HUM-201-E ECONOMICS  
(COMMON FOR ALL BRANCHES)  

L  T  P  Total Credits: 3.5  
3  1  -

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.
ET- 201E TRANSMISSION AND DISTRIBUTION

L  T  P Internal : 30 Marks
3 1 0 External : 70 Marks
Credit : 3.5
DURATION OF EXAM : 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 types 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 Systems” (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 205-E ANALOG ELECTRONICS

L T P  Internal : 30 Marks
3 1 0  External : 70 Marks
Credit : 3.5
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, 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      Internal :  30  Marks
3  2  0      External :  70  Marks

Credit :  4

DURATION OF 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.
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.
ET-215-E  ELECTRICAL MACHINE LAB-I

L T P  Internal : 30 Marks
- - 2  External  : 70 Marks
Credit 1
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.
ET-219-E ELECTRICAL WORKSHOP

L T P Internal : 30 Marks
  -  - 2 External : 70 Marks
  Credit : 1
  DURATION OF EXAM : 3 HRS

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.
UCC-581 (ENVIRONMENTAL STUDIES)

L T P Internal: 30 Marks
4 - - External: 70 Marks
Credit -
DURATION OF EXAM: 3 HRS

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.
- 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.