HUM-201-E ECONOMICS  
(COMMON FOR ALL BRANCHES)  
L    T    P  
3    1    -  
Total Credits: 3.5

COURSE OBJECTIVE : The purpose of this course is to:  
1. Acquaint the student in the basic economic concepts and their operational significance and  
2. Stimulate him to think systematically and objectively about contemporary economic problems.

UNIT-I  
Definition of Economics - various definitions, Nature of Economic problem, Production possibility curve  
Economic laws and their nature. Relation between Science, Engineering, Technology and Economics.

UNIT-II  
Concepts and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility - its  
practical application and importance.

UNIT-III  
Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve,  
Elasticity of demand, measurement of elasticity of demand,factors effecting elasticity of demand, practical  
importance & applications of the concept of elasticity of demand.

UNIT-IV  
Meaning of production and factors of production; Law of variable proportions, Returns to scale, Internal and  
External economics and diseconomies of scale.  
Various concepts of cost - Fixed cost, variable cost, average cost, marginal cost, money cost, real cost  
opportunity cost. Shape of average cost, marginal cost, total cost etc. in short run and long run.

UNIT-V  
Meaning of Market, Types of Market - Perfect Competition, Monopoly, Oligopoly, Monoplistic Competition  
(Main features of these markets)  
Supply and Law of Supply, Role of Demand & Supply in Price Determinition and effect of changes in demand  
and supply on prices.

UNIT-VI  
Nature and characteristics of Indian economy (brief and elementary introduction), Privatization - meaning,  
merits and demerits. Globalisation of Indian economy -merits and demerits. Elementary Concepts of VAT,  
WTO, GATT & TRIPS agreement.

Books Recommended :  
TEXT BOOKS :  

REFERENCE BOOKS :  
1. A Text Book of Economic Theory Stonier and Hague (Longman’s Landon)  
6. Indian Economy : Rudar Dutt & K.P.M. Sundhram

NOTE: Eight questions are to be set atleast one question from each unit and the students will have to attempt  
five questions in all. 
NOTE : Eight questions are to be set in total covering entire course selecting two  
questions from each unit. Each question will be of equal marks. Students will be required to attempt  
five questions in all, selecting at least one question from each unit.
Unit 1: The multidisciplinary nature of environmental studies
Definition, scope and importance.
Need for public awareness.

Unit 2: Natural Resources
Renewable and non-renewable resources:
Natural resources and associated problems:

1. Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction, mining, dams and their effects on forests and tribal people.
2. Water resources: Use and over-utilization of surface and ground water, floods, drought conflicts over water, dams-benefits and problems.
3. Mineral resources: Use and exploitation, environmental effects of extracting and mineral resources, case studies.
4. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
5. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
6. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
   a. Role of an individual in conservation of natural resources.
   b. Equitable use of resources for sustainable lifestyle.

Unit 3: Ecosystems
- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystem:
  a) Forest ecosystem
  b) Grassland ecosystem
  c) Desert Ecosystem
  d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit 4: Biodiversity and its conservation
- Bio-geographical classification of India.
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
- Biodiversity at global, national and local level.
- India as a mega-diversity nation.
- Hot-spots of biodiversity.
• Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
• Endangered and endemic species of India.

Unit 5: Environmental Pollution.
• Definition
• Causes, effects and control measure of:
  a. Air pollution
  b. Water pollution
  c. Soil pollution
  d. Marine pollution
  e. Noise pollution
  f. Thermal pollution
  g. Nuclear hazards
• Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
• Role of an individual in prevention of pollution.
• Pollution case studies.
• Disaster management: floods, earthquake, cyclone and landslides.

Unit 6: Social issues and the Environment.
• From Unsustainable to Sustainable development.
• Urban problems related to energy.
• Water conservation, rain water harvesting, watershed management.
• Resettlement and rehabilitation of people; its problems and concerns, Case studies.
• Environmental ethics: Issues and possible solutions.
• Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and Holo-caust, Case studies.
• Wasteland reclamation.
• Consumerism and waste products.
• Environment Protection Act.
• Air (Prevention and Control of Pollution) Act.
• Water (Prevention and Control of Pollution) Act.
• Wildlife Protection Act.
• Forest Conservation Act.
• Issues involved in enforcement of environmental legislation.
• Public awareness.

Unit 7: Human Population and the Environment.
• Population growth, variation among nations.
• Population explosion – Family Welfare Programme.
• Environment and human health.
• Human Rights.
• Value Education.
• HIV/AIDS
• Women and Child Welfare.
• Role of Information Technology in Environment and human health.
- Case Studies.

