

Syllabus of B.Tech – Electrical Engineering

Humanities Electives I

Subject Code	HS241	Subject Title	Education and Social Change						
LTP	2-0-0	Credit	2	Subject Category	Elective	Year	II	Semester	IV

Course Objective

- To define the various types of education policies
- To understand the role in striving for social change.
- To overview on education and its implications on social changes to the students.

Unit 1

6 Hrs

General introduction to the place of learning in society. Learning, education and training. Changing meanings of education across time and society. A brief historical perspective on education in India.

Unit 2

6 Hrs

Social-political arithmetic as a spurious way of understanding education and social change. Structural functionalist perspectives and structural-conflict perspectives on education

Unit 3

7 Hrs

Class, conflict, legitimation processes, reproduction of society. Anarchist perspectives. "New" Sociology of Education. Symbolic interactionist perspectives on education. Resistances to schooling. Critical theory and education.

Unit 4

7 Hrs

Neo-Weberian perspectives on education. Status politics and education. Caste, class, gender and education in India. Indian thinkers on education. Current debates on the place of education in India.

LEARNING OUTCOME:

- The students will understand how the education system assesses the importance of education in society.
- The students will be able to take a significant action in area of education to maintain social change
- The student will be able to participate in the changes required in society.
- Education will be used as a tool to implement adequate changes in society.

TEXT BOOKS

1. Desai, A.R. (2005), *Social Background of Indian Nationalism*, Popular Prakashan.
2. Giddens, A (2009), *Sociology*, Polity, 6th ed.

REFERENCE BOOKS

- Guha, Ramachandra (2007), *India after Gandhi*, Pan Macmillan.
- Sharma R.S. (1965), *Indian Feudalism*, Macmillan.
- Deshpande, Satish (2002), *Contemporary India: A Sociological View*, Viking.
- Gadgil, Madhav & Ramachandra Guha(1993), *This Fissured Land: An Ecological History of India*, OU Press.
- Haralambos M, RM Heald, M Holborn (2000), *Sociology*, Collins.
- Mohanty, M (ed.) (2004), *Class, Caste & Gender- Volume 5*, Sage.
- Dhanagare, D.N., *Themes and Perspectives in Indian Sociology*, Rawat

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Humanities Electives I

Subject Code	HS242	Subject Title	Introduction to Psychology						
LTP	2-0-0	Credit	2	Subject Category	Elective	Year	II	Semester	IV

Course Objective

- To understand the basic psychological processes and their applications in everyday life.

Unit 1 Introduction

5Hrs.

Psychology as a science, perspective, origin and development of Psychology, Psychology in India, Methods: experimental and case study.

Unit 2 Cognitive Processes-Perception

7Hrs.

Nature of perception, laws of perceptual organization, learning, conditioning observational learning, memory processing, information processing model, techniques for improving memory

Unit 3 Motivation and Emotion

7Hrs.

Motives: Biogenic and Sociogenic; Emotion: Nature of Emotions, key Emotion

Unit 4 Personality and Intelligence-Personality

7Hrs.

Nature and Theories; Intelligence: Nature and Theories

Course Outcome:

- The students will develop an understanding of the various psychological processes to maintain their daily activities
- The students will understand themselves better.
- The students will be better equipped for life.
- The Students will be able to demonstrate critical and creative thinking and scientific approach to understand human behaviour.

Text Books:

- Baron, R.A. and Misra, G., Psychology (Indian Subcontinent Edition). Person Education Ltd. (2014)
- Chndha, N.K. & Seth, S., The Psychological Realm: An Introduction. Pinnacle Learning, New Delhi. (2014)

REFERENCE BOOKS:

- Ciccarelli, S.K. & Meyer, G.E., Psychology (South Asian Edition). New Delhi: Tata Mc Graw Hill. (2008)
- Glassman, W.F., Approaches to Psychology (3rd Ed.) Buckingham: Open University Press. (2000)
- Passer, M.W., Smith, R.E., Holt, N. and Bremmer, A., Psychology: The Science of Mind and Behaviour, McGraw-Hill Education, UK. (2008)

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Humanities Electives I

Subject Code	HS243	Subject Title	Science, Technology & Society						
LTP	2-0-0	Credit	2	Subject Category	Elective	Year	II	Semester	IV

Course Objective

To increase the basic understanding of students towards science and technology, and basic implications of science & technology on social development.

