TAS 301

MATHEMATICS-III

L	T	P
3	1	0

Unit - I : Integral Transforms
8

Fourier integral, Fourier complex transform, Fourier sine and cosine transforms and applications to simple heat transfer equations.

Z – transform and its application to solve difference equations.

Unit - II : Functions of a Complex Variable - I
9

Analytic functions, C-R equations and harmonic functions, Line integral in the complex plane, Cauchy's integral theorem, Cauchy's integral formula for derivatives of analytic functions, Liouvilles theorem, Fundamental theorem of algebra.

Unit - III : Functions of a Complex Variable - II
8

Representation of a function by power series, Taylor's and Laurent's series, Singularities, zeroes and poles, Residue theorem, evaluation of real integrals of type $\int_o^{2\pi} f(\cos\theta, \sin\theta)\, d\theta$ and $\int_{-\infty}^{+\infty} f(x)\, dx$, Conformal mapping and bilinear transformations.

Unit - IV : Statistics and Probability
8

Moments, Moment generating functions, Skewness, Kurtosis,Correlation and Regression, Binomial distribution, Poisson distribution, Normal distribution.

Unit - V : Curve Fitting and Solution of Equations
5

Method of least squares and curve fitting of straight line and parabola, Solution of cubic and bi-quadratic equations.

TEE 301

BASIC SYSTEM ANALYSIS

L	T	P
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Unit 1

Introduction to continuous time signals and systems : Basic Continuous time signals, unit step, unit ramp, unit impulse and periodic signals with their mathematical representation and characteristics. Concept of various types of systems.

Analogous System: Linear mechanical elements, force-voltage and force-current analogy modeling of mechanical and electro-mechanical systems , Analysis of first and second order linear systems by classical method.

(9)

Unit 2

Fourier Transform Analysis : Exponential form and Trigonometric form of Fourier series, Fourier symmetry, Fourier integral and Fourier transform. Transform of common functions and periodic wave forms , Applications of Fourier transform to network analysis. (8)

Unit 3

Laplace Transform Analysis : Review of Laplace transform , Laplace transform of periodic functions, Initial and Final value Theorems, Inverse Laplace transform , Convolution theorem, superposition integral , Application of Laplace transform to analysis of networks, waveform synthesis and Laplace transform of complex waveform.

(8)

Unit 4

State – Variable analysis : Introduction, State space representation of linear systems, transfer function and state variables , State transition matrix, Solution of state equations for Homogeneous and non-homogeneous systems , Applications of state-variable technique to the analysis of linear system.

(8)

Unit 5

Z-Transform Analysis : Concept of Z-transform, Z-transform of common functions, inverse Z-transform, initial and final value theorems , Applications to solution of difference equations, Pulse transfer function.

(7)

Text Books:

1. David K.Cheng; "Analysis of Linear System", Addition Welsley Publishing Company.
2. ME Van-Valkenberg; " Network Analysis", Prentice Hall of India
3 Donald E.Scott,"An Introduction to circuit Analysis", Mc Graw Hill, International Edition.
4 Choudhary, D.Roy, "Network & Systems", Wiley Eastern Ltd.,India.

Reference Books:

5. Oppenheim,Alan V , Willsky, Alan S."Signals and Systems"/PHI/2nd Ed.
6 Haykin Simon/"Signals and Systems"/John Wiley/.
7 Oppenheim,Alan V.et.al, Digital Signal processing/PHI/(New Delhi).
8 Nagrath, S.S., Sharan; S.N.,Ranjan, R, Kumar, S.,"Signals and

Systems,TMH,New Delhi.

Lecture Plan
TEE 301 : Basic System Analysis

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3 1 0

S.No.	Topic Name	Text Book	Chapter No.	Lecture
1 1.1 1.2	**Introduction to continuous time signals and systems :** Basic Continuous time signals, unit step, unit ramp, unit impulse and periodic signals with their mathematical representation and characteristics. Concept of various types of systems.	4	5 & 6	3
   1.3	**Analogous System:** Linear mechanical elements, force-voltage and force-current analogy modeling of mechanical and electro-mechanical systems	1,4	4,9	4
	Analysis of first and second order linear systems by classical method.	1	2	2
2 2.1 2.2 2.3	**Fourier Transform Analysis :** Exponential form and Trigonometric form of Fourier series, Fourier symmetry, Fourier integral and Fourier transform. Transform of common functions and periodic wave forms. Applications of Fourier transform to network analysis.	1,2 1,2 1,2	5,15 5,16 5,16	2 3 3
3 3.1 3.2 3.3	**Laplace Transform Analysis :** Review of Laplace transform , Laplace transform of periodic functions, Initial and Final value Theorems, Inverse Laplace transform. Convolution theorem, superposition integral Application of Laplace transform to analysis of networks, waveform synthesis and Laplace transform of complex waveform.	1,2,4 1,2,4 2,4	6,7&8,5 8,8,13 8,5&6	3 2 3
4 4.1 4.2 4.3	**State – Variable analysis :** Introduction, State space representation of linear systems, transfer function and state variables State Transition Matrix, Solution of state equations for Homogeneous and non-homogeneous systems Applications of state-variable technique to the analysis of linear system.	4 4 4	14 14 14	3 3 2

5 5.1 5.2	**Z-Transform Analysis :** Concept of Z-transform, Z-transform of common functions, inverse Z-transform, initial and final value theorems.	1	10	4
	Applications to solution of difference equations, Pulse transfer function.	1	10	3

Text Books:

1 David K.Cheng; "Analysis of Linear System", Addision Welsley Publishing Company.
2 ME Van-Valkenberg; " Network Analysis", Prentice Hall of India
3 Donald E.Scott,"An Introduction to circuit Analysis", Mc Graw Hill, International Edition.
4 Choudhary, D.Roy, "Network & Systems", Wiley Eastern Ltd.,India.

Reference Books:

5. Oppenheim,Alan V , Willsky, Alan S."Signals and Systems"/PHI/2nd Ed.
6 Haykin Simon/"Signals and Systems"/John Wiley/.
7 Oppenheim,Alan V.et.al, "Digital Signal processing", PHI/(New Delhi).
8 Nagrath, S.S., Sharan; S.N.,Ranjan, R, Kumar, S."Signals and Systems",TMH, New Delhi.

