VEER NARMAD SOUTH GUJARAT UNIVERSITY

Scheme For Teaching and Examination
B.E.-II (Instrumentation & Control Eng.) 3rd Semester

Course	Course No	Teaching Scheme			Examination Scheme					
		L	T	P	Theory Exam University Exam		Pract/Quiz/Viva/T.W. ect.			
		(Hrs)	(Hrs)	(Hrs)	Duration (Hrs)	Marks	Tutorial Marks	Cont Int.Evaluation (P)	Examination (P) Marks	Total Marks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Engineering Maths	ASH 301 IC	3	1	0	3	100	25	-	-	25
Electrical Machines	ELE 302 IC/EC	3	0	2	3	100	-	20	30	50
Electrical Circuit Theory	ELE 303 IC	3	1	0	3	100	25	-	-	25
Measurement & Instruments	IC 304 IC	3	0	2	3	100	-	20	30	50
Digital Circuit	EC 305 IC	3	1	2	3	100	25	20	30	75
Electronic Devices And Circuits	EC 306 IC/EC	3	1	2	3	100	25	20	30	75
	(Total)	18	4	8		600	100	80	120	300
Total contact Hours=				30				Grand	Total	900

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B.E.II (Instrumentation & Control Engg.)

Semester - III

ENGINEERING MATHS : ASH 301 IC

	Lecture	Tutorial	Practical
Teaching Hours	3	1	0
Examination Scheme Marks	100	25	Cont. Evaluation 00 Examination 00

1	MULTIPLE INTEGRALS : Reorientation of concept of integrals, double and triple integral evaluation techniques, change of order of integration, integrals in polar and cylindric coordinates, change of variables of multiple integrals, Application of double and triple integral for evaluation of area, volume and mass.
2	VECTOR CALCULUS : Basic concepts of Vector calculus, line integrals, scalar and vector point functions, differential operator, gradient, directional derivative, divergence, curl and Laplacian with their properties and physical interpretation.
3	Surface integrals, Green's, Gauss and Stokes theorem (without proof), Applications.
4	GAMMA, BETA AND ERROR FUNCTIONS : Improper integrals and their convergence, Gamma and Beta functions and their properties, Error functions, Evaluation and application.
5	FOURIER SERIES : Fourier expansion of functions with arbitrary period, in particular periodic functions with period 2p, conditions of convergence, Fourier series of even and odd functions, Half range Fourier series.
6	PARTIAL DIFFERENTIAL EQUATIONS (PDE) : Basic mathematical concepts, First order PDE of Lagrange's form, Pp + Qq = R, Second order PDE of mathematical Physics (Heat, Wave and Laplace equation) with standard boundary conditions, Solution by separation of variable method using Fourier Series. Partial differential equation Modeling.
7	LAPLACE TRANSFORMATION Basic concept of laplace transform, Laplace of different function, Inverse laplace transform, It's application in 1st & 2nd order system.
8	COMPLEX VARIABLES : Basic mathematical concepts, Analytic functions, C-R equations, Harmonic functions, Related problems; Linear transformations of complex domains, Some special transformations, bilinear transformation, Conformal Mapping and applications; complex integration including contour Integration (Simple cases).

TUTORIALS: Tutorials shall be based upon theory.

REFERENCES :

1. E. KREYSZIG : Advanced Engineering Mathematics, John Wiley, International Student Ed. (1995).
2. C. R. WYLLE : Advanced Engineering Mathematics, Mc-Graw Hill, International Student Ed. (1993).
3. GREWAL B.S.: Higher Engineering Mathematics, khanna publication (1995)

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B.E.II (Instrumentation & Control Engg.)

