

List of Electives

Elective – I

TEE – 011 :	Database Management System, Data Mining and Warehousing
TEN - 011 :	Applications of power Electronics to Power System
TEC – 015:	VLSI System Design
TEE – 013 :	Advanced Control System
TEE – 014:	Digital Control System

Elective – II

TCS - 602 :	Computer Networks
TEE – 802:	Utilization of Electric Energy & Traction
CS - 023 :	Cryptography and Network Security
TEE – 702:	Electric Drives
TEE - 703 :	Power System Operation & Control

Elective – III

TEE – 031 :	Bio-Instrumentation
TEC – 025:	Image Processing
TEE – 033 :	Neural Networks & Fuzzy System
TEE – 034:	Switch Mode and Resonant Converters
TIT – 012 :	Multimedia System

TEE – 701: Switchgear and Protection

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Unit No.	Topic Name	Text Book No.	Chapter No.	No. Of Lectures
1	Introduction to Protection System: Introduction to protection system and its elements, functions of protective relaying, protective zones, primary and backup protection, desirable qualities of protective relaying, basic terminology.	1 2	29 1	3
	Relays: Electromagnetic, attracted and induction type relays, thermal relay, gas actuated relay, design considerations of electromagnetic relay.	1 2	30 3	5
2	Relay Application and Characteristics: Amplitude and phase comparators, over current relays, directional relays, distance relays, differential relay	2	4	4
	Static Relays Comparison with electromagnetic relay, classification and their description, over current relays, directional relay, distance relays, differential relay.	2 1	9,12 39	4
	Protection Of Transmission Line : Over current protection, distance protection, pilot wire protection, carrier current protection, protection of bus, auto reclosing,	1 2 1	34 5,7 36	8
4	Circuit Breaking : Properties of arc, arc extinction theories, restriking voltage transient, current chopping, resistance switching, capacitive current interruption, short line interruption, circuit breaker ratings.	1 1 2 2	3 6 13 14	5
	Testing Of Circuit Breaker : Classification, testing station and equipments, testing procedure, direct and indirect testing.	2 1	18 4	3
5	Apparatus Protection : Protection of transformer, generator and motor.	2 1	32,33 35,36	3
	Circuit Breaker : Operating modes, selection of circuit breakers, constructional features and operation of Bulk Oil, Minimum Oil, Air Blast, SF6, Vacuum and	1 1	21 7-13	5
	d. c. circuit breakers.	2	15,16	

Text Books:

1. S. S. Rao, "Switchgear and Protection", Khanna Publishers.

2. B. Ravindranath and M. Chander, Power system Protection and Switchgear, Wiley Eastern Ltd.

Reference Books:

- 1 B. Ram and D. N. Vishwakarma, “Power System Protection and Switchgear”, Tata Mc. Graw Hill
- 2 Y. G. Paithankar and S R Bhide, “Fundamentals of Power System Protection”, Prentice Hall of India.
- 3 T. S. M. Rao, “ Power System Protection: Static Relays with Microprocessor Applications” Tata Macgraw Hill”.
- 4 A.R. Van C. Warrington, “ Protective Relays- Their Theory and Practice, Vol. I & II” Jhon Willey & Sons.
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TEN - 701: Fundamentals of Digital Signal Processing

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Unit No.	Topic Name	Text Book No.	Chapter No.	No. of Lectures
1	Discrete-Time Signals And Systems: Sequences, discrete time systems, LTI systems, frequency domain representation of discrete time signals and systems ,discrete time signals and frequency domain representation , Fourier Transform.	1	2	4
	Discrete Fourier Transform: Discrete Fourier transforms, properties, linear convolution using DFT, DCT	1	8	3
2	Sampling of Continuous Time Signals: Sampling and reconstruction of signals, frequency domain representation of sampling, discrete time processing of continuous time signals, continuous time processing of discrete time signals, changing the sampling rate using discrete time processing, multi rate signal processing, digital processing of analog signals, over sampling and noise shaping in A/D and D/A conversion	1	4	5

	Transform Analysis of LTI Systems: Frequency response of LTI systems, system functions, frequency response for rational system functions, magnitude-phase relationship, all pass systems, minimum phase systems, linear systems with generalized linear phase.	1	5	5
3	Structures For Discrete-Time Systems: Block diagram representation, signal flow graph representation, basic structures for IIR systems: direct form, cascade form, parallel form, and feedback in IIR systems. Transposed forms, basic network structures for FIR systems: direct form, cascade form, and structures for linear-phase FIR systems.	1	6	4
	Overview of finite precision numerical effects, effects of coefficient quantization, Effects of round-off noise in digital filters, zero-input limit cycles in fixed point realizations of IIR digital filters.	1	6	4
4	Filter Design Techniques: Design of D-T IIR filters from continuous – time filters, design of FIR filters by windowing, Kaiser Window method, optimum approximations of FIR filters, FIR equiripple approximation	1	7	7
5	Efficient computation of the DFT: Goertzel algorithm, decimation in time and decimation in frequency, FFT algorithm, practical considerations, implementation of the DFT using convolution, effects of finite register length.	1	9	5
	Fourier Analysis of Signals Using DFT : DFT analysis of sinusoidal signals, time-dependent Fourier transforms: Block convolution, Fourier analysis of non – stationary and stationary random signals, spectrum analysis of random signals using estimates of the autocorrelation sequence.	1	0	3

Text Book:

1. Oppenheim A.V., Schafer, Ronald W. & Buck, John R., "Discrete Time Signal Processing", Pearson Education, 2nd Edition

Reference Books:

1. Proakis, J.G. & Manolakis, D.G., "Digital Signal Processing: Principles Algorithms and Applications", Prentice Hall of India.
2. Rabiner, L.R. and Gold B., "Theory and applications of DSP", Prentice Hall of India.
3. Oppenheim, Alan V. & Willsky, Alan S., "Signals and Systems", Prentice Hall of India, 2nd Edition
4. Johnson, J.R., "Introduction to Digital Signal Processing", Prentice Hall of India.
5. De Fatta, D.J. Lucas, J.G. & Hodgkiss, W. S., "Digital Signal Processing", John Wiley & Sons.

