2007-2008

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

ELECTRONICS AND INSTRUMENTATION ENGINEERING

COURSE STRUCTURE
II YEAR II SEMESTER

CODE	SUBJECT	T	P	C
	Managerial Economics and Financial Analysis	4+1*	-	4
	Environmental Studies	4+1*	-	4
	Calibration and Electronic Measurements	4+1*	-	4
	Digital IC Applications	4+1*	-	4
	Linear IC Applications	4+1*	-	4
	Sensors and Signal Conditioning	4+1*	-	4
	IC Applications Lab	-	3	2
	Instrumentation Lab – I	-	3	2
	TOTAL	**30**	**6**	**28**

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	4+1*	**0**	**4**

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Unit I Introduction to Managerial Economics:

Definition, Nature and Scope of Managerial Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions.

Unit II *Elasticity of Demand*: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

Unit III Theory of Production and Cost Analysis: Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Cost concepts, Opportunity cost, Fixed vs. Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems)- Managerial Significance and limitations of BEA.

Unit IV Introduction to Markets & Pricing Policies:

Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.

Objectives and Policies of Pricing- **Methods of Pricing:** Cost Plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Two-Part Pricing, Block Pricing, Bundling Pricing, Peak Load Pricing, Cross Subsidization.

Unit V Business & New Economic Environment: Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario.

Unit VI Capital and Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance.

Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

Unit VII Introduction to Financial Accounting: Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

Unit VIII Financial Analysis through ratios: Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

TEXT BOOKS:

1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

REFERENCES:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.
3. Suma Damodaran, Managerial Economics, Oxford University Press.
4. Lipsey & Chrystel, Economics, Oxford University Press.
5. S. A. Siddiqui & A. S. Siddiqui, Managerial Economics & Financial Analysis, New age International Space Publications.
6. Domnick Salvatore: Managerial Economics In a Global Economy, 4th Edition, Thomson.
7. Narayanaswamy: Financial Accounting—A Managerial Perspective, PHI.
8. Raghunatha Reddy & Narasimhachary: Managerial Economics& Financial Analysis, Scitech.
9. S.N.Maheswari & S.K. Maheswari, Financial Accounting, Vikas.
10. Truet and Truet: Managerial Economics:Analysis, Problems and Cases, Wiley.
11. Dwivedi:Managerial Economics, 6th Ed., Vikas.

Prerequisites: Nil

Objective: To explain the basic principles of managerial economics, accounting and current business environment underlying business decision making.

Codes/Tables: Present Value Tables need to be permitted into the examinations Hall.

Question Paper Pattern: 5 Questions to be answered out of 8 questions.
Each question should not have more than 3 bits.

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ENVIRONMENTAL STUDIES

UNIT - I

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Need for Public Awareness.

UNIT - II

Natural Resources : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. - Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT - III

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 ological 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 - IV

Biodiversity and its conservation : Introduction - Definition: genetic, species andecosystem diversity. - Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels. - . India as a mega-diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT - V

Environmental Pollution : Definition, Cause, effects and control measures 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 - VI

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 holocaust. 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 - VII

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 - VIII

Field work : Visit to a local area to document environmental assets River /forest grassland/hill/mountain - Visit to a local polluted site-Urban/Rural/industrial/ Agricultural Study of common plants, insects, birds. - Study of simple cosystemspond,
river, hill slopes, etc.

TEXT BOOK:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE:

1 Textbook of Environmental Sciences and Technology by M. Anji Reddy, BS Publication.

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CALIBRATION AND ELECTRONIC MEASUREMENTS

UNIT – I:

Introduction to measurements. Physical measurement. Forms and methods of measurements. Measurement errors. Statistical analysis of measurement data. Probability of errors. Limiting errors.

UNIT – II:

Standards. Definition of standard units. International standards. Primary standards. Secondary standards. Working standards. Voltage standard. Resistance standard. Current standard. Capacitance standard. Time and frequency standards.

