. Electrical Machine – D. P. Kothari, I. J. Nagrath. Tata McGraw-Hill Education. 3.Electrical Machine -**S. K. Bhattacharya,**Tata McGraw - Hill Education, New Delhi;
Reference Book	**:**	1. Thyrister & their Application- M. Ramamurthy (PHI) 2. Power Electronics—M Rashid (Pearson Publication.) 3. Power Electronics –Dr. P .S. Bhimbra (Khanna Publication) 4. Power Electronics –P C Sen (PHI) 5. Electrical Technology Vol.I& II B.L.TherajaVol.I&II-- S.Chand. 6. ABC of electrical Engineering -- B.L.Theraja--- S.Chand. 7. Electrical Technology--- H.Cotton---Pitman & Sons London).

Section A: Includes Unit I, II and III;
Section B: Includes Unit IV, V and VI.
All units carry equal weightage.

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

For 80 marks Paper:
1. Minimum ten questions.
2. Five questions in each section.
3. Question No-1 from section A and Question No-6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for 10 marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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(Faculty of Science& Technology)

Syllabus of Second Year B. Tech. (Electronics and Telecommunication Engineering) Semester-IV

Code No.: ETC 254	**Title: High Speed Analog Devices**
Teaching Scheme: 04Hrs/week	**Class Test (Marks): 20**
Theory: 04Hrs/week	**Theory Examination (Duration): 3 hrs**
Credits: 04	**Theory Examination (Marks): 80**

Objectives		The physical world is inherently analog, indicating analog circuitry is needed to conditioning physical signals from transducers and then process and control it for various applications in high speed applications.
Unit-I	:	**Op- Amplifier Fundamentals:** Basic building blocks of op-amplifier, pin diagram of 741 IC, Op-amplifier parameters, inverting and non inverting configuration. Ideal characteristics on Op-amp, Linear Application of op-amplifier: Summing amplifier, difference amplifier, instrumentation amplifier, Schmitt trigger, comparator IC such as LM339, bandwidth and slew rate limitation, precision rectifiers and peak detector**.** **(8Hrs)**
Unit-II	:	**Non Linear Applications and phase lock loops:** sample and hold circuit, Analog to Digital and digital to analog conversion techniques, precision half wave & full wave rectifier, instrumentation amplifier, Phase lock loop IC 565 operating principle, locking capture range, applications of PLL : FM detector, Frequency synthesizer, AM detector. Voltage to Frequency converter, frequency to voltage converter **(8Hrs)**
Unit-III	:	**High Speed Operational Amplifiers:** Folded Cascode Voltage Feedback Op-Amps, Case study of AD847, Current Feedback Op-Amps (CFB), CFB model and Bode plot, study of AD8011, Comparison of specifications of Current feedback Op-amp family AD8001, AD8002, AD8009 and AD8073, Noise comparisons between VFB and CFB Op Amps, PSRR Characteristics. **(8 Hrs)**
Unit-IV	:	**High speed devices and circuits :** Requirements of high speed devices circuits and materials,Materials for high speed devices and circuits, high electron mobility transistors, Principle and operation and unique features of HEMT,Heterojunction bipolar transistors, principle of operation, benefits of hetero junction BJT for high speed applications **(8Hrs)**
Unit-V	:	**Applications of high speed systems:** Optimizing feedback network for maximum bandwidth fitness, driving capacitive load , cable drivers and receivers, high performance video line driver, Differential line drivers and receivers, high speed clamping amplifiers, Mixers, Power amplifiers, Linear drivers. **(8Hrs)**
Unit-VI	:	**High speed Data conversion overview :** Converter sampling rate, resolution, architectures, applications, Successive approximation ADCs, Pipelined ADCs, High speed ADC Applications in Software Radios, ADC Applications in video, ADC Applications in ultrasound **(8 Hrs)**
Reference Books:	:	Integrated Circuits — K.R Botkar Op Amps and Linear Integrated Circuits — Ramakant Gayakwad Operational Amplifier — G.B Clayton Intuitive operational amplifiers, Thomas Frederiksen, McGraw hill 1998

Additional Reference Books	:	Operational Amplifier Linear Integrated Circuits Coughlin, Driscoll Design with operational Amplifiers and Analog Integrated circuits Sergio Franco

