Syllabus

for

Second Year

B. Tech. Electronics & Telecommunication Engineering

Four-Year (Eight Semesters) Course

w.e.f. (June 2008)

Department of Electronics and Telecommunication
Dr. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,
Lonere-402103, Dist-Raigad (MS)

Dr. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY
LONERE-402103 (MS)
Syllabus for Second Year Electronics and Telecommunication Engineering
(Effective from year June 2008)

B. Tech. Second Year (Electronics and Telecommunication Engineering)											
Sr No.	**Semester**	**Name of the subject**	**Weekly Load**			**Credit**	**Theory**	**Test (test1 + test 2)**	**Practical/ Oral**	**Term Work**	**TOTAL**
			L	**T**	**P**						
1	**Semester III**	Engineering Mathematics III	4	-	-	8	50	50	-	-	100
2		Electronic Devices and Circuits I	3	1	2	10	50	50	50	25	175
3		Digital Electronics and Microprocessor	4	1	2	12	50	50	25	50	175
4		Electrical Machines	3	-	2	8	50	50	25	25	150
5		Network Analysis	3	1	-	8	50	50	-	50	150
6		Industrial Training	**(Audit Course)**								
		Total of Part I	**17**	**3**	**6**	**46**	**250**	**250**	**100**	**150**	**750**
7	**Semester IV**	Numerical Methods and Computer Programming	4	-	2	10	50	50	25	25	150
8		Electronic Devices and Circuits II	3	1	2	10	50	50	25	25	150
9		Signals and Systems	3	-	2	8	50	50	25	25	150
10		Control Systems	3	-	-	6	50	50	--	--	100
11		Principles of Communication Engg.	3	-	2	8	50	50	25	25	150
12		Electronic Design Lab-I	--	--	2	2	-	-	25	25	50
13		Industrial Training **(Non credit mandatory course)**	**To be assessed in V Semester**								
		Total of Part II	**16**	**1**	**10**	**44**	**250**	**250**	**125**	**125**	**750**

Dr. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Department of Electronics and Telecommunication Engineering

w.e.f. (July 2008)

Semester III

Sr. No.	Subject Code	Name of the subject	Teaching Scheme			
			Hrs/week L	T	P	Credits
01	BET2101	Engineering Mathematics III	04	-	-	08
02	BET2102	Electronic Devices and Circuits I	03	1	-	08
03	BET2103	Digital Electronics and Microprocessor	04	1	-	10
04	BET2104	Electrical Machines	03	-	-	06
05	BET2105	Network Analysis	03	1	-	08
06	BET2106	Electronic Devices and Circuits I Lab	-	-	02	02
07	BET2107	Digital Electronics and Microprocessor Lab	-	-	02	02
08	BET2108	Electrical Machines Lab	-	-	02	02
09	AU1212	Industrial Training	**(Audit Course)**			
		Total	26			46

Semester IV

Sr. No.	Subject Code	Name of the subject	Teaching Scheme			
			Hrs/week L	T	P	Credits
01	BET2201	Numerical Methods and Computer Programming	04	-	-	08
02	BET2202	Electronic Devices and Circuits II	03	1	-	08
03	BET2203	Signals and Systems	03	-	-	06
04	BET2204	Control Systems	03	-	-	06
05	BET2205	Principles of Communication Engg.	03	-	-	06
06	BET2206	Numerical Methods and Computer Programming	-	-	02	02
07	BET2207	Electronic Devices and Circuits II	-	-	02	02
08	BET2208	Signals and Systems	-	-	02	02
09	BET2209	Principles of Communication Engg.	-	-	02	02
10	BET2210	Electronics Design Lab-I		-	02	02
11	BET2211	**Industrial Training**				
		Total	27			44

SEMESTER III

[BET2101] Engineering Mathematics-III

Weekly Teaching Hrs.	TH : 04	PR : 00	TUT: 00	
Examination Hrs.	TH : 03	PR : 00		
Marking Scheme	TH :50	TEST : 50	TW : 00	PR/OR : 00
Credits	TH : 08	PR : 00	TUT : 00	Total = 08

UNIT I
Infinite Series
Series of number, Improper integrals, Cauchy criterion, Test of convergence, Absolute and conditional convergence, Series of functions, Uniform convergence, Power series, Radius of convergence.

