

Semester - IV

ADVANCED GRAPH THEORY –II

Course No. MM-CP-408
Duration of Examination: 3 hrs

Maximum Marks: 100
(a) External Exam: 80
(b) Internal Exam: 20

Unit I

Automorphism group of graphs, Group of composite graph, Graphs with a given group, Frucht's theorem, Symmetric graphs, An edge transitive graph without isolated vertices is either vertex transitive or bipartite, Ring sum of two cycles in a graph is either a cycle or an edge disjoint union of cycles, Vector spaces associated with a graph, Basic vectors of a graph, Subspaces in WG, Cycle subspace W_r and cut-set subspace W_s , Bases of W_r and W_s , orthogonal vectors and spaces, Intersection of join of W_r and W_s .

Unit II

Matchings- Basic concepts, Matchings and 1-factors, Berg's theorem, Hall's theorem, 1-factor theorem of Tutte, Every k -regular and $k-1$ edge connected graph with even order has a 1-factor, Anti factor sets, Number of 1- factors, f - factor theorem, f - factor theorem implies 1-factor theorem. Erdo's-Galli theorem on degree sequences follows from the f - factor theorem. (g, f)-factor theorem, $[a, b]$ factors, Degree factors, k - factor theorem, General concepts and results on factorization, Factorization of K_n .

Unit III

Graph theory in operation Research- Transport networks, Maximal flow cut and its capacity, Max-Flow Min-cut theorem, Multiple sources and sinks, Vertices with specified capacity, Networks containing undirected edges, lower bound on edge flows, Minimal cost flows, Multi commodity flow, topological sorting, Critical path, Graphs in game theory, Kernel of a digraph, Every acyclic digraph has a unique kernel.

Unit IV

Connectedness and components algorithm, Optimization algorithms-Kruskal's algorithm, Prim's algorithm, Dijkstra's algorithm, Floyd's algorithm. Set of fundamental cycles algorithm, Cut vertices and separability algorithm, Directed cycles algorithm, shortest path algorithm, Planarity testing algorithm, and Isomorphism algorithm.

References

1. Frank Harary : Graph Theory, Addison- Wisley.
2. K.R Parthasarty: Basic Graph Theory, Tata Mc-Graw Hill
3. Foulds, Graph Theory with Applications
4. Narsingh Deo : Graph Theory with Applications to Engineering and Computer Sciences, P-III.
5. C.Berge : The theory of Graphs and Its applications, Methuen and Co., London.
6. W. T.Tutte: Graph theory , Cambridge University press
7. B. Bollobas : External Graphs theory, Acad, Press London.
8. W.k..Chen : Applied Graph Theory ,American Elsevier
9. I. Grossman and W. Magnus : Groups and their Graphs, Random House
10. B. Harris : Graph Theory and its Applications, Academic Press.
11. A.White : Graphs, Groups and Surfaces, American Elsevier.