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

Pattern of Question Paper:

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

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

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(Faculty of Science& Technology)
Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-IV

Code No.: ETC291 | **Title: Elective I OOPS using C++**
Teaching Scheme: 04Hrs/week | **Class Test (Marks): 20**
Theory: 04Hrs/week | **Theory Examination (Duration): 03 Hrs**
Credits:04 | **Theory Examination (Marks): 80**

Prerequisite	**:**	Basic knowledge of programming (C Programming).
Objectives	**:**	1. To Explore the Principles of Object Oriented Programming (OOP). 2. To Understand Object-Oriented Concepts such as Data Abstraction, Encapsulation, Inheritance & Polymorphism. 3. To Use the Object-Oriented Paradigm in Program Design. 4. To Lay a Foundation for Advanced Programming.
Unit-I	**:**	**Introduction To Object Oriented Programming:** **History & Features:** Need Of Object-Oriented Programming (OOP), Procedure Oriented Programming (POP) Versus Object Oriented Programming (OOP), Features of Object Oriented Paradigm– Merits & Demerits of OO Methodology. **Beginning With C++:** Keywords, Variables, Constants, Basic Data Types, Operator and Control Statements, Structure of C++ Program. **(08 Hours)**
Unit-II	**:**	**Classes & Objects:** Introduction, Class Specification, Member Function Specification, Access Specifiers, Creating Objects, Memory Allocations for Objects. Array of Objects, Object as Function Arguments. Static Data Members, Static Member Function, Friend Function. **(08 Hrs)**
Unit-III	**:**	**Constructors & Destructors:** Concepts of Constructors. Types of Constructors: Default Constructors, Parameterized Constructors, Copy Constructors. Overloaded Constructors: Multiple Constructors in a Class. Destructor: Special Characteristics, Declaration and Definition of a Destructor. **(08 Hrs)**
Unit-IV	**:**	**Inheritance: Extending Classes :** Introduction, Defining a Derived Class, Visibility Modes & Effects. Public And Private Inheritance. Types Of Inheritance: Single Inheritance, Multilevel Inheritance, Multiple Inheritance , Hierarchical Inheritance , Hybrid Inheritance, Abstract Class. **(08 Hrs)**

Unit-V	**:**	**Polymorphism:** Introduction, Types Of Polymorphism: Compile Time, Run Time Compile Time Polymorphism: Function Overloading, Operator Overloading: Overloading Unary Operators and Binary Operators, Rules for Operator Overloading. Run Time Polymorphism: Virtual Functions, Rules For Virtual Functions. **(08 Hours)**
Unit-VI	**:**	**Pointers and Exception Handling:** **Pointers:** Pointer Variables, Basic Memory Management, Dynamic Variables and Automatic Variables, Pointers as Call-by-Value Parameters. **Exception Handling:** Exception Handling, Principle of Exception Handling, Exception Handling Mechanism, Multiple Catch, Catching all Exceptions, Rethrowing the Exception. **(8 Hrs)**
Reference Books:	**:**	1. Herbert Schildt, C++ The CompleteReference, 4Th Edition, Tata Mcgraw Hill, 2004 2.E Balagurusamy, Object Oriented Programming With C++, 5Th Edition, Tata Mcgraw Hill. 3.Robert Lafore, Object Oriented Programming In C++, 4Th Edition, Pearson Education. 4.Saurav Sahay, Object Oriented Programming With C++, 3Rd Edition, , Oxford. 5.Y.Kanetkar, Let's C++, 5 Th Edition, BPB. 6.B. Stroustrup, C++ Programming Language, 3rd Edition, Pearson Education, 1997, ISBN 0 – 201 – 32755 – 4.

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.