UNIT – III:

Testing and calibration. Traceability. Measurement reliability. Calibration experiment and evaluation of results. Primary calibration. Secondary calibration. Direct calibration. Indirect calibration. Routine calibration. Calibration of a voltmeter, ammeter and an
oscilloscope
.

UNIT - IV

Voltage and current measurements: DC & AC voltage measurements using Rectifier, Thermocouple & Electronic voltmeters, Ohm meter, Digital Voltmeters, Range Extension of Ammeters & Voltmeter.

UNIT – V

Bridges: AC Bridges – measurement of inductance, Maxwell's bridge, Anderson bridge, measurement of capacitance, Schering bridge, measurement of impedance – Kelvin's bridge, Wheat Stone bridge, HF bridges, problems of shielding, and
grounding, Q-meter.

UNIT – VI

Frequency Counters: Basic Principle, errors associated with counter, Different modes of operations: Frequency, Time, Time Period, Average time period, Totalizing, Frequency synthesizer, Wave meters, Wave Analyzers, Output Power meter.

UNIT – VII

Oscilloscopes: CRO operation, CRT characteristics, probes, Time base sweep modes, Trigger generator, Vertical amplifier, modes of operation, A, B, alternate & chop modes, sampling oscilloscopes, storage oscilloscope, Standard specifications of CRO, Synchronous selector circuits.

Unit – VIII

Spectrum analyzers, Different types of spectrum analyzer, Recorders, Introduction to magnetic recording techniques & X-Y plotters. Display Devices and Display Systems, Logic Analyzers – State & time referenced data capture.

TEXT BOOKS:

1. Electronic Instrumentation – HS Kalsi, Tata Mc Graw Hill, 2004..
2. PHIAlan S. Morris: Principles of measurement and instrumentation, 2nd edition,Prentice-Hall of India,2004.

REFERENCES:

1.John P. Bentley: Principles of measurement systems, 3rd edition, Addison Wesley Longman, 2000.
2.Measuring Systems, Application and Design – by E.O. Doebelin, McGraw Hill.
3. Electrical and Electronic Measurements – by Shawney, Khanna Publ.
4. Electronic Instrumentation and measurements – by David A. Bell, 2nd Edition,PHI, 2003.
5. M.M.S. Anand: Electronic instruments and instrumentation Technology, Prentice-Hall of India,2004.

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DIGITAL IC APPLICATIONS

UNIT I

CMOS LOGIC : Introduction to logic families, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior, CMOS logic families.

UNIT II

BIPOLAR LOGIC AND INTERFACING : Bipolar logic, Transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic, Comparison of logic families, Familiarity with standard 74XX and CMOS 40XX series-ICs – Specifications.

UNIT III

THE VHDL HARDWARE DESCRIPTION LANGUAGE : Design flow, program structure, types and constants, functions and procedures, libraries and packages.

UNIT IV

THE VHDL DESIGN ELEMENTS : Structural design elements, data flow design elements, behavioral design elements, time dimension and simulation synthesis.

UNIT V

COMBINATIONAL LOGIC DESIGN : Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, EX-OR gates and parity circuits, comparators, adders & subtractors, ALUs, Combinational multipliers. VHDL modes for the above ICs.

UNIT VI

DESIGN EXAMPLES (USING VHDL) : Design examples (using VHDL) - Barrel shifter, comparators, floating-point encoder, dual parity encoder.

UNIT VII

SEQUENTIAL LOGIC DESIGN : Latches and flip-flops, PLDs, counters, shift register, and their VHDL models, synchronous design methodology, impediments to synchronous design.

UNIT VIII

MEMORIES : ROMs : Internal structure, 2D-decoding commercial types, timing and applications. Static RAM: Internal structure, SRAM timing, standard SRAMS, synchronous SRAMS.
Dynamic RAM : Internal structure, timing, synchronous DRAMs. Familiarity with Component Data Sheets – Cypress CY6116,CY7C1006, Specifications.