**Unit 8: Field Work**
- Visit to a local area to document environmental assets: river/forests/grassland/hill/mountain.
- Visit to a local polluted site: Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems: pond, river, hill slopes etc.

**Examination Pattern:**
The question paper should carry 100 marks.
The structure of the question paper being
Part – A: Short Answer Pattern 25 Marks
Part – B: Essay type with inbuilt choice 50 Marks
Part – C: Field Work 25 Marks

**INSTRUCTIONS FOR THE EXAMINERS**

**Part – A** Question 1 is compulsory and will contain ten short-answer type questions of 2.5 marks each covering the entire syllabus.

**Part – B** Eight essay type questions (with inbuilt choice) will be set from the entire syllabus and the candidates will be required to answer, any four of them. Each essay type question will be of the 12½ Marks.

The examination will be conducted by the college concerned at its own level earlier than the annual examination and each student will be required to score minimum of 35% marks each in theory and practical. The marks obtained in this qualifying paper will not be included in determining the percentage of marks obtained for the award of degree. However, these will be shown in the detailed marks certificates of the student.
**MATHEMATICS - III**

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>P</th>
<th>External :</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>-</td>
<td></td>
<td>Marks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total : 100 Marks

Duration of Exam: 3 Hrs.

**UNIT – I**

**Fourier Series**: Euler’s Formulae, Conditions for Fourier expansions, Fourier expansion of functions having points of discontinuity, change of interval, Odd & even functions, Half-range series.

**Fourier Transforms**: Fourier integrals, Fourier transforms, Fourier cosine and sine transforms. Properties of Fourier transforms, Convolution theorem, Parseval’s identity, Relation between Fourier and Laplace transforms, Fourier transforms of the derivatives of a function, Application to boundary value problems.

**UNIT-II**

**Functions of a Complex Variables**: Functions of a complex variable, Exponential function, Trigonometric, Hyperbolic and Logarithmic functions, limit and continuity of a function, Differentiability and analyticity.

Cauchy-Riemann equations, Necessary and sufficient conditions for a function to be analytic, Polar form of the Cauchy-Riemann equations, Harmonic functions, Application to flow problems, Conformal transformation, Standard transformations (Translation, Magnification & rotation, inversion & reflection, Bilinear).

**UNIT-III**

**Probability Distributions**: Probability, Baye’s theorem, Discrete & Continuous probability distributions, Moment generating function, Probability generating function, Properties and applications of Binomial, Poisson and normal distributions.

**UNIT-IV**

**Linear Programming**: Linear programming problems formulation, Solution of Linear Programming Problem using Graphical method, Simplex Method, Dual-Simplex Method.

**Text Book**


**Reference Book**

1. Complex variables and Applications : R.V. Churchil; Mc. Graw Hill
3. Operation Research : H.A. Taha
4. Probability and statistics for Engineer : Johnson. PHI.

**Note**: Examiner will set eight question, taking two from each unit. Students will be required to attempt five questions taking at least one from each unit.
ET- 201E  TRANSMISSION AND DISTRIBUTION

L   T
Theory : 70 Marks
3 0
Sessional : 30 Marks

Total : 100 Marks

Time : 3 hrs.

UNIT-I
GENERAL:-
Importance of electric power, power system components, Growth of power systems in India, power supply network, effect of voltage on conductor size, comparison of conductor vol. In typical supply systems elementary high voltage DC transmission DC transmission and its advantages and disadvantages.

UNIT-II
LINE PARAMETERS:-
Evaluation of inductance, capacitance, resistance for single phase, three phase symmetrical unsymmetrical, transposed, untransposed single circuit, double circuit lines, skin and proximity effect.
PERFORMANCE OF LINES :
Classification of lines as short, medium and long, representation and detailed performance analysis of these lines including ABCD parameters. Detailed measurements and universal power circle diagram.

UNIT-III
MECHANICAL CONSIDERATIONS:-
Various types of line conductors, line supports, poles and towers, sag calculations, effect of wind, ice and temperature, stringing chart, sag template, line vibrations.
Insulators- Various tupes of insulator, voltage distribution, string efficiency, methods of increasing string efficiency.
CORONA –
Phenomenon of corona, disruptive critical voltage, visual critical voltage, corona loss, radio interference.

UNIT-IV
UNDER GROUND CABLES-
Classification and construction, insulation resistance, capacitance, capacitance determination, power factor in cables, capacitance grading, use of inter sheaths, losses, heat dissipation and temperature rise in cables, current rating, comparison with overhead lines.

Ref. Books:-
1. CL Wadhwa, “Electric Power Sytems” (Willey Eastern Ltd.)
2. IJ Nagrath and DP Kothari “Power System Engineering”. Tata MGH.