Dr.Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Science& Technology)
Syllabus of S.Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-V

Code No.: ETC292 | **Title: Elective I Sensors& Measurements**
Teaching Scheme: 04Hrs/week | **Class Test (Marks): 20**
Theory: 04Hrs/week | **Theory Examination (Duration): 03 Hrs**
Credits:04 | **Theory Examination (Marks): 80**

Prerequisites	**:**	Knowledge of physical measurement quantities and electronic parameters
Objectives	**:**	To study- 1.Types of sensors (transducers) working principles,applicaions of sensing systems. 2.Theory & applications on measurements of Electronic systems.
Unit-I	**:**	**MEASUREMENT SYSTEM** Generalized Measurement System, Basic methods of measurement, Generalized scheme for measurement systems, Performance Characteristics, Static Characteristics, Dynamic Characteristics, Errors, Classification of errors, error analysis, Statistical methods, Calibration, system of Units and standards **(08 Hrs)**
Unit-II	**:**	**PHOTOELECTRIC AND PIEZO ELECTRIC SENSORS** Phototube, Photo Multiplier Tube (PMT), photovoltaic, photoconductive cells,photodiodes, phototransistor, comparison of photoelectric transducers, spectro-photometricapplications of photo electric transducers. Piezoelectric active transducer and biomedicalapplications as pressure & Ultrasound transducer **(08 Hrs)**
Unit-III		**DISPLACEMENT, PRESSURE, TEMPERATURE SENSORS** Strain Gauge**,** Gauge factor, unbounded strain gage,strain gauge as displacement & pressure transducers, capacitive transducer, inductive transducer, LVDT, RVDT, Passive types: RTD materials & range, relative resistance vs. temperature characteristics,thermistor characteristics, Active type: Thermocouple, Types of thermocouples **(08Hrs)**
Unit-IV	**:**	**MESURING DISPLAY AND RECORDING DEVICES INSTRUMENTS** **Measuring instruments**: Stroboscope,Q-meter RX Meter Phase Meter, Vector Impedance Meter **DisplayDevices:**Block Diagram of Oscilloscope, Digital storage oscilloscope, LCD monitor,**Signal Generator:**Function Generator, Random Noise Generator AF Sine and Square Wave Generator, , **Recording Devices**: servo recorders,photographic recorder, magnetic tape recorder, X–Y recorder, thermal recorder. **(08Hrs)**
Unit-V	**:**	**MEASUREMENT OF CURRENT, VOLTAGE, POWER AND ENERGY** DC Ammeter, Aryton Shunt meter, basic meter, DC voltmeter, Multirange Voltmeter, True RMS meter, Multirange AC voltmeter, DigitalMultimeters, Power measurement- Voltmeter ammeter method, Electrodynamicwattmeter , Low power factor wattmeter, Powermeasurement in poly-phase systems, Energy measurement – Single phase andpoly phase induction type energy meter , theory and adjustments –DC energy meter **(10 Hrs)**
Unit-VI		**SIGNAL CONDITIONING & SIGNAL ANALYSER** AC and DC Bridges – Wheatstone Bridge, Kelvin Bridge, Maxwell Bridge,

		Hay Bridge, Schering Bridge, and Wien Bridge**,** Pre-amplifier , impedance matching circuits , isolation amplifier, Spectrum analyzer, Wave analyzer (6**Hrs)**
Reference Books:	**:**	1. "A Course in Electrical and Electronics Measurements and"Instrumentation", 18th Edition by Sawhney A.K**,** , Dhanpat Rai & Company Private Limited, 2007. 2. "Electrical Measurements and Measuring" Instruments", 5th Edition, by Golding. E. W, and Widdis F.C, A. H. Wheeler & Company, 2003. 3. "Electronic Instrumentation", 2nd Edition, Kalsi H. S, Tata McGraw Hill Company, 2004. 4. "Modern Electronic Instrumentation and Measurement Techniques", 5th Edition, Copper. W.D and Hlefrick.. A.D, Prentice Hall of India, 2002. 5. Measurement systems, Application and Design, 5th edition, Ernest o Doebelin and Dhanesh N Manik, McGraw-Hill, 2007. 6. "Transducer Engineering", Renganathan. S, Allied Publishers, Chennai, 2003. 7. "Measurement Systems – Applications and Design" Doebelin. E.A, Tata McGraw Hill, New York, 2000. 8. "Sensors and Transducers", Patranabis. D, Prentice Hall of India, 1999. 9. "Principles of Measurement Systems", III Edition, John. P, Bentley, Pearson Education, 2000. 10. "Transducers and Instrumentation", Murthy.D.V.S, Prentice Hall of India, 2001.

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.