Unit 1

5Hrs.

Introduction of society, Sociological imagination, the two revolutions and their socio-economic technological and scientific implications; Social significance of science and technology, ideas beyond technology.

Unit 2

5Hrs.

Perspectives on relations between science and technology; Sociological perspective on scientific knowledge: Karl Marx, Emile Durkheim and Karl Mannheim's Sociology of knowledge; Merton's approach to science and technology.

Unit 3

7Hrs.

Ethos of science, Matthew effect in science, Thomas theorem and Mathew effect; Thomas Kunn's notions paradigm and paradigm-based science, Scientific community and growth of scientific knowledge.

Unit 4

9Hrs.

Science in India: science and technology policies in India, Scientific communities and their linkages, national and international Science, Ethics in science & engineering, environment and science and technology

COURSE OUTCOME:

- Enable students to examine the role of science and technology in social and economic development.
- The students will understand perspectives on relations between science and technology.
- The student will be able to understand the scientific temper & its social significance.
- The student will be able to understand and implement technological policies for the betterment of society.

TEXT BOOKS

1. Federic A. Lyman: Opening Engineering Students Mind to Idea to Ideas Beyond Technology. IEEE Technology and Society Magazine, Fall, pp.16-23. (2002)
2. John Theodore Rivers: Technology and the use of Nature. Technology in Society, 25(3), August, pp.403-416 (2003).

REFERENCE BOOKS

- Ronald R. Kline: Using History & Sociology to Tech Engineering Ethics. IEEE Technology and Society Magazine, Winter, pp.13-20 (2002).
- V.V. Krishna: A portrait of the scientific community in India: Historical Growth and Contemporary Problems, Gaillard et al. (eds). Scientific Communities in the Developing World, Sage (1997)

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Humanities Electives I

Subject Code	HS245	Subject Title	Ethics & Self Awareness						
LTP	2-0-0	Credit	2	Subject Category	Elective	Year	II	Semester	IV

Course Objective

- To introduce the concepts pertaining to ethical and moral reasoning and action
- To develop self – awareness

Unit 1 Introduction

4Hrs.

Definition of Ethics; Approaches to Ethics: Psychological, Philosophical, Social.

Unit 2 Psycho-social theories of moral development

4Hrs.

View of Kohlberg, Morality and Ideology, Culture and Morality, Morality in everyday context

Unit 3

8Hrs.

Ethical Concerns: Work Ethics and Work Values, Business Ethics, Human values in organizations, Self-Awareness: Self Concept: Johari Window, Self and Culture, Self-Knowledge, Self-Esteem

Unit 4

11Hrs.

Perceived Self-control, Self-serving bias, Self-presentation, Self-growth: Transactional Analysis and Life Scripts. Self-Development: Character strengths and virtues, Emotional intelligence, Social intelligence, Positive cognitive states and processes (Self-efficacy, Empathy, Gratitude, Compassion, and Forgiveness).

COURSE OUTCOME

- Students will develop an understanding of the ethical values and their application in daily activities
- Students will learn business ethics and work ethically in every sphere.
- Students will understand themselves better and develop healthy interpersonal relationships.
- Students will be able to develop themselves into wholesome personalities.

TEXT BOOKS

1. Leary M.R., "The Curse of Self: Self-awareness, Egotism and the Quality of Human Life", Oxford University Press. 2004
2. Louis P. P., "The Moral Life: An Introductory Reader in Ethics and Literature", Oxford University Press. 2007

REFERENCE BOOKS

- Corey, G., Schneider Corey, M., & Callanan, P., "Issues and Ethics in the Helping Professions", Brooks/Cole. 2011
- Snyder, C.R., Lopez, Shane, J., & Pedrotti, J.T., "Positive Psychology" Sage, 2nd edition. 2011

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Subject Code	EE204	Subject Title	ELECTRICAL POWER GENERATION						
LTP	3 0 0	Credit	3	Subject Category	DC	Year	2 nd	Semester	4 th

Objectives of the Course

- The objective of the course is that after studying this subject the student should become familiar with the different modes of electrical power generation, their advantages and limitations.
- He should also become aware of the various components and their working which are involved in the process of electrical power generation.
- He should have fair idea about energy generation and cost structure for revenue generation by energy