TEE-302

ELECTRICAL MEASUREMENT & MEASURING INSTRUMENT

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Unit I :–

(1) Philosophy Of Measurement : Methods of Measurement, Measurement System**,** Classification of instrument system , Characteristic of instrument & measurement system **,** Errors in Measurement & its Analysis , Standards . (3)

(2) Analog Measurement of Electrical Quantities : Electrodynamic ,Thermocouple Electrostatic & rectifier type Ammeters & Voltmeters , Electrodynamic Wattmeter, Three Phase Wattmeter, Power in three Phase System , Errors & remedies in Wattmeter and energy meter. (5)

Unit II :

Instrument Transformer and their application in the extension of instrument range, Introduction to measurement of speed , Frequency and Power factor.
(6)

Unit III :
Measurement of Parameter: Different methods of measuring low, medium and high resistances**,** Measurement of Inductance & Capacitance with the help of AC Bridge, Q Meter. (7)

Unit IV :
(1) AC Potentiometer : Polar type & Co-ordinate type AC potentiometer , Application of AC Potentiometers in Electrical measurement
(3)
(2) Magnetic Measurement : Ballistic Galvanometer , Flux meter **,** Determination of Hysteresis loop **,** Measurement of iron losses**.**
(4)

Unit V :
(1) Digital Measurement of Electrical Quantities: Concept of digital Measurement, Block Diagram Study of digital voltmeter, frequencymeter poweranalyzer and harmonicsanalyzer; Electronic Multimeter.
(2)Cathode Ray Oscilloscope : Electronic multimeter , Power Analyzer, Harmonics analyzer , Electronic multimeter , Power Analyzer, Harmonics analyzer , Basic CRO circuit (Block Diagram),Cathode ray tube (CRT) & its component **,** Application of CRO in measurement ,Lissajous Pattern., Dual trace &dual beam Oscilloscope.

Text Book:

1. E.W. Golding & F.C. Widdis, " Electrical Measurement &Measuring Instrument" , A.W. Wheeler& Co. Pvt. Ltd. India .
2. A.K. Sawhney : " Electrical & Electronic Measurement & Instrument " , Dhanpat Rai & Sons , India .

References :

1. Forest K. Harries , "Electrical Measurement " Willey Eastern Pvt. Ltd. India .
2. M.B. Stout , "Basic Electrical Measurement" Prentice hall of India ,India.
3. W.D. Cooper ," Electronic Instrument & Measurement Technique " prentice hall International.
4. Rajendra Prashad , " Electrical Measurement &Measuring Instrument" Khanna Publisher.
5. J.B. Gupta Electrical Measurements and Measuring Instruments , S.K. Kataria & Sons.

Lecture Plan

TEE-302

ELECTRICAL MEASUREMENT & MEASURING INSTRUMENT

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Unit	Name of Topics	Text Book	Chapter No.	No. of Lecture
Unit I :– (1) Philosophy Of Measurement (2) Analog Measurement of Electrical Quantities				
1.1.1	Methods of Measurement, Measurement System	**2**	**1**	**1**
1.1.2	Classification of instrument system , Characteristic of instrument & measurement system	**2**	**2**	**1**
1.1.3	Errors in Measurement & its Analysis	**2**	**3**	**1**
1.1.4	Standards	**2**	**5**	**1**
1.2.1	Electrodynamic ,Thermocouple Electrostatic & rectifier type Ammeters & Voltmeters	**1 2**	**18 9**	**1**
1.2.2	Electrodynamic Wattmeter, Three Phase Wattmeter	**1 2**	**20 11**	**2**
1.2.3	Power in three Phase System	**2**	**11**	**1**
1.2.4	Errors & remedies in Wattmeter and energy meter	**1 2**	**21 11-12**	**2**
Unit II :				
2.1	Instrument Transformer and their application in the extension of instrument range.	**2**	**10**	**3**
2.2	Introduction to measurement of speed , Frequency and Power factor	**1 2**	**23 13**	**3**
Unit III : Measurement of Parameter				
3.1	Different methods of measuring low, medium and high resistances	**1 2**	**7 14**	**3**
3.2	Measurement of Inductance & Capacitance with the help of AC Bridge	**1 2**	**6 16**	**3**
3.3	Q Meter	**2**	**24**	**1**
Unit IV : (1) AC Potentiometer (2) Magnetic Measurement				
4.1.1	Polar type & Co-ordinate type AC potentiometer	**1 2**	**8 15**	**2**
4.1.2	Application of AC Potentiometers in Electrical measurement	**1 2**	**8 15**	**1**
4.2.1	Ballistic Galvanometer	**1 2**	**9 8**	**1**
4.2.2	Flux meter	**1 2**	**9 8**	**1**
4.2.3	Determination of Hysteresis loop	**1 2**	**9 18**	**1**
4.2.4	Measurement of iron losses	**1 2**	**9 18**	**1**

Unit V : (1) Digital Measurement of Electrical Quantities (2)Cathode Ray Oscilloscope				
5.1.1	Concept of digital Measurement	**2**	**28**	**1**
5.1.2	Block Diagram Study of digital voltmeter , frequency meter Power analyzer, harmonics analyzer	**2**	**28**	**3**
5.1.3	Electronic multimeter ,	**2**	**23**	**1**
5.2.1	Basic CRO circuit (Block Diagram),Cathode ray tube (CRT) & its component	**2**	**21**	**2**
5.2.2	Application of CRO in measurement, Lissajous Pattern	**2**	**21**	**1**

Text Book:

1. E.W. Golding & F.C. Widdis, " Electrical Measurement &Measuring Instrument" , A.W. Wheeler& Co. Pvt. Ltd. India .
2. A.K. Sawhney : " Electrical & Electronic Measurement & Instrument " , Dhanpat Rai & Sons , India .