NOTE : Eight questions are to be set in total covering entire course selecting two questions from each unit. Each question will be of equal marks. Students will be required to attempt five questions in all, selecting at least one question from each unit.
ET-203-E NETWORK ANALYSIS & SYNTHESIS

L T P : 30 Marks Internal
3 1 0 : 70 Marks External
: 100 Marks TOTAL

OF EXAM : 3 HRS DURATION

UNIT I
TOPOLOGY :
Principles of network topology, graph matrices, network analysis using graph theory.

TRANSIENT RESPONSE :
Transient Response of RC, RL, RLC Circuits to various excitation signals such as step, ramp, impulse and sinusoidal excitations using laplace transform.

UNIT 2
NETWORK FUNCTIONS :
Terminal pairs or Ports, Network functions for one-port and two-port networks, poles and zeros of Network functions, Restrictions on pole and zero Locations for driving point functions and transfer functions, Time domain behavior from the pole-zero plot.

UNIT 3
CHARACTERISTICS AND PARAMETERS OF TWO PORT NETWORKS :
Relationship of two-port variables, short-circuit Admittance parameters, open circuit impedance, parameters, Transmission parameters, hybrid parameters, relationships between parameter sets, Inter-connection of two port networks.

UNIT 4
TYPES OF FILTERS AND THEIR CHARACTERISTICS :
Filter fundamentals, high-pass, low-pass, band-pass, and band-reject Filters.

NETWORK SYNTHESIS :
Positive real functions, synthesis of one port and two port networks, elementary ideas of Active networks.

TEXT BOOKS:

REFERENCE BOOKS:
1. Introduction to modern Network Synthesis : Van Valkenburg; John Wiley
2. Network Analysis: Van Valkenburg; PHI
3. Basic circuit theory:Dasoer Kuh; McGraw Hill.
4. A Course in Electrical Circuit Analysis by Soni & Gupta; Dhanpat Rai Publication.

NOTE : Eight questions are to be set in total covering entire course selecting two questions from each unit. Each question will be of equal marks. Students will be required to attempt five questions in all, selecting at least one question from each unit.
ET 205-E ANALOG ELECTRONICS

L T P : 30 Marks Internal
3 1 0 : 70 Marks External
TOTAL : 100 Marks DURATION

OF EXAM : 3 HRS.

UNIT - 1
SEMICONDUCTOR DIODE:
P-N junction and its V-I Characteristics, P-N junction as rectifier, Switching characteristics of Diode.

DIODE CIRCUITS:
Diode as a circuit element, the load-line concept, half-wave and full wave rectifiers, clipping circuits, clamping circuits, filter circuits, peak to peak detector and voltage multiplier circuits.

UNIT-2
TRANSISTOR AT LOW FREQUENCIES:
Bipolar junction transistor : operation, characteristics, Ebers-moll model of transistor, hybrid model, h-parameters (CE, CB, CC configurations), analysis of a transistor amplifier circuits using h-parameters, emitter follower, Miller’s Theorem, frequency response of R-C coupled amplifier.

TRANSISTOR BIASING:
Operating point, bias stability, collector to base bias, self-bias, emitter bias, bias compensation, thermistor & sensistor compensation.

UNIT-3
TRANSISTOR AT HIGH FREQUENCIES:
Hybrid P model, CE short circuit current gain, frequency response, alpha, cutoff frequency, gain bandwidth product, emitter follower at high frequencies.

FIELD EFFECT TRANSISTORS:
Junction field effect transistor, pinch off voltage, volt-ampere characteristics, small signal model, MOSFET Enhancement & Depletion mode V-MOSFET. Common source amplifier, source follower, biasing of FET, Applications of FET as a voltage variable resistor (VVR).

UNIT-4
OPERATIONAL – AMPLIFIER:
OP-AMP, differential amplifier and its DC, AC analysis, OP-AMP characteristics, Non-Inverting/Inverting Voltage and Current feedback linear and Non-Linear OP-AMP circuits.

REGULATED POWER SUPPLIES:
Series and shunt voltage regulators, power supply parameters, three terminal IC regulators, SMPS.

TEXT BOOK:
1. Integrated Electronics : Millman & Halkias; McGraw Hill
2. Electronic circuit analysis and design (Second edition) D.A.V. Neamen : TMH

REFERENCE BOOKS:

NOTE: Eight questions are to be set in total covering entire course selecting two questions from each unit. Each question will be of equal marks. Students will be required to attempt five questions in all, selecting at least one question from each unit.
ET-207-E

ELECTRICAL MACHINES - I

L T P Theory
3 1 - 70 Marks
3 1 - 50 Marks
100 Marks

Exam : 3 Hrs.

