Study Scheme : B-Tech. Electrical & Electronics Engineering

Course Outline Semester Wise

Semester-III-EEE

Subject Code	Subject	L T P	Marks E + S	Marks Total	Credit
TCS-301	Computer Based Numerical Technique	2-1-0	75+25	100	3
TEC-301	Electronic Devices and Circuits	3-1-0	100+50	150	4
TEE-302	Electromechanical Energy Conversion-I	3-1-0	100+50	150	4
TEC-303	Electronics Measurement & Instrumentation	3-1-0	100+50	150	4
TEE-301	Network Analysis and Synthesis	3-1-0	100+50	150	4
THM-301	Engineering Economics	2-0-0	75+25	100	2
PRACTICAL:					
PEC-351	Electronic Devices and Circuits Lab	0-0-2	25+25	50	3
PEC-352	EMEC Lab-I	0-0-2	25+25	50	2
PEE-353	Network and Measurement Lab	0-0-2	25+25	50	2
Personality Development/GP				50	
TOTAL				1000	28

Semester-IV-ECE

Subject Code	Subject	L T P	Marks E + S	Marks Total	Credit
TEE-401	Electrical & Electronics Engg. Materials	3-1-0	100+50	150	4
TEE-402	EMEC-II	2-1-0	75+25	100	3
TCS-403	Microprocessor & Application	3-1-0	100+50	150	4
TEC-404	Signal and Systems	3-1-0	100+50	150	4
TEE-405	Elements of Power Systems	3-1-0	100+50	150	4
TEC-406	Communication Engineering	2-1-0	75+25	100	2
Practical					
PEE -451	EMEC-II lab	0-0-2	25+25	50	3
PCS -452	Microprocessors Lab	0-0-2	25+25	50	2
PEC-453	Communication Engineering Lab	0-0-2	25+25	50	2
Personality Development/GP				50	
TOTAL				1000	28

Sl. No.	TEC 301 L T P 3 1 0 ELECTRONIC DEVICE AND CIRCUIT	No of periods per unit
1.	**Unit-I** **Crystal Properties and charge Carriers in Semiconductors:** Elemental and compound semiconductor materials, crystal lattice structure **Magnetic material:-**Origin of magnetic dipoles in solids, permanent magnetic dipoles, diamagnetic paramagnetic, ferromagnetic anti-ferromagnetic and ferry-magnetic materials	5
2.	**Unit-II** **Transistor amplifier Frequency response:** Bipolar Transistor as amplifier, Ebers mole and h-parameter model high Frequency model) high frequency response of common source, common collector, common base. High frequency response of common source, common gate, common drain.	10
3.	**Unit-III** **Feedback:** Concept of feedback, classification feedback, Analysis of different type of feedback. **Oscillators:** Concept of oscillators, condition of oscillations, frequency and amplitude stability of oscillations, analysis of quartz, Hartely, colpitts, RC phase shift, Wein bridge and UJT oscillators	10
4.	**Unit-IV** **Multistage and Tuned Amplifiers:** Introduction to multistage amplifiers, cascade amplifiers, coupling of amplifiers, direct coupled, differential coupling, and transformer coupled amplifier, Darlington amplifier and its analysis, bootstrapping, tuned and double tuned voltage amplifiers	10
5.	**Unit-V** **Multivibrator:** Astable, mono-stable, and bi-stable multivibrators	5

Reference Books:

1. Electronic Devices Circuit and SSD, R K Singh and D S Chauhan, Vikash Publication, Delhi
2. Boylestad, Electronic Devices and Circuit Theory, 10/e, Pearson
3. Donald A Neaman, "Semiconductor Physics and Devices Basic Principles" 3rd Ed TMH India.
4. Integrated Electronics, Milman and Halkias, Pearson