UNIT II
Fourier series
Half-range expansions, Approximation by trigonometric polynomials, Fourier integrals.

UNITIII
Partial Differential Equations
First and second order Liner Partial Differential Equations with variable coefficients, Wave equation and heat equation in one and two dimensions, Laplace equation in two and three dimensions (Cartesian co-ordinates only), Transforms techniques in Ordinary Differential Equations and Partial Differential Equations.

UNIT IV
Power Series Methods For Solution of Ordinary Differential Equations
Legendre equations and Legendre polynomials, Bessel functions of first and second kind, Orthogonality, Strum-Liouville problems.

UNIT V
Laplace transforms
Laplace transforms of various functions.

UNIT VI
Inverse transforms
Shifting on the s and t axes, Convolutions, Partial fractions.

Texts/References:

1. J.N. Wartikar and P.N. Wartikar, " Engineering Mathematics Vol. I and Vol.II, Pune
2. VidyarthiGriha Prakashan", Pune, 1984, 9th edition
3. B.S. Grewal, " Higher Engineering Mathematics", Khanna Publication, New Delhi.1990, 22nd edition
4. E. Kreyszig, "Advanced Engineering Mathematics", John Wiley Eastern, New York, 1999, 9th edition
5. Peter V ,O'Neil, "Advanced Engineering Mathematics, PWS" , Bosten, 1991, 3rd edition

■ ■ ■

[BET2102] Electronic Devices and Circuits – I

Weekly Teaching Hrs.	TH : 03	PR : 02	TUT: 01	
Examination Hrs.	TH : 03	PR : 02		
Marking Scheme	TH :50	TEST : 50	TW : 25	PR/OR : 50
Credits	TH : 06	PR : 02	TUT : 02	Total = 10

UNIT I
Study of Electronic Materials and Components
Classification of materials based on band gaps, Resistors: Types of resistors, Resistor Color coding, Specifications and applications. Capacitor: Types of capacitor based on dielectrics- electrolytic, Capacitor standard values, Specifications and applications. Study of Electric & Magnetic properties of materials.

UNIT II

Junction Diode Characteristics

Review of semi conductor Physics – n and p –type semi conductors, Mass Action Law, Continuity Equation, Hall Effect, Fermi level in intrinsic and extrinsic semiconductors, Open-circuited p-n junction, The p-n junction Energy band diagram of PN diode, PN diode as a rectifier (forward bias and reverse bias), The current components in p-n diode, Law of junction, Diode equation, Volt-ampere characteristics of p-n diode, Temperature dependence of VI characteristic, Transition and Diffusion capacitances, Step graded junction, Breakdown Mechanisms in Semi Conductor (Avalanche and Zener breakdown) Diodes, Zener diode characteristics, Characteristics of Tunnel Diode with the help of energy band diagrams, Varactar Diode, P-N diode as wave shaping element in clipping and clamping circuits, LED,LCD, Photo diodes.

UNIT III

Rectifiers, Filters and Regulators

Half wave rectifier, ripple factor, full wave rectifier, Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L-section filter, P- section filter, Multiple L- section and Multiple P-section filter, and comparison of various filter circuits in terms of ripple factors, Simple circuit of a regulator using zener diode, Series and Shunt voltage regulators

UNIT IV

Transistor and FET Characteristics

Junction transistor, Transistor current components, Transistor as an amplifier , Transistor construction, Detailed study of currents in a transistor, Transistor alpha, Input and Output characteristics of transistor in Common Base, Common Emitter, and Common collector configurations, Relation between Alpha and Beta, typical transistor junction voltage values, JFET characteristics (Qualitative and Quantitative discussion), Small signal model of JFET, MOSFET characteristics (Enhancement and depletion mode), Symbols of MOSFET, Comparison of Transistors, Introduction to SCR and UJT.