UNIT-I

TRANSFORMERS: Principle, construction of core, winding & tank, operation, testing of single phase transformer, equivalent circuit, phasor diagram, parameters determination, P.U. representation of parameters, regulation, losses & efficiency, separation of iron losses.

UNIT-II

Various types of connection of three phase transformer, their comparative features, Zig-Zag connection.

Parallel operation of single phase & three phase transformers. Auto-transformer: Principle, construction, comparison with two winding transformers, application.

UNIT-III

Nature of magnetizing current, plotting of magnetizing current from B-H curve, Inrush current, harmonics, effect of construction on input current, connection of three phase transformer. Phase-Conversion: Three to two phase, three to six phase and three to twelve phase conversions. Introduction to three winding, tap-changing & phase-shifting transformers.

UNIT-IV

D.C. MACHINES: Elementary DC machine, principle & construction of D.C. generator, simplex lap and wave windings, E.M.F. equation, armature reaction, compensating winding, commutation, methods of excitation, load characteristics, parallel operation. Principle of DC Motors, torque and output power equations, load characteristics, starting, speed control, braking, testing, efficiency & applications.

TEXT BOOKS:

2. Performance & Design of D.C. Machines: A.E. Clayton & N.N. Hancock; ELBS)

REF. BOOKS:

1. Electric Machinery, Fitzgerald & Kingsley, MGH.
2. Theory of alternating current machinery, A.S. Langsdorf , TMH.
3. Electrical Machines, P.S.Bhimbra, Khanna Publishers Delhi

NOTE: Eight questions are to be set in total covering entire course selecting two questions from each unit. Each question will be of equal marks. Students will be required to attempt five questions in all, selecting at least one question from each unit.
ET-209-E  ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS

L T P
:30 Marks  Sessional
3 1 0
:70 Marks  Exam
:100 Marks  Total
:3hrs
Duration of Exam

UNIT-I

UNITS STANDARDS & ERRORS: S.I. units, Absolute standards (International, Primary, Secondary & Working Standards), True Value, Errors (Gross, Systematic, Random); Static Characteristic of Instruments (Accuracy, Precision, Sensitivity, Resolution & threshold).

MEASURING SYSTEM FUNDAMENTALS: Classification of Instruments (Absolute & Secondary Instruments; Indicating, Recording & Integrating instruments; Based upon Principle of operation), Generalized Instrument (Block diagram, description of blocks), three forces in Electromechanical indicating instrument (Deflecting, controlling & damping forces), Comparison between gravity & spring controls; Comparison of damping methods & their suitability, bearing supports, pivot-less supports (Simple & taut-band), Scale information, Instrument cases (Covers).

UNIT-III

MEASURING INSTRUMENTS: Construction, operating principle, Torque equation, Shape of scale, use as Ammeter or as Voltmeter (Extension of Range), Use on AC/DC or both, Advantages & disadvantages, Errors (Both on AC/DC) of PMMC types, Electrodynamic Type, Moving iron type (attraction, repulsion & combined types), Hot wire type & Induction type, Electrostatic type Instruments.

UNIT-III

WATTMETERS & ENERGy METERS: Construction, operating principle, Torque equation, Shape of scale, Errors, Advantages & Disadvantages of Electrodymanics & Induction type Wattmeters; & single phase induction type Energy meter, Compensation & creep in energy meter.

POWER FACTOR & FREQUENCY METERS: Construction, operation, principle, Torque equation, Advantages & disadvantages of Single phase power factor meters (Electrodynamics & Moving Iron types) & Frequency meters (Electrical Resonance Type, Ferrodynamic & Electrodymanics types).

UNIT-IV

LOW & HIGH RESISTANCE MEASUREMENTS: Limitations of Wheat stone bridge; Kelvin’s double bridge method, Difficulties in high resistance measurements, Measurement of high resistance by direct deflection, loss of charge method, Megohm bridge & Meggar.

A.C. BRIDGES: General balance =n, Ckt. diagram, Phasor diagram, Advantages, disadvantages, applications of Maxwell’s inductance, inductance-capacitance, Hays, Anderson, Owens, De-Sauty’s, Schering & Weins bridges, Shielding & earthing.


REFERENCE BOOKS: 1. Electrical Measurements by E.W. Golding
4. Measuring Systems by E.O. Doeblin; TMH.