Sl. No	TEE 302 L T P 3 1 0 **ELECTRO-MECHANICAL ENERGY CONVERSION –I**	No of periods per unit
1.	**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	(8)
2.	**Unit-II** **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.	(7)
3.	**Unit-III** **D.C. Machines (Contd.):-** Performance Characteristics of D.C. motors ,Starting of D.C. motors ; 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)	(8)
4.	**Unit-IV** **Single Phase Transformer:** Phasor diagram, efficiency and voltage regulation, all day efficiency. **Testing of Transformers:** O.C. and S.C. tests, Sumpner;s test, polarity test. **Auto Transformer:** Single phase and three phase auto transformers, volt-amp, relation, efficiency, merits & demerits and applications.	(6)
5.	**Unit-V** **Three Phase Transformers:** Construction, three phase transformer phasor groups and their connections, open delta connection, three phase to 2 phase, 6 phase or 12 phase connections, and their applications, parallel operation and load sharing of single phase and three phase transformers, excitation phenomenon and harmonics in transformers, three winding transformers.	(10)

Reference Books:

1Irving L.Kosow, "Electric Machine and Tranformers", Prentice Hall of India.
2M.G. Say, "The Performance and Design of AC machines", Pit man & Sons.
3 Bhag S. Guru and Huseyin R. Hizirogulu, "Electric Machinery and Transformers" Oxford University Press, 2001.

Sl. No.	**TCS-302** **L T P** **2 1 0** **Computer Based Numerical Technique**	No of periods per unit
1.	**Unit-I** **Introduction:** Numbers and their accuracy, Computer Arithmetic, Mathematical preliminaries, Errors and their Computation, General error formula, Error in a series approximation. **Solution of Algebraic and Transcendental Equation:** Bisection Method, Iteration method, Method of false position, Newton-Raphson method, Methods of finding complex roots, Muller's method, Rate of convergence of Iterative methods, Polynomial Equations	**8**
2.	**Unit-II** **Interpolation:** Finite Differences, Difference tables Polynomial Interpolation**:** Newton's forward and backward formula Central Difference Formulae: Gauss forward and backward formula, Stirling's, Bessel's, Everett's formula.	**6**
3.	**Unit-III** **Numerical Integration and Differentiation:** Introduction, Numerical differentiation Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rule, Boole's rule, Waddle's rule.	**6**
4.	**Unit-IV** **Statistical Computation:** Frequency chart, Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc, Data fitting with Cubic splines, Regression Analysis, Linear and Non linear Regression, Multiple regression, Statistical Quality Control methods.	**6**

Reference Books:

1. Gerald & Whealey, "Applied Numerical Analyses", AW
2. Grewal B S, "Numerical methods in Engineering and Science", Khanna Publishers, Delhi.
3. Numerical Method Principles, analysis and algorithms ,Srimamta Pal (Oxford Higher ed)
4. Sastry S. S, "Introductory Methods of Numerical Analysis", Pearson Education.

Sl. No.	TEC 303 L T P 3 1 0 ELECTRONIC INSTRUMENTATION AND MEASUREMENTS	No of periods per unit
1.	**Unit-I** **Unit, dimensions and standards:** Scientific notations and metric prefixes. SI electrical units, SI temperature scales, Other unit systems, dimension and standards. Measurement Errors: Gross error, systematic error, absolute error and relative error, accuracy, precision, resolution and significant figures, Measurement error combination, basics of statistical analysis. PMMC instrument, galvanometer, DC ammeter, DC voltmeter, series ohm meter	7
2.	**Unit-II** Transistor voltmeter circuits, AC electronic voltmeter, current measurement with electronic instruments, multimeter probes Digital voltmeter systems, digital multimeters, digital frequency meter System, Voltmeter and ammeter methods, Wheatstone bridge, low resistance measurements, low resistance measuring instruments AC bridge theory, capacitance bridges, Inductance bridges, Q meter	7
3.	**Unit-III** **Analog to digital converter:** Transfer characteristics, A/D conversion technique: Simple potentiometer and servo method, successive approximation method ramp type, integrating and dual slope integrating method **D/A Converter:** Transfer characteristic, D/A conversion technique, digital mode of operation, performance characteristics of D/A convertors. **Display Devices:** Alpha numeric display using LCD and LED Specification of digital meters, Display digits and count resolution, sensitivity, accuracy, speed and settling time etc.	9
4.	**Unit-IV** **CRO:** CRT, wave form display, time base, dual trace oscilloscope, measurement of voltage, frequency and phase by CRO, Oscilloscope Probes, Oscilloscope specifications and performance. Delay time based Oscilloscopes, Sampling Oscilloscope, DSO, DSO Applications	8
5.	**Unit-V** **Signal generator and analyzer:** Signal generator: Sine wave, non-sinusoidal signal and function generators, frequency synthesis techniques and digital signal generators **Signal analyzers:** Spectrum analyzer and distortion, **Concept of ECG, EMI, EMC, EEG** etc. **Recorders:** X-Y recorders, plotters	9

