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ELECTRONICS AND COMMUNICATION ENGINEERING BRANCH

SCHEME OF INSTRUCTION AND EXAMINATION, w.e.f. 2019-2022

II/IV B.TECH - SEMESTER I

S.No.	Course Details		Category	Scheme of Instruction			Scheme of Examination		
	Code	Subject Name		Hours in a Week			Marks		Credits
				L	T	P	Internal	External	
1	EC 211	Electronic Devices	PC	3	0	0	40	60	3
2	EC 212	Digital Logic Design	PC	3	0	0	40	60	3
3	EC 213	Signals & Systems	PC	3	0	0	40	60	3
4	EC 214	Network Theory	PC	3	0	0	40	60	3
5	EC 215	Mathematics-III	BS	3	0	0	40	60	3
6	EC 216	Essence of Indian Traditional Knowledge	MC	2	0	0	100	0	0
7	EC 251	Electronics Devices Lab	PC	0	0	3	40	60	1.5
8	EC 252	Digital Logic Design Lab	PC	0	0	3	40	60	1.5
9	EC 253	Signals & Systems Lab	PC	0	0	3	40	60	1.5
10	EC 254	MATLAB	Skill Oriented Course	0	0	3	40	60	2
Total Credits									21.5

EC211 **ELECTRONIC DEVICES** **L T P M C**

3 0 0 100 3

UNIT I

THE PN JUNCTION DIODE: Basic Structure of the PN Junction, Biasing of PN Junction Diode, V-I characteristics of PN junction diode, Diode Current Equation, Effect of temperature on PN junction diodes, Static and Dynamic Resistances, Break Down of PN Junction Diode, Diffusion Capacitance, Transition Capacitance of The Diode, Diode Switching times, Piecewise Linear Diode Model.

UNIT II

BIPOLAR JUNCTION TRANSISTOR (BJT): Transistor Construction, Operation, Specification Sheet, Transistor Testing, Transistor Casing and Terminal Identification, Transistor Biasing, Operation of NPN and PNP transistor, Transistor as an Amplifier, Transistor configurations and their characteristics, Ebers Moll Model.

UNIT III

TRANSISTOR BIASING AND STABILIZATION: Need for Biasing, Operating Point, Load lines and Quiescent Point, Fixed Bias Circuit, Self Bias Circuit, Voltage Divider Bias Circuit, Collector to Base Bias Circuit Emitter Stabilized Bias Circuit, Bias Compensation using Diodes and Transistors Stabilization Factors, Stabilization against variations in VBE and β, Bias Compensation using Diodes and Transistors, Thermal Runaway, Thermal Stability, .

UNIT IV

JFET BIASING: Biasing Circuits for FET: Fixed Bias Circuit, Voltage Divider Bias Circuit, Self Bias Circuit, Graphical Solution for Self Bias.

MOSFET: Depletion MOSFET, Enhancement MOSFET, Comparison of BJT, JFET and MOSFET, Comparison of DMOSFET and EMOSFET, Biasing of MOSFET.

UNIT V

SINGLE STAGE AMPLIFIERS: Small Signal Low Frequency Amplifier Circuits: CE, CB, CC Amplifier Circuits, Small Signal Analysis of Junction Transistor: Analysis of CE, CB, CC using Hybrid Model, Analysis of CE Amplifier with Collector to Base Bias, Millers Theorem, Analysis of CE Amplifier with Emitter Resistance: Exact and Approximate Analysis.

TEXT BOOKS:

1. Jacob Millman, Christos C. Halkias, and Satyabrata Jit “Electronic devices and Circuits”, 2nd Edition TMH, 1998.

2. Donald A. Neamen, "Semiconductor Physics and Devices", 3rd edition, TMH,2003
3. Robert L.Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory, Tenth Edition, PEARSON Publications.

REFERENCE BOOKS:

1. S.Salivahanan, N.Suresh Kumar and A.Vallavaraju, "Electronic Devices and Circuits" 2nd Edition, 2008, TMH.
2. U.A.Bakshi and A.P.Godse "Electronic Devices and Circuits" 1st Edition, 2014, Technical Publications.