UNIT V

Biasing and Stabilization

BJT biasing, DC equivalent model, criteria for fixing operating point, Fixed bias, Collector to base bias, Self bias techniques for stabilization, Stabilization factors, (S, S', S''), Compensation techniques, (Compensation against variation in VBE, Ico,) Thermal run away, Thermal stability. FET biasing.

UNIT VI

Amplifiers

Stages in amplifiers, Small signal low frequency transistor amplifier circuits: h-parameter representation of a transistor, Analysis of single stage transistor amplifier using h-parameters: voltage gain, current gain, Input impedance and Output impedance. Comparison of transistor configurations in terms of AI, Ri, Av, Ro.

Texts/References:

1. Boylestad and Nashelsky, "Electronic Devices and Circuits" Pearson/Prentice Hall,9th Edition,2006.
2. David A. Bell, "Electronic Devices and Circuits", PHI, New Delhi, 2002, 3rd edition
3. Millman and Halkias, "Electronic Devices and Circuits", New Delhi, McGraw-Hill, 2nd edition-2007.

■ ■ ■

[BET2103] Digital Electronics and Microprocessor

Weekly Teaching Hrs.	TH : 04	PR : 02	TUT: 01	
Examination Hrs.	TH : 03	PR : 02		
Marking Scheme	TH :50	TEST : 50	TW : 50	PR/OR : 25
Credits	TH : 08	PR : 02	TUT : 02	Total = 12

UNIT I

Number System and Coding Techniques

Number systems: Binary, Decimal, Octal and Hexadecimal, Conversion methods, Binary addition and subtraction, 1's and 2's complement of binary number, Concept of coding, BCD code, Excess-3 code, Gray code, ASCII code, Error detecting and correcting codes.

UNIT II

Logic Gates and Boolean Algebra

Logic gates: Inverter, AND, OR, NAND, NOR, Exclusive-OR and Exclusive-NOR, Boolean operations and expressions, De-Morgan's theorems, Simplification using Boolean algebra, Standard forms of Boolean expressions, Karnaugh map up to 6 variables, Don't care conditions, Quine Mc-Clusky method up to 4 variables

UNIT III

Combinational Logic Circuit

Arithmetic circuits: Half adder , Full adder, Half subtractor, Full subtractor, Carry look ahead generator, BCD adder, Excess-3 adder, Digital comparator, Multiplexers, Demultiplexers, Encoder, Decoder, Parity generator/checker

UNIT IV

Sequential Logic Circuit

Basic flip-flop circuit, Types of flip-flop and conversion, Counters, Register

UNIT V

Semiconductor Memories, ADC/ DAC & Logic Families

RAM, ROM, PROM, EPROM, EEPROM, SRAM, DRAM, Concept of PLA and PAL.
Sample and hold circuits, DAC: the weighted resistor DAC, R-2R ladder network, ADC: Successive approximation, Dual slope, Integrator type and flash ADC.
Logic Families:TTL, ECL, CMOS families and their interface.

UNIT VI

Introduction to 8085 Microprocessor and its Programming

Introduction, Architecture, Memory addressing, Addressing modes, Instruction set, Timing diagrams, 8085 pins and signals,
Programming techniques: Looping, counting and indexing, Counter and Time delay, Stack and subroutine, Code conversion, BCD arithmetic.

