B.C.A. Part–I Semester–II (Old) Examination

2ST5 : DISCRETE MATHEMATICS–II

Time : Three Hours] [Maximum Marks : 60

Note :— (1) All questions carry equal marks.

(2) Assume suitable data and draw neat and labelled diagrams wherever necessary.

1. (A) Define :

   (i) Parallel edges

   (ii) Loop

   (iii) Pendent vertex

   (iv) Finite graph

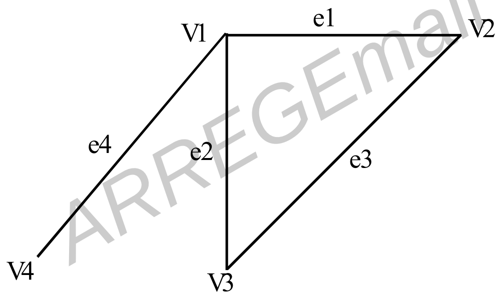
   (v) Degree of vertex

   (vi) Isolated vertex 6

   (B) Verify Havel Hakimi theorem for degree sequence {5, 5, 3, 3, 2, 2} 6

OR

2. (A) Find adjacency matrix and incidence matrix for the following graph : 6



   (B) Explain isomorphism in graphs. State conditions for two graphs to be isomorphic. 6

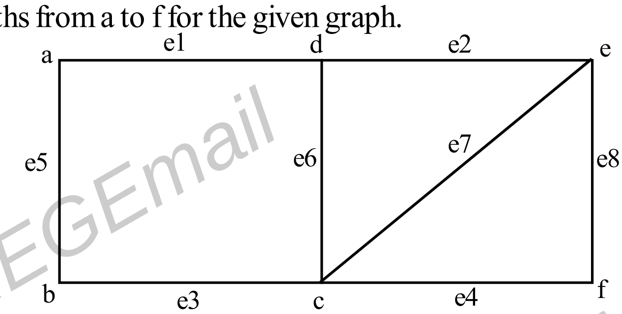
3. (A) Show that vertex connectivity of any graph can never exceed edge connectivity for that graph. 6

   (B) State Menger's theorem in vertex form and edge form. 6

OR

4. (A) Define vertex connectivity and edge connectivity with examples. 6

   (B) Find all paths from a to f for the given graph. 6



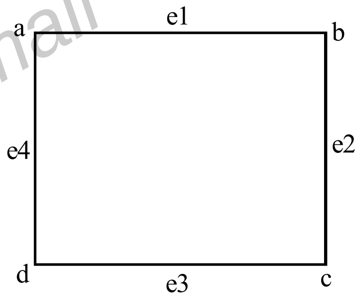
5. (A) Prove that graph is Eulerian iff degree of each vertex is even. 6

   (B) Define Eulerian and Hamiltonian graph. Give example of a graph which is both Eulerian and Hamiltonian. 6

OR

6. (A) Prove that an Eulerian graph G is arbitrarily traceable from vertex v iff every circuit contains v. 6

(B) Show that the following graph is Eulerian and trace circuit by using Fleury's algorithm. 6



7. (A) Define centre, radius and diameter of tree with example. 6

(B) Prove that, Binary tree of n vertices has $\left(\frac{n+1}{2}\right)$ pendent vertices. 6

OR

8. (A) Explain spanning trees with example. 6

(B) Prove that graph with 'n' vertices is a tree iff it is circuit free and has $(n-1)$ edges. 6

9. (A) Draw diagraph for,

V (G) = {a, b, c, d, e} and

E (G) = {(a, b), (b, c), (c, d), (d, e), (d, d), (a, a)}. Find degree of all vertices. 6

(B) Define the terms with suitable example : 6

(i) Arborescence

(ii) Network

OR

10. (A) Prove that every cutset in a connected graph G must contain at least one branch of every spanning tree of G. 6

(B) Define with examples : 6

(i) Simple diagraph

(ii) Symmetric diagraph