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(Faculty of Science and Technology)

Syllabus of Second Year B. Tech. (Electronics and Telecommunication Engineering) Semester IV

Code No.: ETC293	**Title: Elective I Consumer Electronics**
Teaching Scheme:04Hrs/week	**Class Test (Marks): 20**
Theory: 04 Hrs/ week	**Theory Examination (Duration): 03hrs**
Credits:04	**Theory Examination (Marks): 80**

Prerequisites	**:**	Knowledge of electronics components and devices.
Course Objectives	**:**	• To acquaint students with the knowledge of modern electronic system employed for audio video and domestic applications. • Knowledge of Consumer electronic systems and products and introduce the latest trends and technologies. • Understanding of different product compliance safety standards and techniques.
Unit-I	**:**	**Introduction toCommunication devices:** Mobile handsets, comparative study of mobile operating system like android, iOS, blackberry, Windows, Bada , introduction to mobile generations like 2G, 3G and 4G, EPABX, introduction of Wi-Fi, Li-Fi. **(08 Hrs)**
Unit-II		**Mass Communication devices:** Colour Television, Antenna, HDTV, LCD TV,LED TV, 3D Technology In TV Interactive TV, DTH TV, Plasma TV, Video Conferencing, FAX Machine, PA System, Dolby Digital Systems, Gesture Technology In TV. **(10 Hrs)**
Unit-III	**:**	**Household electronics devices:** Washing Machine, Microwave Oven, Types Applications, Electronics Weighing Balance, Air Conditioner, Vacuum Cleaner, ceiling Fan. **(06 Hrs)**
Unit-IV	**:**	**Printing and recording devices:** LASER printer, Inkjet Printers, thermal printer 3D printer Photocopiers, Scanner, USB, HDD, P. A. System. **(08 Hrs)**
Unit-V	**:**	**Special purpose machines:** Electronic Voting Machine, CFL, LED Lamps, Application and Advantages. Solar Lamp, Water Purifier, Electronic Calculator, ATM. Security devices: Biometric Attendance Monitoring System, Working, Biometric Sensors, Home Automation System. **(08 Hrs)**
Unit-VI	**:**	**Compliance :** Product safety and liability issues; standards related to electrical safety and standards related to fire hazards, e.g., UL and VDE. EMI/EMC requirements and design techniques for compliance, e.g. ESD, RF interference and immunity, line current harmonics and mains voltage surge. **(08 Hrs)**
Text Books	**:**	1.A. M. Dhake, "Television & Video Engineering"- TMH Publication. 2.R.G.Gupta, "Audio & Video Systems" 3.Arora C.P., "Refrigeration and Air conditioning", Tata McGraw-Hill, New Delhi,1994 4.S.P.Bali, "Consumer Electronics" Pearson Education

References e- books, e- Journals	**:**	1.S.P.Bali, "Colour TV Theory & Practice" –TMG Hill Publication 2.GeorgeKennedy," Electronic Communication Systems", TMH 3.Yi Bing Lin, "Mobile communications" Jon Wiley Publication.

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

Pattern of Question Paper:

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

For 80 marks Paper:

1. Set ten questions in all, with five questions in each section.
2. Question no. 1 from section A and Question no. 6 from section B should be made compulsory and should cover the entire course syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
3. Two questions of 15 marks each from remaining questions from each section A and B should be asked to solve.

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Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-II

Code No.: ETC255	**Title: Electromagnetic Engineering**
Teaching Scheme: 02 hrs / Week	**Class Test (Marks): 10**
Theory: 02Hrs/week	**Theory Examination (Duration): 2 Hrs**
Tutorial: Nil	**Theory Examination (Marks): 40**