Semester - III

ELECTRONIC DEVICES & CIRCUITS : EC 302 EC/IC

	Lecture	Tutorial	Practical
Teaching Hours	3	1	2
Examination Scheme Marks	100	25	Cont. Evaluation 20 Examination 30

1	DIODE CIRCUIT ANALYSIS : Introduction to Semiconductor junction diode; Nonlinear properties; Ideal diode; Basic theory and analysis of simple diode circuit; DC load line; Small signal analysis and concept of dynamic resistance; AC load line; Diode capacitance; Temperature effects of diode; Different types of diode (Zener, schottky) Manufacturer's specifications.
2	RECTIFIERS : Circuit analysis of half wave and full wave rectifier using semiconductor devices; Bridge rectifier; Ripple and form factor calculation for above circuits; Efficiency and PIV for above circuits; Types of filters; C filter, L filter, LC filter, PIE filter; Analysis of filter and calculation of ripple and regulation.
3	INTRODUCTION TO TRANSISTOR CIRCUITS : Transistor characteristic; Plots for NPN and PNP configurations; Current flow mechanism in the junction transistor and calculation of Alpha and Beta; Analysis of CE configuration; Current amplification in the transistor; Graphical analysis of transistor circuits; Power calculations; Infinite bypass capacitor; Infinite coupling capacitors; Different dc biasing methods; Fixed bias, emitter stabilized bias, potential divider bias, dc bias with voltage feedback; Common base configuration analysis; Emitter follower.
4	BIAS STABILITY : Quiescent point variation due to uncertainty in Beta; Effect of temperature on the Q point; Stability factor analysis; Temperature compensation using diode biasing.
5	AUDIO FREQUENCY LINEAR POWER AMPLIFIERS : Introduction to Class A, B, AB and C operation; Class A common-emitter power amplifier; Transformer coupled amplifier; Class B push-pull power amplifier; Amplifiers using complementary symmetry; Class C amplifier.
6	SMALL SIGNAL LOW FREQUENCY ANALYSIS AND DESIGN : Hybrid parameters; CE configuration; CB configuration; CC configuration; Impedance reflection; Bootstrapping circuit; Phase splitter; Interpretation of manufacturers specification
7	MULTIPLE TRANSISTOR CIRCUITS : Cascading of amplifier stages; Difference amplifier; Common mode rejection ratio; Difference amplifier with constant current source; Different amplifier with emitter resistor for balance; Darlington amplifier; Cascade amplifier

TUTORIALS : Tutorials shall be based on Theory

REFERENCES :

1. SCHILLING & BELOVE : Electronic Circuits-Discrete and Integrated McGraw-Hill Pub., 3rd edition 1989, Reprint 1994.
2. BOYLESTEAD & NASHLESKY : Electronic Devices & Circuit Theory, Prentice-Hall India, 5th edition 1992, Ninth reprint 1995.
3. SEDRA & SMITH : Microelectronics Circuits, 4th Edition, 1996.
4. HORENSTEIN : Microelectronics Circuits & Devices, Prentice-Hall of India, 1996.

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B.E.II (Instrumentation & Control Engg.)

Semester - III

ELECTRICAL CIRCUIT THEORY: EL 303 IC

	Lecture	Tutorial	Practical
Teaching Hours	3	1	0
Examination Scheme Marks	100	25	Cont. Evaluation 00 Examination 00

1.	NETWORK CONCEPTS : Network element Symbols and Conventions - Active element Conventions -Voltage & current Conventions - Loops and Meshes -nodes, Coupled circuit and dot Conventions.
2.	MESH CURRENT NETWORK ANALYSIS : -Mesh current - choice of Mesh Current, - Number of Mesh currents required in setting up mesh equations. By inspection -Self & Mutual inductance - impedance matrix form, Use of cramer's rules for Analysis.
3.	NODE VOLTAGE NETWORK ANALYSIS: - Nodal Analysis for setting up Voltage equation.- Self and Mutual admittance,- Cramer's rules and Matrices Method for Nodal analysis in Voltage form.
4.	THEOREMS OF NETWORK: - Linearity & Superposition with Application.- Thevenin's. theorems and Applications.- Norton's. theorems and Applications.- Miller's. theorems and Applications.- Max Power transfer , reciprocity theorem , Duality and dual of planner network.
5.	LAPLACE TRANSFORMATION FOR ANALYSIS :- - R-L, R-C and R-L-C DC transients, - Two mesh transient,- R-L, R-C & R-L-C Sinusoidal transients analysis using Laplace transform.- Initial & final Value theorem for dc and ac Analysis.
6.	GRAPH THEORY AND ITS APPLICATION : -Fundamental concepts . Definition and relative terms.-tree topology of graph :- planner & dual graphs.-Matrices of oriented graphs, and this properties
7.	SINUSOIDAL STEADY STATE ANALYSIS : -Radian freq. and sinusoid -Magnitude and phase of n/w fan -Sinusoidal n/w function in terms of poles an zeros.-Resonant circuit bandwidth and factor -Polar plot of n/w .applications of symmetrical lattice networks.