NOTE: Eight questions are to be set in total covering entire course selecting two questions from each unit. Each question will be of equal marks. Students will be required to attempt five questions in all, selecting at least one question from each unit.
EE-211-E
INSTRUMENTS LAB
ELECTRICAL MEASUREMENTS & MEASURING

L   T   P
Sessional : 30 Marks

Exam
:

0  0  2
Marks

Total
:

70
Marks

: 100
Marks

Duration of Exam: 3hrs

LIST OF EXPERIMENTS:

1. To identify the meters from the given lot.
2. To convert & calibrate a D’Arsonnal type galvanometer into a voltmeter & an ammeter.
3. To calibrate an energy meter with the help of a standard wattmeter & a stop watch.
4. To measure power & p.f. by 3-ammeter method.
5. To measure power & p.f by 3-voltmeter method.
6. To measure power & p.f in 3-phase circuit by 2-wattmeter method.
7. To measure capacitance by De Sauty's bridge.
8. To measure inductance by maxwell's bridge.
9. To measure frequency by Wien's bridge.
10. To measure the power with the help of C.T & P.T.
11. To measure magnitude & phase angle of a voltage by rectangular type potentiometer.
12. To measure magnitude & phase angle of a voltage by polar type potentiometer.
13. To measure low resistance by Kelvin's double bridge.
14. To measure high resistance by loss of charge method.

Note: At least 7 experiments should be performed from above list. Remaining 3 experiments may either be performed from above list or designed & set by concerned institution as per scope of syllabus.
ET-215-E  ELECTRICAL MACHINE LAB-I

L  T  P
-    -    2
External : 70 Marks
Internal : 30 Marks
Total : 100 Marks

Duration of Exam : 3 Hrs.

LIST OF EXPERIMENTS
1. To find turns ratio & polarity of a 1-phase transformer.
2. To perform open & short circuit tests on a 1-phase transformer.
3. To perform Sumpner's Back to back test on 1-phase transformers.
4. Parallel operation of two 1-phase transformers.
5. To convert three phase to 2-phase By Scott-connection.
6. To perform load test on DC shunt generator.
7. Speed control of DC shunt motor.
8. Swinburne’s test of DC shunt motor.
9. Hopkinson’s test of DC shunt M/Cs.

NOTE: At least 10 experiments be performed in the semester. At least seven experiments should be performed from above list. Remaining 3 experiments may either be performed from the above list or designed & set by concerned institution as per scope of syllabus.
LIST OF EXPERIMENTS:

1. Transient response of RC circuit.
2. Transient response of RL circuit.
3. To find the resonance frequency, Band width of RLC series circuit.
4. To calculate and verify "Z" parameters of a two port network.
5. To calculate and verify "Y" parameters of a two port network.
6. To determine equivalent parameter of parallel connections of two port network.
7. To plot the frequency response of low pass filter and determine half-power frequency.
8. To plot the frequency response of high pass filter and determine the half-power frequency.
9. To plot the frequency response of band-pass filter and determine the band-width.
10. To calculate and verify "ABCD" parameters of a two port network.
11. To synthesize a network of a given network function and verify its response.
12. Introduction of P-Spice

NOTE: Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.
ET-219-E  ELECTRICAL WORKSHOP

L T P : 30 Marks
0 0 2 : 70 Marks
 : 100 Marks
 : 3 HRS

Sessional
EXAM
TOTAL
DURATION OF EXAM

LIST OF EXPERIMENTS:

1. Introduction of tools, electrical materials, symbols and abbreviations.
2. To study stair case wiring.
3. To study house wiring i.e., batten, cleat, casing-caping and conduit wirings.
4. To study fluorescent tube light.
5. To study high pressure mercury vapour lamp (H.P.M.V).
6. To study Sodium lamp.
7. To study repairing of home appliances such as heater, electric iron, fans etc.
8. To study construction of moving iron, moving coil, electrodynamics & induction type meters.
9. To design & fabricate single phase transformer.
10. To study fuses, relays, contactors, MCBs and circuit breakers.
11. Insulation testing of electrical equipments.
12. To design, fabricate a PCB for a circuit, wire-up and test.

NOTE: Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution.
ET- 202E POWER GENERATION AND CONTROL

L  T  P : 30  Marks  Internal
3  1  0 : 70  Marks  External
: 100  Marks  TOTAL

OF EXAM : 3 HRS  DURATION

UNIT-1
LOAD AND LOADING FORECASTING
Load Curves, Maximum Demand, Load Factor, Diversity Factor, Capacity Factor, Utilization Factor, Types of Load, Load Forecasting.

POWER PLANT ECONOMICS
Choice of type of generation, size of generator and number of units, Cost of electrical energy, depreciation of plant, effect of load factor on cost of Electrical Energy.

TARIFFS AND POWER FACTOR IMPROVEMENT
Different types of tariffs and methods of power factor improvement.

UNIT-2
THERMAL POWER PLANTS
Choice of site, Main and Auxiliary equipment fuel gas flow diagram, water stream flow diagram, working of power plants and their layout, characteristics of turbo generators.