Objectives	:	1. To introduce the basic mathematical concepts related to electromagnetic vector fields 2. To impart knowledge on the concepts of electrostatics and boundary conditions. 3. To get knowledgeabout magneto statics and Magnetic Boundary Conditions. 4. To study Maxwell's Equation for Static, Free space, Good Conductor, Time
Unit-I	:	**VECTOR ANALYSIS AND ELECTROSTATICS:** Vector algebra, Coordinate system: The Cartesian Coordinate system Circular Cylindrical Coordinates, Spherical Coordinate System, Coulomb's Law, Electric Field Intensity, Field of Point charge and n point Charges, Field due to a continuous Volume Charge Distribution, Field of Line Charge and infinite line charge, Field of a Sheet of Charge and infinite sheet charge , Gauss's Law, Diversion Theorem, Maxwell's First Equation. **(4 Hrs)**
Unit-II	:	**ENERGY AND POTENTIAL:** Energy Expended in Moving a Point Charge in an Electric Field, The Line Integral, Definition of Potential and Potential Difference, Work done, Equipotential Surfaces, The Potential Field of a Point Charge, The Potential Field of a Line charge and System Charges, Conservative Property, Potential Gradient, The Dipole, Energy Density in the Electrostatics Field **(4 Hrs)**
Unit-III	:	**CURRENT, CONDUCTORS, DIELECTRICS AND CAPACITANCE:** Current and Current Density, Continuity of Current, Conductor Properties , The Nature of Dielectric Materials, Boundary conditions, Method of Images, Concept of Capacitance , capacitance of Two Wire Line, capacitance of Coaxial Cable, Energy stored. Poisson's Equations and Laplace's Equations **(4 Hrs)**
Unit-IV	:	**THE STEADY MAGNETIC FIELD:** Concept of Magnetic field, Magnetic Flux - magnetic Flux Density and their relation, Biot-Savart Law, Ampere's circuital Law, Curl , Stokes's Theorem, Scalar and Magnetic Potentials, Magnetic Boundary Conditions **(4 Hrs)**
Unit-V	:	**TIME_VARYING FIELDS AND MAXWELL'S EQUATISON:** Faraday's Law, Displacement Current and conduction current, Maxwell's Equation in Point Form and Integral Form, Maxwell's Equation for static condition, Time Varying Field, Free Space, Good Conductor and Harmonically varying Fields in point form and Integral Form, The Retarded Potentials. **(4 Hrs)**
Unit-VI	:	**The Uniform Plane wave:** Plane wave and Uniform plane wave, General wave Equation, wave Equation in free space, relation between E and H in uniform plane wave (Free Space) , Wave propagation in Perfect Dielectrics (Lossless), Plane Wave in Lossy Dielectrics, Propagation in Good Conductor, Power Flow and Poynting Vector, The Poynting Theorem **(4 Hrs)**

Reference Books:	**:**	1. William H. Hayt and John A. Buck, "Engineering Electromagnetics□, Tata McGraw Hill 8th Revised edition, 2011. 2. Kraus and Fleish, "Electromagnetics with Applications□, McGraw Hill International Editions, Fifth Edition, 2010. 3. Ashutosh Pramanik, "Electromagnetism – Theory and Applications□, PHI Learning Private Limited, New Delhi, Second Edition-2009. 4. T.V.S. Arun Murthi, " Electromagnetic Fields", S Chand Publication, Revised
Additional Reference Books	**:**	1. Joseph. A.Edminister, „Schaum□s Outline of Electromagnetics, Third Edition (Schaum□s Outline Series), Tata McGraw Hill, 2010 2. Bhag Singh Guru and Hüseyin R. Hiziroglu "Electromagnetic field theory Fundamentals", Cambridge University Press; Second Revised Edition, 2009.

Section A: Includes Unit I, II and III;
Section B: Includes Unit IV, V and VI.
All units carry equal weightage

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

For 40 marks Paper:

1. Minimum eight questions
2. Four questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 7 marks each from remaining questions from each section A and B be asked to solve.

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Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-IV

Code No.: ETC271 **Title: High Speed Analog Devices**
Teaching Scheme:02hrs/week **Teachers Assessment (Marks): 25**
Practical (Marks): 25 **Credits: 1**

Course Objectives	:	To design, build and test the applications of real world
List of Practicals (Not Less than 10)	**:**	1. Op-Amp application as inverting and non inverting amplifier 2. Op- amp as Integrator 3. Op- amp as Differentiator amplifier 4. Op-Amp as Schmitt Trigger 5. Op-Amp as Comparator 6. Op-Amp as an Phase Lock Loop amplifier 7. Design and build Precision Half way and Full way Rectifier 8. Voltage to Frequency and frequency to voltage convertors 9. To study the characteristics of HEMT. 10. Instrumentation amplifier.
List of Reference Books	**:**	Integrated Circuits K.R Botkar Op Amps and Linear Integrated Circuits Ramakant Gayakwad Operational Amplifier G.B Clayton
List of Equipments /Instruments	**:**	Function Generator, Cathode Ray Oscilloscope, Regulated Power Supply, Digital Multimeter, and experimental boards