IC – 707 Telemetry and Data Transmission**L T P
3 1 0****Unit-1.1. Sampling Fundamentals:**

Introduction to sampling theorem and sampling process, convolution, computing minimum sampling rate. Aliasing Errors.

(2)

2. Digital Modulation Techniques:

Review of PCM, DPCM, Methods of binary data transmission, Data Formats, DM code converters, PSK, QPSK, FSK, probability of error, phase ambiguity resolution and differential encoding, error detection, error correction, error correction codes.

(6)

Unit- 2 & 3**3. Data Handling System:**

Block schematic, Sensors, Signal conditioners, Multiplexing- high level and low level, ADC- range and resolution, Word Format, Frame format, Frame synchronizer codes, R. F. links, X24, RS 422, RS423, RS 232C interfaces, Multi terminal configuration, Multiplier & Concentrator, Data Modems, Data transmission over telephone lines.

(8)

4. Data Reception Systems:

Bit synchronizers, frame synchronizers, subframe synchronizers, PLL,

Display systems.
(4)

Unit-4

5. Remote Control:

Communication based processing control systems, pipelines, Operational security systems components, Pipeline control, Power system control, Programmable controllers for factory automation.

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6. Command:

Tone command system, Tone digital command system, ON/OFF command and data commands.

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Unit-5

7. Aerospace Telemetry:

Signal formation and conversion, Multiplexing techniques in telecontrol, Industrial telecontrol installations, reliability in telecontrol installations.

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Text Books:

1. Patranabis," Telemetry Principles: Tata Mcgrew Hill.
2. Schweber," Data Communication " Mcgraw Hill.
3. Berder & Menjewlse," Telemetry Systems".

TEE – 751: Power System Lab:

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Note:- At least 10 experiments should be performed out of which 3 should be simulation based.

(A) Hardware Based:

1. To determine direct axis reactance (x_d) and quadrature axis reactance (x_q) of a salient pole alternator.

2. To determine negative and zero sequence reactances of an alternator.
3. To determine sub transient direct axis reactance (x_d) and sub transient quadrature axis reactance (x_q) of an alternator
4. To determine fault current for L-G, L-L, 2L-G and L-L-L faults at the terminals of an alternator at very low excitation
5. To study the IDMT over current relay and determine the time current characteristics
6. To study percentage differential relay
7. To study Impedance, MHO and Reactance type distance relays
8. To determine location of fault in a cable using cable fault locator
9. To study ferranti effect and voltage distribution in H.V. long transmission line using transmission line model.
10. To study operation of oil testing set.

(B) Simulation Based Experiments (using MATLAB or any other software)

11. To determine transmission line performance.
12. To obtain steady state, transient and sub-transient short circuit currents in an alternator
13. To obtain formation of Y-bus and perform load flow analysis
14. To perform symmetrical fault analysis in a power system
15. To perform unsymmetrical fault analysis in a power system

Reference Books :

1. Hadi Sadat, " Power system Analysis" Tata Mc Graw Hill.
2. T. K. Nagsarkar & M. S. Sukhija, " Power System Analysis" Oxford University Press.

TEN – 751: Digital Signal Processing Lab.

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Note:- Minimum of 10 experiments should be performed out of the following using DSP kit TMS 320 CXX.

- 1 To generate sinusoidal, square and triangular waveforms
- 2 To study response of audio (analog) input
- 3 To study response and stability of linear shift invariant system with given unit sample response

- 4 To study addition and multiplication of sequences
- 5 To study matrix multiplication
- 6 To find discrete Fourier Transform of given sequence
- 7 To implement Geartzd Algorithm
- 8 To implement FFT decimation in time algorithm
- 9 To implement floating point arithmetic
- 10 To implement Tone generation
- 11 To implement LPC computation
- 12 To implement Coding schemes

facility Note:- The institute/college may add any three experiments according to available.

TEN – 752: Project:

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Project shall be assigned to students at the start of VIIth semester. There should not usually be more than 3 students in batch. The project should be based on latest technology as far as possible and it may be hardware or/and software based. The assessment of performance of students should be made at least twice in the semester. Students should be encouraged to present their progress of project using overhead projector or LCD projector.

TEN – 753: Practical & Industrial Training Presentation:

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Students will go practical & Industrial training of four weeks in any industry or reputed organization after the VIth semester examinations in summer. They will also prepare an exhaustive technical report of the training which will be duly signed by the officer under whom training was taken in the industry /organization. They will have to present about the training before a committee consisting of faculty members constituted by the concerned Head of the Department.

TEE – 801: Instrumentation and Process Control

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Unit No.	Topic Name	Text Book No.	Chapter No.	No. of Lectures
1	Transducer – I: Definition, advantages of electrical transducers, classification, characteristics, factors affecting the choice of transducers, Potentiometers, Strain gauges, Resistance thermometer, Thermistors, Thermocouples, LVDT, RVDT.	1 2	2 4	8
2	Transducer – II : Capacitive, Piezoelectric Hall effect and opto-electronic transducers. Measurement of Motion, Force pressure, temperature, flow and liquid level.	1 2	3 7,8,9,11,12	9
3	Telemetry : General telemetry system, land line & radio frequency telemetering system, transmission channels and media, receiver & transmitter. Data Acquisition System: Analog data acquisition system, Digital data acquisition system, Modern digital data acquisition system.	1	4	7
4	Display Devices and Recorders: Display devices, storage oscilloscope, spectrum analyzer, strip chart & x-y recorders, magnetic tape & digital tape recorders. Recent Developments: Computer aided measurements, fibre optic transducers, microprocessors, smart sensors, smart transmitters.	1 2	5,6 18	5 3
5	Process Control : Principle, elements of process control system, process characteristics, proportional(P), integral(I), derivative(D), PI, PD and PID control modes. Electronic, Pneumatic & digital	3	1,9,10,11	

controllers.			
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Text Books:

1. A.K.Sawhney, “Advanced Measurements & Instrumentation”, Dhanpat Rai & Sons
2. B.C. Nakra & K.Chaudhry, “Instrumentation, Measurement and Analysis”, Tata Mc Graw Hill 2nd Edition.
3. Curtis Johns, “Process Control Instrumentation Technology”, Prentice Hall