TUTORIALS : Tutorials shall be based on Theory

REFERENCES :

(1)VAN VALKENBERG : Network Analysis. Printice hall of India (1996)
(2) VAN VALKENBERG : network synthesis, Printice Hall of India (1996)
(3) G.K. MITHAL : network theory. Khanna Publication, (1995)
(4) HAYT AND KIMMERLY : Eng. Circuit analysis. Mc Graw Hill Publication (1993)
(5) IYER TSRV: Circuit analysis . Tata McGraw Hill (1994)

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B.E.II (Instrumentation & Control Engg.)

Semester - III

MEASUREMENT & INSTRUMENTS : IC 304 IC

	Lecture	Tutorial	Practical
Teaching Hours	3	0	2
Examination Scheme Marks	100	0	Cont. Evaluation 20 Examination 30

1	UNITS AND DIMENSIONS Absolute Units, Fundamental and Derived Units, Dimensional Equation, CGS & MKS System, SI Units, Determination of Absolute Units, Non electrical units
2	CHARACTERISTIC OF MEASURING INSTRUMENT:- Types of static and dynamic characteristic, Types of errors in measuring instrument and its reduction, Types of systems for measurement (1st order, 2nd order etc.)
3	Measurement of Resistance ,Inductance and Capacitor Using Meter And Bridges using Different Techniques
4	INDICATING AND INTEGRATING INSTRUMENTS:- Principles of moving iron , moving coil and rectifier type ammeter and voltmeters-principle of dynamic watt meter and induction energy meter , Principle of P.F. meter and frequency meter.
5	INSTRUMENT TRANSFORMERS:- Theory of current and potential transformers -ratio error and phase angle-Use of CT/PT for extension of instruments range-testing of CT/PT , Biffi's method and clothier-Median method.
6	MEASURING INSTRUMENT : Analog type : classifications and operating principle (i) Galvanometers --Working & Construction (ii) Multimeter Working & construction and App. (iii) C.R.O -- Types, Construction & Working Principle, Application for voltage, current , Phase difference and lissajous pattern
7	DIFFERENT TYPES OF CABLES, IT'S APPLICATION:
8	INTRODUCTION TO POWER TRANSMISSION AND DISTRIBUTION SYSTEM:

REFERENCES:

1) A.K. SAWHNEY :-Course in Electrical and electronic Measurement and Instrumentation Dhanpat rai and sons.. (1996)
2) COPPER W. D.& HELFRIC A. D.: Modern electronic instrumentation and measurements techniques, Prentice Hall of India Ltd, (1996)
3) GOLDING E. W. AND WIDDIS F.C. : Electrical Measurements & Measuring Instruments, Wheeler publication, (1995)
4) BUCKINGHAM & PRICE: Principles of Electrical Measurement, ELBS Book, (1993)
5) V.K., MEHTA: Principle of power System Including generation , transmission,. distribution, switch gear and protection, S. Chand & Company Ltd.(1996)

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Semester - III

DIGITAL CIRCUITS : EC 305 EC/IC

	Lecture	Tutorial	Practical
Teaching Hours	3	1	2
Examination Scheme Marks	100	25	Cont. Evaluation 20 Examination 30