Texts/References:

1. M. Marris Mano, Digital Logic and Computer Design, PHI, New Delhi, 2001.
2. W. H. Gothman, Digital Electronics Theory And Practice, PHI, New Delhi, 2002, 2nd edition.
3. Malvino and Leach, Digital Principles and Application, TMH, New Delhi, 1995, 4th edition
4. Fletcher, An Engineering Approach to Digital Design, PHI, New Delhi, 1997.
5. R. S. Gaonkar, "Microprocessor Architecture, Programming & Applications with 8085", PIP, Mumbai, 1997, 3rd edition
6. Wiley K. Short, "Microprocessor & Programmed logic", PHI
7. Leventhal, "8080/8085: Assembly Language Programming", McGraw-Hill, Berkeley, 1990
8. Intel Corporations, "Microprocessor and Peripheral Handbook", Vol. II & I

■ ■ ■

[BET2104] Electrical Machines

Weekly Teaching Hrs.	TH : 03	PR : 02	TUT: 00	
Examination Hrs.	TH : 03	PR : 02		
Marking Scheme	TH :50	TEST : 50	TW : 25	PR/OR : 25
Credits	TH : 06	PR : 02	TUT : 00	Total = 08

UNIT I
Introduction to Machine Theory
Role of electrical Machine, Convergence process in a machine, Magnetic field energy, Analysis of force of alignment, Rotary motion (rotary magnetic field).

UNIT II
3-Phase Induction Motor
Principle of action, Frequency of rotor EMF and current, Relationship between rotor I^2R loss and the rotor slip, Factor determining the torque variation of torque with slip, Torque slip characteristic, Starting methods, Speed control methods, Applications.

UNIT III
Single Phase Motors
Principle of operation, Construction, Types, Torque slip characteristics, Applications, Stepper motor, Servo motor, Hysteresis motors.

UNIT IV
Alternators
Principle of construction, Types of rotors, EMF equation, Armature reaction, Voltage regulation, Synchronous impedance method and applications.

UNIT V
DC Machines
DC GENERATORS**:** Principle of operation, Construction EMF equation, Types of generators, Armature reaction, Commutation, Characteristic of series, Shunt and compound generators, Efficiency calculations and applications.

UNIT VI
DC Motors
DC motors as a generator or motor, Significance of back emf, Torque/speed characteristics, Speed control, Different types of starters and its applications.

Texts/References :

1. Nagrath and Kothari, “Electrical Machines”, TMH, 1996.
2. H. Cotton, “DC Machines”, Wheelers, 1995.
3. P.S. Bhimra, “Electrical Machines”, TMH.

■ ■ ■

[BET2105] Network Analysis

Weekly Teaching Hrs.	TH : 03	PR : 00	TUT: 01	
Examination Hrs.	TH : 03	PR : 00		
Marking Scheme	TH :50	TEST : 50	TW : 50	PR/OR : 00
Credits	TH : 06	PR : 00	TUT : 02	Total = 08

UNIT I

Network Simplification Techniques

Network definitions, Mesh and nodal analysis, Principle of duality, Source transformation, Simplification of networks in equivalent 'T' and 'π' form, 'T' and 'π'inter conversion. Network Theorems: Super-position, Thevenin, Reciprocity, Millman, Maximum Power Transfer, Norton Theorem.

UNIT II

Network Topology

Graph of network, Concept of tree, Theorem of topology, Network variables, Concept of loop current and node voltages, Incidence, Tie Set and Cut Set Matrices, Equilibrium equations.

UNIT III

Two Port Networks and Network Parameters

Two port networks, Characteristic Impedance Z_o, Propagation constant γ for a symmetrical network and its calculations, Asymmetrical networks, Image and iterative impedances.

Network Parameters : Short circuit admittance parameters, Open circuit impedance parameters, Transmission parameters, Hybrid-parameters, Relationship between parameters, Connection of two port networks.

UNIT IV

Passive Filters

Fundamentals of filter, Propagation constant and characteristic impedance, Constant k-type, m-derived and composite filters.

UNIT V

First Order and Second Order Differential Equations

General and particular solution, Time constant, Integrating factor, Initial condition in elements, Procedure for evaluating initial condition, Initial state of network, First and second order differential equation, Applications in electrical networks.

