

Mathematics

B.A./B.Sc. III year

Paper-I

Linear Algebra and Linear Programming

M.M:50

Note: There shall be three sections A, B and C in this paper. Questions within all the three sections shall carry equal marks. Section A will be compulsory and objective in nature having ten questions. Marks allotted to this section shall be 10. Questions in section B will be short answer type of 20 marks. Candidates will have to attempt four out of eight questions selecting at least one question from both parts (viz. Linear Algebra and Linear Programming). Questions in section C will be of descriptive nature of 20 marks. Candidates will have to attempt any two out of four questions. The number of questions for framing of question paper shall be 80% from Linear Algebra, 20% from Linear Programming. The question paper be framed proportionately from the whole syllabus.

Linear Algebra

Vector spaces: Vector space, sub spaces, Linear combinations, linear spans, Sums and direct sums, Linear dependence, Bases and dimensions, Dimensions and subspaces, Coordinates and change of bases.

Linear Transformations: Linear transformations, rank and nullity, Operations with linear transformations, Linear operators, Algebra of linear operators, Invertible linear operators, Matrix of linear transformation, Matrices and linear transformation, Matrix of linear operator, Change of basis, similarity.

Linear Functional: Linear functional, Dual space and dual basis, Double dual space, Annihilators, Transpose of linear transformation, Bilinear, Quadratic and Hermitian forms, quadratic form.

Linear programming

Programming, Graphical Linear method, Simplex method, the dual of a linear programming problem.

Paper-II

Analysis

M.M.: 50

Note: There shall be three sections A, B and C in this paper. Questions within all the three sections shall carry equal marks. Section A will be compulsory and objective in nature having ten questions. Marks allotted to this section shall be 10. Questions in section B will be short answer type of 20 marks. Candidates will have to attempt four out of eight questions selecting at least one question from both parts (viz. Real Analysis and Complex Analysis). Questions in section C will be of descriptive nature of 20 marks. Candidates will have to attempt any two out of four

questions. The number of questions for framing of question paper shall be 60% from Real Analysis, 40% from Complex Analysis. The question paper be framed proportionately from the whole syllabus.

Real Analysis

Continuity of functions, Properties of continuous functions, Types of discontinuities, Uniform continuity, Differentiability, Taylor's theorem with various forms of remainders, Riemann integral-definition and properties, Condition of integrability, Convergence and uniform convergence of improper integrals.

Point wise convergence, Uniform convergence, Test of uniform convergence, Convergence and uniform convergence of sequences and series of functions.

Complex Analysis

Functions of complex variable, Harmonic functions, Cauchy and Riemann equations, Analytic functions, Complex integration, Cauchy's theorem, Cauchy's integral formula, Taylor's series, Laurent's series, Liouville's theorem, Poles and singularities, Residues, Residue theorem and its applications in the evaluation of integrals.

Paper -III

This paper shall consist of any one of the following four option M.M.: 50

- a) Numerical Analysis
- b) Mathematical Statistics
- c) Spherical Trigonometry and Astronomy
- d) Principal of Computer Science and Information Technology

Note-(1). The choice for selecting the optional paper will be subject to the approval of the Head of Department, depending upon availability of resources and will be as per combinations available at the respective centers.

Note-(2). candidates offering Statistics as one of the optional subjects in B.A./ B.Sc. I& II shall not be allowed to offer paper III(a) and III(b).

Note-(3). Simple Calculators (Non-Programmable) be allowed to the examinees during examination of paper III(a).

Note-(4). Note-(3) should invariably be printed as instruction in the question paper III(a).

Note-(5). Candidates offering Computer Science and Information Technology as one of the optional subject in B.A./B.Sc I &II shall not be allowed to offer paper III(d).

Paper-III (a)

Note: There shall be three sections A, B and C in this paper. Questions within all the three sections shall carry equal marks. Section A will be compulsory and objective in nature having ten questions. Marks allotted to this section shall be 10. Questions in section B will be short answer type of 20 marks. Candidates will have to attempt four out of eight questions. Questions in section C will be of descriptive nature of 20 marks. Candidates will have to attempt any two out of four questions. The question paper be framed proportionately from the whole syllabus.