References :

3 Forest K. Harries , "Electrical Measurement " Willey Eastern Pvt. Ltd. India .
4 M.B. Stout , "Basic Electrical Measurement" Prentice hall of India ,India.
5 W.D. Cooper ," Electronic Instrument & Measurement Technique " prentice hall International.
6 Rajendra Prashad , " Electrical Measurement &Measuring Instrument" Khanna Publisher.

TEC-301

SOLID-STATE DEVICES AND CIRCUITS

L	T	P
3	1	0

Unit-I : Special Diodes

LED, Varactor, Photodiode, Schotkey barrier, tunnel diodes and their constructions and characteristics.

Bipolar Junction Transistors : Transistor as an amplifier, small signal Equivalent circuits (Hybrid-pi, Ebers moll), Graphical Analysis, biasing the BJT for discrete-circuit design,

Unit-II :

Basic Single Stage BJT amplifier configurations transistor as a switch-cut off & saturation, complete static characteristics, Internal capacitances and second order effects Field Effect transistor-Structure and physical operation of Enhancement and depletion types MOSFET, I/V characteristics, MOSFET circuits at DC, MOSFET as an amplifier, biasing in MOS amplifier circuits, Basic configurations of single stage MOS amplifier, Internal capacitances of MOSFETS.

Unit-III : Frequency Response

S-Domain analysis, amplifier transfer function, Low and high frequency response of common source and common emitter amplifiers, common base & common gate cascade configurations, Frequency response of source followers, CC-CE cascade.

Unit-IV : Feed Back

General feed back structure, properties of negative feed back, four basic feed back topologies sedries shunt; series-series; shunt-shunt; & shunt-series feedback amplifier, determination of Loop gain, stability problem.

Unit-V : Oscillators

Basic principles of sinusoidal oscillator, RC oscillators: Weinbridge and phases half tuned oscillators: Collptts, Hartley and Clap. Crystal Oscillators.

Text book:

1. A.S. Sedra and K.C. Smith, "Microelectronic circuits", Oxford University Press (India).
2. B.P. Singh & R. Singh, Electronics Devices & Integrated Circuits, Pearson.

Reference Book

1. Millman, J. and Grabel, A./"Microelectronics"/McGraw Hill.
2. Bell, David A/ "Electronic Devices & Circuits"/Prentice Hall (India)4th Edition.
3. Nair, B. Somanathan /"Electronics Devices & Applications"/Prentice-Hall (India)
4. Neamen, Donald A./ "Electronic Circuit Analysis & Design"/Tata McGraw Hill.
5. Neamen, Donald A./"Semiconductor Physics & Devices"/Tata McGraw Hill.
6. Sedra, "Micro Electronics Circuits" Oxford University Press.

TEC-304

PULSE AND DIGITAL ELECTRONICS

L	T	P
3	1	0

Unit-1:

1. **Logic Families :** Circuit concepts and comparison of logic families : TTL, CMOS.NMOS and ECL; characteristic parameters: logic levels/fan-in and fan out, noise margin, propagation delay and power consumption. (4)
2. **Minimization of Boolean functions using** (i) Karnough Map having don't care entries and (ii) tabular method. (3)

Unit-2:

3. **Arithmetic Logic Circuits:** Representation of negative numbers, 9's and 1's complements lO's and 2's complements, arithmetic using 2's complements. Adders and Subtracters, magnitude comparator. (4)
4. **Combinational Logic Circuits:** Multiplexers/ Demultiplexers, encoders/decoders, PAL and PLA. (4)

Unit-3:

5. **Sequential Logic Circuits:** Latches& Flip-Flops : SR, D, T, JK and Master-slave JK.

   Shift Registers: Basic principle, serial and parallel data transfer, shift left/right register, universal shift register. (4)

   Counters: Mode N counters, ripple counters, synchronous counters, ring & Johnson counters (4)

Unit-4:

6. **Memories:** Read Only Memories; Random Access Memories; Static and dynamic; sequential memory: Memory Organisation. (3)

7. **Linear Wave shaping :** RC low pass and high pass circuits and response to sine and square wave inputs, RC circuit as differentiator, integrator & compensated attenuator. (3)

8. **Converters :** Sample & hold circuit, A/D and D/A converters (2)

Unit-5:

9. **Op-Amp Applications:**
   Astable and monostable multivibrators, schmittrigger, VCO and PLL; simple active filters (LP.NP, BP and notch type). . (5)

10. **1C Timer:** 1C 555 timer and its applications . (1)

11. **Voltage regulators :** Concept of series, shunt and switching regulators, Op-amp based configurations, fixed and adjustable voltage 1C regulators. (3)

Text Books:

1. Malvino & Leach,"Digital Principles and Applications" Tata McGraw Hill
2. Signov & Donovan,"Digital Electronics"Delmar Thomson Learning.
3. R.A. Gayakwad,"Op-Amps and Linear Integrated Circuits"Prentice Hall of India,

Reference Books:

4. Taub & Schilling."Digital Electronics"Tata McGraw Hill
5. IJ. Nagrath, "Electronics Analog and Digital" Prentice Hall of India Ltd.
6. R.P. Jain."Modern Digital Electronics 'Tata McGraw Hill.
7. Ronald J.Tocci &. Neal S. Widmer. "Digital Systems" Pearson Education.

TEE 351

NUMERICAL TECHNIQUE LAB

L	T	P
0	0	2

Note: Minimum seven experiments out of the following list:

MATLAB Based Experiments

1 Solution of linear equations for under determined and over determined cases.
2 Determination of eigen values and eigenvectors of a square matrix
3 Determination roots of a polynomial
4 Determination of polynomial using method of least square curve fitting

5 Determination of polynomial fit, analyzing residuals, exponential fit and error bounds from the given data
6 Solution of differential equations using 4th order Runge-Kutta method
7 Solution of differential equation using revised Euler method
8 Determination of time response of an R-L-C circuit
9 Solution of difference equation
10 College may add any three experiments in the above list.