EC212	**DIGITAL LOGIC DESIGN**	**L**	**T**	**P**	**M**	**C**
		3	**0**	**0**	**100**	**3**

UNIT-I

NUMBER SYSTEMS AND CODES: Decimal, Binary, Hexadecimal Number Systems and their Conversions Arithmetic Additions Subtraction using the method of Complements, Multiplication and Division Codes: BCD, Excess-3, Gray and Alphanumeric Codes
BOOLEAN ALGEBRA: Boolean Expressions and Theorems, Logic Gates, Universal Gates, Canonical and Standard forms, Boolean functions, Simplification of Boolean functions using K maps, Minimal Functions and their properties, Tabulation Method NAND and NOR Implementations Two Level and Multi Level

UNIT-II

COMBINATIONAL LOGIC CIRCUITS: EX-OR EX-NOR Circuits, General procedure for combinational logic circuits, design and application of binary Adders and Subtractors, Comparators, Encoders, Decoders Multiplexers and Demultiplexers, Design of BCD to 7 Segment Decoder, Parity Generator and Checker, BCD Adder/Subtractor, Carry Look Ahead Adders

UNIT-III

SEQUENTIAL LOGIC CIRCUITS: Latches, characteristic table, characteristic Equation, Excitation Table, State table and State Diagrams for SR, JK, Master Slave JK, D and T flip-flops, Conversion from one type of Flip-Flop to another, shift registers, Analysis and Synthesis of Sequential Circuits, Sequence Generator, Sequence detector, Parity Generator
COUNTERS USING FLIP-FLOPS: Design of Ripple Counters, Synchronous Counter Up/Down Counters using Flip-Flops.

UNIT-IV

SYNCHRONOUS SEQUENTIAL CIRCUITS: Basic Design Steps, Sate Assignment Problem, Mealy State Model, Serial Adder Example, State Minimization, Design of a Counter using the Sequential Circuit Approach, FSM as an Arbiter Circuit, Analysis of Synchronous Sequential Circuits, ASM Charts, Formal Model for Sequential Circuits.

UNIT V

IC LOGIC FAMILIES: RTL, DTL, TTL, ECL and IIL families and their comparison

TEXT BOOKS:

1. M Morris Mano and Micael D. Ciletti, Digital Design, Pearson Education, 2008
2. Digital Principles and Design, Donald D. Givone, TMH, 20Cb

REFERENCE BOOKS

1. Thomas L. Floyd, Digital Fundamentals 7th Edition, Pearson
2. Charles H. Roth jr., Fundamentals of logic Design, Jaico publications, 1992
3. Taub and Schilling, Digital Integrated Electronics.

EC213	**SIGNALS & SYSTEMS**	**L**	**T**	**P**	**M**	**C**
		3	**0**	**0**	**100**	**3**

UNIT -1

SIGNAL ANALYSIS: Introduction to signals and systems, classification of signals and systems (both discrete and continuous), approximation of a function by a set of mutually orthogonal functions, evaluation of mean square error, orthogonality in complex functions, trigonometric and exponential Fourier series.

UNIT - II

FOURIER TRANSFORM

Representation of an arbitrary function over the entire interval: Fourier transform, Fourier transform of some useful functions, Singularity functions, Fourier transform of periodic function, some properties of Fourier transform, Energy density spectrum.

SIGNAL TRANSMISSION THROUGH LINEAR NETWORKS: Linear time- invariant system, Time response, Convolution and it's graphical interpretation, Causality and stability, Paley-Wiener criterion, Frequency response, Filter characteristics of linear systems, Conditions for distortionless transmission, Relation between bandwidth and rise time.

UNIT - III

SPECTRAL DENSITY AND CORRELATION: Energy and power spectral density, Properties, Auto-correlation and Cross-correlation functions, Properties of correlation function, Parseval's theorem.

SAMPLING THEOREM AND ITS IMPLICATIONS RECONSTRUCTION: ideal interpolator, Zero-order hold, First order hold, Aliasing and its effects.

UNIT-IV

LAPLACE TRANSFORM: The Laplace transform, Region of Convergence, the inverse Laplace transform, Properties of Laplace transform, problems.

