Course Contents

Category of Course	Course Title	Course Code	Credits - 6C			Theory Papers (EE)
			L	T	P	
Departmental Core DC-9	**Electrical Machine-II**	**EE501**	3	1	2	Max.Marks-100 Min.Marks-35 Duration-3hrs.

Branch: Electrical Engineering-V Semester

Course: EE501 Electrical Machine-II

Unit I

Polyphase Synchronous Machines : Constructional features. Polyphase Distributed AC Windings: Types, Distribution, coil span and winding factors. Excitation systems, emf equation and harmonic elimination. Generator Mode, Interaction between excitation flux and armature mmf, equivalent circuit model and phasor diagram for cylindrical rotor machine. Salient pole machines: two reaction theory, equivalent circuit model and phasor diagram. Power angle equations and characteristics. Voltage regulation and affect of AVR. Synchronising methods, Parallel operation and load sharing, operation on infinite busbar.

Unit II

Motoring mode, Transition from motoring to generating mode, Phasor diagram, steady state operating characteristic, V-curves, starting, synchronous condenser, hunting -damper winding effects, speed control including solid state control.

Unit III

Analysis under sudden short circuit. Transient parameters of synchronous machines, various transient and sub-transient reactance, time constant. Expression of transient and sub transient reactance in terms of self and mutual inductances of various windings, Analysis of 3-ph short circuit oscillogram and determination of transient parameters from oscillogram.

Testing of Synchronous Machines - Stability considerations. Brush less generators, Single phase generators.

Unit IV

Generalized theory of Electrical Machines: Basics for development of generalized approach for analysis of electrical machines, Kron's Primitive machine, Concept of rotational transformer, voltage and pseudo stationary coil, Expression for self and mutual inductances of various windings w.r.t. rotor position, Park's and Inverse Parks transformation.

Unit V

Special Electric motors: Switched reluctance motor, linear machines- power energy and levitation types, PM brushless dc motors.

Reference Books:

1. Fitzgerald, C.Kingslay, S.D. Umans, Electric machinery ,5th Ed., McGraw Hills, 1992
2. GMC pherson and R.D. Laramorl, An Introduction to Electric Machine & Transformer,2nd Ed.,John Wiley & Sons, 1990

Text Books:

1. P.S. Bimbhra, Generalised Theory of Electrical Machines.
2. E. Open claw Tayler, The performance & Design of AC Computer Meters, A.H.Wheeler & Co. (P) Ltd. Alalhabad, 1971

Electrical Machine-II EXPERIMENTS

1. Determination of complete torque speed characteristics of a three phase induction machine in braking, motoring and generating regions and it's calibration
2. Study of effect of rotor resistance on the load characteristics of a wound - rotor induction motor.
3. (a) Determination of equivalent circuit parameters, prediction of performance. Verification from actual load test. (b) Separation of losses of Induction motors and estimation of efficiency.
4. Speed control of Induction motor - Conventional, electronic. Solid state speed control using (i) V constant, (ii) V/f constant, (iii) slip - energy injection
5. Determination of equivalent circuit parameters of a single phase Induction motor. Prediction torque -speed characteristics. Verification from load test
6. Study of torque step rate characteristic of a stepper motor. Determination of operating range.
7. Load characteristic of universal motor, operating on dc and ac supply. Comparison of performance.
8. Load characteristic of shaded pole-motor.
9. Characteristic of switched reluctance motor.
10. Circle diagram of 3 phase Induction Motor.
11. Performance of 3 Ph. Induction Motor with single phasing and comparison.

PROGRAMME: B.E. Electrical Engg., V Semester

Course: EE 502 Electronic Instrumentation

CATEGORY OF COURSE	COURSE TITLE	COURSE CODE	CREDIT-6C			THEORY PAPER
			L	T	P	
Departmental Core DC-7	Electronic Instrumentation	EE502	3	1	2	Max.Marks-100 Min.Marks-35 Duration-3hrs.