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

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

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

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

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Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-IV

Code No.: ETC272 **Title:** Power Devices and Machines
Teaching Scheme:02hrs/week **Teachers Assessment (Marks): 25**
Practical (Marks):25 **Credits: 1**

Course Objectives	:	1. This subject provides fundamental knowledge of power electronic devices, power electronic systems and Machines.
List of Practicals (Not Less than 10)	**:**	1. To plot V-I Characteristics of SCR/DIAC/TRIAC/MOSFET 2. To study SCR Triggering, Commutation circuits and observes the output. 3. To study Single phase controlled rectifier on various loads and observe the output. 4. To study chopper and observe the output. 5. To study inverter and observe the output. 6. To perform speed control of DC motor. 7. Reversal of speed for DC Motors. 8. To study DC motor starters. 9. Reversal of speed of three phases Induction motor. 10. To perform V/F Control by three phases Induction motor. 11. To Study of operation of Single phase Capacitor start Induction motor. 12.To Study of operation of Single phase Capacitor start-capacitor run Induction motor
List of Reference Books	**:**	1. Thyrister & their Application- M. Ramamurthy (PHI) 2. Power Electronics—M Rashid (Pearson Publication.) 3. Power Electronics –DR. R .S. Bhimbra (Khanna Publication) 4. Power Electronics –P C Sen (PHI) 5. Electrical Machines-- Nagrath Kothari--- TMH). 6.Electrical Technology Vol.I& II B.L.TherajaVol.I&II-- S.Chand 7.ABC of electrical Engineering -- B.L.Theraja--- S.Chand 8.Electrical Technology--- H.Cotton---Pitman & Sons London
List of Equipments /Instruments	**:**	Function Generator, Cathode Ray Oscilloscope, Regulated Power Supply, Digital Multimeter, and experimental boards

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

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

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

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

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Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-IV

Code No.: ETC273 **Title:** Fundamentals of PLC programming.

Teaching Scheme:02hrs/week **Teachers Assessment (Marks): 25**

Practical (Marks):25 **Credits: 1**

Course Objectives	:	To study the Fundamentals of PLC programming Languages and creating of control system on the basis of PLC, both theoretical and practical aspects of the topic.
List of Practicals (Minimum 10)	:	1. Study of PLC architecture. 2. Study of Basics of PLC programming and Ladder elements. 3. Study of Basic Introduction of switches,relays and Contactors. 4. Implement AND, NAND, OR, XOR, NOR and X-NOR function using PLC ladder. 5. Implement 4:1 MUX and D-MUX by using PLC ladder. 6. Implement a ON/OFF-DELAY timer by using PLC ladder. 7. Implement a UP-counter and down counter by using a PLC ladder. 8. Interface a DC motor and control through IR Sensor. 9. Make a ladder diagram to control the water level in a tank. 10. Interfacelimit switch, Temperature sensor, and proximity sensor. 11. Interface 3 phase AC motor with PLC. 12. Interface solenoid valve for control of Pneumatic. 13. Study of DCS(Distributed Control System).
List of Reference Books		1. "Programmable Logic Controllers" (English) 3rd Edition: by Frank Petruzella,Publisher:Tata McGrawhill. 2. **"**ProgrammableLogicControllers" *(*English*)* ***5th*** Edition**:**byGeorgeBolton**, Publisher:**ELSEVIERINDIA 3. **"**Introduction to **Programmable Logic Controller"** By Garry Dunning. 4.**"**ProgrammableLogicCircuits**"** by Frank D. Petruzella.TATA Mcgraw hill
List of Equipments /Instruments		PLC , Simulation Software, Sensors, Switches,AC/DCMotors etc.