TEE 352

ELECTRICAL MEASUREMENT LAB

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0 0 2

Note: Minimum of nine experiments from the following :

1 Calibration of ac voltmeter and ac ammeter
2 Measurement of Form Factor of a rectified sine wave and determine source of error if r.m.s. value is measured by a multimeter
3 Measurement of phase difference and frequency of a sinusoidal ac voltage using C.R.O.
4 Measurement of power and power factor of a single phase inductive load and to study effect of capacitance connected across the load on the power factor
5 Measurement of low resistance by Kelvin's double bridge
6 Measurement of voltage, current and resistance using dc potentiometer
7 Measurement of inductance by Maxwell's bridge
8 Measurement of inductance by Hay's bridge
9 Measurement of inductance by Anderson's bridge
10 Measurement of capacitance by Owen's bridge
11 Measurement of capacitance by De Sauty bridge
12 Measurement of capacitance by Schering bridge
13 Study of Frequency and differential time counter
14 College may add any two experiments in the above list

TEC-351

ELECTRONICS LAB-1

L T P
0 0 2

1. Study of CRO and multimeter applications.
2. Plot V-I characteristics of Junction diode under forward and reverse-biased condition. (Si & Ga)
3. Draw the waveshape of the electrical signal at the input and output points of the half-wave, full wave and bridge rectifiers.
4. Plot the V-I characteristics of zener diode.
5. Plot the I/P output characteristics for the common-base transistor.

6. To plot output characteristics of FET & measure pinch-off voltage. Calculate FET parameters at a given operating point.
7. Realize a voltage regulator using zener diode and study the load characteristics.
8. Design of P.S : 220/230 V (AC), 5VDC, 200 mA.

* College may add two more experiments in the above list

TEC-354

PULSE AND DIGITAL ELECTRONICS LAB

List of Experiments

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Note : Select any 10 out of the following:

1. To study multiplexer operation using 1C 74150.
2. To study demultiplexer/decoder operation using 1C 74138.
3. To study Adder/ subtracter operation using 4 bit/8 bit 1C 7483.
4. To study operation of JK Master-slave flip flop.
5. To study input and output characteristics of TTL inverter.
6. To study response of RC differentiator and integrator circuits using square and sine wave inputs.
7. To study high pass and low pass RC circuits.
8. To study operation of lC 74121 and 1C 74123 monostable multivibrators.
9. To study operation of Op-Amp based Schmit trigger as 1C oscillator and triangular wave generator.
10. To study operation of Modulo N Counter using programmable counter 1C 74190.
11. To study waveform generation using 1C 555 in Astable and Monostable multivibrator modes.
12. To experimentally verify the output of an A/D counter.
13. To experimentally verify the output of a D/A converter.
14. To study operation of 1C NE/SE 566 voltage controlled oscillator and determine output frequency for various voltage levels.
15. To study regulation of unregulated power supply using 1C 7812 voltage regulator and measure the load and line regulations.

TEE – 401

ELECTRO-MECHANICAL ENERGY CONVERSION –I

L	T	P
3	1	0

Unit – I

Principles of Electro-mechanical Energy Conversion - Introduction, Flow of Energy in Electromechanical Devices, Energy in magnetic systems(defining energy & Co-

energy) , Singly Excited Systems; determination of mechanical force, mechanical energy, torque equation , Doubly excited Systems; Energy stored in magnetic field, electromagnetic torque , Generated emf in machines; torque in machines with cylindrical air gap . (7)

Unit – 2

D.C. Machines:- Construction of DC Machines,Armature winding ,Emf and torque equation , Armature Reaction ,Commutation , Interpoles and Compensating Windings, Performance Characteristics of D.C. generators . (9)

Unit –3

D.C. Machines (Contd.) :- Performance Characteristics of D.C. motors ,Starting of D.C. motors ; Concept of starting (3 point and 4 point starters) , Speed control of D.C. motors; Field Control , armature control and Voltage Control(Ward Lenonard method) ,Efficiency and Testing of D.C. machines(Hopkinson's and Swinburn's Test). (8)

Unit –4

Transformer :- Three phase transformer Construction, Three – phase unit transformer and Bank of three single phase transformers with their advantages , Three-phase transformer Groups(Phasor groups) and their connections , Y-Δ connection, Open delta connection , Three-phase/ 2 phase Scott connection and it's application. (8)

Unit –5

Transformer (Contd) :

Sumpner's test , All day efficiency, polarity test Excitation Phenomenon in Transformers, Harmonics in Single phase and 3-phase transformers , Parallel operation and load sharing of Single phase and three phase transformers , Three winding transformers, Tertiary winding

Auto Transformer : Single phase Auto-transformer , Volt-amp relation, efficiency, Conversion of a two-winding Transformer to an Auto transformer, Saving in conductor material, Advantages , disadvantages and applications of autotransformers. (8)

Text Books :

1 I.J. Nagrath & D.P.Kothari," Electrical Machines", Tata McGraw Hill
2 Husain Ashfaq ," Electrical Machines", Dhanpat Rai & Sons
3 Irving L.Kosow,"Electric Machine and Tranformers", Prentice Hall of India.
4 B.R. Gupta & Vandana Singhal, "Fundamentals of Electrical Machines, New Age International.

Reference Books :

5. A.E. Fitggerald, C.Kingsley Jr and Alexander Kusko,"Electric Machinery" McGraw Hill, International Student Edition.
6. A.E. Clayton,"The Performance and Design of DC machines", Pitman &Sons
7. M.G. Say,"The Performance and Design of AC machines", Pit man & Sons
8. Langsdorf ;"Theory of Alternating Current Machinery", Tata McGraw Hill.