COURSE CONTENTS

Unit-I

Introduction to CRO, Different parts of CRO, Its Block diagram, Electrostatic focusing, Electrostatic deflection, post deflection acceleration, Screen for CRTs, Graticule, Vertical & Horizontal deflection system, Time base circuit, Oscilloscope probes and transducers, Attenuators, Application of CROs, Lissajous patterns, Special purpose CROs- Multi input, Dual trace, Dual beam, Sampling, Storage (Analog & Digital) Oscilloscopes.

Unit-II

A.C. Bridge Measurement

Sources and detectors, Use of Bridges for measurement of inductance, Capacitance & Q factor Maxwells bridge, Maxwells inductance capacitance bridge, Hays bridge, Andersons bridge, Owen's Bridge, De-sauty's Bridge, Schering Bridge, High Voltage Schering bridge, Measurement of relative permittivity, Heaviside cambell's bridge, Weins bridge, Universal bridge, Sources of errors in Bridge circuit, Wagner's Earthing device, Q meter and its applications and measurement methods.

Unit-III

Transducers

Transducers definition and classification, mechanical devices as primary detectors, Characteristic & choice of Transducers, Resistive inductive and capacitive transducers, strain gauge and gauge factor, Thermistor, Thermo couples, LVDT, RVDT, Synchros, Piezo-Electric transducers, Magnet elastic and magnetostrictive Hall effect transducers, Opto-electronic transducers such as photo voltaic, Photo conductive, photo diode and photo conductive cells, Photo transistors, Photo optic transducers. Introduction to analog & Digital data acquisition systems-Instrumentation systems used, Interfacing transducers to electronic control & measuring systems Multiplexing - D/A multiplexing A-D Multiplexing, Special encoders. Digital control description

Unit-IV

Signal Generators

Fixed & variable frequency AF oscillators, Sine wave generators, Standard signal generator, AF Sine and Square wave generator Function generator, Square and pulse generator, Random noise generator, Sweep generator, TV Sweep generator, Marker generator, Sweep- Marker generator, Wobblyscope, Video pattern generator Vectroscope, Beat frequency oscillator

Wave analyser

Basic wave analyzer, Frequency selective wave analyzer, Heterodyne wave analyzer, Harmonic distortion, analyzer, spectrum analyzer digital Fourier analyzer.

Unit-V

Digital Instruments

Advantages of Digital instruments over analog instruments, resolution and sensitivity of Digital meters., Digital Voltmeter - Ramp type, Dual slope integration type, Integrating type, Successive approximation type, Continuous balance DVM or Servo balancing potentiometer type φVM. , compression of Electronic & Digital Volt meter, Digital Multimeter, Digital frequency meter, Time period measurement, High frequency measurement, Electronic counter, Digital tachometer, Digital PH meter, Digital phase meter, Digital capacitance meter.

Digital display system and indicators like CRT, LED, LCD, Nixies, Electro luminescent, Incandescent, Electrophoretic image display, Liquid vapour display dot-matrix display, Analog recorders, X-Y recorders. Instruments used in computer-controlled instrumentation RS 232C and IEEE 488, GPIB electric interface.

List of Experiments:-

1. Measurement of inductance of a coil using Anderson Bridge.
2. Measurement of capacitance of a capacitor using schering bridge.
3. LVDT and capacitance transducers characteristics and calibration.
4. Resistance strain gauge- Strain Measurement and calibration.
5. Measurement of R,L,C & Q using LCR-Q meter.
6. Study & measurement of frequency using Lissajous patterns.
7. Measurement of pressure using pressure sensor.
8. Study of Piezo-electric Transducer and Measurement of impact using Piezo-electric Transducer
9. Measurement of Displacement using LVDT.
10. Measurement of speed of a Motor using photoelectric transducer.
11. Study & Measurement using ph meter.
12. Temperature measurement & Control using thermo couple & using thermistor.