Unit 1	<p>Introduction: Present energy scenario in India, Power Plant Economics and Tariffs: 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 including three part tariff; Causes and effects of low power factor, advantages of power factor improvement, different methods for power factor improvements</p> <p>Thermal Power Plant: Site selection, general layout and operation of plant, Rankine cycle, Function of pulverization, boiler, economizer, super heater, air pre-heater, ESP, turbine and pump. Classification of steam turbines, impulse and reaction turbines velocity diagrams</p>	8L
Unit 2	<p>Gas Turbine Plant: Operational principle (Brayton cycle) of gas turbine plant & its efficiency, fuels, open and closed-cycle plants, regeneration, inter-cooling and reheating, role and applications, Diesel Plants: Diesel plant layout, components & their functions, its performance, role and applications</p> <p>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.</p>	8L
Unit 3	<p>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 & disadvantages</p> <p>Major Electrical Equipment in Power Plants: Differences between generators used in steam and hydro power plants, requirement of excitation systems, types of excitation systems,</p>	8L
Unit 4	<p>Cogeneration: Introduction, types of cycles and technologies, advantages and scope in India</p> <p>Captive Generation: Introduction, advantages and constraints</p> <p>Solar power plant: Working of solar power plant, Solar energy collectors, Photovoltaic cell, merits and limitations of solar power plant</p>	8L
Unit 5	<p>Wind Energy: site selection for wind power plant, differences between horizontal and vertical axis turbines, power developed using wind turbine and its efficiency</p> <p>Introduction to Geothermal energy, Ocean Energy and Tidal energy, Introduction to fuel cells.</p>	8L

Text Books:

B.R. Gupta, "Generation of Electrical Energy", S. Chand Publications

Reference Books

1. Elements of Electric Power Station Design by M.V. Deshpande
2. A. Chakrabarti, M.L. Soni, P.V. Gupta, U.S. Bhatnagar, "A Text Book on Power System Engineering", Dhanpat Rai & Co
3. J.B. Gupta, "A Course in Electrical Power", Kataria Publications

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Subject Code	EE205	Subject Title	ELECTROMECHANICAL ENERGY CONVERSION- II						
LTP	3 1 2	Credit	5	Subject Category	DC	Year	2 nd	Semester	4 th

Objectives of the Course

- To empower students with the advanced understanding of AC machines.
- To empower students to have sufficient knowledge about synchronous machines
- To empower students to have sufficient knowledge about induction machines

Synchronous Machine I:

Unit 1 Constructional features, Armature winding, EMF Equation, Winding coefficients, equivalent circuit and phasor diagram, Armature reaction, Working principle of synchronous generator, 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 **8L**

Synchronous Machine II:

Unit 2 Two Reaction Theory, Power flow equations of cylindrical and salient pole machines, Operating characteristics Synchronous Motor: Working principle of synchronous motor, Starting methods, Effect of varying field current at different loads, V-Curves, Hunting & damping, synchronous condenser. **8L**

Three phase Induction Machine – I:

Unit 3 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 **8L**

Three phase Induction Machine- II:

Unit 4 Starting, Deep bar and double cage rotors, Cogging & Crawling, Speed Control (with and without emf injection in rotor circuit.) **8L**

Single phase Induction Motor:

Unit 5 Double revolving field theory, Equivalent circuit, No load and blocked rotor tests, Starting methods, repulsion motor. AC Commutator Motors: Universal motor, stepper motors **8L**

Text Books:

- P.S.Bhimbra, “Electrical Machinery”, Khanna publication.
I.J. Nagrath & D.P.Kothari, “Electrical Machines”. Tata McGraw Hill

Reference Books

Charles Gross, Electric Machines, T & F, Delhi

Outcome of the Course:

- Student becomes familiar with the elementary AC machines other than transformers
- To empower students with the advanced knowledge about principle of operation and applications of synchronous machines.
- To empower students with the advanced knowledge about principle of operation and applications of induction machines.

List of Experiments

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Subject Code	EE206	Subject Title	ENGINEERING MATERIALS						
LTP	3 0 0	Credit	3	Subject Category	DC	Year	2 nd	Semester	4 th

Objectives of the Course

- In this course student will learn the Crystal structure of materials
- The student will learn about electron theory of materials
- The student will learn about thermal conductivity and study the material properties according to use in electrical equipment.