UNIT -V

Z-transform: Z-transform, Region of Convergence, Properties of Z-transform, Inverse Z-transform

TEXT BOOKS:

1. B P Lathi, Signals, Systems and Communications, BSP, 2003
2. P.Z Peebles, Jr, Probability, random variables and random signal principles, TMH.
3. Simon Haykin, Signals and Systems, John Wiley, 2004

REFERENCE BOOKS:

1. A V Oppenheim, A S Wilsky and IT Young, Signals and Systems, PHI/ Pearson,2003
2. David K Cheng, Analysis of Linear Systems, Narosa Publishers, 1990.

EC214	NETWORK THEORY	L	T	P	M	C
		3	0	0	100	3

UNIT – I

Review of R, L, C and M(Mutual Inductance) and their V-I characteristics-dot rule-Energy Sources, Ideal, Practical and dependent sources and their V-I characteristics, Source transformation, Voltage and Current division; V-I characteristics of Passive elements and their series / parallel combination; Star Delta transformation.

Graph Theory: Introduction to Graph Theory, Tree, Branch, Link, Cutset and loop matrices, relationship among various matrices and parameters, Mesh and Nodal Analysis for DC circuits. Formulation of mesh & nodal equations involving are R,L,C and M.

UNIT – II

Review of sinusoidal analysis: Phase relation in pure resistor, Inductor and capacitor; Impedance diagram, phasor diagram, series and parallel circuits, compound circuits. Computation of active, reactive and complex powers; power factor.

First order R-L, R-C circuits, Initial conditions in RLC elements- initial conditions for complicated network-time constant-second order circuits (RLC series and parallel circuits).

UNIT – III

Laplace Transforms:

Laplace Transforms of typical signals, periodic functions, Inverse transforms, Initial and final value theorems, Application of Laplace transforms in circuit analysis.

Transformed Network Analysis: Response of RL, RC, RLC circuits for impulse and pulse excitations using Laplace Transform method.

Definition of operational/ transformed impedances and admittances of L, C and transformer with initial conditions; development of transformed networks incorporating initial conditions as sources and solution of transformed networks.

UNIT – IV

Network Theorems: Superposition theorem, Thevenin's and Norton's theorems, Reciprocity, Compensation, Maximum power transfer theorems, Tellegan's and Millman's theorems, Application of theorems to DC circuits. Sinusoidal steady state Mesh and Node Analysis. Application of network theorems to AC circuits.

UNIT V

Resonance: Series resonance, Impedance and phase angle, voltages and currents, bandwidth and Q factor and its effect on bandwidth, magnification, parallel resonance, resonant frequency, variation of impedance with frequency , Q factor, magnification, reactance curves in parallel resonance. Frequency response of RL, RC circuits.

TEXT BOOKS:

1. William H. Hayt, Jack E. Kemmerly and Steven M. Durbin, Engineering Circuit Analysis, 6th Edition,TMH, 2002.
2. M.E.Vanvalkenburg, Network Analysis, 3rd Edition, PHI, 2003.
3. A Sudhakar and Shyam Mohan SP, Circuits and Networks: Analysis and Synthesis, 4th Ed, TMH,2010

REFERENCE BOOKS:

1. Franklin F.Kuo, Network Analysis and Synthesis, 2nd Edition, John Wiley & Sons, 2003.
2. Mahmood Nahvi and Joseph Edminister, Electric Circuits, 4th Edition, Schaum's outline series, TMH, 2004.

EC215	**MATHEMATICS - III**	**L**	**T**	**P**	**M**	**C**
		3	**0**	**0**	**100**	**3**

UNIT – I:

Fourier Series: Introduction and Euler's formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, Change of interval, Even and Odd functions, Half range series, Typical wave forms and Parseval's formulae, Complex form of the Fourier series.