References:

1. Albert. D. Helfrick, W.D. Cooper, Modern Electronic Instrumentation and measurement techniques, PHI.
2. Kalsi H.S., Electronic Instrumentation, TMH.
3. A.K. Sawhney, Electrical and Electronic measurements and Instrumentation, Dhanpat Rai and Co.
4. E.W. Golding, Electrical Measurement and Measuring Instruments Sir Isaac Pitman and Sons, Ltd. London 1940

5. C.S. Rangan, G.R. Sarma, V.S.V. Mani, Instrumentation Devices and Systems Tata McGraw-Hill Publishing
6. Company Ltd.
7. B.C. Nakra, K.K. Choudhry, Instrumentation, Measurement and Analysis Tata McGraw-Hill Publishing CompanyLtd.
8. Morris A.S., Principles of Measurement & Instrumentation, PHI
9. Murthy BVS, "Transducers and Instrumentation", PHI.
10. Doeblin D.O., Measurement Systems- Applications and Desig Albert D. Helfrick, William D.Cooper, Modern Electronic Instrumentation and Measurement Techniques Pearson Education.

Course Contents

Category of Course	*Course Title*	Course Code	*Credits-4C*			Theory Papers (EE)
			L	**T**	**P**	
Departmental Core DC-8	Signals & Systems	***EE503***	3	1	0	Max.Marks-100 Min.Marks-35 Duration-3hrs.

Branch: Electrical Engineering-V Semester

Course: EE503 Signals & Systems

Unit I

Dynamic Representation of Systems: Systems Attributes, Causality linearity, Stability, time-invariance. Special Signals, Complex exponentials, Singularity functions (impulse and step functions).. Linear Time-Invariant Systems: Differential equation representation convolution Integral. Discrete form of special functions. Discrete convolution and its properties. Realization of LTI system (differential and difference equations).

Unit II

Fourier Analysis of Continuous Time Signals and Systems : Fourier Series, Fourier Transform and properties, Parseval's theorem, Frequency response of LTI systems. Sampling Theorem.

Unit III

Fourier Analysis of Discrete Time Signals & Systems : Discrete-Time Fourier series, Discrete-Time Fourier Transform (including DFT) and properties. Frequency response of discrete time LTI systems.

Unit IV

Laplace Transform: Laplace Transform and its inverse: Definition, existence conditions, Region of Convergence and properties, Application of Laplace transform for the analysis of continuous time LTI system (stability etc.) Significance of poles & zeros.

Z-Transform : Z-Transform and its inverse: Definition, existence, Region of convergence and properties, Application of Z-Transform for the analysis of Discrete time LTI Systems, Significance of poles and zeros.

Unit V

Sampling: The sampling theorem, reconstruction of signal from its samples, sampling in the frequency domain, sampling of discrete-time signals.

References

1. Alan V. Oppenheim, Alan S. Willsky and H. Nawab, Signals and Systems, Prentice Hall, 1997
2. Simon Haykin, Communication Systems, 3rd Edition, John Wiley, 1995.

Course Contents

Category of Course	*Course Title*	Course Code	*Credits-6C*			Theory Papers (EE)
			L	T	P	
Interdisciplinary Core DID-5	Digital Electronics & Logic Design	*EE504*	3	1	2	Max.Marks-100 Min.Marks-35 Duration-3hrs.

Branch: Electrical Engineering-V Semester

Course: EE504 Digital Electronics & Logic Design

Unit I

(A) Number System: Various number systems-decimal, Binary, Hex and Octal with mutual conversion, binary arithmetic in computers, addition, subtraction, multiplication and division.

(B) Binary Codes: Weighted, non-weighted codes, error detecting and correcting codes, alphanumeric codes, ASCII codes

Unit II

Boolean Algebra & Logic Hardware

(A) Boolean Algebra: AND, OR, NOT, NAND, NOR, EXOR, operations and gates, laws of Boolean algebra, reduction of Boolean expression, logic diagram, universal building blocks, negative logic

(B) Logic hardware " Diode as switch, Bipolar transistor as switch FET as switch, MOSFET (Deplection and Enhancement mode) IC Technology, MSI, LSI, VLSI, logic specification, logic families (DTL, TTL, ECL, MOS, CMOS)

Unit III

Combinational circuits and system

(A) Combinational logic: Minterms and maxterms, Truth table and Karnaugh mapping, reduction of Boolean expression with SOP, POS and mixed terms, incompletely specified functions multiple output minimization, variable mapping, minimization by labular/ Quine Mc cluskey method.