Unit 1	<p>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</p>	7L
Unit 2	<p>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.</p>	8L
Unit 3	<p>Magnetic Material: Origin of permanent magnetic dipoles in matters, Classification Diamagnetism, Paramagnetism, Ferromagnetism, Antiferromagnetism and Ferrimagnetism, magnetostriction, Properties of magnetic materials, soft and hard magnetic materials, permanent magnetic materials.</p>	8L
Unit 4	<p>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</p>	8L
Unit 5	<p>Semiconductor Material And Devices: Properties of semiconductors, Conductivity of insulators, Metals and semiconductor in terms of energy bands, Intrinsic and Extrinsic semiconductors, Concentration of charge carriers, Hall effect, Drift and Diffusion current, semiconductor junction diode, Integrated circuits, semiconducting materials.</p>	7L

Text Books:

- A.J. Dekker, “Electrical Engineering Materials”, Prentice Hall of India
 R. K. Rajput, “Electrical Engineering Materials”, Laxmi Publications

Reference Books

- Solymar, “Electrical Properties of Materials” Oxford University Press.
 Ian P.Hones, “Material Science for Electrical & Electronic Engineering,” Oxford University Press.
 J.B.Gupta, “Electrical and Electronics Engineering Materials” Katson publishers.

Outcome of the Course:

- Types of engineering materials.
 Various phenomena associated with different types of materials.
 Applications of these materials in different fields.

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Subject Code	EE207	Subject Title	MICROPROCESSORS						
LTP	3 0 2	Credit	4	Subject Category	DC	Year	2 nd	Semester	4 th

Objectives of the Course

- The student will learn how the hardware and software components of a microprocessor-based system work together to implement system-level features and integrating digital devices into microprocessor-based systems;
- The student will learn the operating principles of, and gain hands-on experience with, common microprocessor peripherals such as timers, USART, and PPI; role of CPU, registers, and modes of operation of 8085 and 8086 microprocessor.
- Learning Microprocessor instruction sets and learning assembly-programming styles, structured assembly language programming.

Unit 1	Evolution of Microprocessors, history of computers, Introduction to Microprocessor, Microprocessor systems with bus organization, Microprocessor Architecture & Operations, Tristate devices, buffers, encoder, decoder, latches, Memory devices: Semiconductor memory organization, Category of memory, I/O Device.	8L
Unit 2	Register organization, 8085 Microprocessor Architecture, Address, Data and Control Buses, Pin Functions, Demultiplexing of Buses, Generation of Control Signals, Timing diagrams: Instruction Cycle, Machine Cycles, T- States, Concept of Address line and Memory interfacing, Address Decoding and Memory Interfacing.	8L
Unit 3	Classification of Instructions, Addressing Modes, 8085 Instruction Set, Instruction And Data Formats, Writing assembly language programs, Programming techniques: looping, counting and indexing, Stack & Subroutines, Developing Counters And Time Delay Routines, Code Conversion, BCD Arithmetic And 16-Bit Data Operations. The 8085 Interrupts, 8085 vector interrupts.	8L
Unit 4	Memory interfacing, I/O interfacing – memory mapped and peripheral mapped I/O Programmable Interfacing Devices Like 8255A PPI, 8253/8254 Timer, 8259A PIT, 8237 DMA Controller, and Serial I/O Concepts 8251A USART. Interfacing of above chips with 8085, Programming them In Different Modes.	8L
Unit 5	A Architecture of 8086, block diagram, register set, flags, Queuing, concept of segmentation, Pin description, operating modes, addressing modes.	8L

Text Books:

1. Microprocessor Architecture, Programming, and Applications with the 8085 Ramesh S. Gaonkar - Penrar International
2. Microcomputers and Microprocessors: The 8080, 8085 and Z-80 Programming, Interfacing and Troubleshooting John E. Uffenbeck..

Reference Books

1. Microprocessor and Microcontroller fundamentals. The 8085 and 8051 Hardware and Software William Kleitz

Outcome of the Course:

- Identify the basic element and functions of microprocessor.
- Describe the architecture of microprocessor and its peripheral devices.
- Demonstrate fundamental understanding on the operation between the microprocessor and its interfacing devices.
- Apply the programming techniques in developing the assembly language program for microprocessor application.
- An ability to design microprocessors based system, components or process as per needs and specifications

List of Experiments

1. To perform 8-bit arithmetic operations between two numbers stored at consecutive memory locations:

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addition, subtraction, multiplication, division.