Reference Books:

1. E.O. Decblin, “Measurement System – Application & design”, Mc Graw Hill.
2. W.D. Cooper and A.P. Beltried, “Electronics Instrumentation and Measurement Techniques” Prentice Hall International
3. Rajendra Prasad,”Electronic Measurement and Instrumentation Khanna Publisher

TEN – 801: Advanced Communication Systems

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Unit No.	Topic Name	Text Book No.	Chapter No.	No. of Lectures
1	Telephone Systems : Wire Telephony Public Telephone Networks	1	17	8
2	Facsimile And Television Systems: Facsimile Transmission Television Television Signal Television receivers(Black & White, Colour), Television transmitters, high-definition television	1	18	8
3	Radar and Wireless Communication Systems: Basic Principles Pulsed Systems Other radar systems Mobile communication concepts, cellular, concepts multiple access techniques: FDMA,TDMA,CDMA Mobile communication standards:GSM,IS-95,UMTS	2 3	16 10	4 5

4	Satellite Communication Systems: Introduction, orbits, power systems, altitude control, satellite station keeping, antenna look angles, limits and visibility. Frequency plans and polarization, trans-ponders. Uplink power budget calculations, downlink power budget calculations, overall link budget calculations, digital carrier transmission, multiple access methods	1	19	8
5	Optical Communication Systems: Introduction, Principles of light transmission in fiber, losses in fibers, dispersion Light sources in fiber optics, photo detectors, connectors and splices, fiber-optic communication link.	1	20	7

Text Books :

1. "Electronic Communications" Roody, Dennis and Coolen, John, 4th Ed., Prentice Hall international
2. "Electronic Communication Systems" Kennedy, George and Davis, Bernard, 4th Ed., Tata Mc Graw-Hill.

Reference Books:

1. Roy Blake, "Wireless Communication Technology" Thomson Asia Pvt.Ltd. Singapore.
2. Toomay, J.C., "Principles of Radar", Prentice Hall of India
3. Feher, Kamilo, "Wireless Digital Communications", Prentice Hall of India
4. Pratt. T& Bostian, C.W., "Satellite Communications", John Wiley & Sons
5. Roddy, D., "Satellite Communication", Prentice Hall of India
6. Senior, John M., "Optical Fiber Communications principles & Practices", 2nd Edition Prentice Hall of India.

TEE – 851: Electrical Instrumentation Lab.

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Note: Minimum ten experiment should be performed from the following

1. Measurement of displacement using LVDT.
2. Measurement of displacement using strain gauge based displacement transducer.
3. Measurement of displacement using magnetic pickup.
4. Measurement of load using strain gauge based load cell.
5. Measurement of water level using strain gauge based water level transducer
6. Measurement of flow rate by anemometer
7. Measurement of temperature by RTD.
8. Measurement of temperature by thermocouple
9. Study of P,PI and PID controllers

10. Study of storage oscilloscope and determination of transient response of RLC circuit.
11. Determination of characteristics of a solid state sensor/fibre-optic sensor
12. Design and test a signal conditioning circuit for any transducer
13. Study of data acquisition system using “**labview**” software and test all signal points
14. Measurement of sine, triangular ,square wave signal of function generator and verify its frequency at 100 Hz tap point using “**labview**” software.
15. Measurement of voltage and current signal of programmable power supply using **labview** GPIB interface.

Note :- Three more software based experiments may be added in place of experiments nos.13 to 15.at the institute level.

TEN – 851: Telemetry Lab

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1. Measurement of Temperature Using RTD Thermistor and amplification to an appropriate level suitable for Teletransmission.
2. Sampling Though a S/H circuit, and reconstruction of the sampled signal.
3. Realizing of PCM signal using ADC & reconstruction using DAC using 4 bit / 8 bit system. Observe Quantization noise in each case.
4. Fabricate and test a PRBS Generator.

5. Realization of data in Defferent formats such as NRZ-L, NRZ-M &NRZ-S.
6. Clock recovery circuit from NRZ-L data using PLL.
7. Manchester Coding & Decoding (Biphase 1) of NRZ-L data.
8. Coding & Decoding of NRZ- L into URZ-L (Unipolar return to Zero coding)
9. ASK- Modulation & Detection.
10. FSK- Modulation & Detection.
11. PSK- Modulation & Detection.
12. Error introduction, Error detection & Correction using Hamming code.
13. Amplitude Modulation & Detection of signal obtained from Experiment no-1.

TEN – 852: Project

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Students should devote themselves to expedite progress of the project as soon as VIIIth semester starts. They are supposed to finish project work latest by middle of April and submit project report by the end of the April month. The assessment of performance of students should be made at least twice in the semester. The students should present project using overhead project or LCD projector in the end semester project examination.

3	Data Base Design & Normalization: Functional dependencies, normal forms, first, second and third normal forms, BCNF, inclusion dependences, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design,	1	7	8
4	Foundation. Introduction to DATA Warehousing. Client / Server Computing model & Data Warehousing. Parallel processors & System. Distributed DBMS implementations. Client /Server RDBMS Solutions.	2	15,16,17	8
5	DATA Warehousing. Data Warehousing Components. Building a Data Warehouse. Mapping the Data Warehouse to a Multiprocessor Architecture. DBMS Schemes for Decision Support. Data Extraction, cleanup & Transformation Tools, Metadata. Data Mining: Introduction to data Mining	I 3,4	16	7 1

Text Books:

1. Korth , Silbertz,Sudarshan, "Database Concepts",Mc Graw Hill
2. Date C.J., "An Introduction To Database System", Addition Wesley
3. Alex Berson & Stephen J. Smith, " Data Warehousing, Data Mining & OLAP", Tata MCGraw Hill.
4. Mallach, Data Warehousing Syatem", (MCGraw Hill)

Reference Books :

1. Elmasri,Navathe, "Fundamentals of Database Systems",Addition Wesley
2. Bipin C.Desai, "An Introduction to Database Systems, "Galgotia Publication
3. MaJumdar & Bhattacharya, "Database Management System", Tata Me Graw Hill
4. Ramakrishnan, Gehrke, "Database Management System", Me Graw Hill.