HYDRO ELECTRIC PLANTS
Choice of site, classification of Hydro Electric Plants, main parts and working of plants and their layouts, characteristics of hydro electric generators.

UNIT-3
NUCLEAR POWER PLANTS
Choice of site, classification of plants, main parts, layout and their working, associated problems.

DIESEL POWER PLANTS
Diesel plant equipment, diesel plant layout and its working, application of diesel plants.

COMBINED WORKING OF PLANTS
Advantages of combined operation plant requirements for base load and peak load operation. Combined working of run off river plant and steam plant.

UNIT-4
POWER STATION EQUIPMENT AND CONTROL
i) Excitation system – Purpose and requirements of excitation system, brushless excitation systems.
ii) Voltage regulators – Function and characteristics of automatic voltage regulators, solid regulator.
iii) Speed Governing – Purpose of speed governing system, Hydraulic type, speed governing system for steam turbines and hydro turbines.
iv) Automatic generation control – types of interconnection, Advantages of interconnection, real and reactive power control, single area automatic generation control, automatic generation control for two area system, types of automatic generation control for interconnection power systems.

Ref. Books :
1. C.L. Wadhwa, “Electric Power System” (Willey Eastern Ltd.)
2. IJ Nagnath and DP Kothari “Power System Engineering”. Tata MGH.

NOTE: Eight questions are to be set in total covering entire course selecting two questions from each unit. Each question will be of equal marks. Students will be required to attempt five questions in all, selecting at least one question from each unit.
ET-204-E  DIGITAL ELECTRONICS

L T P SESSIONAL
3 1 0 30 Marks External
: : : 70 Marks TOTAL
: : : 100 Marks DURATION OF EXAM
 : : : 3 HRS

UNIT 1
FUNDAMENTALS OF DIGITAL TECHNIQUES:

UNIT 2
COMBINATIONAL DESIGN USING GATES:
Design using gates. Karnaugh map and Quine Mcluskey methods of simplification.

COMBINATIONAL DESIGN USING MSI DEVICES
Multiplexers and Demultiplexers and their use as logic elements, Decoders, Adders / Subtractors, BCD arithmetic circuits, Encoders, Decoders / Drivers for display devices.

UNIT 3
SEQUENTIAL CIRCUITS:

A/D AND D/A CONVERTERS:
Sample and hold circuit, weighted resistor and R -2 R ladder D/A Converters, specifications for D/A converters. A/D converters: Quantization, parallel -comparator, successive approximation, counting type, dual-slope ADC, specifications of ADCs.

UNIT 4
DIGITAL LOGIC FAMILIES:
Switching mode operation of p-n junction, bipolar and MOS devices. Bipolar logic families:RTL, DTL, DCTL, HTL, TTL, ECL, MOS, and CMOS logic families. Tristate logic, Interfacing of CMOS and TTL families.

PROGRAMMABLE LOGIC DEVICES:
ROM, PLA, PAL, FPGA and CPLDs.

TEXT BOOK :
1. Modern Digital Electronics(Edition III) : R. P. Jain; TMH

REFERENCE BOOKS :
1. Digital Integrated Electronics : Taub & Schilling; MGH
2. Digital Principles and Applications : Malvino & Leach; McGraw Hill.
3. Digital Design : Morris Mano; PHI.

NOTE: Eight questions are to be set in total covering entire course selecting two questions from each unit. Each question will be of equal marks. Students will be required to attempt five questions in all, selecting at least one question from each unit.
ET-206-E COMMUNICATION SYSTEMS

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>P</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>0</td>
<td>Internal</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td>30 Marks</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td></td>
<td></td>
<td>70 Marks</td>
<td></td>
</tr>
<tr>
<td>150</td>
<td></td>
<td></td>
<td>150 Marks</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TOTAL</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>DURATION</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 HRS</td>
<td></td>
</tr>
</tbody>
</table>

UNIT 1
INTRODUCTION TO COMMUNICATION SYSTEMS:
The essentials of a Communication system, modes and media’s of Communication, Classification of signals and systems, Fourier Analysis of signals.

UNIT 2
AMPLITUDE MODULATION:
Amplitude modulation, Generation of AM waves, Demodulation of AM waves, DSBSC, Generation of DSBSC waves, Coherent detection of DSBSC waves, single side band modulation, generation of SSB waves, demodulation of SSB waves, vestigial sideband modulation (VSB).

ANGLE MODULATION:
Basic definitions: Phase modulation (PM) & frequency modulation(FM), narrow band frequency modulation, wideband frequency modulation, generation of FM waves, Demodulation of FM waves.

