

L: 3

MA 401 Mathematics IV

T: 1

Theory: 100 marks

P: 0

Sessional: 50 marks

Time: 3 hours

Unit 1: Series Solutions

25 Marks

Power series solution of initial value problems, Power series solution using recurrence relations, singular points and the method of Frobenius, solution of Bessel's equation and Bessel's functions, solution of Legendre's equation and Legendre Polynomials, orthogonal set of functions, Sturm-Liouville Problem, eigen values and eigen functions of singular problems, Bessel's functions as eigen functions of singular problem, Legendre Polynomials as eigen functions of singular problems, eigen function expansions.

Unit 2: Partial Differential Equations

25 Marks

Basic concepts, formation of partial differential equations, equation solvable by direct integration, linear and non-linear equations of first order. Homogenous linear equations with constant coefficients, solutions of heat equations, wave equations, transmission line equations and Laplace equations.

Unit 3: Tensor Analysis

20 Marks

Curvilinear coordinates, unit vectors in curvilinear system, representation of a vector F in terms of unit base vectors, contravariant and covariant components of F , arc length and volume element in orthogonal curvilinear coordinates. Transformations of coordinates. Definition of tensors, fundamental operations with tensors, Symmetric and skew-Symmetric tensors, Riemannian space and metric tensor, Conjugate tensor, Christoffel symbols.

Unit 4: Calculus of Complex Variables

20 Marks

Analytic functions, C-R equations, conjugate functions, Harmonic functions, orthogonal systems. Formation of analytic functions, conformal mapping, integration of a complex function, Cauchy's Integral Theorem, power series representation of complex functions, Laurent's Series, singularities, Residue Theorem.

Unit 5: Z-Transform

10 Marks

Definition, properties, Z-transform of some basic sequences, Z-transforms of some basic discrete functions, Shifting theorems.

Text books and References:

1. Advanced Engg. Maths, E. Kreyszig. Wiley Eastern Ltd.
2. Advanced Engg. Maths, Peter V. O. Neil. Thomson Books.
3. A Text Book on Engg. Maths, Bali, Tyenger. Laxmi Publishers.
4. Higher Engg. Maths, B.S. Grewal. Khanna Publishers.
5. Linear Algebra and it's Applications, Gilbert Strang. Thomson Books.
6. Calculus, James Stewart. Thomson Books.
7. Laplace Transform, Spiegel. Thomson Books.
8. Elements of Partial Differential Equations, I. M. Snedon. S. Chand and Co.
9. Text book of Vector Calculus by Shanti Narayan, S. Chand and Co.
10. Function of Complex Variables by Shanti Narayan, S. Chand and Co.

L: 3

ET464 Electronic Circuits

T: 1

Theory: 100 marks

P: 3

Sessional: 50 marks

Practical: 50 marks

Time: 3 hours

Bipolar amplifiers

Basic circuit-common base, common emitter and common collector topology. Biasing of single stage amplifiers- single power supply and bipolar power supply. Multiple stage amplifiers biasing schemes with emphasis on direct coupling. NPN and PNP connections. Hand calculation of bias current and voltages. Simulation of such circuits on SPICE.

Hybrid π small signal equivalent circuit

Computation of input resistance, output resistance and gain of amplifiers at low to high frequencies. High frequency response. Simulation on SPICE. Some idea about time domain response and determining of transient response on SPICE.

Compound Configurations

Study of the differential pair, current sources, voltage sources, the Darlington and Cascode connections. Large signal output stages. Application of Op-Amps.

Feedback amplifiers

Basic principles-advantages. Frequency response and stability of feedback amplifiers. Frequency compensation.

Oscillators

Principles. The Hartley, Colpitt, Wien- bridge and phase shift oscillators. Determination of frequency of oscillation and criteria for oscillations to occur.

Text Books/references:

1. P.E. Gray and Campbell L.Searle- Electronic Principles. Published by McGraw- Hill Book Company.
2. Paul R. Gray and R.G.Mayer- Analog Integrated Circuits Published by John Wiley and Sons, international edition.
3. Handouts to be supplied by the instructor.

L: 3

ET 465 Signals and Systems

T: 1

Theory: 100 marks

P: 3

Sessional: 50 marks

Practical: 50 marks

Time: 3 hours

Introduction

Definitions, continuous and discrete-time signals. Systems and their classifications.

LTI systems

Continuous-time LTI systems - the convolution integral. Discrete time LTI systems – the convolution sum. Properties of LTI systems. Systems described by differential and difference equations.

Fourier analysis of continuous time case

Response of LTI systems to complex exponential waveforms. Representations of periodic signals by the Fourier series. Representation of periodic signals by Fourier transforms. Properties of Fourier transforms. System analysis by Fourier transforms.

Fourier analysis of discrete time case

Response of LTI systems to complex exponential waveforms. Discrete time Fourier series discrete time Fourier transform and their properties. Analysis of systems.

Sampling

The sampling theorem Effects of undersampling. Spectrum of sampled signal.

Laplace transform

Definition and properties Methods of inversion. Application to LTI system analysis.

Z – transform

Definition. The region of convergence. Properties of z-transform. Inversion of Z- transforms. Application to system analysis.

Random signals and systems

Random variables. Distribution and density functions. Statistical averages. Different probability distribution models. Random processes. Ensemble averages and correlation. Stationary and

ergodic processes. Spectral density and its correlation functions Response of linear random inputs.

L: 3

CS 476 Computer Architecture and Organization

T: 1

Theory: 100 marks

P: 0

Sessional: 50 marks

Time: 3 hours

Evolution of Computer

Introduction, different generations till the present time. Basic structure of a computer.

Design Methodology

Components and design techniques at gate level, resistor level and processor level. Processing Unit of a Computer.