Reference Books:

1. David A. Bell, "Electronic Instrumentation and Measurements", 2nd Ed., PHI , New Delhi 2008
2. Elements of Electronic Instrumentation and Measurement, 3/e, Carr. Pearson
3. Oliver and Cage, "Electronic Measurements and Instrumentation", TMH, 2009.
4. Alan S. Morris, "Measurement and Instrumentation Principles", Elsevier (Buterworth Heinmann), 2008

Sl. No	TEE 301 L T P 3 1 0 NETWORK ANALYSES AND SYNTHESIS	No of periods per unit
1.	**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.	(8)
2.	**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.	(8)
3.	**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 plot, frequency response and Bode plots.	(9)
4.	**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 & π Representation.	(8)
5.	**Unit-V** **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.	(7)

Reference Books:

1. Network Analysis with Applications, 4/e (with CD), Stanley. pearson
2. Franklin F. Kuo, "Network Analysis and synthesis", 2nd Edition, Wiley India Pvt Ltd.
3. Behrouz Peikari, "Fundamentals of Network Analysis & synthesis", Jaico Publishing House, 2006.
4. M. E. Van Valkenberg, "Network Analysis", 2nd Edition, Prentice Hall of India Ltd.Oliver and Cage,

Sl. No	THU-301 L T P 2 0 0 **ENGINEERING ECONOMICS**	No of periods per unit
1.	**Unit-I** **Time value of money :** Simple and compound interest, Time value equivalence, Compound interest factors, Cash flow diagrams, Calculation, Calculation of time –value equivalences. Present worth comparisons, Comparisons of assets with equal, unequal and infinite lives, comparison of deferred investments, Future worth comparison, payback period comparison.	(8)
2.	**Unit-II** Use and situations for equivalent annual worth comparison, Comparison of assets of equal and unequal life. Rate of return, Internal rate of return, comparison of IIR with other methods, IRR misconceptions.	(8)
3.	**Unit-III** **Analysis of public Projects:** Benefit/ Cost analysis, quantification of project, cost and benefits, benefit/ cost applications, Cost –effectiveness analysis.	(9)
4.	**Unit-IV** Depreciation, computing depreciation charges, after tax economic comparison, Break-even analysis; linear and non-linear models. Product and Process Costing, Standard Costing, cost estimation, Relevant Cost for decision making, Cost control and Cost reduction techniques.	(8)

Reference Book :

1. Horn green, C.T., Cost Accounting, Prentice Hall of India
2. Riggs, J.L., Dedworth, Bedworth, D.B, Randhawa, S.U. Engineering Economics, McGraw Hill International Edition, 1996

PEC 301 ELECTRONICS DEVICES & CIRCUITS LAB

L T P
0 0 2

The following experiments must be performed on Bread Board

1. Field Effect Transistors-Single stage Common source FET amplifier –plot of gain in dB Vs frequency, measurement of bandwidth, input impedance, maximum signal handling capacity (MSHC) of an amplifier

2. Bipolar Transistors- Design of single stage RC coupled amplifier –design of DC biasing circuit using Potential divider arrangement –Plot of frequency Vs gain in dB. Measurement of bandwidth of an amplifier , input impedance and Maximum Signal Handling Capacity of an amplifier.

3. Two stage Amplifier. Plot of frequency Vs gain. Estimation of Q factor, bandwidth of an amplifier

4. Common Collector Configuration-Emitter Follower (using Darlington pair)-Gain and input impedance Measurement of the circuit.