Lecture Plan

TEE – 401

ELECTRO-MECHANICAL ENERGY CONVERSION –I

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3	**1**	**0**

Unit	**Name of Topics**	**Text Book**	**Chapter No**	**No of Leccture**
1	**Principles of Electro-mechanical Energy Conversion**			
1.1	Introduction, Flow of Energy in Electromechanical Devices	1&2	4 & 10respectively	1
1.2	Energy in magnetic systems(defining energy & Co-energy)	--do--	--do--	1
1.3	Singly Excited Systems; determination of mechanical force, mechanical energy, torque equation	--do--	--do--	2
1.4	Doubly excited Systems; Energy stored in magnetic field, electromagnetic torque	--do--	--do--	2
1.5	Generated emf in machines; torque in machines with cylindrical air gap	1,2&3	5& 11 respectively	1
2	**D.C. Machines:**			
2.1	Construction of DC Machines, Armature winding	1,2&3	2,7& 2 respectively	2
2.2	Emf and torque equation	1,2	--do--	1
2.3	Armature Reaction	1,2,3	2,7,5 respectivily	1
2.4	Commutation	--do--	--do--	1
2.5	Interpoles and Compensating Windings	--do--	--do--	2
2.6	Performance Characteristics of D.C. gnerators	--d0--	7&6,3 respectively	2
3	**D.C. Machines (Contd.)**			
3.1	Performance Characteristics of D.C. motors	--d--	2,7,4	1
3.2	Starting of D.C. motors ; Concept of starting (3 point and 4 point starters)	--do--	7 or both	2
3.3	Speed control of D.C. motors; Field Control, armature control and Voltage Control (Ward Lenonard method)	--do--	--do--	2
3.4	Efficiency and Testing of D.C. machines (Hopkinson's and Swinburn's Test)	--do--	--do--	3
4	**Transformer**			
4.1	Three phase transformer Construction, Three – phase unit transformer and Bank of three single phase transformers with their advantages	2	2	2

4.2	Three-phase transformer Groups(Phasor groups) and their connections, Y-Δ connection,Open 0, connection	--do--	--do--	2
4.3	Three-phase/ 2 phase Scott connection and it's application	--do--	1	1
5	**Transformer Cont. :**			
5.1	Sumpner's test, All day efficiency, polarity test	2	1,14	2
5.2	Excitation Phenomenon in Transformers, Harmonics in Single phase and 3-phase transformers	3,6	14,3	3
5.3	Parallel operation and load sharing of Single phase and three phase transformers	2 ,6	2,8	2
5.4	Three winding transformers, Tertiary winding	6	8	1
5.5	**Auto Transformer :** Single phase Auto-transformer, Volt-amp relation, efficiency, Conversion of a two-winding, Transformer to an Auto transformer Saving in conductor material Advantages, disadvantages and applications of autotransformers	2,3	2,14	3

Text Books :

1. I.J. Nagrath & D.P.Kothari," Electrical Machines" Tata McGraw Hill
2. Husain Ashfaq ," Electrical Machines" Dhanpat Rai & Sons
3. Irving L.Kosow,"Electric Machine and Tranformers"Prentice Hall of India.
4. B.R. Gupta & Vandana Singhal, "Fundamentals of Electrical Machines, New Age International.

Reference Books :

5. A.E. Fitggerald, C.Kingsley Jr and Alexander Kusko, "Electric Machinery" McGraw Hill, International Student Edition.
6. A.E. Clayton,"The Performance and Design of DC machines" Pitman &Sons
7. M.G. Say,"The Performance and Design of AC machines" Pit man & Sons
9. Langsdorf ;"Theory of Alternating Current Machinery", Tata McGraw Hill.

TEE 402

NETWORK ANALYSIS AND SYNTHESIS

L T P

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1 0

Unit – I :

Graph Theory : Graph of a Network, definitions, tree, co tree , link, basic loop and basic cut set, Incidence matrix, cut set matrix, Tie set matrix Duality, Loop and Node methods of analysis. (7)

Unit – II :

Network Theorems (Applications to ac networks): Super-position theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, Reciprocity theorem. Millman's theorem, compensation theorem, Tellegen's theorem.
(7)

Unit – III :

Network Functions :

Concept of Complex frequency , Transform Impedances Network functions of one port and two port networks, concept of poles and zeros, properties of driving point and transfer functions, time response and stability from pole zero plot, frequency response and Bode plots. (9)

Unit – IV :

Two Port Networks:

Characterization of LTI two port networks ZY, ABCD and h parameters, reciprocity and symmetry. Inter-relationships between the parameters, inter-connections of two port networks, Ladder and Lattice networks. T & ∏ Representation.
(7)

Unit – V :

(a) Network Synthesis :

Positive real function; definition and properties; properties of LC, RC and RL driving point functions, synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms.

(b) Filters :

Image parameters and characteristics impedance, passive and active filter fundamentals, low pass, highpass,band pass, band elimination filters.
(9)

Text Books:

1 M.E. Van Valkenburg," Network Analysis", Prentice Hall of India
2 D.Roy Choudhary,"Networks and Systems" Wiley Eastern Ltd.
3 Donald E. Scott : "An Introduction to Circuit analysis: A System Approach" McGraw Hill Book Company.
4 A.Chakrabarti,"Circuit Theory" Dhanpat Rai & Co.

Reference Books :

5 M.E. Van Valkenburg,"An Introduction to Modern Network Synthesis",Wiley Eastern Ltd.
6 W.H. Hayt & Jack E-Kemmerly, Engineering Circuit analysis" Tata McGraw Hill.
7 Soni, Gupta ,"Circuit Analysis", Dhanpat Rai & Sons.

Lecture Plan

TEE 402

NETWORK ANALYSIS AND SYNTHESIS

L T P

3 1 0

S.No.	Topic Name	Text Books	Chapter	Lecture
1	**Graph Theory** :			
1.1	Graph of a Network, definitions, tree, co- tree , link, basic loop and basic cut set,	2	3	2
1.2	Incidence matrix, cut set matrix, Tie set matrix	2	3	2
1.3	Duality,	2	3	1
1.4	Loop and Node methods of analysis	2	3	2
2	**Network Theorems (Applications to ac networks):**			
2.1	Super-position theorem, maximum power transfer theorem	1,2	9,7	1
2.2	Thevenin's theorem, Norton's theorem	1,2	9,7	2
2.3	Reciprocity theorem., compensation theorem	1,2	9,7	2
2.4	Millman's and Tellegen's theorems.	2	7	2
3	**Network Functions :**			
3.1	Concept of Complex frequency , Transform impedance and Networks, concept of poles and zeros	1,2	9,15	2
3.2	Properties of driving point and transfer functions	1,2	10,15	1
3.3	Time response and stability from pole-zero plot.	2	6	2
3.4	Frequency response and Bode plots	1,2	10,15	2
		1,2	13,15	2
4	**Two-Port Networks :**			
4.1	Characterization of Linear time invariant two port networks, Z-parameters, Y-parameters ABCD (or transmission parameters) h(for hybrid) parameters, reciprocity and symmetry	1,2	11,10	3
4.2	Interrelationships Between parameters	2	10	1
4.3	Interconnection of two port networks	2	10	1
4.4	Ladder and Lattice networks	2	10	1
4.5	T and ∏ representation	2	10	1

