M.A/M.Sc Mathematics Semester 2nd

Effective from academic session 2010 ⟹ **Repetition for 2012 with minor change**

METHODS OF APPLIED MATHEMATICS-II

Course No.MM-CP-204

Unit-I

Graphs, Basic terminology, Incidence and Degree, Isomorphism, Sub graphs, adjacency matrix, Walks, Paths, Cycles, Connected graphs, Components, Eulerian graphs, Euler's theorem, Konigsberg Bridge Problem, Unicursal graphs, Operations on graphs, connected graphs and circuits, Hamiltonian paths and cycles, Dirac's theorem, Degree sequences. Planar graphs, Kuratowski's two graphs, Embedding on a sphere, Euler's formula.

Unit-II

Trees, properties of trees, Pendant vertices in trees, Degree sequences in trees, Necessary and sufficient conditions for a sequence to be a degree sequence of a tree, Distance and Centers in a tree, spanning tree of a graph, The minimum spanning tree problem, Rooted and Binary trees, Cayley's theorem on the number of trees on a given set of vertices, Fundamental cycles, Generation of trees, Ramsey's theorem and Ramsey numbers.

Unit-III

Introduction to Mathematical Modelling, Types of Modelling, Mathematical formulation of a problem, Solution and Interpretation of a Model. Modelling Motion of a Simple Pendulum, Simple Harmonic Motion, Escape Velocity, Kepler's Planetary Laws, Single Species Population Models, Exponential Growth Model and Logistic Growth Model.

Unit-IV

Modelling Blood Flow and Oxygen transfer in Human Body, Viscosity, Poiseulla Law and their Mathematical Formulation, Constituents of Blood, Blood Circulation in Heart. Fick's Law of Diffusion and Fick's Perfusion Principle, Diffusion in Biological Systems, Olfactory Communication in Animals.

Recommended Books:

1. F. Harary, Graph Theory, Addison-Wesley.
2. Narsingh Deo : Graph Theory with Applications to Engineering and Computer Sciences, Printice Hall, India Ltd.
3. D.B. West Introduction to Graph Theory prentice, Hall, India.
4. J. Clark and D.A Holton: A First book at Graph Theory, World Scientific
5. O. Ore: Theory of Grpahs, AMS.
6. J.Matousek and J.Nesetril, Invitation to Discrete Mathematics, Oxford University Press, 2009.
7. J.D. Murray Mathematical Biology (An Introduction, Vol. I and II), Springer Verlag.
8. J.N. Kapur, Mathematical Model in Biology and Medicines.
9. S. I. Rubinow, Introduction to Mathematical Biology, John Wiley and Sons, 1975.
10. M. R. Cullen, Linear Models in Biology, Ellis Horwood Ltd.
11. J. N. Mazumdar, Biofluid Dynamics, World Scientific, Singapore.