UNIT VI

Transmission Lines

Primary and secondary line constants, Relationship between primary and secondary line constants, Transmission line general equation for V and I, Infinite line, Line wavelength, Velocity of propagation, Line termination with Z_o and without Z_o, Open circuit and short circuit lines, equivalent 'T' and 'π' form of line, Reflections, Standing waves, Line at HF and UHF, Smith chart and its Applications, Impedance matching using stub.

Texts/References:

1. M. E. Van Valkenberg, "Network Analysis, PHI, New Delhi", 1995, 3rd edition
2. Umesh Sinha, "Network Analysis and Synthesis", Satya Pub., New Delhi, 1987, 5th edition
3. D. Roy Choudhary, " Networks and Systems", New Age Int. Pub., 1996
4. John D. Ryder, "Network, Lines & Fields", PHI, New Jersey, 1995, 2nd edition
5. Umesh Sinha, "Transmission Lines and Networks", Satya Publication, New Delhi, 2001, 7th edition
6. Sudhakar and ShyamMohan, "Circuits and Networks: Analysis & Design", TMH, New Delhi, 1999.

■ ■ ■

SEMESTER – IV

[BET2201] Numerical Methods and Computer Programming

Weekly Teaching Hrs.	TH : 04	PR : 02	TUT: 00	
Examination Hrs.	TH : 03	PR : 02		
Marking Scheme	TH :50	TEST : 50	TW : 25	PR/OR : 25
Credits	TH : 08	PR : 02	TUT : 00	Total = 10

UNIT I

Introduction to Computational Methods and Errors

Computational Methods: General principles of computational techniques, Introduction, common ideas and concepts of computational methods, Various computational techniques.

Errors: Types and sources of errors, Concept in error estimation, Error propagation, Error due to floating point, Representation of errors. Elementary uses of series in calculation of errors.

UNIT II

Solution of Transcendental / Polynomial Equations and System of Linear Equation

Solution of Transcendental / Polynomial Equations: Finding root of polynomial equations deploying computational methods such as Bisection, Regula-falsi, Newton-Raphson, Seccant, Successive approximation.

System of linear equation: Solving linear equations deploying computational methods such as Gauss elimination, Gauss Jordan, Partial pivoting, Matrix triangularisation (LU decomposition), Cholesky , Gauss Seidel and Jacobi methods.

UNIT III

Interpolation and Polynomial Approximation

Least square approximation, Orthogonal polynomials Chebyshev polynomials, Finite difference operator and their relations, Forward, backward, central and divided difference, Newton's forward divided difference, Backward difference interpolation, Sterling interpolation, Lagranges interpolation polynomials, Spline interpolation, Least square approximation.

UNIT IV

Numerical Integration and Differentiation

Numerical Integration: Methods based on interpolation such as Trapezoidal rule, Simsons 1/3 and 3/8 rules.

Numerical differentiation: Euler's method, Modified Euler's method, Taylor's series, Runge Kutta 2^{nd} and 4^{th} order, Stability analysis of above methods.

UNIT V

Object Oriented Programming

Software Evaluation, Object oriented programming paradigm, Basic concepts of object oriented programming, Benefits of OOP, Object oriented languages, Applications of OOP.

Beginning with C++

Structure of C++ program, Creating the source file, Compiling & linking, Basic data types, User defined data types, Symbolic constants, Declaration of variables, Dynamic initialization of variables, Reference variables, Operators in C++, Scope resolution operator, Type cast operator.

Functions in C++

Function prototyping, Inline functions, Function overloading, Friend and virtual functions.

Classes and Objects

Specifying a class, Defining member functions, C++ program with class, Arrays within a class, Memory allocation for objects, Constructors, Multiple constructor in class, Dynamic initialization of objects, Dynamic constructor, Destructors.

UNIT VI

Operator Overloading and Type Conversions

Defining operator overloading, Overloading unary operators, Overloading binary operators, Manipulation of strings operators, Rules for overloading operators.