5 5.1 5.2 5.3	**(a) Network Synthesis :** Positive real functions; definition and properties Properties of LC,RC and RL driving point functions Synthesis of LC,RC and RL driving point immittance functions using Foster and Cauer first and second forms **(b) Filters:** Image parameters, characteristics impedance Passive filters and active filter fundamentals, low pass, high pass, band pass, band elimination filters.	2	16	1 2 2 1 3

Text Books:

1 M.E. Van Valkenburg," Network Analysis", Prentice Hall of India
2 D.Roy Choudhary,"Networks and Systems" Wiley Eastern Ltd.
3 Donald E. Scott : "An Introduction to Circuit analysis: A System Approach" McGraw Hill Book Company.
4 A.Chakrabarti,"Circuit Theory" Dhanpat Rai & Co.

Reference Books :

5 M.E. Van Valkenburg,"An Introduction to Modern Network Synthesis", Wiley Eastern Ltd.

6 W.H. Hayt & Jack E-Kemmerly, Engineering Circuit analysis" Tata McGraw Hill.

7 Soni, Gupta ,"Circuit Analysis", Dhanpat Rai & Sons.

TEE 403

ELECTRICAL & ELECTRONICS ENGINEERING MATERIALS

L T P

3 1 0

Unit – I

1 Crystal Structure of Materials:

A. Bonds in solids, crystal structure, co-ordination number, atomic packing factor, Miller Indices, Bragg's law and x-ray diffraction, structural Imperfections, crystal growth

B. Energy bands in solids, classification of materials using energy band. (8)

Unit – II

2 Conductivity of Metals:

Electron theory of metals, factors affecting electrical resistance of materials, thermal conductivity of metals, heat developed in current carrying conductors, thermoelectric effect, superconductivity and super conducting materials. (7)

Unit – III

3 Dielectric Properties of Material:

Polarisation and dielectric constant, dielectric constant of mono-atomic, poly atomic gases and solids, frequency dependence of electronic and ionic polarisabilities, dipolar relaxation, dielectric loss, piezoelectricity, ferroelectric materials. (8)

Unit – IV

4 Mechanism of Conduction in semiconductor materials:

Types of semiconductors, current carriers in semiconductors, Half effect, Drift and Diffusion currents, continuity equation, P-N junction diode, junction transistor, FET & IGFET.

(7)

Unit – V

5 Magnetic Properties of Material:

Origin of permanent magnetic dipoles in matters, Classification Diamagnetism, Paramagnetism,Ferromagnetism,AntiferromagnetismandFerrimagnetism, magnetostriction

6 Electrical Engineering Materials:

Properties and application of electrical conducting, semiconducting, insulating and magnetic materials, soft and hard magnetic materials, permanent magnetic materials, mechanical properties of metals, optical properties of solids.

(10)

Text Books :

1 A.J. Dekker,"Electrical Engineering Materials" Prentice Hall of India
2 R.K. Rajput," Electrical Engg. Materials," Luxmi Publications.
3 C.S. Indulkar & S.Triruvagdan "An Introduction to Electrical Engg. Materials, S.Chand & Co.
4 Solymar, "Electrical Properties of Materials" Oxford University Press.

References :

5. Ian P. Hones," Material Science for Electrical and Electronic Engineering," Oxford University Press.
6. Narula,"Material Science,"Tata McGraw Hill.
7. Van Vlash,"Elements of Material Science & Engineering" John Wiley & Sons.
8. G.P. Chhalotra & B.K. Bhat, "Electrical Engineering Materials"Khanna Publishers.

Lecture Plan

TEE 403

ELECTRICAL & ELECTRONICS ENGINEERING MATERIALS

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3 1 0

S.No.	Name of Topic	Book No.	Chapter No.	No.of Lectures
	Unit – I : Crystal Structure of Materials:			
1	Bonds in Solids	2	1	1
2	Crystal Structure	2	1	2
3	Co-ordination Number, Atomic Packing Factor Miller Indices	2	1	2
4	Bragg's Law and X-ray diffraction	3	1	1
5	Structural imperfections	2	1	1
6	Crystal growth	2	1	1
	Unit – II : Conductivity of Metals:			
7	Energy Bands in solids, Classification of Materials using energy band	3	7	2
8	Electron theory of metals	2	2	2
9	Factors affecting electrical resistance of materials	2	2	1
10	Thermal Conductivity of metals, heat developed in current carrying conductor	2	2	1
11	Thermoelectric effect, superconductivity and super-conducting materials.	3	3	1
	Unit – III : Dielectric Properties of Material :			
12	Polarization and dielectric constant	1	2	1
13	Dielectric constant of monoatomic, polyatomic gases and solids	1	2	2
14	Frequency dependence of electronic and ionic polarizabilities	1	3	2
15	Dipolar relaxation, Dielectric loss, spontaneous polarization	1	3	2
16	Ferroelectric Material , Piezoelectricity	1	2	1
	Unit – IV : Mechanism of Conduction in Semiconductor Materials:			
17	Types of semiconductors, current carriers in semiconductors	2	5	2
18	Hall effect, Drift and diffusion currents, continuity equation	1	6	2
19	P-N junction diode, volt – ampere equation and its temperature junction transistor, EFT & IGFET	3	8,14	3
	Unit – V : Magnetic Properties of Materials:			
20	Origin of permanent magnetic dipoles in matter, classification	1	4	1
21	Diamagnetism, paramagnetism ferromagnetism, antiferromagnetism and ferrimagnetism ,	3	6	3

	magnetostriction			
	Properties and Applications of Electrical Engineering Material:			
22	Properties and applications of electrical conducting, semiconducting, insulating and magnetic materials	2	6	3
23	Soft and hard magnetic materials, permanent magnetic materials	2	4	1
24	Mechanical Properties of metals	3	13	1
25	Optical properties of solids	3	11	1

Text Books :

1. A.J. Dekker,"Electrical Engineering Materials" Prentice Hall of India
2. R.K. Rajput," Electrical Engg. Materials," Luxmi Publications.
3. C.S. Indulkar & S.Triruvagdan "An Introduction to Electrical Engg. Materials, S.Chand & Co.
4. Solymar, "Electrical Properties of Materials" Oxford University Press.

