

C 17328

Name.....

Reg. No.....

SECOND SEMESTER M.C.A DEGREE EXAMINATION, AUGUST 2006

MCA 2K 202—GRAPH THEORY AND COMBINATORICS

(New Scheme)

Time : Three Hours

Maximum : 100 Marks

*Answer any five full questions.
All questions carry equal marks.*

1. (a) Define a subgraph.
Prove that the sum of degree of all vertices of a graph G is twice the number of edges in G .
(b) State and prove Euler's formula.
2. (a) State and prove Kuratowski's theorem.
(b) Define a Hamiltonian graph and prove that a finite connected graph G is an Eulerian if and only if each vertex has even degree.
3. (a) Define a tree. Prove that any tree with n vertices has $n - 1$ edges.
(b) Explain the Kruskal's algorithm for finding minimal spanning tree.
4. (a) Explain the steps involved in Floyd-Warshall algorithm.
(b) State and prove Max-flow-Min-cut theorem.
5. (a) Find the number of ways that an organisation consisting of 26 members can elect a President, Treasurer and Secretary (assuming no person is elected to more than one position).
(b) Prove that $c(n + 1, r) = c(n, r - 1) + c(n, r)$.
6. (a) Find the number of ways that 5 large books, 4 medium sized books and 3 small books be placed on a shelf so that all books of same size are together.
(b) Find the number m of triangles that can be formed by the vertices of a regular polygon with n sides.
7. (a) Find the recurrence relation satisfying $a_n = A 3^n + B (-4)^n$.
(b) Solve the recurrence relation $a_n - 3a_{n-1} - 4a_{n-2} = 4^n$.