TEN – 011 : Applications of power Electronics to Power System

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Unit –1

1. Steady state and dynamic problems in AC systems. Flexible AC transmission systems (4) (FACTS).
2. Principles of series and shunt compensation. Description of static variable Compensator (5) (SVC), thyristor controlled series Compensators (TCSC).

Unit –2

1. Static phase shifters (SPS), Static condenser (STATACON). Static Synchronous series (7) compensator (SSSC) and unified power flow controller (UPFC).

Unit –3

1. Modeling and Analysis of FACTS controllers. Control strategies to improve system (6) stability.

Unit – 4

2. Power Quality problems in distribution systems, harmonics creating loads, modeling, (8) harmonic prorogation series and parallel resonances, harmonic power flow
3. Mitigation of harmonics, filters, passive filters, Active filters, shunt, series hybrid filters, (8) voltage sages & swells, voltage flicker, Mitigation of power quality problems using power electronic conditioner. IEEE standards.

Unit .

Text Books:

1. G. T. Heydt/ Power Quality/ Stars in a circle publications, Indiana, 1991.
2. T. J. E. Miller/ Static Reactive Power Compensation/ John Wiley & Sons, New York, 1982.

TEC - 015 : VLSI System Design

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Unit No.	Topic Name	Text Book No.	Chapter No.	No. of Lectures
1	Implementation Strategies for Digital ICS: From custom to semicustom and structured array, design approaches. Custom circuit design Cell-based design methodology Array based implementation approaches Perspective	1	8	8

	Design methodology:Characterizing logic and sequential cells Design methodology insert F design synthesis			
2	Coping with interconnect : Capacitive parasitics Resistive parasitics Advanced interconnect techniques Perspective: Networks-on-a-chip Timing issues in digital circuits Timing classification of digital systems Synchronous design Self-timed circuit design Synchronizers and arbiters Clock synthesis and synchronization using Phase-locked loop Future directions and perspectives Design methodology: Design verification	1	9	9
3	Designing arithmetic building blocks : Data paths in digital processor architectures The multiplier The Shifter Other arithmetic operators Power and speed trade-offs in data path structures Perspective : Design as a trade-off	1	11	8
4	Designing Memory and Array Structures: Introduction The Memory core Memory peripheral circuitry Memory reliability and yield Power dissipation in memories Case studies in memory design Perspective : Semiconductor memory trends and evolutions	1	12	8
5	Validation and test of manufactured circuits: Introduction Test Procedure Design for Testability Test-pattern generation	1	12	7

Text Book :

1. Rabaey, John. M. & Chandrakasan, Anantha & Nikolic, Borivoje, "Digital Integrated

Circuits, A Design perspective”, Pearson Education, 2nd Edition.

Reference Books :

1. Pucknell, Douglas A. & Eshraghian, Kamran, “Basic VLSI Design”, Prentice Hall of India.
2. Wayne Wolf, “Modern VLSI Design-Systems on Silicon”, Addison-Wesley, 2nd Edition
3. Geiger, R.L., Allen, P.E. & Strader, N.R., “VLSI :Design Techniques for Analog & Digital Circuits”, Mc Graw Hill.
4. Weste, N.H.E. & Eshraghian, K., “Principles of CMOS VLSI Design”, Pearson Education Asia.

TEE – 013: Advanced Control System
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Unit No.	Topic Name	Text Book No.	Chapter No.	No. of Lectures
1	State Space Analysis of Continuous System: Review of state variable representation of continuous system, conversion of state variable models to transfer function and vice-versa, solution of state equations and state transition matrix, controllability and observability, design of state observer and controller.	1	5,7	8
2	Analysis of Discrete System: Discrete system and discrete time signals, state variable model and transfer function model of discrete system, conversion of state variable model to transfer function model and vice-versa, modeling of sample-and-hold circuit, solution of state difference equations, steady state accuracy, stability on the z-plane and Jury stability criterion, bilinear transformation, Routh-Hurwitz criterion on rth planes.	1	2,3,4	8

3	Stability: Lyapunov's stability theorems for continuous and discrete systems, methods for generating Lyapunov function for continuous and discrete system, Popov's criterion.	1	8	5
	Non linear System: Types of non linearities, phenomena related to non - linear systems. Analysis of non linear systems-Linearization method, second order non-linear system on the phase plane, types of phase portraits, singular points, system analysis by phase-plane method, describing function and its application to system analysis.	2	14	4
4	Optimal Control: Introduction,formation of optimal control problem, calculus of variations minimization of functions, constrained optimization.Pontryagin's Minimum Maximum Principle,Linear Quadratic Problem-Hamilton Jacobi equation, Riccati equation and its solution.	2	11	8
5	Adaptive Control: Introduction, modal reference adaptive control systems, controller structure, self tuning regulators.	3	1,2,3,4	4
	Introduction to neural network, fuzzy logic and genetic algorithms.	4		3

Text Books:

1. M.Gopal, "Digital Control and State variable Methods", Tata Mc Graw Hill
2. Ajit K.Madal, "Introduction to Control Engineering: Modelling, Analysis and Design"
New Age International.
3. D.Landau, "Adaptive Control", Marcel Dekker Inc.
4. S.Rajasekaran & G.A.Vjayalakshmi Pai, "Neural Networks,Fuzzy Logic and Genetic
Alogorithms: Synthesis and Applications" Prentice Hall of India.

Reference Book:

1. Donald E. Kiv, "Optimal Control Theory: An Introduction" Prentice Hall
2. B.C. Kuo, "Digital Control Systems" Sounders College Publishing
3. C.H.Houpis and G.B.Lamont,"Digital Control Systems:Theory,Hardware, Software"Mc
Graw Hill.