UNIT 3
PULSE ANALOG MODULATION:
Sampling theory, time division (TDM) and frequency division (FDM) multiplexing, pulse amplitude modulation (PAM), pulse time modulation.
PULSE DIGITAL MODULATION:
Elements of pulse code modulation, noise in PCM systems, Measure of information, channel capacity, channel capacity of a PCM system, differential pulse code modulation (DPCM). Delta modulation (DM).

UNIT 4
DIGITAL MODULATION TECHNIQUES:
ASK, FSK, BPSK, QPSK, M-ary PSK.
INTRODUCTION TO NOISE:
External noise, Internal noise, S/N ratio, noise figure.

TEXT BOOKS:
2. Communication systems: Singh & Sapre; TMH.

REFERENCE BOOKS:
1. Electronic Communication systems : Kennedy; TMH.
2. Communication Electronics : Frenzel; TMH.
3. Communication system : Taub & Schilling; TMH.

NOTE: Eight questions are to be set in total covering entire course selecting two questions each unit. Each question will be of equal marks Students will be required to attempt five questions in all, selecting at least one question from each unit.
SIGNAL AND SYSTEMS.

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

External : 70 Marks
Internal : 30 Marks
Total : 100 Marks

Time: 3 Hrs.

SIGNAL

UNIT-I

UNIT-II

SYSTEM

UNIT-III
Classification linear and non-linear, time invariant and time varying, Lumped and distributed. Deterministic and Stochastic. Casual and non causal, Analog and Discrete/Digital memory and memory less, 1 port and N – port, SISO, SIMO, MISO, MIMO.

UNIT-IV
System modeling in terms of differential, equations, state variables, difference equations and transfer functions. Linear time invariant system properties, elementary idea of response determination to deterministic and stochastic signals. Concept of impulse response.

REF. BOOKS :
1. Fred J Taylor – “Principles of Signals and System”, MGH.
3. A Papoulis – “Circuit and System” Modern Approach HRW

NOTE: Eight questions are to be set in total covering entire course selecting two questions each unit. Each question will be of equal marks Students will be required to attempt five questions in all, selecting at least one question from each unit.
ET-210-E ELECTRICAL MACHINES - II

L T
External : 70Marks
3 1
Internal : 30 Marks

Total : 100

Time: 3 Hrs.

UNIT –I
Basic Concept of Electrical Machines:-
Winding factors, generated e.m.f. and m.m.f. of distributed a.c. winding, rotating magnetic field.

UNIT –II
Induction machines –
a) Constructional features, production of torque, phasor diagram, equivalent circuit, performance analysis, torque slip characteristics.
b) Testing running light and blocked rotor test, load test.
c) Effect of rotor resistance, deep bar and double cage induction motor.
d) Generator operation.
f) Speed control – Various methods of speed control of squirrel cage and wound rotor induction motor.
g) Effect of space harmonics.

UNIT –III
Signal phase induction motors-
a) Constructional features, double revolving field theory, equivalent circuit, determination of parameters.
b) Split phase starting methods & applications.

UNIT –IV
Synchronous machines-
a) Constructional features.
b) Cylindrical rotor machine.
I) Synchronous generator – Generated emf, circuit model and phasor diagram, armature reaction, synchronous impedance, voltage regulation and different methods for its estimation.
II) Synchronous motor – Operating principle, circuit model, phasor diagram, effect of load.
III) Operating characteristics of synchronous machines V-curves starting methods of synchronous motors.
c) Salient pole machine-
Two reaction theory, analysis of phasor diagram, power angle characteristics, determination of $x_d$ and $x_q$
d) Parallel operation of alternators –
Synchronization and load division.

REF. BOOKS:-
2. Nagrath & Kothari “Electric Machinery” TMH
3. Fitzgerald & Kingsley “Electric Machinery” MGH

NOTE: Eight questions are to be set in total covering entire course selecting two questions each unit. Each question will be of equal marks Students will be required to attempt five questions in all, selecting at least one question from each unit.
ET – 212 POWER SYSTEM LAB.– I

L T P Internal
: 30 Marks
0 0 2 External
: 70 Marks
: 100 Marks
TOTAL
: 3 HRS.

1. a) To measure the dielectric strength of transformer oil.
   b) To find string efficiency of string insulator.
      (i) Without guard ring.
      (ii) With guard ring.
2. To measure ABCD parameters of transmission line.
3. To plot power angle characteristics of transmission line.
4. Parallel operation of two alternator.
5. To create unbalanced voltage system and to measure the sequence voltage by Segregating network.
6. To study the characteristics of transmission line represented by :
      i) T-Network :
      ii) Pie-Network
7. To study the characteristics of differential relay.
8. Testing and calibration of energy meter.
9. To plot the characteristics of IDMT static relay.