References :

5. Ian P. Hones," Material Science for Electrical and Electronic Engineering," Oxford University Press.
6. Narula,"Material Science,"Tata McGraw Hill.
7. Van Vlash,"Elements of Material Science & Engineering" John Wiley & Sons.
8. G.P. Chhalotra & B.K. Bhat, "Electrical Engineering Materials"Khanna Publishers.

TEE 404

MICROPROCESSORS

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0

Unit 1

Introduction To Microprocessor : 8085 Evolution Of Microprocessor, Register Structure, ALU, Bus Organization, Timing And Control, instruction set.
(5)

Architecture of 16-bit Microprocessors: Architecture of 8086; (Bus Interface Unit, Execution unit) Register Organization, Bus operation, Memory segmentation.
(3)

Unit 2

Assembly Language Programming: Addressing Modes and instruction set of 8086, Arithmetic and Logic instructions, Program Control Instructions (jumps, conditional jumps, subroutine call) Loop and string instructions , Assembler Directives.
(7)

Unit 3

CPU Module : Signal Description of pins of 8086 and 8088 , Clock generator, Address and Data bus Demultiplexing, Buffering Memory Organization, Read and Write cycle Timings, Interrupt Structures, Minimum Mode, Maximum Mode Operation .
(9)

Unit 4

Peripharal Interfacing : Programmed I/O, Interrupt Driven , I/O, DMA, Parallel I/O, (8255-PPI, Parallel port) , 8253/8254 programmable Timer/Counter Interfacing with ADC. (7)

Unit 5

(a) Peripheral Interfacing (Contd.)
8259 Programmable Interrupt controller, 8237 DMA controller
(5)

(b) Concept of Advanced 32 bit Microprocessors: Pentium Processor.
(4)

Text Books

1. Gaonkar, Ramesh S. /"Microprocessor Architecture, Programming, and Applications with the 8085"/Pen ram International Publishing /5th Ed.
2. Ray , A.K. & Burchandi, K.M./"Advanced Microprocessors and Peripherals: Architecture, Programming and Interfacing"/Tata McGraw Hill.
3. Hall D.V./"Microprocessors Interfacing"/Tata McGraw Hill /2nd Ed
4. B.P. Singh & Renu Singh, "Microprocessors and Microcontrollers" New Age International.

Reference Book :

5. Liu and Gibson G.a./"Microcomputer Systems: The 8086/8088 Family"/Prentice Hall (India)/2nd Ed.
6. Brey, Barry B./"INTEL microprocessors"/Prentice Hall (India)/4th Ed.
7. Ram B.,"Adavanced Microprocessor & Interfacing/Tata McGraw Hill "
8. Renu Singh & B.P. Singh, "Microprocessors and Interfacing & Applications" New Age International.

Lecture Plan

TEE 404

MICROPROCESSORS

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3 1 0

Unit No	Topic Name	Text Book	Chapter No	Lecture
1	**Introduction To Microprocessor :** 8085 Evolution Of Microprocessor, Register Structure, ALU, Bus	1	1,2,3	5

	Organization, Timing And Control, Instruction set			
	Architecture of 16-bit Microprocessors: Architecture of 8086; (Bus Interface Unit, Execution unit) Register Organization, Bus operation, Memory segmentation	2	1	3
2	**Assembly Language Programming:** Addressing Modes and Instruction set of 8086, Arithmetic and Logic instructions, Program Control Instructions (jumps, conditional jumps, subroutine call) Loop and string instructions.	2	2,3	4
	Assembler Directives	2	2	3
3	**CPU Module** : Signal Description of pins of 8086 and 8088,	2	1	3
	Clock generator, Address and Data bus De-multiplexing, Buffering Memory Organization,	3	8	3
	Read and Write cycle Timings, Interrupt Structures, Minimum Mode, Maximum Mode Operation.	2	4	3
4	**Peripharal Interfacing:** Programmed I/O, Interrupt Driven , I/O, DMA, Parallel I/O, (8255-PPI, Parallel port),8253/8254 Programmable timer / counter, interfacing with ADC.	2	5	4+3=7
5(a)	8259 Programmable Interrupt controller, 8237 DMA controller.	2	6,7	5
5(b)	Concept of Micro-controller, Advanced 32 bit Microprocessors: Pentium Processor.	2,3	11,15	4

Text Books

1 Gaonkar, Ramesh S. /"Microprocessor Architecture, Programming, and Applications with the 8085"/Pen ram International Publishing /5th Ed.

2. Ray , A.K. & Burchandi, K.M./"Advanced Microprocessors and Peripherals: Architecture, Programming and Interfacing"/Tata McGraw Hill.

3. Hall D.V./"Microprocessors Interfacing"/Tata McGraw Hill /2nd Ed

4. B.P. Singh & Renu Singh, "Microprocessors and Microcontrollers" New Age International.

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5. Liu and Gibson G.a./"Microcomputer Systems: The 8086/8088 Family"/Prentice Hall (India)/2nd Ed.
6. Brey, Barry B./"INTEL microprocessors"/Prentice Hall (India)/4th Ed.
7. Ram B.,"Adavanced Microprocessor & Interfacing/Tata McGraw Hill
8. Renu Singh & B.P. Singh, "Microprocessors and Interfacing & Applications" New Age International.

TEC-401

ELECTROMAGNETIC FIELD THEORY

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3	1	0

Unit-I

Review of Vector analysis, Rectangular, Cylindrical and Spherical coordinates and their transformation. Divergence, gradient and cvrv in different coordinate systems. Electric field intensity, Electric Flux density, Energy and potential.