TEE – 014: Digital Control System

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Unit No.	Topic Name	Text Book	Chapter No.	No. of Lectures
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1	Signal Processing in Digital Control: Basic digital control system, advantages of digital control and implementation problems, basic discrete time signals, z-transform and inverse z-transform, modeling of sample-hold circuit., pulse transfer function, solution of difference equation by z-Transform method.	1,2	2,3	7
2	Design of Digital Control Algorithms: Steady state accuracy, transient response and frequency response specifications, digital compensator design using frequency response plots and root locus plots.	1	4,8,9	8
3	State Space Analysis and Design: State space representation of digital control system, conversion of state variable models to transfer functions and vice versa, solution of state difference equations, controllability and observability, design of digital control system with state feedback.	1,2	10	8
4	Stability of Discrete System: Stability on the z-plane and Jury stability criterion, bilinear transformation, Routh stability criterion on rth plane. Lyapunou's Stability in the sense of Lyapunou, stability theorems for continuous and discrete systems, stability analysis using Lyapunor's method.	1,2 1,2	2,3 8	5 4
5	Optimal digital control : Discrete Euler Lagrange equation, max. min. principle, otpimality & Dynamic programming, Different types of problem and their solutions.	1	11	8

Text Books:

1. B.C.Kuo, "Digital Control System", Saunders College Publishing.
2. M.Gopal, "Digital Control and State Variable Methods", Tata McGraw Hill.

Reference Books:

1. J.R.Leigh, "Applied Digital Control", Prentice Hall, International
2. C.H. Houpis and G.B.Lamont, "Digital Control Systems: Theory, hardware, Software", McGraw Hill.

TCS-602 Computer Networks

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UNIT-I

Introduction :

Goals and applications of Networks, Network structure and architecture, The OSI reference model, services, Network Topology Design- Delay Analysis, Back Bone Design, Local Access Network Design. Physical Layer Transmission Media, Switching methods , ISDN, Terminal Handling.

UNIT-II

Medium Access Control sub layer:

Medium Access sub layer- Channel Allocation, LAN protocols- ALOHA protocols- Overview of IEEE standards – FDDI, Data Link Layer – Elementary data Link Protocols, Sliding Window protocols, Error Handling.

UNIT –III

Network Layer:

Network Layer – Point – to Point Networks, routing, Congestion control, Internetworking – TCP /IP –IP packet, IP address, IP v6.

UNIT –IV

Transport Layer:

Transport Layer – Design issues, connection management, session Layer – Design issues, remote procedure call, Presentation Layer – Design issues, data compression techniques, cryptography – TCP Window Management.

UNIT –V

Application Layer:

Application Layer- File Transfer, Access and Management, Electronic mail, Virtual Terminals, Other application, Example Networks – Internet and Public Networks.

Text Books:

1. Behrouz A. Forouzan, “Data Communication and Networking”, Tata Mc Graw Hill.
2. A.S. Tanenbaum, “ Computer Networks”, 3rd Edition, Prentice Hall India .
3. S. Keshav, “An Engineering Approach on Computer Networking”, Addition Wesley.
4. W. Stallings, “Data and Computer Communication”, Macmillan Press.

TEE – 802: Utilization of Electrical Energy and Traction

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Unit No.	Topic Name	Text Book No.	Chapter No.	Page Nos.	No. of Lectures
1.	Electric Heating: Advantages and methods of electric heating Resistance heating Electric arc heating Induction heating Dielectric heating	1 1 1 1 1	4 4 4 4 4	319-320 320-332 333-349 349-364 364-372	1 2 2 2 2
2	Electric Welding: Electric Arc Welding Electric Resistance welding Electronic welding control Electrolyte Process: Principles of electro deposition, Laws of electrolysis, applications of electrolysis	1 1 1 1	5 5 5 7	376-386 386-394 395-401 499-514	1 1 2 3
3	Illumination: Various definitions, Laws of illumination, requirements of good lighting Design of in door lighting and outdoor lighting systems Refrigeration and Air Conditioning: Refrigeration systems, domestic refrigerator, water cooler Types of air conditioning, Window air conditioner	1 1 1 1	6 6 9 9	408-419, 453-459 464-487 670-678 678-679	2 3 2 1
4	Electric Traction: Types of electric traction, systems of track electrification Traction mechanics- types of services, speed time curve and its simplification, average and schedule speeds Tractive effort, specific energy consumption, mechanics of train movement, coefficient of adhesion and its influence	1; 2 1 1; 2	8; 10 8 8; 10	518-598; 305-308 539-545 545-560; 315-320, 309-310	1 2 4
5	Electric Traction – II Salient features of traction drives Series – parallel control of dc traction drives (bridge transition) and energy saving	1; 2 1; 2	8; 10 8; 10	613-615; 327-328; 624-628; 631-633;	1 2

	Power Electronic control of dc and ac traction drives	2	10	330-333 334-348	4
	Diesel electric traction.	2	10	348-351	1

Text Books:

1. H.Partab, "Art and Science of Electrical Energy" Dhanpat Rai & Sons.
2. G.K.Dubey, "Fundamentals of Electric Drives" Narosa Publishing House

Reference Book:

1. E.O. Taylor, "Utilization of Electric Energy" Pitman & Sons.

TIT- 701 : Cryptography and Network Security

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Unit I

Introduction:

Introduction to Security attacks, services and mechanism, Introduction to cryptology.

Conventional Encryption: Conventional Encryption model, classical encryption techniques – substitution ciphers & transposition ciphers, cryptanalysis, stereography, stream & block ciphers.

Model Block Ciphers : Block Ciphers principles, Shannon's theory of Confusion and diffusion, fiestal structure, Data Encryption Standards (DES), Strength of DES, Differential & Linear Cryptanalysis of DES, Block Cipher modes of operation, Triple DES, IDEA encryption & decryption, Strength of IDEA, Confidentiality using Conventional Encryption, traffic confidentiality, key distribution, random number generation.

Unit II

Introduction to graph, ring and field, Prime and relative prime numbers, modular arithmetic, Fermat's & Euler's Theorem, Primality testing, Euclid's Algorithm, Chines remainder theorem, Discrete logarithms.

Principles of public key cryptosystems, RSA algorithm, security of RSA, key management, Diffle- Hellman key Exchange algorithm, Introductory idea of Elliptic curve cryptography, Elganal Encryption.