Inheritance: Extending Classes

Defining derived classes, Single inheritance, Multilevel inheritance, Multiple inheritance, Hierarchical inheritance, Hybrid inheritance, Virtual base classes, Abstract classes, Member classes: Nesting of classes

Pointers Virtual Functions and Polymorphism

Pointers to objects, Pointers to derived classes, Virtual functions, Pure virtual functions.

Managing Console I/O Operations
C++ Streams, C++ Stream Classes, Unformatted I/O Operations, Managing output with manipulators.

Texts/References:

1. S. S. Sastry , "Introductory Methods of Numerical Analysis", PHI, 1990, 3rd edition.
2. V. Rajaraman , "Computer Oriented Numerical Methods , PHI, New Delhi", 2000, 3rd edition.
3. E. V. Krishnamurthy, and Sen S. K., "Numerical Algorithm : Computations in Science and Engg", Affiliated East West, New Delhi, 1996
4. D. Ravichandran, "Programming with C++" , TMH
5. E. Balagurusamy, "Object-Oriented Programming with C++" , TMH, New Delhi, 2001,2nd edition
6. Yeshwant Kanetkar, "Let us C++, BPB Pub.", Delhi, 2002, 4th edition
7. Stroupstrup Bjarne, "C++ Programming Language", Addison Wesley, 1997, 3rd edition
8. Horton, "Beginning C++: The Complete Language", Shroff Pub., Navi Mumbai, 1998.

■ ■ ■

[BET2202] Electronic Devices and Circuits – II

Weekly Teaching Hrs.	TH : 03	PR : 02	TUT: 01	
Examination Hrs.	TH : 03	PR : 02		
Marking Scheme	TH :50	TEST : 50	TW : 25	PR/OR : 25
Credits	TH : 06	PR : 02	TUT : 02	Total = 10

UNIT I
Voltage Regulators
Zener diode as a shunt regulator, Emitter follower regulator, Transistorized series feedback type regulator, Comparisons of above discrete regulators on the basis of Voltage stability ratio, Thermal stability ratio and output resistance, over voltage and over current protection circuits

UNIT II
RF/HF Amplifiers
Hybrid – π small signal model of BJT, its relation with h-parameters, Definitions of f_α, f_β, f_T. Gain bandwidth product, Coil losses, unloaded and loaded Q of tank circuits, Analysis of single tuned amplifier, Double tuned, stagger tuned amplifiers, instability of tuned amplifiers, stabilization techniques, Narrow band neutralization using coil, Broad banding using Hazeltine neutralization, Class C tuned amplifiers and their applications. Efficiency of Class C tuned Amplifier

UNIT III
Multistage Low Frequency Amplifiers (BJT/FET)
Necessity of cascading LF small signal amplifiers in various configurations, RC coupled, Transformer coupled and direct coupled amplifiers, Techniques of improving input impedance of CC stage, Darlington connection, Miller Theorem Bootstrapping, CE-CE cascade, CE-CB cascade arrangement, Effect of cascading on frequency response , Square wave testing or step response of AF amplifier. Differential Amplifiers.

UNIT IV
Low Frequency Amplifiers with Feedback
Feedback concept, Classification of feedbacks, Block schematic of amplifier with negative feedback, Gain with feedback, Consequences of introducing negative feedback in small signal and multistage amplifiers, Classification of amplifiers in view of feedback concept voltage series, Current series, Voltage shunt, Current shunt amplifiers, Effect of negative feedback on Z_i and Z_o in all four types,
Positive Feedback concept, Employing positive feedback in amplifier,
Barkhausen criteria for sinusoidal oscillators, RC Oscillators: Transistorized RC phase shift/ Wein bridge oscillators, LC oscillators- Hartley, Colpitts, clamp, Crystal (Miller & Pierce), UJT relaxation oscillator.

UNIT V

Large Signal (Power) AF Amplifiers

Classification of amplifiers in class A, B, C, etc., Concept of large signal amplification, Total harmonic distortion, Push pull configuration, Efficiency of power conversion, CE transformer coupled power amplifier, Complementary symmetry power amplifier. Crossover distortion, Heat sink, its standard shapes and sizes, Thermal calculations and resistances.