UNIT – II

Integral Transforms: Introduction- Definition – Fourier integrals – Fourier integral theorem (without proof)-Fourier sine and cosine integrals – complex form of Fourier integral - Fourier Transforms - Properties of Fourier Transforms - Finite Fourier sine and cosine transforms - Convolution theorem (without proof), Parseval's Identity for Fourier Transforms (without proof)

UNIT-III

Numerical Solutions of Equations: Introduction - Solution of Algebraic and Transcendental Equations - Bisection method-Newton- Raphson Method - Solutions of linear Simultaneous Linear Equations: iterative Methods - Gauss-Seidel Method

UNIT-IV

Finite Differences and Interpolation:Finite Differences – Differences of a polynomial – factorial notation – relations between operators – Newton's Interpolation formulae – central difference interpolation formulae - Gauss interpolation formulae – stirlings formula - interpolation with unequal intervals – Lagranges interpolation – inverse interpolation

UNIT-V

Numerical Differentiation and Integration: Numerical Differentiation – Formulae for derivatives. Numerical Integration: Trapezoidal rule - Simpson's one-third rule - Simpson's three-eighth.Numerical Solution of Ordinary Differential Equations: Introduction – Picard's Method-Euler's Method - Runge- Kutta Method of fourth order.
Numerical Solution of Partial Differential Equations: Introduction - Classification of second order equations.

TEXT BOOK:

1. B.S. Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.

REFERENCE BOOKS:

1. N.P. Bali, A textbook of Engineering Mathematics, Laxmi publications.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 8th Edition, New Age International (P) Ltd.
3. N.P. Bali, Satyanarayana Bhavanari and Indrani Kelker Engineering Mathematics-I by Laxmi publications, New Delhi.

EC 216 ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE L T P M C
2 0 0 100 0

UNIT I:

Introduction to Culture: Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India.

UNIT II:

Indian Languages, culture and Literature: The role of Sanskrit, Significance of scriptures to current society, Indian philosophies, other Sanskrit literature, literature of South India.

UNIT III:

Religion and Philosophy: Religion and Philosophy in ancient India, Religion and Philosophy in Medieval India, Religious reform movements in Modern India(selected movements only).

UNIT IV:

Fine Arts in India: (Arts, Technology & Engineering): Indian painting, Indian handicrafts, music, divisions of Indian classic music, modern Indian music, Dance and Drama, Indian Architecture (Ancient, Medieval and Modern), Science and Technology in India, development of science in ancient, medieval and modern India.

UNIT V:

Education system in India: Education in Ancient, Medieval and Modern India, aims of Education, subjects, languages, science and scientists of Ancient India, Medieval and Modern India.

Reference Books:

1. Kapil Kapoor, "Text and Interpretation: The India Tradition", ISBN: 81246033375, 2005
2. "Science and Samskrit", Samskrita Bharti Publisher, ISBN 13:978-8187276333, 2007
3. NCERT, "Position paper on Arts, Music, Dance and Theatre", ISBN: 81-7450 494- X, 200

EC251	**ELECTRONIC DEVICES AND CIRCUITS LAB**	**L**	**T**	**P**	**M**	**C**
		0	**0**	**3**	**100**	**1.5**

1. Study of C.R.O
2. Characteristics of Silicon and Germanium diodes
3. Characteristics of Zener diode and regulator
4. Characteristics of Common Base configuration
5. Characteristics of Common Emitter configuration
6. Characteristics of Emitter follower circuit
7. Drain and Transfer Characteristics of JFET
8. Drain and Transfer Characteristics of Depletion MOSFET
9. Drain and Transfer Characteristics of Enhancement MOSFET
10. Design and verification of Self bias circuit
11. Characteristics of LDR and Thermistor
12. Characteristics of source follower circuit
13. Characteristics of Photo transistor
14. Design and verification of collector to base bias circuit
15. Design and verification of Current Source Bias Circuit

EC252	**DIGITAL LOGIC DESIGN LAB**	**L**	**T**	**P**	**M**	**C**

0 0 3 100 1.5

1. Realization of Gates using Discrete Components.
2. Realization of Gates using Universal Building Block (NAND only).
3. Design of Combinational Logic Circuits like Half-adder, Full-adder, Half- Subtractor and Full-Subtractor.
4. Verification of 4-bit Magnitude Comparator.
5. Design of Decoders like BCD-Decimal decoder.
6. Applications of IC Parallel Adder (1's & 2's compliment addition).
7. Design of Code Converters (Binary to Gray).
8. Design of Multiplexers/De-Multiplexers.
9. Verification of Truth-Table of Flip-Flops using Gates.
10. Design of Shift registers (To Verify Serial to parallel, parallel to Serial, Serial to Serial and parallel to parallel Converters) using Flip-Flops.
11. Design of ring& Johnson counters using flip-flops.
12. Conversion of flip-flops (JK-T, JK-D).
13. Design of binary/decade counter
14. Design of Asynchronous counter, mod counter**,** up counter**,** down counter & up/down counter.
15. Design of synchronous counter, mod counter, up counter, down counter& up/down counter.

