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

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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

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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

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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

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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

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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

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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:

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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.