(B) Encoders, Decoders, Multiplexers, Demultiplexers, code convertors, Binary address Digital comparator, parity checker/ generator, programming logic Array (PLA);

Unit IV

Sequential circuits

(A) State tables and diagrams, flip flop and its various types- JK, RS, T, D, pulse and edge triggered flip flops transition and excitation tables, timing diagrams.

(B) Shift registers: Series and parallel data transfer, ripple counters, synchronous counters, Modulo N counter design, Up down counters, Ring

Unit V

Memory & A/D Conversion

(A) Semiconductor ROM, Bipolar and MOS RAM, organization of RAM memory subsystem. Timing circuit, clock circuit and IC Timer.

(B) Analog/ Digital conversion: Digital to analog conversion, dualeslope integration successive approximation, parallel and parallel/ series conversion, converter specifications.

Reference Books:

1. An Introduction to Digital Computer Design by V. rajaraman and T. Radhakrishnan, 3rd Edn. PHI.
2. Digital Principles and Applications by A.P. Malvino and B.P. Leach, 4th Edn. McGraw Hill.
3. Digital computer Fundamentals by T.C. Bratee, 6th Edn. McGraw Hill.
4. Pulse, Digital and switching circuits-Millman

Text Books:

1. Digital Electronics by WH Gothmann, 2nd Edn. PHI.

Course Contents

Category of Course	Course Title	Course Code	Credits-4C			Theory Papers (EE)
Humanities & Social Sciences ***HS-3***	Principles of Management & Economics	**EE505**	**L**	**T**	**P**	Max.Marks-100 Min.Marks-35 Duration-3hrs.
			3	1	0	

Branch: *Electrical Engineering-V Semester*

Course: EE505 *Principles of Management & Managerial Economics*

Unit I

Management Concept: *Management, Administration and Organization Difference and Relationship between Organization Management and Administration. Importance of Management, Characteristics of Management*

Unit II

Management: Scientific Management, Principles of Management, Process of Management, Functions of Management, Levels of Management, Project Management

Unit III

Decision Making: Introduction and Definition, Types of Decisions, Techniques of Decision Making, Decision making under certainity Decision making under uncertainty, Decision Making under risk

Unit IV

Managerial Economics: Introduction, Factors Influencing Manager, Micro and Macro-economics, Theory of the Cost, Theory of the Firm, Theory of Production Function.

Unit V

Productivity: Input-Output Analysis, Micro-economics Applied to Plants and Industrial Undertakings, Production and Production system, Productivity, Factors affecting Productivity, Increasing Productivity of Resources

Reference Books

1. The Practice of Management Peter Drucker Harper and Row
2. Essentials of Management: Koontz, Prentice Hall of India
3. Management Staner, Prentice Hall of India
4. Principle and Practice of Management T.N. Chhabra, Dhanpat Rai New Delhi
5. Industrial Organisation and Engineering T.R. Banga and S.C. Sharma,Economics Khanna Publishers
6. Industrial Engineering and Management O.P. Khanna, Dhanpat Rai
7. Managerial Economics Joel Dean, Prentice Hall of India

8. Managerial Economics Concepts & Cases V.L. Mote, Samuel Paul, G.S. Gupta, Tata Mc Graw Hill New Delhi
9. Managerial Economics V.L.Mote, Tata McGraw Hill
10. Analytical Models for Managerial and Engineering Economics Schweyer Reinhold

Course Contents

Category of Course	**Course Title**	Course Code	Credit-4C		
Information Technology IT 5	Computer Programming V	EE506	L	T	P
			0	**0**	**4**

Branch: *Electrical Engineering V Semester*

Course: EE506 *Computer Programming V (Hardware Lab).*

Essentials of Networking

Installation and implementation of:

1. **Workstations in NOS.**
2. **Servers in NOS.**
3. **Enterprise servers in NOS**

Options of NOS are

a. **Microsoft Windows NT**
b. **Linux**
c. **Unix.**
d. **Sun-Solaris.**

(H/W Examples: AS/400; RS-6000; IBM-Compatible Platform Silicon-Graphics for multimedia; IBM-Net Finity Server)