UNIT III

Message Authentication & Hash Functions: Authentication recruitments, Authentication functions, Message Authentication codes, Hash functions, Birthday attacks, security of Hash function & MACS, MD5 message digest algorithm, secure Hash Algorithm (SHA).

Digital Signature : Digital Signature, Authentication protocol, Digital Signature Standard (DSS), proof of digital signature algorithm.

Unit IV

Authentication Applications: Kerberos & X. 509, directory authentication service, Electronic Mail security- Pretty Good Privacy (PGP), S / MIME.

Unit V

IP Security : Authentication Header, Encapsulating security payloads, Combining security associations, Key management.

Web Security : Secure Socket Layer & Transport Layer Security, secure Electronic Transaction (SET).

System Security: Intruders, Viruses and related threads, Firewall design principles, trusted systems.

Text Books:

1. William Stallings, “ Cryptography and Network Security : Principles and Practice”, Prentice Hall.
2. Johanners A. Buchmann, “ Introduction to cryptography”, Springer –Verlag.
3. Bruce Schiener, “Applied Cryptography”.

TEE –702: Electric Drives

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Unit No.	Topic Name	Text Book No.	Chapter No.	Page Nos.	No. of Lectures
1	Fundamentals of Electric Drive:				
	Electric Drives and its parts, advantages of electric drives	1	1	1-9	2
	Classification of electric drives	2	1	1-2	1
	Speed-torque conventions and multi-quadrant operations	1,2	2,2	12-14, 4-6	1
	Constant torque and constant power operation	1	3,5,6	35,89,187	1
	Types of load				
2	Dynamics of Electric Drive: Dynamics of motor-load combination Steady state stability of Electric Drive Transient stability of electric Drive Selection of Motor Power rating: Thermal model of motor for heating and cooling, classes of motor duty, determination of motor	2	2	3-4	1
		1	2	18-20	1
		2,1	2,2	12-16, 11-12 &14-17	2
		2,1	2,2	19-24, 23-24	1
		2	2	24-30	1
		1,2	4,7	44-56, 137-158	4

	power rating for continuous duty, short time duty and intermittent duty. Load equalization	1,2	2,7	24-28, 159-162	1
3	Electric Braking: Purpose and types of electric braking, braking of dc, three phase induction and synchronous motors	2	6	107-129	5
	Dynamics During Starting and Braking: Calculation of acceleration time and energy loss during starting of dc shunt and three phase induction motors, methods of reducing energy loss during starting.	2	5	91-104	2
	Energy relations during braking, dynamics during braking	2	6	29-134	2
4	Power Electronic Control of DC Drives: Single phase and three phase controlled converter fed separately excited dc motor drives (continuous conduction only), dual converter fed separately excited dc motor drive, rectifier control of dc series motor.	1	5	98-116	4
	Supply harmonics, power factor and ripples in motor current	1	5	118-121	1
	Chopper control of separately excited dc motor and dc series motor.	1	5	121-131	2
5	Power Electronic Control of AC Drives: Three Phase induction Motor Drive: Static Voltage control scheme, static frequency control scheme (VSI, CSI, and cyclo - converter based) static rotor resistance and slip power recovery control schemes.	1	6	183-227	4
	Three Phase Synchronous motor: Self controlled scheme	1	7	260-262	1
	Special Drives: Switched Reluctance motor, Brushless dc motor.	1	7	271-274,	2
	Selection of motor for particular applications	2	8	288-295	1

Text Books:

1. G.K. Dubey, "Fundamentals of Electric Drives", Narosa publishing House.
2. S.K.Pillai, "A First Course on Electric Drives", New Age International.

Reference Books:

- 1 M.Chilkin, “Electric Drives”, Mir Publishers, Moscow.
- 2 Mohammed A. El-Sharkawi, “Fundamentals of Electric Drives”, Thomson Asia, Pvt. Ltd. Singapore.
- 3 N.K. De and Prashant K.Sen, “Electric Drives”, Prentice Hall of India Ltd.
- 4 V.Subrahmanyam, “Electric Drives: Concepts and Applications”, Tata McGraw Hill.

TEE – 703: Power System Operation and Control

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Unit No.	Topic Name	Text Book No.	Chapter No.	No. of Lectures
1	Introduction :			
	Structure of power systems,	1	1	1
	Power system control center and real time computer control, SCADA system	1; 2	10	3
	Level decomposition in power system	2	10	1
	Power system security	1; 2	13; 9	1
	Various operational stages of power system	6	7	1
	Power system voltage stability	1	13	1
2	Economic Operation :			
	Concept and problems of unit commitment	8	2	1
	Input-output characteristics of thermal and hydro-plants	2; 1	3; 7	1
	System constraints	2	3	1
	Optimal operation of thermal units without and with transmission losses, Penalty factor, incremental transmission loss, transmission loss formula (without derivation)	2; 1	3; 7	4
	Hydrothermal scheduling long and short terms	2	3	1
	Concept of optimal power flow	1	7	1
3	Load Frequency Control :			
	Concept of load frequency control,	1; 2	8; 6	6
	Load frequency control of single area system: Turbine speed governing system and modeling, block diagram representation of single area system, steady state analysis, dynamic response, control area concept, P-I control, load frequency control and economic dispatch control.			
	Load frequency control of two area system: Tie line power modeling, block diagram	2;1	7; 8	3

	representation of two area system, static and dynamic response			
4	<p>Automatic Voltage Control : Schematic diagram and block diagram representation, different types of Excitation systems & their controllers.</p> <p>Voltage and Reactive Power control : Concept of voltage control, methods of voltage control-control by tap changing transformer. Shunt Compensation, series compensation, phase angle compensation</p>	2 1	8 5,15	3 3
5	<p>State Estimation: Detection and identification, Linear and non-linear models.</p> <p>Flexible AC Transmission Systems: Concept and objectives FACTS controllers: Structures & Characteristics of following FACTS Controllers. TCR,FC-TCR, TSC, SVC, STATCOM, TSSC, TCSC, SSSC, TC-PAR, UPFC</p>	4 3	13	3 4

Text Books:

1. D.P. Kothari & I.J. Nagrath, "Modern Power System Analysis" Tata Mc Graw Hill, 3rd Edition.
2. P.S.R. Murty, "Operation and control in Power Systems" B.S. Publications.
3. N. G. Hingorani & L. Gyugyi, " Understanding FACTs" Concepts and Technology of Flexible AC Transmission Systems"
4. A. J. Wood & B.F. Wollenburg, " Power Generation, Operation and Control " John Wiley & Sons.