1	NUMBER SYSTEMS : Decimal number system; Binary, octal and hexadecimal number systems; Conversion from one number to another number system; Addition, subtraction, multiplication and division using different number systems; Representation of binary number in sign-magnitude, sign 1's complement and sign 2's complement notation; Rules for addition and subtraction with complement representation; BCD, EBCDIC, ASCII, Extended ASCII, Gray and other codes.
2	LOGIC GATES AND BOOLEAN ALGEBRA : AND, OR, NOT, NAND, NOR, Ex-OR logic gates: Positive and negative logic; Fundamental concepts of Boolean algebra; Demorgan's laws; Principles of duality; Simplification of Boolean expressions; Canonical and standard forms for Boolean functions; SOP and POS forms; Realization of Boolean functions using only NAND and NOR gates.
3	BOOLEAN FUNCTION MINIMIZATION : Objectives of the minimization procedures; Karnaugh map method; Don't care conditions; Quinn-McCluskey tabulation method; Concept of prime implicants
4	COMBINATIONAL LOGIC CIRCUITS USING DESECRATE LOGIC GATES : Half adder and full adder; Half subtractor and full subtractor; Parity generator and checker; Code converters; Binary multiplier; Majority circuits, magnitude comparator.
5	COMBINATIONAL LOGIC CIRCUIT USING MSI INTEGRATED CIRCUITS : Binary parallel adder; BCD adder; Encoder, priority encoder, decoder; Multiplexer and Demultiplexer circuits; Implementation of Boolean functions using decoder and Multiplexer; Arithmetic and logic unit; BCD to 7-segment decoder; Common anode and common cathode 7-segment displays; Random access memory, Read only memory and erasable programmable ROMS; Programmable logic array (PLA) and programmable array logic (PAL).
6	INTRODUCTION TO SEQUENTIAL LOGIC CIRCUITS : Basic concepts of sequential circuits; Cross coupled SR flip-flop using NAND or NOR gates; JK flip-flop rise condition; Clocked flip-flop; D-type and Toggle flip-flops; Truth tables and excitation tables for flip-flops; Master slave configuration; Edge triggered and level triggered flip-flops; Elimination of switch bounce using flip-flops; Flip-flops with preset and clear.
7	SEQUENTIAL LOGIC CIRCUIT DESIGN : Basic concepts of counters and registers; Binary counters; BCD counters; Up down counter; Johnson counter, module-n counter; Design of counter using state diagrams and table; Sequence generators; Shift left and right register; Registers with parallel load; Serial-in-parallel-out(SIPO) and parallel-in-serial-out(PISO); Register using different type of flip-flop; Sequence generator.

TUTORIALS : Tutorials shall be based on Theory

REFERENCES :

1. MORRIS MANO : Digital Logic and Computer Design, Prentice-Hall of India, New Delhi, 1992.
2. BARTEE THOMAS : Digital Computer Fundamentals, McGraw- Hill, 1995.
3. TAUB AND SCHILLING : Digital Integrated Electronics, McGraw- Hill, 1985.
4. RICHARD SANDIGE : Modern Digital Design, McGraw-Hill, 1990.

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Semester - III

ELECTRICAL MACHINES : EL 306 EC/IC

	Lecture	Tutorial	Practical
Teaching Hours	3	0	2
Examination Scheme Marks	100	-	Cont. Evaluation 20 Examination 30

1	MACHINES: Construction, simple lap and wave winding , emf torque and power equations, Ckt model, Generating and motoring models , Magnetizing characteristics, Introduction to armature reaction and commutation, Self exited generator, Shunt and series compound motors , Speed control, efficiency and losses.
2	TRANSFORMERS :Fundamentals and construction of single phase and three phase transformers, , ideal transformer, emf equation, no load conditions, Loading accounting for finite permeability and core losses equivalent circuit, no load and short circuit test per unit system, Voltage regulation, Efficiency, Auto-transformer ,three phase transformer, Star and delta connections.
3	SYNCHRONOUS MACHINES : construction and basic principals, three phase windings, rotating magnetic field, distribution and pitch factors, emf equation, synchronous speed, armature reaction. Synchronous reactance, voltage regulation, synchronizing to mains, damper winding, vector diagram for generating and motoring modes, synchronous motor starting. V curves.
4	INDUCTION MACHINES : construction and simple theory of operation of three phase induction motor. equivalent circuit, torque speed characteristics, no load and blocked rotor tests, load test, starting, speed control.
5.	FRACTIONAL KW MOTORS : Brief description of reluctance motor hysteresis motor, two phase servo motor, stepper motors.

TUTORIALS : Tutorials shall be based on Theory

REFERENCES:

1. Clayton A.E.: Performance and design of DC Machines, CBS Publication, (1990)
2. Say MG: Performance and design of AC machines. Pitman. CBS Publication, (1983)
3. Nagrath I.J. & Kothari D.P.Electric Machines,. TMH.(1996)
4. Mukherjee and Chakravorti: Electrical Machines, Dhanpat Rai & sons, (1996)