5. Study of Series and shunt feedback amplifier and determination of voltage and current gain, Plot of gain in dB Vs frequency, measurement of bandwidth

6. Study of Wein bridge oscillator (b) phase shift oscillator

7. Study of Hartely & Colpitts oscillator

8. Study of Mono and astable multiviberator using transistor

9. Fabrication of DC unregulated power supply

10. PCB Lab: (a) Artwork & printing of a simple PCB. (b) Etching & drilling of PCB. (c) Testing of power supply fabricated in Experiment No. 6 (d) Mini Project

PEE-301 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. shunt generator and compound generator (a) Cumulatively compounded (b) Differentially compounded
3 To obtain efficiency of a dc shunt machine using Swinburn's test
4 To perform Hopkinson's test and determine losses and efficiency of DC machine
5 To obtain speed-torque characteristics of a dc shunt motor
6 To obtain speed control of dc shunt motor using (a) armature resistance control (b) field control
7 To obtain speed control of dc separately excited motor using Conventional Ward-Leonard/ Static Ward –Leonard method.
8 To study polarity and ratio test of single phase and 3-phase transformers
9 To obtain equivalent circuit, efficiency and voltage regulation of a single phase transformer using C.C. and S.C. tests.
10 To obtain efficiency and voltage regulation of a single phase transformer by Sumpner's test.

PEC 302 **MEASUREMENT LAB**

L T P
0 0 2

1. Study of semiconductor diode voltmeter and its us as DC average responding AC voltmeter.
2. Study of L.C.R. Bridge and determination of the value of the given components.
3. Study of distortion factor meter and determination of the % distortion of the given oscillator.
4. Study of the transistor tester and determination of the parameters of the given transistors.
5. Study of the following transducer (i) PT-100 Transducer (ii) J- type Transducer (iii) K-type Transducer (IV) Presser Transducer
6. Measurement of phase difference and frequency using CRO (Lissajous Pattern)
7. Measurement of low resistance Kelvin's double bridge.
8. Radio Receiver Measurements
9. Study of A to D convertor and its realization
10. Study of D to A convertor and its realization
11. Designing of some characters like A by alpha numeric Display.

SCHEME OF EXAMINATION

For

B. Tech. Electrical & Electronics Engineering

(Effective from the session: 2010-2011)

Uttrakhand Technical University,Dehradun

UTTARAKHAND TECHNICAL UNIVERSITY DEHRADUN

STUDY AND EVALUATION SCHEME

B.TECH. IInd YEAR SEMESTER-IV

ELECTRICAL& ELECTRONICS ENGINEERING

EFFECTIVE FROM SESSION:-2010-2011

S. No.	Course No.	Subject	Periods			Evaluation				Subject Total	Credit
						Sessional Exam			Exam		
		Theory	L	T	P	CT	TA	Total	ESE		
1.	TEE 405	Electromechanical Energy Conversion-II	3	1	0	30	20	50	100	150	4
2	TEE 406	Elements of Power Systems	3	1	0	30	20	50	100	150	4
3	TEE 403	Electrical &Electronics Engineering Materials	2	1	0	15	10	25	50	75	3
4	TEE 404	Microprocessors & its Applications	3	1	0	30	20	50	100	150	4
5	TEC 405	Communication Engineering	2	1	0	15	10	25	50	75	3
6	TEC-402	Signal and Systems	3	1	0	30	20	50	100	150	4
Practical /Design											
7	PEE-454	Electromechanical Energy Conversion-I Lab	0	0	3		50	50	50	100	2
8	PEE-452	Microprocessors Lab	0	0	2		25	25	25	50	2
9	PEC-455	Communication Engineering Lab	0	0	2		25	25	25	50	2
10	GP-401	General Proficiency (NSS/NCC/Sports/ Cultural)	-	-	-	-	-	50	-	50	-
		Total								1000	28

TEE-403: ELECTRICAL & ELECTRONICS ENGINEERING MATERIALS

L	T	P
2	1	0

UNIT – I : Crystal Structure of Materials:

Bonds in solids, crystal structure, co-ordination number, atomic radius representation of plane distance b/w two planed packing factor, Miller Indices, Bragg's law and x-ray diffraction, structural Imperfections, crystal growth **(7)**