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

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

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

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

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Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-IV

Code No.: ETC274 **Title: Signals and Systems Lab**

Termwork : 02 Hrs/week **Teachers Assessment (Marks): 50**

Credits: 01

Prerequisites	**:**	Knowledge of Engineering Mathematics and MATLAB software
Objectives	**:**	• To describe basic signals mathematically and understand mathematical operations on signals. • To understand systems classification, properties & apply skills to solve problems. • To understand the Fourier series & Transforms for representation of periodic and aperiodic signals. • To analyze systems in time & frequency domain by applying knowledge of Fourier and Z-Transforms.
List of Experiments (Not less than 10)	**:**	1. Study of different MATLAB commands used for Signals and Systems 2. MATLAB program to plot various CT signals such as unit impulse, unit step, square, triangular, sinusoidal, exponential, sinc etc. 3. MATLAB program to plot various DT signals signals such as unit impulse, unit step, square, triangular, sinusoidal, exponential, sinc etc. 4. MATLAB program to perform addition, substraction and multiplication of signals 5. MATLAB program to find even and odd parts of the signals 6. MATLAB program to calculate convolution between two DT signals by using 'conv' command. 7. MATLAB program to calculate convolution between two DT signals by using mathematical operators. 8. MATLAB program to calculate Autocorrelation and Crosscorrelation between two DT signals by using 'xcorr' command. 9. MATLAB program to calculate Autocorrelation and Crosscorrelation between two DT signals by using mathematical operators 10. MATLAB program to plot Magnitude and Phase response of first order system 11. MATLAB program to plot Magnitude and Phase response of second order system 12. MATLAB program to plot pole-zero plot for given transfer function of system 13. Any one application of Simulink 14. Generation of simple GUI.
Reference Books:	**:**	1.A.V. Oppenheim, A.S. Wilsky, S.H. Nawab, *Signals* and *Systems*, Prentice Hall, 1997 2.Hsu, "Signals & system" (Schaum's outlines), Tata McGraw Hill 3.Ramesh Babu, "Signals & system", SciTech Publication 4.Simon Haykin, Barry Van Veen, "Signals & system", Wiley publication 5.Michael J. Roberts, "Fundamentals of signals & systems", Tata McGraw Hill
List of Software,	**:**	MATLAB software, Desktop computer, Printer.

Equipments		

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 workmentioned above.

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Syllabus of S. Y. B. Tech. (Electronics and Telecommunication Engineering) Semester-IV

Code No.: ETC275 **Title: DOS IIICircuit Simulation Lab**
Teaching Scheme: 02Hrs/week **Teachers Assessment (Marks): 50**
Credits: 01

Course Objectives	**:**	• To learn various types of Passive and Active components, switches, connectors, relays and PCB design steps. • To learn Analog and Digital Circuit Design and simulation. • To learn the basic operation of MATLAB and Simulink.
List of Practical (Perform: Not Less than 10)	**:**	1. To Study of various types of Passive and Active components, switches, connectors, relays. 2. To Study of various types of PCB, layout and artwork techniques. 3. To study different windows of simulation software. 4. Design and simulation of any Analog Circuit using simulation software. 5. Design and simulation of any Digital Circuit using simulation software. 6. To study different windows of MATLAB. 7. To perform various arithmetic operations, matrices, array operations, functions using MATLAB. 8. To study various relational and logical operations, Complex and statistical functions , Numbers and strings using MATLAB 9. To study Flow control constructions in MATLAB 10. Introductions of Programming in MATLAB. 11. Introduction of MATLAB Simulink and Circuit simulation using MATLAB Simulink. 12. Miniproject using circuit simulation software and MATLAB
List of Reference Books	**:**	1.Testing Active and Passive Electronic Components by Richard Powell 2.The Printed Circuits Handbook by Coombs 3.Printed Circuit Boards: Design and Technology by Walter C Bosshart, McGraw Hill publishing company, New Delhi 4.Electronic Circuit & System Simulation Methods (SRE),Lawrence Pillage, McGraw Hill Professional 5.Matlab its Application in Engineering, Bansal / Goel/Sharma, Pearson. 6.Introduction to Matlab 7 ,Etter, Pearson
List of Equipments /Instruments	**:**	Software: MATLAB (Scilab**), Proteus , P-spice, Eagle/CADSTAR , Windows based i3 and 3 GB and more RAM configured Computer

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 workmentioned above

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

- The record of the experiments submitted by the candidate and viva -voce based on the syllabus