UNIT VI

Multivibrator Circuits

Collector coupled and Complementary collector coupled astable multivibrators, Emitter coupled astable Multivibrator, monostable and bistable multivibrator using similar and complementary transistors, triggering methods, storage delay and calculation of switching times, speed up capacitors, Schmitt trigger circuits.

Monostable and Astable Blocking Oscillators using Emitter based timing, frequency control using core saturation, push pull operation of astable blocking oscillator i.e., inverters, pulse transformers, RC and RL wave shaping circuits, UJT saw tooth generators, Linearization using constant current circuit, Bootstrap and Miller saw tooth generators, current time base generators.

Texts/References:

1. Boylestad and Nashelsky, "Electronic Devices and Circuits" Pearson/Prentice Hall,9th Edition,2006.
2. David A. Bell, "Electronic Devices and Circuits", PHI, New Delhi, 2002, 3rd edition
3. Millman and Halkias, "Electronic Devices and Circuits", New Delhi, McGraw-Hill, 2nd edition-2007.

■ ■ ■

[BET2203] Signals and Systems

Weekly Teaching Hrs.	TH : 03	PR : 02	TUT: 00	
Examination Hrs.	TH : 03	PR : 02		
Marking Scheme	TH :50	TEST : 50	TW : 25	PR/OR : 25
Credits	TH : 06	PR : 02	TUT : 00	Total = 08

UNITI

Introduction to Signals and Systems

Signals: Classification, General characteristics, Singularity functions.

Systems: Continuous Time (CT) and Discrete Time (DT) systems, Interconnection, Classification and Properties. Sampling theorem: Nyquist criterion, Sampling of CT signals, and reconstruction from sampled signals.

UNIT II

Time Domain Representation of Analog and Digital Linear Time Invariant Systems (CT and DT LTI)

Introduction, Continuous Time and Discrete Time LTI systems, impulse response and convolution sum equation, Properties, Direct form-I and Direct form-II realization methods of system.

UNIT III

Fourier Representation of CT and DT Signals

Fourier Series: Representation of signals by Fourier series, Properties. Fourier Transform: Signal representation, Dirchlet conditions. CT and DT Fourier Transform: Introduction, Representation of signals, Properties.

UNIT IV

Laplace Transform (LT)

Introduction, LT-transform of elementary signals, Properties of LT, Inverse LT, LT with and without initial conditions, Initial and final value theorem, Applications of LT in analysis of electronics circuits, Transfer function of CT LTI systems.

UNIT V

Z- Transform (ZT)

Introduction, Z-transform of elementary signals, Region of convergence, Properties, Inverse of ZT, Applications of ZT in analysis of DT-LTI systems, Relation between Z-transform and Fourier transform.

UNIT VI

Random Processes

Introduction, Random variables, Vector random variables and random processes, Distribution and density functions, Correlation and power spectral density, Wide sense stationary processes, Ergodic processes.

Texts/References:

1.Oppenhein, Willsky and Nawab, "Signals and Systems", PHI, 2003, 3rd edition
2.Ziemer, "Signals and Systems, Continuous and Discrete", Macmillan
3.Hsu, "Signals and Systems", TMH
4.Taylor, "Principles of Signals and Systems", McGraw-Hill, New York, 1994

■ ■ ■

[BET2204] Control Systems

Weekly Teaching Hrs.	TH : 03	PR : 00	TUT: 00	
Examination Hrs.	TH : 03	PR : 00		
Marking Scheme	TH :50	TEST : 50	TW : 00	PR/OR : 00
Credits	TH : 06	PR : 00	TUT : 00	Total = 06

UNIT I

Basics of Control Systems and Components

Introduction to linear control systems, definitions and elements of control system, open loop and closed loop control system, feedback & feed forward control system linear & non-linear control system.