NOTE: Eight questions are to be set in total covering entire course selecting two questions from each unit. Each question will be of equal marks. Students will be required to attempt five questions in all, selecting at least one question from each unit.
ET- 214-E  
ELECTRICAL MACHINE-II LABORATORY

L  T  P :  30  Marks  
0  0  2 :  70  Marks  
:  50  Marks  

OF EXAM :  3 HRS  

1. Determine mechanical losses by light running of a three phase Induction Motor.
2. To perform Load test on a 3-phase induction motor & DC generator set and to determine the efficiency of induction motor.
3. Study and starting of 1 phase induction-motor. To perform light running and block rotor test and to determine the parameters of the equivalent circuit.
4. To perform the open circuit test and block rotor test on 3 phase induction motor and draw the circle diagram.
5. To find out the rotor resistance of a poly phase induction motor.
6. To calculate regulation by synchronous impedance method:-
   I) Conduct open and short circuit test on a three phase alternator.
   II) Determine and plot variation of synchronous impedance with I_f.
   III) Determine S.C.R.
   IV) Determine regulations for 0.8 lagging power factor, 0.8 leading power factor and unity power factor.
7. To plot V-Curves of a synchronous machine.
   (a) Determination of Xo of a synchronous machine.
   (b) Measurement Xd’ + Xq’ (Direct axis and Quadrantant axis).
8. To measure Xq of synchronous machine (negative sequence reactance).
9. To calculate regulation by ZPF. method.
10. To conduct the load test to determine the performance characteristics of the I.M..
11. To study the parallel operation of synchronous generators.

NOTE : At least ten experiments are to be performed, at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.
ET-218-E  DIGITAL ELECTRONICS LAB

L  T  P : 30  Marks  Internal
0  0  2 :  70  Marks  External
: 100  Marks  TOTAL

OF EXAM : 3 HRS  DURATION

1. Study of TTL gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.

2. Design & realize a given function using K-maps and verify its performance.

3. To verify the operation of multiplexer & Demultiplexer.

4. To verify the operation of comparator.

5. To verify the truth tables of S-R, J-K, T & D type flip flops.

6. To verify the operation of bi-directional shift register.

7. To design & verify the operation of 3-bit synchronous counter.

8. To design and verify the operation of synchronous UP/DOWN decade counter using J K flip-flops & drive a seven-segment display using the same.

9. To design and verify the operation of asynchronous UP/DOWN decade counter using J K flip-flops & drive a seven-segment display using the same.

10. To design & realize a sequence generator for a given sequence using J-K flip-flops.

11. Study of CMOS NAND & NOR gates and interfacing between TTL and CMOS gates.

12. Design a 4-bit shift-register and verify its operation. Verify the operation of a ring counter and a Johnson counter.

NOTE: At least ten experiments are to be performed, atleast seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.
LIST OF EXPERIMENTS:


2. Study of Frequency Modulation and determination of Modulation index.

3. Study of Phase Modulation.


5. Study of Pulse Width Modulation.


7. Study of Pulse Code Modulation.

8. Study of frequency Shift Keying.

9. Study of ASK and QASK.

10. Study of PSK and QPSK.

11. Project related to the scope of the course.

NOTE: At least ten experiments are to be performed, at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.
ET-213-E  ANALOG ELECTRONICS-LAB

<table>
<thead>
<tr>
<th>L T P</th>
<th>Internal</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 0 2</td>
<td>External</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
</tr>
<tr>
<td></td>
<td>DURATION OF EXAM</td>
</tr>
<tr>
<td>:</td>
<td>(Marks)</td>
</tr>
<tr>
<td>:</td>
<td>30</td>
</tr>
<tr>
<td>:</td>
<td>70</td>
</tr>
<tr>
<td>:</td>
<td>100</td>
</tr>
<tr>
<td>:</td>
<td>3 HRS</td>
</tr>
</tbody>
</table>

LIST OF EXPERIMENTS
1. Study of Half wave & full wave rectifiers.
2. Study of power supply filters.
3. Study of Diode as clipper & clamper.
4. Study of Zener diode as a voltage regulator.
5. Study of CE amplifier for voltage, current & Power gains and input, output impedance’s.
6. Study of CC amplifier as a buffer.
7. To study the frequency response of RC coupled amplifier.
8. Study of 3-terminal IC regulator.
9. Study of transistor as a constant current source in CE configuration.
10. Study of FET common source amplifier.
11. Study of FET common Drain amplifier.
12. Graphical determination of small signal hybrid parameters of bipolar junction transistor.
13. Study & design of a d.c. voltage doubler.

NOTE: At least ten experiments are to be performed, atleast seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.