UNIT – II : Dielectric Materials:

Polarization 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 **(7)**

UNIT – III : Electrical Engineering Material:

Electron theory of metals, factors affecting electrical resistance of materials, thermal conductivity of metals, heat developed in current carrying conductors, Half effect, Drift and Diffusion currents, continuity equation, thermoelectric effect, superconductivity and super conducting materials, optical properties of solids **(8)**

UNIT – IV : Magnetic Material:

Origin of permanent magnetic dipoles in matters, Classification Diamagnetism, Paramagnetism, Ferromagnetism, Antiferromagnetismand Ferrimagnetism, magnetostriction, Properties of magnetic materials, soft and hard magnetic materials, permanent magnetic materials. **(7)**

References :

1 Solymar, "Electrical Properties of Materials" Oxford University Press.

2. Ian P. Hones," Material Science for Electrical and Electronic Engineering," Oxford University Press.

3 A.J. Dekker,"Electrical Engineering Materials" Prentice Hall of India

TEE-404: MICROPROCESSORS and ITS APPLICATION

L T P
3 1 0

UNIT-I : Introduction to Microprocessors: Evolution of Microprocessors, history of computers, Timing and control , Memory devices: Semiconductor memory organization, Category of memory **(4)**

UNIT-II: 8-bit Microprocessors (8085): Architecture, Instruction Set, Addressing modes, Assembly Language Programming. **(6)**

UNIT-III: 16-bit Microprocessors (8086): Architecture, Physical address, segmentation, memory organization, Bus cycle, Instruction Set, Addressing modes, difference between 8085 & 8086 , Assembler Directives , Assembly Language Programming of 8086 **(10)**

UNIT-IV: Peripheral Interfacing: Introduction, Types of transmission, 8257 (DMA), 8255 (PPI), Serial Data transfer (8251), Keyboard-display controller (8279), Programmable Priority Controller (8259), 8253, ADC, Application of peripheral devices **(11)**

UNIT-V: Advanced Microprocessors: Introduction to 80186, 80286, 80386, 80486, Pentium microprocessors, introduction To Microcontroller (8051) **(9)**

Reference 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, Programaming and Interfacing" Tata Mc. Graw Hill.
3 Brey, Barry B. "INTEL Microprocessors" Prentice Hall (India)
4 ADitya P Mathur, "Introduction to Microprocessor" Tata Mc Graw Hill
5 M. Rafiquzzaman, "Microprocessors- Theory and applications" PHI

TEE – 405: Electro-mechanical Energy Conversion - II

L T P
3 1 0

Unit I. Synchronous Machine I

Constructional features, Armature winding, EMF Equation, Winding coefficients, equivalent circuit and phasor diagram, Armature reaction,
O. C. & S. C. tests, Voltage Regulation using Synchronous Impedance Method, MMF Method, Potier's Triangle Method, Parallel Operation of synchronous generators, operation on infinite bus, synchronizing power and torque co-efficient

Unit II Synchronous Machine II:

Two Reaction Theory, Power flow equations of cylindrical and salient pole machines, Operating characteristics
Synchronous Motor: Starting methods, Effect of varying field current at different loads, VCurves, Hunting & damping, synchronous condensor

Unit III Three phase Induction Machine – I:

Constructional features, Rotating magnetic field, Principle of operation
Phasor diagram, equivalent circuit, torque and power equations, Torque- slip characteristics, no load & blocked rotor tests, efficiency, Induction generator

Unit IV Three phase Induction Machine- II

Starting, Deep bar and double cage rotors, Cogging & Crawling, Speed Control (with and without emf injection in rotor circuit.)

Single phase Induction Motor

Double revolving field theory, Equivalent circuit, No load and blocked rotor tests,
Starting methods, repulsion motor.AC Commutator Motors:

Unit V

Universal motor, Single phase a.c. series compensated motor, stepper motors

Reference Books:

1. El Hawary, "Principles of Electrical Machines with Power Electronics", Wiley India
2. D.P.Kothari & I.J.Nagrath, "Electric Machines", Tata Mc Graw Hill
3. Sen, Principles of Electrical Machines & Power Electronics, Wiley India
4. 4. O.C. Taylor, "The performance & design of A.C. Commutator Motors", A.H.Wheeler & Co(P) Ltd.

