Optional paper for sixth Semester

Paper XIV (A): Graph Theory- II

Planar Graphs:

Line graph, Total graph, subdivision graph, inner vertex set and inner vertex number, Plane and planar graphs, Euler identity, non-planar graphs, Maximal planar graphs, outer planar graphs.

Matrix representation:

Incidence matrix, Circuit matrix, Characteristic polynomials, Eigen values, Spectra of a graph.

Directed graphs:

Preliminaries of digraph, oriented graph, indegree and out degree, Elementary theorems in digraph, Types of digraph, Tournament, cyclic and transitive.

Colorability:

Vertex coloring, color class, n-coloring, chromatic index of a digraph, chromatic number of standard graphs, bichromatic graphs, colorings in critical graphs, relation between chromatic number and clique number/independence number/maximum degree, edge coloring, edge chromatic number of standard graphs and coloring of a plane map, chromatic polynomial.

52Hrs

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).

Paper XIV (B): DISCRETE MATHEMATICS-II

Analaysis of Algorithms:

Time complexity of algorithms, shortest path algorithm, complexity of problems, tractable and intractable problems, Discrete numeric functions and generating function. Recurrence relation and recursive algorithms: Linear recurrence relation with constant coefficients. Homogenous solutions. Particulars solutions. Total solutions. Solution by the method of generating function.

Coding Theory:

Semigroups, monoids and groups, codes and group codes, codes, coding of binary information and error detection, decoding and error correction. **27 Hrs**

Boolean algebra:

Lattices and Algebraic Structures. Principal of duality. Distributive and complemented lattices. Boolean lattices and Boolean algebras. Boolean functions and expressions. Propositional calculus. Design and implementation of digital network. Switching circuits. **25Hrs**

Note: Internal marks: 30

References:

1. Liu C.L. Elements of Discrete mathematics (McGraw Hill).
2. Trambly J.P. and Manohar.R. Discrete Mathematical strucutres with application to computer science (TMH).
3. Narsing Deo, Graph theory with application to Engineering and computer Science (PHI).
4. Kolamn B and Busy R.C. Discreate Mathematical structures for computer science (PHI).

Paper XIV (C): OPERATIONS RESEARCH-II

Linear Programming:

Formulation, linear programming in matrix notation, Graphical solution, some basic properties of convex sets, convex functions and concave functions, simplex methods, artificial variables, M-technique, two-phase method. Principal of duality in linear programming problem. Fundamental duality theorem. Simple problems, dual simplex method, sensitivity analysis, transportation and assignment problems. Netwoprk analysis-CPM and PERT. **40Hrs**

Integer Programming:

Gomory's constrainits, cutting plane algorithm, branch and bound algorithms **12Hrs**

Note: Internal marks: 30

References:

1. Taha H: Operations Research (Mcmillan).
2. Kanti Swarup, Gupta P.K. and Manmohan: Operations Research (S.Chand & Co.,)
3. Kalavathy S.: Operations Research (Vikas).
4. Sharma S.D.: Operation Research.

Paper XIV (D): MECHANICS–II

Analytical Statics:

Resolution of forces in two and three – dimensions, parallelogram law, triangular law of forces Lamis theorem, Resultant of parallel forces, couples, moment of a couple, varignan's theorem and theorem of couples. A System of force action in one plane at different points of a body be reduced to a single force through a given point and couple. A static equilibrium, General conditions of equilibrium, common centenary. **25Hrs**

Hydrostatics:

Pressure equation, condition for equilibrium, lines of force, surface of equal pressure, pressure in fluids, center of pressure, resultant pressure on plane and curved surfaces. Equilibrium of floating bodies, curves and surfaces of buoyancy, stability of hydrostatic Equilibrium of floating bodies, meta center, work done in producing a displacement, vessel contacting liquid. **27Hrs**

Note: Internal marks: 30

References:

1. S.L. Loney: Statics, Mc Millan & Co. London.
2. R.S. Verma, A. Textbook on statics, Pothishala publ. Allahabad.
3. M.Ray and P.T. Chandi: Statics.
4. W.H. Besant & A.S. Ramsey: A Treatise on Hydromechanics: Part – I Hydrostatics,ELBS & G Bell & Sons Ltd., London.

Paper XIV (E): MATHEMATICAL MODELLING–II

Modelling through differential equations. Non-Linear Model: non- linear population growth model, multi-species models, age structured population model, prey – predator model, competition model, epidemic growth model, spread of technological innovations and infectious diseases, chemical reactions.

Modelling in dynamics- simple pendulum, falling body. Mathematical modelling through difference equations: the need for modelling through difference equations, simple models population growth model, logistic model, prey-predator model, completion model, epidemic model, non-linear population growth model, an age structured model, Hardy- Weinberg law in Genetics.

52Hrs

Note: Internal marks: 30

References:

1. Differential equations 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 & M.Thompson, Springer – Verlag, 1982.
4. Models in applied mathematics springer Verlag, 1982.
5. Mathematical Modeling, J.N. Kapur, Wiley Estern, 1988.