EC-253 SIGNALS AND SYSTEMS LAB

L	T	P	M	C
0	0	3	100	1.5

1. Write a program to generate the discrete sequences (i) unit step (ii) unit impulse (iii) ramp (iv) periodic sinusoidal sequences. Plot all the sequences.
2. Find the Fourier transform of a square pulse .Plot its amplitude and phase spectrum.
3. Write a program to convolve two discrete time sequences. Plot all the sequences. Verify the result by analytical calculation.
4. Write a program to find the trigonometric Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with appropriate weightings.
5. Write a program to find the trigonometric and exponential Fourier series coefficients of a periodic rectangular signal. Plot the discrete spectrum of the signal.
6. Generate a discrete time sequence by sampling a continuous time signal. Show that with sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.
7. The signal x(t) is defined as below. The signal is sampled at a sampling rate of 1000 samples per second. Find the power content and power spectral density for this signal. $X(t) = \cos (2\pi * 47t) + \cos(2\pi * 219t)$, $0 < t < 10$ $X(t) = 0$, otherwise
8. Write a program to find the magnitude and phase response of first order low pass and high pass filter. Plot the responses in logarithmic scale.
9. Write a program to find the response of a low pass filter and high pass filter, when a speech signal is passed through these filters.
10. Write a program to find the autocorrelation and cross correlation of sequences.

11. Generate a uniformly distributed length 1000 random sequence in the range (0,1). Plot the histogram and the probability function for the sequence. Compute the mean and variance of the random signal.
12. Generate a Gaussian distributed length 1000 random sequence. Compute the mean and variance of the random signal by a suitable method.
13. Write a program to generate a random sinusoidal signal and plot four possible realizations of the random signal.
14. Generate a discrete time sequence of N=1000 i.i.d uniformly distributed random numbers in the interval (-0.5,-0.5) and compute the autocorrelation of the sequence.
15. Obtain and plot the power spectrum of the output process when a white random process is passed through a filter with specific impulse response.

Text Book:
Contemporary Communication Systems using MATLAB by John G. Proakis, M. Salehi, Cengage Learning Publisher.

EC254	MATLAB	L	T	P	M	C
		0	0	3	100	2

1. Write a MATLAB program to find greatest of three numbers? Use nested if, else if ladder
2. Write a MATLAB program to read marks of a student and print the sum, average and display the grade?
3. Write a MATLAB program to count the digits of a number? Use for loop
4. Write a MATLAB program to check whether a number is perfect or not? Use do-while
5. Write a MATLAB program to check whether a number is strong or not? Use while
6. Write a MATLAB program to check whether a number is armstrong or not? Use for
7. Write a MATLAB program to check whether a number is palindrome or not? Use for
8. Write a MATLAB program to find the Fibonacci series upto the given number? Use while
9. Write a MATLAB program to print the result of the series 1+x^2/2+x^3/3+….+x^n/n
10. Write a MATLAB program to perform menu driven arithmetic operations using functions?
11. Write a MATLAB program to find the factorial of a number using recursive and non-recursive functions?
12. Write a MATLAB program to find the Fibonacci series using recursive functions?
13. Write a MATLAB program to find the solution for towers of Hanoi using recursive function?
14. Write a MATLAB program to read an array and sort the elements in an array?
15. Write a MATLAB program to find the minimum and maximum numbers of the array?
16. Write a MATLAB program to read two matrices and find their sum, difference and product?
17. Write a MATLAB program to find the transpose of a matrix?
18. Write a MATLAB program to print upper and lower triangle of a given matrix?
19. Write a MATLAB program to read a file and write data into file?
20. Write a GUI MATLAB program to create student application form?
21. Write a MATLAB program on creating simple plots?
22. Write a MATLAB program to read an image, perform different operations on image and display the resulting images?