Unit-II

Current and conductors, Diclectrics and capacitance, Poission's and Laplace's equation.

Unit-III

Steady magnetic field, magnetic forces, materials and inductance, Time varying field and Maxwell's equation.

Unit-IV

Uniform plane waves, Plane wave reflection and dispersion.

Unit-5

Transmission lines, and guided waves

Text Book

Mayt, W.H. and Buck, J.A. 'Engineering Electromagnetics Tata McGraw Hill Publishing Co. Ltd., New Delhi Seventh edition.

Reference Books

1. Jordan E.C. and Balmain K.G. 'Electromagnetic' wave and radiating systems. PHI Second edition.
2. Krans, F 'Electromagnetics ' Tata McGraw Hill Fifth edition.
3. Ramo S, Whinnery T.R. and Vanduzer T, 'Field and Waves in Communication electronics' John Wiely and Sons Third edition.

TEE 451

ELECTROMECHANICAL ENERGY CONVERSION- I LAB

L	T	P
0	0	2

Note : Minimum eight experiments are to be performed from the following list :

1 To obtain magnetization characteristics of a d.c. shunt generator

2 To obtain load characteristics of a d.c. compound generator (a) Cummulatively compounded (b) Differentially compounded
3 To obtain load characteristics of a dc shunt generator
4 To obtain load characteristics of a dc series generator
5 To obtain efficiency of a dc shunt machine using Swinburn's test
6 To perform Hopkinson's test and determine losses and efficiency of DC machine
7 To obtain speed-torque characteristics of a dc shunt motor
8 To obtain speed control of dc shunt motor using (a) armature resistance control (b) field control
9 To obtain speed control of dc separately excited motor using Ward Leonard method
10 To study polarity and ratio test of single phase and 3-phase transformers
11 To obtain efficiency and voltage regulation of a single phase transformer by Sumpner's test
12 To obtain 3-phase to 2-phase conversion by Scott connection
13 To perform open circuit and short circuit tests on a three phase transformer and determine parameters of equivalent circuit

TEE 452

NETWORK LABORATORY

L	**T**	**P**
0	**0**	**2**

Note : Minimum eight experiments are to be performed from the following list.

1 Verification of principle of superposition with dc and ac sources
2 Verification of Thevenin, Norton and Maximum power transfer theorems in ac circuits
3 Verification of Tellegin's theorem for two networks of the same topology
4 Determination of transient response of current in RL and RC circuits with step voltage input
5 Determination of transient response of current in RLC circuit with step voltage input for underdamp, critically damp and overdamp cases
6 Determination of frequency response of current in RLC circuit with sinusoidal ac input
7 Determination of z and h parameters (dc only) for a network and computation of Y and ABCD parameters
8 Determination of driving point and transfer functions of a two port ladder network and verify with theoretical values
9 Determination of image impedance and characteristic impedance of T and ∏ networks, using O.C. and S.C. tests
Write Demo for the following (in Ms-Power point)
10 Verification of parameter properties in inter-connected two port networks : series, parallel and cascade also study loading effect in cascade

11 Determination of frequency response of a Twin – T notch filter
12 College may add any three experiments in the above list.

TEE 453

MICROPROCESSOR LABORATORY

	L	**T**	**P**
`	**0**	**0**	**2**

A. Study Experiments

1 To study 8085 based microprocessor system
2 To study 8086 and 8086A based microprocessor system
3 To study Pentium Processor

B. Programming based Experiments (any four)

4 To develop and run a program for finding out the largest/smallest number from a given set of numbers.
5 To develop and run a program for arranging in ascending/descending order of a set of numbers
6 To perform multiplication/division of given numbers
7 To perform conversion of temperature from ^{0}F to ^{0}C and vice-versa
8 To perform computation of square root of a given number
9 To perform floating point mathematical operations (addition, subtraction, multiplication and division)

C. Interfacing based Experiments (any four)

10 To obtain interfacing of RAM chip to 8085/8086 based system
11 To obtain interfacing of keyboard controller
12 To obtain interfacing of DMA controller
13 To obtain interfacing of PPI
14 To obtain interfacing of UART/USART
15 To perform microprocessor based stepper motor operation through 8085 kit
16 To perform microprocessor based traffic light control
17 To perform microprocessor based temperature control of hot water.

TEE 454 : Electrical Simulation Lab

(List of Experiments (PSPICE based)

L	T	P
0	0	2

Note : Select any 10 out of the following:

1. Study of various commands of PSPICE.
2. To determine node voltages and branch currents in a resistive network.
3. To obtain Thevenin's equivalent circuit of a resistive network.
4. To obtain transient response of a series R-L-C circuit for step voltage input.
5. To obtain transient response of a parallel R-L-C circuit for step current input.
6. To obtain transient response of a series R-L-C circuit for alternating square voltage waveform.
7. To obtain frequency response of a series R-L-C circuit for sinusoidal voltage input.
8. To determine line and load currents in a three phase delta circuit connected to a 3-phase balanced ac supply.
9. To plot magnitude, phase and step response of a network function.
10. To determine z,y,g,h and transmission parameters of a two part network.
11. To obtain transient response of output voltage in a single phase half wave rectifier circuit using capacitance filter.
12. To obtain output characteristics of CE NPN transistor.
13. To obtain frequency response of a R-C coupled CE amplifier.
14. To obtain frequency response of an op-Amp integrator circuit.
15. To verify truth tables of NOT, ANDor OR gates implemented by NAND gates by plotting their digital input and output signals.

Reference Books:

1. Irvine, Calif, "PSPICE Manual" Microsim Corporation, 1992.
2. Paul W. Tuinenga, "SPICE : A guide to circuit Simulation and Analysis Using PSPICE", Prentice Hall, 1992.
3. M.H. Rashid, "SPICE for Circuits and Electronics Using PSPICE" Prentice Hall of India, 2000.

U.P. TECHNICAL UNIVERSITY

LUCKNOW

Revised Syllabus

2nd Year (3rd & 4th Semester)

[Effective from the session 2005-06]

B.TECH. ELECTRICAL ENGINEERING
AND
ELECTRICAL & ELECTRONICS ENGINEERING