TEE - 406: Elements of Power Systems

L T P
3 1 0

Unit No.1 Power System Components:

Single line Diagram of Power system,Brief description of power system Elements: Synchronous machine, transformer, transmission line, bus bar , circuit breaker and isolator.

Supply System

Different kinds of supply system and their comparison, choice of transmission voltage

Transmission Lines:

Configurations, types of conductors, resistance of line, skin effect, Kelvin's law. Proximity effect

Unit 2 Over Head Transmission Lines

Calculation of inductance and capacitance of single phase, three phase, single circuit and double circuit transmission lines,
Representation and performance of short, medium and long transmission lines, Ferranti effect. Surge impedance loading

Unit 3 Corona and Interference:

Phenomenon of corona, corona formation, calculation of potential gradient, corona loss, factors affecting corona, methods of reducing corona and interference.
Electrostatic and electromagnetic interference with communication lines,

Overhead line Insulators:

Type of insulators and their applications, potential distribution over a string of insulators, methods of equalizing the potential, string efficiency.

Unit 4 Mechanical Design of transmission line:

Catenary curve, calculation of sag & tension, effects of wind and ice loading, sag template, vibration dampers.

Unit 5 Insulated cables:

Type of cables and their construction, dielectric stress, grading of cables, insulation resistance, capacitance of single phase and three phase cables, dielectric loss, heating of cables.

Reference Books

1. Weedy, "Electric Power Systems", Wiley India
2. P.S.R.Murthi, Electrical Power System. B.S. Publications
3. W. D. Stevenson, "Element of Power System Analysis", McGraw Hill, USA

TEC - 405: Communication Engineering

L T P
2 1 0

Unit 1 Amplitude Modulation:

Amplitude modulation, DSBSC, SSB and VSB modulation and demodulation schemes, AM transmitters and receivers, super-hetrodyne receiver, IF amplifiers, AGC circuits. Frequency division multiplexing.

Unit 2 Angle Modulation:

Frequency modulation, phase modulation, Generation of frequency modulation
FM receivers and demodulators
Noise:
External noise, internal noise, Noise calculations, signal to noise ratio, Noise in AM and FM systems

Unit 3 Pulse Communication

Sampling Process, PAM,PWM,PPM and PCM, Delta modulation and adaptive delta modulation
Digital Modulation:
Introduction, brief description of phase shift keying(PSK), Differential phase shift keying (DPSK), frequency shift Keying (FSK), Quadrature amplitude modulation (QAM) and time division multiplexing (TDM).

Unit 4 Radio Propagation:

Ground waves, sky wave propagation, space waves, tropospheric scatter propagation, Satellite Communication- transponders, Geo-stationary satellite system, low earth and medium earth-orbit satellite system.
Introduction to Cellular system
Personal communication system (PCS), data communication with PCS.

Reference Books **:**

1. B. P. Lathi, “Modern Analog and Digital Communication Systems” BS Publications.
2. Simon Haykin, “ Communication Systems” John Wiley & Sons (BS Publication)
2. G. Kennedy and B. Davis , “Electronic Communication Systems” Tata McGraw Hill
3. Shanmugam, “Digital & Analog Communication Systems”, Wiley India
4. Roy Blake, “ Wireless Communication Technology” Thomson Asia Pvt. Ltd. Singapore
6. Taub & Schilling, “Principles of Communication Systems” McGraw Hill.