TEXT BOOKS :

1. Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 3rd Ed., 2005.
2. VHDL Primer – J. Bhasker, Pearson Education/ PHI,3rd Edition.

REFERENCES :

1. Digital System Design Using VHDL – Charles H. Roth Jr., PWS Publications,1998.
2. Introduction to Logic Design – Alan B. Marcovitz,TMH,2nd Edition,2005.
3. Fundamentals of Digital Logic with Verilog Design – Stephen Brown, Zvonko Vransesic, TMH, 2003.
4. Cypress Semiconductors Data Book(Download from website).
5. Fundamentals of Digital Logic with VHDL Design – Stephen Borwn and Zvonko Vramesic, McGraw Hill,2nd Edition.,2005.
6. Linear Integrated Circuit Applications by K. Lal kishore, Pearson Educations 2005

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LINEAR IC APPLICATIONS

UNIT I

INTEGRATED CIRCUITS

Differential Amplifier- DC and AC analysis of Dual input Balanced output Configuration, Properties of other differential amplifier configuration (Dual Input Unbalanced Output, Single Ended Input – Balanced/ Unbalanced Output), DC Coupling and Cascade Differential Amplifier Stages, Level translator.

UNIT II

Characteristics of OP-Amps, Integrated circuits-Types, Classification, Package Types and temperature ranges, Power supplies, Op-amp Block Diagram, ideal and practical Op-amp specifications, DC and AC characteristics, 741 op-amp and its features, FET input. Op-Amps, Op-Amp parameters & Measurement, Input and Out put Off set voltages and currents, slew rates, CMRR, PSRR, drift, Frequency Compensation technique.

UNIT III

LINEAR APPLICATIONS OF OP- AMPS Inverting and Non-inverting amplifier, Integrator and differentiator, Difference amplifier, Instrumentation amplifier, AC amplifier, V to I, I to V converters, Buffers.

UNIT IV

NON-LINEAR APPLICATIONS OF OP- AMPS Non- Linear function generation, Comparators, Multivibrators, Triangular and Square wave generators, Log and Anti log amplifiers, Precision rectifiers.

UNIT V

OSCILLATORS AND WAVEFORM GENERAGTORS: Introduction, Butter worth filters – 1st order, 2nd order LPF, HPF filters. Band pass, Band reject and all pass filters. Applications of VCO (566)

UNIT VI

TIMERS & PHASE LOCKED LOOPS

Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks, 565 PLL, Applications of PLL – frequency multiplication, frequency translation, AM, FM & FSK demodulators.

UNIT VII

D to A & A to D CONVERTERS Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC. DAC and ADC Specifications, Specifications AD 574 (12 bit ADC).

UNIT VIII

ANALOG MULTIPLIERS AND MODULATORS Four Quadrant multiplier, balanced modulator, IC 1496, Applications of analog switches and Multiplexers, Sample & Hold amplifiers.

TEXT BOOKS:

1. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition,2003.
2. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI,1987.

REFERENCES:

1. Design with Operational Amplifiers and Analog Integrated Circuits – Sergio Franco, McGraw Hill, 1988.
2. Operational Amplifiers and Linear Integrated Circuits – R.F. Coughlin and Fredrick Driscoll, PHI, 6th Edition.
3. Micro Electronics – Millman, McGraw Hill,1988.
4. Operational Amplifiers – C.G. Clayton, Butterworth & Company Publ. Ltd./ Elsevier, 1971.
5. Linear Integrated Applications by K. Lal Kishore, Pearson Education - 2005

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SENSORS AND SIGNAL CONDITIONING

UNIT1:

Introduction to measurement systems: general concepts and terminology, measurement systems, sensor classification, general input-output configuration, methods of correction

performance characteristics: static characteristics of measurement systems, accuracy, precision, sensitivity, other characteristics: linearity, resolution, systematic errors , random errors, dynamic characteristics of measurement systems: zero-order, first-order, and second-order measurement systems and response

UNIT2:

Resistive sensors: potentiometers , strain gages and types, resistive temperature detectors (rtds) , thermistors , magneto resistors, light-dependent resistors (ldrs)