Reference Books:

1. O.I. Elgerd, "Electric Energy System Theory" Tata McGraw Hill.
2. P. Kundur, " Power System Stability and Control Mc Graw Hill.
3. M.H. Rashid, "Power Electronics: Circuits, devices and Applications" Prentice Hall of India,3rd Edition.
4. T. K. Nagsarkar & M.S.Sukhiza,' Power System Analysis' Oxford University Press.

TEE – 031: Bio-Instrumentation

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Unit No.	Topic Name	Text Book No.	Chapter No.	Page No.	No. of Lectures
1	Basic physiological system of the body: Problems encountered in measuring living systems, bioelectric potentials, biomaterials Basic Transducer Principles: Active and passive transducers, Transducers for biomedical applications. Generation, propagation and distribution of bioelectric potentials (ECG, EEG and EMG).	1	1	16-21	2
		1	2	27-42	3
		1	3	50-54	2
2	Bio-potential electrodes: Basic types (micro, skin surface and needle electrodes) biochemical transducers. (PH, blood, gas and specific ions electrodes). The cardiovascular system and measurements: Heart and cardiovascular system and circulation block diagram, blood pressure and measurement, characteristics of blood flow and heart sounds. Electrocardiography, ECG lead configurations, ECG recording and their types	1	4	66-76	2
		1	5	85-89	2
		1	6	93-104 06-126 126-135	1 1 2
3	The Nervous System The anatomy of nervous system, Neuronal communication, EPSP & IPSP Organization of the brain, Measurements from the nervous system Systemic Body & Skin Temperature Measurement Temperature measurements Brief idea about ultrasonic	1	10	278-282	2
				286-289	1
				296-303	2
		1		244-55 255-263	1 2

	measurements				
4	Patient care monitoring: Elements of intensive care, Organization of the Hospital for patient-care monitoring Pace-makers-types, systems, modes and generators, Defibrillators-types. Bio telemetry & applications of telemetry in patient care	1 1	7 12	174-184 193-195 195-206 206-212 337-343	2 1 2 1 2
5	Automation of chemical tests, Instrumentation for diagnostic X Rays, Interfacing computer with medical instrumentation and other equipments, biomedical computer applications. Shock hazards from electrical equipments, methods of accident prevention	1 1 1 1	13 14 15 16	357-362 269-374 401-429 437-447	1 1 4 2

Text Book :

3. T. Cromwell, F.J. Weibell & F.A.Pfieffer, "Biomedical Instrumentation & Measurements" Prentice Hall International

Reference Books :

1. R.S. Khanpur, "Handbook of Biomedical Instrumentation" Tata Mc Graw Hill
2. H.E. Thomas, "Handbook of Biomedical Instrumentation and Measurement" Restone Publishing Company
3. J.G. Webster, "Medical Instrumentation", Houghton Mifflin.

TEC - 025 : Image Processing

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Unit No.	Topic Name	Text Book No.	Chapter No.	No. of Lectures
1	Image: Image formation, image geometry perspective and other transformation, stereo imaging elements of visual perception Digital Image-sampling and quantization	1	4	6

	serial & parallel Image processing		4	
2	Signal Processing - Fourier, Walsh-Hadamard discrete cosine and Hotelling transforms and their properties, filters, correlators and convolvers Image enhancement-Contrast modification, Histogram specification, smoothing, sharpening, frequency domain enhancement, pseudo-colour enhancement	2	2	10
3	Image Restoration-Constrained and unconstrained restoration Wiener filter , motion blur remover, geometric and radiometric correction Image data compression-Huffman and other codes transform compression, predictive compression two tone Image compression, block coding, run length coding, and contour coding.	2	8	8
4	Segmentation Techniques-thresholding approaches, region growing, relaxation, line and edge detection approaches, edge linking, supervised and unsupervised classification techniques, remotely sensed image analysis and applications	2	7	6
5	Shape Analysis – Gestalt principles, shape number, moment Fourier and other shape descriptors, skelton detection, Hough transform, topological and texture analysis, shape matching. Practical Applications – Finger print classification, signature verification, text recognition, map understanding, bio-logical cell classificaton.	2	9	10

Text Books:

1. Ganzalez and Wood, “Digital Image Processing”, Addison Wesley, 1993.
2. Anil K.Jain, “Fundamental of Image Processing”, Prentice Hall of India.

References:

1. Rosenfeld and Kak, “Digital Picture Processing” vol.I & vol.II, Academic,1982
2. Ballard and Brown, “Computer Vision”, Prentice Hall, 1982
3. Wayne Niblack, “An Introduction to Digital Image Processing”, Prentice Hall, 1986
4. Milan Sonka, Vaclav Hlavac, Roger Boyle, “Image Processing, Analysis and Machine Vision”,Vikas Publications.

TEE – 033: Neural Networks and Fuzzy System

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Neural Networks:

Unit No.	Topic Name	Text Book No.	Chapter No.	No. of Lectures
1	Introduction and Architecture: Basic of Artificial Neural Networks Neuron, nerve structure and synapse Concept of multilayer networks Auto-associative and hetro-associative memory Artificial Neural Networks Neuron signal functions Neuron models Neuron activation	4 3 3 1 1 1 3 1	1 1 5 10 3 3 1 3	8
2	Learning Techniques: Learning in neural nets Unsupervised learning Supervised learning Hebbian learning Competitive learning Perception learning and Convergence theorem Single layer perceptrons The back propagation algorithm	1 1 1 1,4 1 1 4 3,4,1	5 5 5 10,2 12 5 3 5,4,6	10
3	Applications: Applications of neural networks in load flow study, load forecasting, detection of faults in distribution system, steady state stability and electric drives control, neural network simulator.	3	10	4
Fuzzy Logic:				
4	Introduction: Basic concepts of fuzzy logic Fuzzy sets and Crisp sets Fuzzy set theory and operations Properties of fuzzy sets Fuzzy and Crisp relations Fuzzy to Crisp conversion	5 2,5 5 5 2 2	1 2,3 3 3 3 5	8
5	Fuzzy, Membership, Rules and Applications:	2	6	