2. To perform 16-bit arithmetic operations between two numbers stored at consecutive memory locations: addition, subtraction, multiplication, division.
3. To find the largest and smallest element in an array. Also find the sum of elements in an array.
4. Generation of Fibonacci series in 8085 in hexadecimal sequence.
5. Write and execute the program for finding even and odd numbers.
6. To sort the given number in the ascending and descending order using 8085 microprocessor.
7. Code conversion: decimal number to hexadecimal, hexadecimal number to decimal.
8. To add two 8 bit BCD numbers stored at consecutive memory locations.
9. To subtract two 8 bit BCD numbers stored at consecutive memory locations.
10. To interface programmable peripheral interface 8255 with 8085 and study its characteristics in mode0, mode1 and BSR mode.

Value added Experiments:

To interface 8253 Interface board to 8085 mp and verify the operation of 8253 in six different modes.

To interface a stepper motor with 8051 microcontroller and operate it.

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Subject Code	EE208	Subject Title	NETWORK ANALYSIS & SYNTHESIS						
LTP	3 1 2	Credit	5	Subject Category	DC	Year	2 nd	Semester	4 th

Objectives of the Course

- This course aims to provide knowledge of graph theory applicable for analysis of electrical circuits.
- The students will get understanding of circuit analysis in transient and steady state condition.
- The students will get understanding of different two port network parameters.
- The course will provide knowledge of active and passive filters.

Unit 1	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. Analysis of first and second order linear systems by classical method.	8L
Unit 2	TRANSIENT CIRCUIT ANALYSIS: Natural response and forced response, Transient response and steady state response for arbitrary inputs (DC and AC), Evaluation of time response both through classical and Laplace methods.	8L
Unit 3	NETWORK FUNCTIONS AND TWO PORT NETWORKS : 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. Two Port Networks: Characterization of LTI two port networks; Z, Y, ABCD, A'B'C'D', g and h parameters, Reciprocity and symmetry, Inter-relationships between the parameters, Inter- connections of two port networks, Ladder and Lattice networks: T & Π representation.	8L
Unit 4	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 Caue first and second forms.	8L
Unit 5	FILTERS: Introduction, Classification of filters, Image parameters and characteristics impedance, passive and active filter, low pass, high pass, constant K type, M derived filters and their design.	8L

Text Books:

William Hayt, Jack Kemmerly, Steven Durbin, “Engineering Circuit Analysis”, Tata McGraw Hill , 8th Edition
ChoudharyD.Roy, “Network & Systems”, Wiley Eastern Ltd.

Reference Books

Kuo, “Network Analysis & Synthesis”, Wiley India.
Jagan, “Network Analysis”, B S Publication.
ME Van-Valkenberg; “Network Analysis”, Prentice Hall of India

Outcome of the Course:

- An ability to design and analyse electrical circuits.
- An ability to control AC and DC circuits by using Basic Electrical devices.
- An ability to visualize and work on laboratory and multi-disciplinary tasks.

List of Experiments

To determine node voltages and branch currents in a resistive network using MULTI-SIM software. To obtain Thevenin’s equivalent circuit of a resistive network.
To obtain transient response of a series R-L-C circuit for step voltage input using MULTI-SIM software.
To obtain transient response of a parallel R-L-C circuit for step current input using MULTI-SIM software.

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To obtain transient response of a series R-L-C circuit for alternating square voltage waveform using MULTI-SIM software.

To obtain frequency response of a series R-L-C circuit for sinusoidal voltage input using MULTI-SIM software.

To determine line and load currents in a three phase delta circuit connected to a 3-phase balanced ac supply.

To plot magnitude, phase and step response of a network function using MULTI-SIM software.

To determine Z, Y, G, H and transmission parameters of a two part network.

To obtain transient response of output voltage in a single phase half wave rectifier circuit using capacitance filter.

Verification of cascade connection of 2, two -port networks.

Value added Experiments

Verification of superposition theorem using MULTI-SIM software.

Verification of reciprocity theorem using MULTI-SIM software.