UTTRAKHAND TECHNICAL UNIVERSITY DEHRADUN
STUDY AND EVALUATION SCHEME
B.TECH.II Year Semester-IV
ELECTRICAL ENGINEERING, ELECTRICAL AND ELECTRONICS ENGINEERING
(Effective from the Session : 2008-2009)

S.No	Course No.	Subject	Periods			Evaluation				Subject Total
						Sessional Exam.			Exam ESE	
		Theory	L	T	P	CT	TA	Total	Exam ESE	
1	TEE 401	Electromechanical Energy Conversion- I	3	1	0	30	20	50	100	150
2	TEE 402	Power Station Practice	3	1	0	30	20	50	100	150
3	TEE-403	Electrical & Electronics Engineering Materials	3	1	0	30	20	50	100	150
4	TEE-404	Microprocessors	3	1	0	30	20	50	100	150
5	TEE-401	Electromagnetic Field Theory	3	1	0	30	20	50	100	150
Practical/Design										
6	TEE 451	Electromechanical Energy Conversion-I Lab.	0	0	2	-	25	25	25	50
7	TEE 452	Microprocessor Lab.	0	0	2	-	25	25	25	50
8	TEE 453	Electrical Simulation Lab.	0	0	2	-	25	25	25	50
9	GP 451	General Proficiency	-	-	-	-	-	100	-	100
10	DIS 451	Discipline						100		100
		Total	**15**	**5**	**6**			**525**	**575**	**1100**

ELECTRO-MECHANICAL ENERGY CONVERSION-I (TEE-401)

Unit-I

Principles of Electro-mechanical Energy Conversion- Introduction, Flow of Energy in Electromechanical Devices, Energy in magnetic systerms (defining energy and Coenergy) , 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-3

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

Unit-3

D.C.Machines:- 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.machine (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 advantage , 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 application of autotransformers.

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 Transformers", 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 and 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.

Power Station Practice (TEE 402)

Topic Name

Introduction :

Electric energy demand and growth in India, electric energy sources.

Thermal Power Plant :

Site selection, general layout and operation of plant, detailed description and use of different parts.

Hydro Electric Plants:

Classifications, location and site selection, detailed description of various components, general layout and operation of plants, brief description of impulse, reaction, Kaplan and Francis turbines, advantages and disadvantages, hydro-potential in India.

Nuclear Power Plant:

Location, site selection, general layout and operation of plant, Brief description of different types of reactors Moderator material, fissile materials, control of nuclear reactors, disposal of nuclear waste material, shielding.

Gas Turbine Plant:

Operational principle of gas turbine plant and its efficiency, fuels , open and closed-cycle plants, regeneration , inter-cooling and reheating, role and applications.

Diesel Plants :

Diesel plant layout, components and their functions, its performance, role and applications.

Sub-stations Layout :

Types of substations, bus-bar arrangements, typical layout of substation.

Power Plant Economics and Tarrifs:

Load curve, load duration curve, different factors related to plants and consumers, Cost of electrical energy, depreciation, generation cost, effect of

Load factor on unit cost. Fixed and operating cost of different plants, role of load diversity in power system economy. Objectives and forms of Tariff,. Causes and effects of low power factor, advantages of power factor improvement , different methods for power factor improvements.

Economic Operation of Power Systems:

Characteristics of steam and hydro-plants,

Constraints in operation, Economic load scheduling of thermal plants Neglecting and considering transmission Losses, Penalty factor, loss coefficients, Incremental transmission loss. Hydrothermal Scheduling

Non Conventional Energy Sources:

Power Crisis, future energy demand, role of Private sectors in energy management.

MHD generation: Working principle, open and closed cycles, MHD systems, advantages, parameters governing power output.

Solar power plant: Conversion of solar heat to electricity, Solar energy collectors, Photovoltaic cell, power generation, future prospects of solar energy use.

Wind Energy: Windmills, power output with combined operation of wind turbine generation and isolated generating system, technical choices & economic size.

Geothermal Energy : Earth energy, heat extraction, vapor turbine cycle, difficulties & disadvantages,

Tidal energy : Tidal phenomenon, tidal barrage, tidal power Schemes.

Ocean Thermal Energy : Introduction, energy conversion, problems.

Text Books :

1. B.R.Gupta, ”Generation of Electrical Energy”, S.Chand Publication.
2. Soni, Gupta & Bhatnagar,”A text book on Power System Engg.”, Dhanpat Rai & Co.
3. P.S.R. Murthy, “Operation and control of Power System” BS Publications, Hyderabad.

Reference Books:

1. W.D.Stevenson,”Elements of Power System Analysis”, McGraw Hill.
2. S.L.Uppal, “Electrical Power”, Khanna Publishers.

ELECTRICAL & ELECTRONICS ENGINEERING MATERIALS (TEE 403)

Unit-I

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 material using energy band. (8)

Unit- II

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

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

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

Magnetic Properties of Material:

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

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.

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.

MICROPROCESSORS (TEE 404)

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 instruction, 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

Peripheral 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.," Advanced Microprocessor & Interfacing/Tata McGraw Hill "
8. Renu Singh & B.P.Singh, "Microprocessors and Interfacing & Applications" New Age International.

ELECTROMAGNETIC FIELD THEORY (TEC-401)

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.

ELECTROMECHANICAL ENERGY CONVERSION-I LAB (TEE 451)

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 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

MICROPROCESSOR LABORATORY (TEE 452)

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 form ^{o}F to ^{o}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 453 : Electrical Simulation Lab

Note: Minimum eight experiments are to be performed from the following list:
The experiments are based upon circuit simulation using PSPICE or MULTISIM software:

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 Tellgin'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 stem 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

In electrical engineering, the power system is a sub-topic that deals with the transmission, generation, electric power usage, distribution, etc. Please refer to this link to know more about the list of power system projects or power electronics projects. Diploma Projects for EEE.Â Latest EEE Projects Ideas for Engineering Students. Electrical engineering projects can be built using various electrical and electronic components, students. Here, we are providing final year projects for EEE, which are suitable for electrical students. Arduino based DC Motor Speed Control.