Numerical Analysis

Finite difference, Difference operators, Newton's interpolation formula, divided differences, Interpolation with unequal interval of arguments, Lagrange's formula, Sterling and Bessel formula (application only).

Numerical differentiation, Numerical integration, Simpson's rule, Trapezoidal rule and their accuracy, Numerical solution of algebraic equations in two unknown quantities, Regula Falsi, Newton Raphson, Graff's root squaring method. Numerical method of matrix inversion, determination of Eigen values and Eigen vectors.

Paper-III (b)

Mathematical Statistics

Note: There shall be three sections A, B and C in this paper. Questions within all the three sections shall carry equal marks. Section A will be compulsory and objective in nature having ten questions. Marks allotted to this section shall be 10. Questions in section B will be short answer type of 20 marks. Candidates will have to attempt four out of eight questions. Questions in section C will be of descriptive nature of 20 marks. Candidates will have to attempt any two out of four questions. The question paper be framed proportionately from the whole syllabus.

Mathematical Statistics

Elements of the theory of probability, Addition and Multiplication theorems, Expectations, Moments, m.g.f. (definition and application to Binomial and Poisson's distributions), Skewness, Kurtosis, Binomial, Poisson's and normal distributions, Interpolation (Newton's and Lagrange's formula).

Simple random sampling, Association of attributes, Yule's coefficient of association, Consistency of data, Curve fitting, Correlation, Regression lines and rank correlation coefficient. Chi square test, test of significance based on "t" and "z" test.

Paper-III(c)

Spherical Trigonometry and Astronomy

Note: There shall be three sections A, B and C in this paper. Questions within all the three sections shall carry equal marks. Section A will be compulsory and objective in nature having ten questions. Marks allotted to this section shall be 10. Questions in section B will be short answer type of 20 marks. Candidates will have to attempt four out of eight questions selecting at least one question from both parts (viz. Spherical Trigonometry and Astronomy). Questions in section C will be of descriptive nature of 20 marks. Candidates will have to attempt any two out of four questions. The number of questions for framing of question paper shall be 30% from Spherical Trigonometry and 70% from Astronomy. The question paper be framed proportionately from the whole syllabus.

Spherical Trigonometry:

Fundamental formulae of spherical trigonometry, (excluding circles and areas), Solutions of right angled triangles, Latitudes and Longitudes on the surface of the earth.

Astronomy:

Celestial sphere, Diurnal motion, Twilight, Atmospheric refraction, Meridian circle, planetary motions, Time planetary phenomenon, Precession and notation.

Paper-III (d)

Principles of Computer Science and Information Technology

Note: There shall be three sections A, B and C in this paper. Questions within all the three sections shall carry equal marks. Section A will be compulsory and objective in nature having ten questions. Marks allotted to this section shall be 10. Questions in section B will be short answer type of 20 marks. Candidates will have to attempt four out of eight questions. Questions in section C will be of descriptive nature of 20 marks. Candidates will have to attempt any two out of four questions. The question paper be framed proportionately from the whole syllabus.

Introduction to computers: Information processing and the electronic digital computers, Information Technology, Use of computers, Computers and human beings, Generations and types of computers, Microcomputer, Input output devices, Storges devices.

Data storage and data manipulation: Storage of bits, Main memory, Coding information of storage, Storing integers, Storing functions, Communication errors, The central processing unit, Programme execution, Arithmetic/Logic instructions, Computer-Peripheral communication.

Computer Languages: Characteristics of programming languages, Machine languages, Assembly languages, High level languages, Fifth generation languages, Object oriented and visual programming.

Data communications and networks: Communications, Computers and communications,

Telephone related communications, New technologies in modem, Communications protocols, Communication channels, Types of connections, Types of networks, Local area networks, Transmission models, Data encoding and decoding.