OPTIONAL PAPERS FOR FIFTH SEMESTER

Paper XI (A) Title: GRAPH THEORY- I

Introduction:

Graphs, finite and null graphs. Connectedness and component, degree of vertex, minimum and maximum degree, $\sum \deg v_i = 2q$. The number of vertices of odd degree is even. Isomorphism, complete graph, line graph, total graph. Sub graphs, spanning and induced sub graphs, walk, trial, path, cycle, the shortest path problems, bipartite graph characterization of bipartite graph in terms of its cycles. **22Hrs**

Eulerian and Hamiltonian graphs:

Introduction the Kenigsberg bridge (New name as kalingrad) problem and travelling salesman problem, Characterization of Eulerian graphs and properties of Hamiltonian graphs some applications graphs in electronic network., Cut vertex, bridge, block, tree, spanning tree, rooted and binary trees, forest. Some properties of trees. **15Hrs**

Connectivity:

Vertex and edge connectivity. Some external problems, Mengers theorems (statement), Properties of n-Connected graphs with respect to vertices and edges, Matrix representation: Incidence, adjacency, power of adjacency matrix, edge sequence in adjacency matrix, circuit matrix, some applications **15Hrs**

Note: Internal marks: 30

References:

1. Robin J Wilson: Introduction to Graph theory Longman (London), UK.
2. Narsing Deo : Graph theory and applications (PHI), India.
3. Frank . Harrary : Graph Theory, Narosa Publications, India.
4. V.K.Balakrishnan: Graph Theory, (Schum's Outline Series).

B.Sc NEW SYLLABUS

Paper XI (B): DISCRETE MATHEMATICS-I

Sets and propositions-Cardinality. Mathematical induction. Principle of Inclusion and exclusion. Computability and formal languages- Ordered sets. Languages, Phrase structure grammers. Types of grammers and languages.

Permutation, Combinations and discrete probability. Relations and Functions: Binary relations. Equivalence relations and partitions. Partial order relations and lattices. Chains and anti-chains. Functions and the pigeonhole principle.

Graphs and Planar Graphs: Basic terminology, Multi-Graphs. Weighted graphs. Paths and circuits. Hamiltonian paths and circuits. Travelling salesman problem. Planar Graphs.
Trees: Trees, Routed trees, Binary search trees. Spanning trees and cut sets. Transport Networks
Finite state Machines: Equivalent machines. Finite state machines as Language Recognizers.
Recurrence relations: First order relations, second order linear homogeneous relations, Third and higher order linear homogeneous relations, linear non-Homogeneous relations of second and higher order.

52Hrs

Note: Internal marks: 30

References:

1. Liu C.L: Elements of discrete Mathematics (McGraw Hill).
2. Trambley J.P. and Manohar P: Discrete Mathematical Structures with Application to computer Science (TMH).
3. Narsingh Deo: Graph Theory with Application to Engineering and Computer Science (PHI).
4. Kolamn B. and Busy R.C: Discrete Mathematical Structures for Computer Science (PHI).

B.SC NEW SYLLABUS

Paper XI(C): OPERATION RESEARCH-I

Probability Theory:

Nation probability- Random experiment, sample space, axion of probabiltity, elementary properties of probabilty, equally likely outcome problems.

Rnadom variable – concept, cumulative distribution function discrete and continuous random variable, expectation mean variance, moment generation functions.

Discrete Random variables- Bernoulli random variable, Binomial random variable, geometric random variable, Normal random variable.

Conditional probability and conditional expectations – Bayes theorem, Independence, computing expectation by conditioning; some application – a list model, a random graph, Poly's urn model.

Bivarite random variable – Joint distribution, joint and conditional distribution, the correlation coefficient.

Function of random Variable – Sum of random variable, the law of large numbers and limit theorem, the approximation of distribution **52Hrs**

Note: Internal marks: 30

References:

1. Ross S.M: introduction to probabilty models (Acdemic Press).
2. Gupta S.C. and Kapoor V.K. : Fundamental of mathematical statistics (S.chand & sons)
3. Pitman J : Probability (Narosa)
4. Blake I : An Introdection to Applied Probability (Jophn wiley & Sons)

B.Sc NEW SYLLABUS

Paper XI (D): MECHANICS-I

Dynamics of a Particle and System of Particles:

Conservation Principle. Mechanics of particle Conservation of linear momentum, angular momentum and Energy. Mechanics and system of particles- Conservation of linear momentum, angular momentum and Energy. Tangential and normal components of velocity and acceleration. Constrained motion of a particle under gravity along, inside and outside of a circle and a cycloid. Radial and transverse compounds of velocity and acceleration. Motion of a particle in a central force field, determination of orbit from central forces and vice-versa, Kepler's Laws of Planetary Motion. **27 Hrs**

Dynamics of Rigid Bodies:

Centre of mass of a rigid body, static equilibrium of rigid body, rotation of rigid body about a fixed axes. Moment of Inertia. Laminar motion of a rigid body, body rolling down an inclined plane. Angular momentum of a rigid body. Product of inertia, moment of inertia of a rigid body, about an arbitary axes, momental ellipsoid. D'Alembert's Principle, General equation of motion of a rigid body, motion of centre of inertia, motion relavative to centre of inertia. **25 Hrs**

Note: Internal marks: 30

References:

1. S.L.Gupta, V.Kumar and H.V.Sharma: Classical Mechanics, Pragati Prakashan, Meerut.
2. F.Chorlton: Textbook of Dynamics, CBS Publishers, New Delhi.
3. Murray R Spiegal: Theoretical Mechanics, Schaum Series.
4. S.L.Loney: An elementary treatise on the dynamics of a particle and of rigid bodies, Cambridge University Press, 1958.
5. Grant R.Fowles: Analytical Mechanics, Holt, Rinehart and Winston Inc.

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Paper XI (E): MATHEMATICAL MODELLING-I

Introduction

The technique of mathematical modeling, Characteristics of mathematical models, Limitations of mathematical modeling.

Mathematical Modelling through Ordinary Differential Equations:

Linear Growth and decay models: Single Sprecies population models, Population growth, effecta of immigration and emigration on populations size, spread of scientific and technological innovation, radioactive decay, diffusion, diffusion of medicine in the blood stream.

Higher Order Linear Models:

A model for the detection of diabetes, modeling in dynamics, vibration of a mass on a spring free and undamped, damped forced motion, electric circuit problem

Modelling of Epidemics:

A simple epidemic model, a susceptible-infected-susceptible (SIS) model, simple epidence model with carriers and removal model for arm race, combat model, traffic model.

52Hrs

Note: Internal marks: 30

References:

1. Differential Equation Models, Eds. Martin Braun, C.S.Colman, D.A.Drew, Springer Verlag, 1982.
2. Discrete & System models, W.R.Lucas, F.S.Roberts, R.M.Thrall, Springer Verlag, 1982.
3. Life Science Models, H.M.Roberts and M.Thompson, Springer Verlag, 1982.
4. Models in Applied Mathematics, Springer Verlag, 1982.
5. Mathematical Modelling, J.N.Kapur, Wiley Eastern, 1988.

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