Processor organization

Number formats. Instruction formats, instruction types. Fixed point arithmetic, addition, subtraction, division and multiplication.

ALU

Organization floating point arithmetic, arithmetic processor.

Control Unit

Instruction sequencing and interpretation. Control unit design.

Memory Organization

Types of memories. Memory device characteristics. RAM organization. Memory hierarchies. Cost and performance Virtual memories. High speed memories like caches.

Parallel Processing

Introduction and types of parallel processors with performance considerations. Pipe-line processors and multiple processors.

Text Books / references:

1. John P Hayes - Computer Architecture & Organization, Mc Graw Hill Book Company.
2. M. Mano - Computer System Architecture, Prentice-Hall of India.

L: 3

CS477 Data Structure

T: 1

Theory: 100 marks

P: 3

Sessional: 50 marks

Practical: 50 marks

Time: 3 hours

Time and Space analysis of Algorithms – Order Notations.

Linear Data Structures : Sequential representations – Arrays and Lists, Stacks, Queues, Strings; Link Representations – Linear linked lists, Circular linked lists, Doubly linked lists; Applications.

Recursion – Design of Recursive Algorithms, Tail Recursion.

Nonlinear Data Structures : Trees – Binary Trees, Traversals and Threads, Binary Search Trees, Insertion and Deletion algorithms, Height Balanced Trees and Weight Balanced Trees, B-trees, B+ trees, Application of trees; Graphs – Representations, Breadth-first and Depth-first Search.

Hashing – Hashing Functions, Collision Resolution Techniques.

Sorting and Searching Algorithms : Bubble sort, Selection sort, Insertion sort, Quick sort, Merge sort, Heap sort, Radix sort.

File Structures: Sequential and Direct Access, Relative files, Indexed files, B+ tree as index, Multi-index files, Hashed files.

Books:

1. Data Structures and Algorithms, A. V. Aho, J. E. Hopcroft, J. E. Ullman, Addison Wesley.
2. Fundamentals of Data Structures, E. Horowitz, S. Sahni, Galgotia Publ.
3. Data Structures using C, A. S. Tanenbaum
4. Algorithms, Data Structures, and Problem Solving, Addison Wesley.
5. Data Management and File Structures, Loomis, Marry, PHI
6. M. A. Weiss – Data Structures & Algorithm Analysis in C⁺⁺, Addison Wesley.
7. Lipshutz – Theory and Problems of Data Structures, McGraw Hill.
8. Neil Graham – Learning with C⁺⁺, McGraw Hill

HU 403 Communication Skills

Theory: 50

Sessional: 25

Time: 3 hours

1. Group discussion: aspects, preparation, facing group discussions
2. Communication: Aspects, Issues and Vitals.
3. Body Language: Studying body language, its orientation.
4. The art of listening: Active listening, hearing and listening; good listening, Barriers to listening.
5. Negotiation: The act of negotiation. Truths about negotiation; hurdles in negotiation.

Textbooks & references

1. Essentials of Business Communication By Pal and Rorualing. S. Chand & sons
2. The Essence of Effective Communication By Ludlow and Panthon, PHI

HU 402 Sociology and Accountancy

Theory: 50 + 50

Sessional: 25 + 25

Time: 3 hours

Part A, Sociology and Industrial Relations

1. Concept of the state. Origin and development of the state, the individual and the state
2. Social institutions and social groups. Non-government Organisations and Panchayati Raj Institutions, local communities and alternate group characteristics, functions and purposes;
3. Social structure. Social differentiation; Role status, Power and authority; social order and social problems.
4. Social change: Meaning and nature of social change; factors affecting social change; Technology and social change; Social and economic displacement. Labour and Labour relations, Organized and unorganised labour; Problems associated with labour. Absentism, labour turnover, displacement and obsolescence.
5. Human resources: Meaning and development; Relations with industrial and economic needs, Industrial productivity. Worker's participation in Management.
6. Man power planning: definition and objectives, Characteristics of man power planning. Man power demand and supply forecasting.
7. Industrial disputes-settlement of industrial disputes, Trade unionism in India. Labour legislation in India- Indian Factories Act, 1948, Payment of Wages Act, 1936. workmens Compensation Act, 1923.
8. Social security: concept of social security. Provision of social security in India.

Recommended Readings:

1. Rao, C.N. Sankara, Sociology
2. Sarma, R.N, Principles of Sociology.
3. Mukherjee, R.K, Indian Working Class.
4. Saxena, R.N, Labour Problems and Social Welfare

Part B. Accountancy

1. Dual aspects of Accounts, classification of Accounts, cardinal rules for Debit and credit, Journal, Ledger, Balancing of account
2. Subsidiary Books, types of Cashbook, Imprest, Petty cash book, Bank reconciliation statement.

3. Trial balance; Trading and Manufacturing account; Profit and Loss account; balance sheet with adjustments.
4. Concepts of Capital expenditure and Revenue expenditure; Bad debt and doubtful debt, Reverse capital and liabilities; Outstanding expenses; Prepaid expenses, Marshalling of Balance sheet, Liquidity and Profitability of assets.
5. Cost accounting- concepts, benefits and distinction between cost accounting and financial accounting- various elements of cost, cost sheet, overhead cost, Job and process costing.
6. Depreciation- concept and importance. Methods of charging depreciation on fixed assets used in industries

Books

1. Shukia, M.C., Grewal T.S., and Gupta .: Advanced Accounts; S. Chand & Co
New Delhi
2. Agarwala, A. N, Agarwala K.N: Higher Sciences of Accountancy: Kitab Mahal,
Allahabad
3. Rajpurohit B.S., Bissa and others: Financial Accounting.
4. Cost Accounts-M.C Saikia