Fuzzy Numbers and Fuzzy vectors	2	4	10
Membership functions	2	4	
Interference in fuzzy logic	5	5	
Fuzzy if-then rules	2	6	
Fuzzy algorithms	2,5	7,6	
Approximate reasoning	5	6	
Fuzzy implications	2	4	
Fuzzyfication	2	5	
Defuzzification	2	13	
Fuzzy control system	2	13	
Fuzzy logic controllers	2	13	
Industrial applications			

Text Books:

1. Kumar Satish, "Neural Networks", Tata Mc Graw Hill
2. Timothy J.Ross, "Fuzzy Logic With Engineering Applications"

Reference Books:

1. N.K.Bose & P.Liang, "Neural Network Fundamentals with Graphs, Algorithms and Applications", Tata Mc Graw hill
2. Simon Haykin, "Neural Networks", Prentice Hall of India
3. S.Rajasekaran & G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications" Prentice hall of India.

TEE - 034: Switch Mode and Resonant Converters

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Unit No	Topic Name	Text Book No	Chapter No.	No. of Lectures
1	Introduction: Linear power supply regulators and their drawbacks; switch-mode power regulators-elements, salient features and application.	1,2	5,7	1
	Switch-Mode DC-DC Regulators, Without Isolation: Characteristics and analysis of Buck, Boost, Buck-Boost,Cuk,and Full bridge converters, Multiple output and Diode rectifier-fed Boost converters	1,2	5,7	7
2	Switching Power DC Supplies : (DC-DC Converters with Isolation) Overview of Switch-mode dc power supply (SMPS), introduction to dc-dc converters and their control.	2	10	2
	Characteristics and analysis of Flyback, Forward, Push-pull, Half bridge, Full bridge and Current source converters, control circuits; Design considerations	1,2	14,10	6

3	Switch-Mode DC-AC Inverters(DC to Sinusoidal AC): Basic concepts, single phase full bridge inverter (PWM with unipolar and bipolar voltage switching) and push-pull inverters, three phase PWM inverters other switching schemes.	2	8	5
	Power conditioners and Uninterruptible Power Supplies (UPS): Disturbances in commercial power supply, power quality and power conditioners, configurations of off-line and on-line UPS, various inverter arrangements, control, batteries.	2,3		3
4	Resonant Converters – I: Concept, advantage and limitations characteristics and analysis of series, parallel, series-parallel, resonant converters, quasi resonant converters, class E resonant inverter, class E resonant rectifier.	1,2	8,9	8
5	Resonant Converters-II: ZCS resonant converters(L and M types), and ZVS resonant converters and their comparison Two quadrant ZVS resonant converters, resonant dc link inverters.	1,2	8,9	5
	Utility interface with Power Electronic Systems: Harmonic standards and recommended practices need for improved utility interface, improved single phase utility interface, Electromagnetic interference.	2	18	3

Text Books:

1. M.H.Rashid, “Power Electronics: Circuits, Devices and Applications” Prentice hall of India, 3rd Edition
2. Ned Mohan, T.M. Undeland and William P. Robins, “Power Electronics: Converters, Applications and Design” John Willey & Sons, 2nd Edition

Reference Books:

1. M.S. Jamil Asghar, “Power Electronics” Prentice Hall of India
2. R.P. Severns and G.E. Bloom, “Modern DC to DC Switch-Mode Power Converter Circuits” Van Nostrand Reinhold
3. K.Kit Sum, “Switch-Mode Power conversion. Basic Theory and Design” Marcel Decker.
4. G. Chryssis, “High Frequency Switching Power supplies: Theory and Design” Mc Graw Hill.

TIT – 012: Multimedia System

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Unit- I

Introduction

Introduction to multimedia, Multimedia Information, Multimedia Objects, Multimedia in business and work. Convergence of Computer, Communication and Entertainment Products.

Stages of Multimedia Projects

Multimedia hardware, Memory & storage devices, Communication devices, Multimedia software's presentation tools, tools for objects generations, video, sound, image capturing, authoring tools, card and page based authoring tools.

Unit- II

Multimedia Building Blocks

Text, Sound MIDI, Digital Audio, audio file formats, MIDI under windows environment Audio & Video Capture.

Unit –III

Data Compression

Huffman Coding, Shannon Fano Algorithm, Huffman Algorithms, Adaptive Coding, Arithmetic Coding Higher Order Modeling. Finite Context Modeling, Dictionary based Compression, Sliding Window Compression, LZ77, LZW compression, Compression ratio loss less & lossy compression.

Unit –IV

Speech Compression & Synthesis

Digital Audio concepts, Sampling Variables, Loss less compression of sound, loss compression & silence compression.

Unit – V

Images

Multiple monitors, bitmaps, Vector drawing, lossy graphic compression, image file format animations Images standards, JPEG Compression, Zig Zag Coding, Multimedia Database. Content based retrieval for text and images. **Video** : Video representation, Colors, Video Compression, MPEG standards recent development in Multimedia. MHEG Standard Video Streaming on net, Video Conferencing, Multimedia Broadcast services, Indexing and retrieval of Video Database, recent development in Multimedia.

Reference:

1. Tay Vaughan "Multimedia, Making IT Work" Osborne McGraw Hill
2. Buford "Multimedia System " Addison Wesley
3. Agrawal & Tiwari "Multimedia System " Excel
4. Marl Nelson "Data Compression Book" BPB
5. David Hillman "Multimedia technology and Application" Galgotia Publications.
6. Roasch "Multimedia Bible" Sams Publishing.
7. Slienreitz "Multimedia System " Addison Wesley.
8. James E Skuman "Multimedia in Action " Vikas.

U.P. TECHNICAL UNIVERSITY

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Syllabus

of

4th Year (Sem. VII & Sem. VIII)

**B. Tech. (Electrical & Electronics
Engineering)**