TEC-402 SIGNAL S AND SYSTEMS

Unit-I Signals and Systems:

Continuous-time and discrete-time Signals,Transformations of the Independent Variable, Exponential and Sinusoidal Signals, Continuous-Time and Discrete-Time LTI Systems and their properties, convolution sum and convolution integrals, LTI System described by differential and difference equation. 8

Unit-II Fourier series and Fourier Transformer:
The response of LTI Systems to Complex Exponentials, Fourier Series Representation of Continuous-time Periodic Signals and their Properties, Continuous time and discrete time Fourier Transforms and their properties, System Characterized by Linear Constant Coefficient Differential equations and Difference equation. 10

Unit-III Time and Frequency Characterization of Signals and Systems:
Magnitude Phase Representation of the Fourier Transform, Magnitude Phase Representation of the Frequency response of LTI systems, Time domain Properties of Ideal Frequency Selective filter, Time Domain and Frequency Domain aspects of Non ideal filters, First Order and Second Order Continuous Time and Discrete time Systems. 6

Unit-IV Sampling and Laplace Transform:
Signal representation by samples,sampling theorem, Impulse train sampling, sampling of discrete time signals, discrete time processing of continuous time signals. Laplace Transform, Region of convergence, inverse Laplace Transform,Analysis and characterization of LTI System, Block diagram representation, Unilateral Laplace transform.

Unit-V Z-Transform:
Z-Transform, Region of convergence, Inverse Ztransform,analysis and characterization of LTI system, Block diagram representation, Unilateral Z-transform. 8

Refrences:

1. Haykin, “Signals & Systems”, Wiley India
2. B P Lathi, Signals & Systems, BS Publication, Hyd.

PEE-452: MICROPROCESSOR LAB

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.

PEE-454: Electro-mechanical Energy Conversion – II Laboratory

L	T	P
0	0	3

Note: The minimum 8 experiments are to be performed from the following,

out of which there should be at least two software based experiments.

1. To perform no load and blocked rotor tests on a three phase squirrel cage induction motor and determine equivalent circuit.
2. To perform load test on a three phase induction motor and draw:
   (i) Torque -speed characteristics
   (ii) Power factor-line current characteristics
3. To perform no load and blocked rotor tests on a single phase induction motor and determine equivalent circuit.
4. To study speed control of three phase induction motor by
   Keeping V/f ratio constant
5. To study speed control of three phase induction motor by varying supply voltage.
6. To perform open circuit and short circuit tests on a three phase alternator and determine voltage regulation at full load and at unity, 0.8 lagging and leading power factors by (i) EMF method (ii) MMF method.
7. To determine V-curves and inverted V-curves of a three phase synchronous motor.
8. To determine Xd and Xq of a three phase salient pole synchronous machine using the slip test and draw the power-angle curve.
9. To study synchronization of an alternator with the infinite bus by using:
   (i) dark lamp method (ii) two bright and one dark lamp method

Software based experiments (Develop Computer Program in 'C' language or use MATLAB or other commercial software)

10. To determine speed-torque characteristics of three phase slip ring induction motor and study the effect of including resistance, or capacitance in the rotor circuit.
11. To determine speed-torque characteristics of single phase induction motor and study the effect of voltage variation.
12. To determine speed-torque characteristics of a three phase induction motor by (i) keeping v/f ratio constant (ii) increasing frequency at the rated voltage.
13. Draw O.C. and S.C. characteristics of a three phase alternator from the experimental data and determine voltage regulation at full load, and unity, 0.8 lagging and leading power factors.
14. To determine steady state performance of a three phase induction motor using equivalent circuit.

TEC 455: Communication Engineering Laboratory:

L	T	P
0	0	2

Note: A minimum of 10 experiments is to be performed.

1. To study amplitude modulation using a transistor and determine depth of modulation.
2. To study generation of DSB-SC signal using balanced modulator.
3. To study generation of SSB signal
4. To study envelop detector for demodulation of AM signal and observe diagonal peak clipping effect.
5. To study super heterodyne AM receiver and measurement of sensitivity, selectivity and fidelity.
6. To study frequency modulation using voltage controlled oscillator.
7. To detect FM signal using Phase Locked Loop.
8. To measure noise figure using a noise generator.
9. To study PAM, PWM and PPM.
10. To realize PCM signal using ADC and reconstruction using DAC and 4 bit/8bit system. Observe quantization noise in each case.
11. To study Delta Modulation and Adaptive Delta Modulation.
12. To study PSK-modulation system.
13. To study FSK-modulation system.
14. To study sampling through a Sample-Hold circuit and reconstruction of the sampled signal and observe the effect of sampling rate & the width of the sampling pulses.
15. To study functioning of colour television.