UNIT3:

Signal conditioning for resistive sensors: measurement of resistance , voltage dividers , Wheatstone bridge. Balance and deflection measurements , sensor bridge calibration and compensation instrumentation amplifiers , interference types and reduction

UNIT4:

Reactance variation and electromagnetic sensors : capacitive sensors – variable & differential, inductive sensors - reluctance variation, eddy current, linear variable differential transformers (lvdts) , variable transformers: synchros, resolvers, inductosyn , magneto elastic sensors, electromagnetic sensors - sensors based on faraday's law, hall effect sensors

UNIT5:

Signal conditioning for reactance variation sensors : problems and alternatives, ac bridges, carrier amplifiers - application to the lvdt, variable oscillators, resolverto- digital and digital-to-resolver converters

UNIT6:

Self-generating sensors: thermoelectric sensors, piezoelectric sensors, pyroelectric sensors, photovoltaic sensors , electrochemical sensors

UNIT7:

Signal conditioning for self-generating sensors: chopper and low-drift amplifiers, offset and drifts amplifiers , electrometer amplifiers, charge amplifiers, noise in amplifiers

UNIT8:

Digital sensors: position encoders, variable frequency sensors - quartz digital thermometer, vibrating wire strain gages , vibrating cylinder sensors, saw sensors, digital flow meters, Sensors based on semiconductor junctions : thermometers based on semiconductor junctions, magneto diodes and magneto transistors, photodiodes and phototransistors, sensors based on mosfet transistors, charge-coupled sensors - types of ccd imaging sensors , ultrasonic-based sensors , fiber-optic sensors

TEXT BOOK:

1. Sensors and Signal Conditioning : Ramon Pallás Areny, John G. Webster; 2nd edition, John Wiley and Sons, 2000.
2. Sensors and Transducers – D.Patranabis, TMH 2003

REFERENCES:

1. Sensor Technology Handbook – Jon Wilson, Newne 2004.
2. Instrument Transducers – An Introduction to Their Performance and Design – by Herman K.P. Neubrat, Oxford University Press.
3. Measurement System : Applications and Design – by E.O. Doeblin, McGraw Hill Publications.
4. Process Control Instrumentation Technology – D. Johnson, John Wiley and Sons

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LINEAR IC APPLICATIONS LAB

Minimum Twelve Experiments to be conducted :
Study of OP AMPs – IC 741, IC 555, IC 565, IC 566, IC 1496 – functioning, parameters and Specifications.
OP AMP Applications – Adder, Subtractor, Comparator Circuits.
Integrator and Differentiator Circuits using IC 741.
Active Filter Applications – LPF, HPF (first order)
Active Filter Applications – BPF, Band Reject (Wideband) and Notch Filters.
IC 741 Oscillator Circuits – Phase Shift and Wien Bridge Oscillators.
Function Generator using OP AMPs.
IC 555 Timer – Monostable Operation Circuit.
IC 555 Timer – Astable Operation Circuit.
Schmitt Trigger Circuits – using IC 741 and IC 555.
IC 565 – PLL Applications.
IC 566 – VCO Applications.
Voltage Regulator using IC 723.
Three Terminal Voltage Regulators – 7805, 7809, 7912.
4 bit DAC using OP AMP.

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INSTRUMENTATION LAB – I

(Minimum 10 experiments should be conducted)

1. Conversion of D' Arsonval Galvanometer into DC meters (Current and voltage)
2. Conversion of D' Arsonval Galvanometer into AC meters (Current and voltage)
3. Conversion of D' Arsonval Galvano meter into Ohm meter.
4. Measurement of RLC and Q using Q-meter
5. Measurement of strain using strain gauge
6. Measurement of R, L and C using bridge circuits.
7. RTD – characteristics.
8. LVDT – characteristics.
9. Inductive and capacitive tranducers.
10. Piezoelectric tranducers.
11. Bourdon tube
12. Acceleration transducer.