Control system components: Servomotors, stepper motor, Synchros, Tachometers, Potentiometers, Error detectors, Actuators, Amplidyne, Incremental encoders.

UNITII

Block Diagram and Signal Flow Graph Representation

Block Diagram Representation: Introduction, simple and canonical form of closed loop systems, Rules for block diagram reduction, Analysis of multiple input multiple output systems.

Signal Flow Graph Representation: Introduction, properties and terminology, Mason's gain formula and its application to electrical networks, Block diagram from signal flow graph.

UNIT III

Time Response Analysis of Control Systems

Introduction, Standard test inputs, steady state analysis, Type 0,1 and 2 systems, Transient response analysis, First and second order systems, Introduction to P-I-D controllers.

UNIT IV

Stability of Control System

Introduction, Relative stability, Routh Hurwitz criterion, Routh's stability criterion and its advantages/ disadvantages and applications.

UNIT V

Root Locus and Frequency Domain Analysis of Control Systems

Introduction, Root Locus plot, Root locus analysis of control systems.

Frequency Domain analysis of Control systems : Introduction, Bode plot, Polar plot, Log magnitude verses phase plot, Nyquist stability criterion.

UNIT VI

Compensation of Control Systems

Introduction, Types of compensation, Compensating networks, Design of compensator using Bode plot and Root locus.

Texts/References:

1. K. Ogata, "Modern Control Engineering, Prentice Hall Education", New Delhi, 2002 , 2nd edition.
2. B. C. Kuo, "Automatic Control Systems, PHI" , New Delhi, 1997, 7th edition.
3. Naresh Sinha, "Control System", New Age Int. Pub., 1998, 3rd edition.

■ ■ ■

[BET2205] Principles of Communication System

Weekly Teaching Hrs.	TH : 03	PR : 02	TUT: 00	
Examination Hrs.	TH : 03	PR : 02		
Marking Scheme	TH :50	TEST : 50	TW : 25	PR/OR : 25
Credits	TH : 06	PR : 02	TUT : 00	Total = 08

UNIT I

Introduction to Communication Systems

Introduction to transmitter, the dB in communications, noise, noise designation & calculation, noise measurement, concept of modulation, Bandwidth requirement, Frequency allocation, Noise in modulation systems, Introduction to random processes and random signals as applicable to noise.

UNIT II

Amplitude Modulation: Transmission

Introduction, AM fundamentals, circuits for AM generation, AM transmitter systems, transmitter measurements.

Single-Sideband Techniques

SSB characteristics, sideband generation, filters, SSB transmitters, SSB demodulation, SSB receivers, VSB transmission.

UNIT III

Amplitude Modulation: Reception

Receiver characteristics, AM detection, superheterodyne receivers, superheterodyne tuning, superheterodyne analysis, AGC, AM receiver systems, Troubleshooting.

UNIT IV

Frequency Modulation: Transmission

Theory of frequency and phase modulation, a simple FM generator, FM analysis, Noise Suppression, Direct FM generation, Indirect FM generation, PLL FM transmitter, Stereo FM, FM transmission.

UNIT V

Frequency Modulation: Reception

Comparison with AM receiver, Block diagram, RF amplifiers, Limiters, Discriminators, PLL, Stereo Demodulation, FM receivers. Single and independent sideband receivers.

UNIT VI

Communication Techniques

Introduction, Frequency conversion, Special techniques, receiver noise & sensitivity, dynamic range, Intermodulation distortion testing, Frequency synthesis, directs digital synthesis, FM communications transceivers.
Review of telegraphy, Telephony and telemetry.
Microphones and Loudspeakers: Concept, classifications & working.PA system.

Texts/References:

1. Beasley & Miller, "Modern Electronic Communication",Prentice-Hall India-2006, 8th Edition
2. Kenndy, "Electronics Communications Systems", McGraw-Hill New Delhi-1997, 4th Edition
3. R.G.Gupta, "Audio & Video Systems" Tata McGraw-Hill New Delhi-2008.

■ ■ ■