DDD-1717

B. Sc. (I.T.) (Sem. II) Examination

March / April - 2016

Paper-202 : Mathematics - II

Time : 3 Hours] [Total Marks : 70

Instructions : (1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :
☛ **B. Sc. (I.T.) (Sem. II)**

Name of the Subject :
☛ **Paper-202 : Mathematics - II**

☛ Subject Code No. : 1 7 1 7 ☛ Section No. (1, 2,.....) : Nil

Seat No. :

Student's Signature

(2) There are five questions in this question paper.
(3) Answer all questions.
(4) Figure to the right indicates marks of the questions.

1 Define any SEVEN. [14]

1. Path
2. Pendent vertex
3. Region
4. Disconnected graph
5. Ring-sum of graphs
6. Parallel edges
7. Rooted tree
8. Close walk
9. Path
10. Vertex connectivity

2(a) Discuss seating Problem. [5]

OR

(a) Prove that the number of odd vertices in a graph is always even.

(b) Attempt any THREE. [9]

1. Discuss the Utilities Problem.
2. Prove that an infinite graph with finite number of edges must have infinite number of isolated vertices.
3. Prove that every self-loop is a circuit but converse is not true.
4. Using an example prove that $G_1 \cup G_2 = G_2 \cup G_1$.

3(a) For a graph with n-vertices and m edges, if δ is the minimum and Δ is the maximum of the degrees of vertices, show that $\delta \leq 2m/n \leq \Delta$ [5]

OR

(a) Prove that any connected graph with n vertices and $n-1$ edges is a tree.

(b) Attempt any THREE. [9]

1. Prove that a tree with more than two vertices will always has at least two pendant vertices.
2. Prove that a simple graph with n vertices must be connected if it has more than $\frac{(n-1)(n-2)}{2}$ edges.
3. Prove that if a tree has two centers then those two centers must be adjacent.
4. A graph G is disconnected if and only if its vertex set V can be partitioned into two non-empty, disjoint subset V1 and V2 such that there exist no edge in G whose one end vertex is in subset v1 and other is in subset V2

4(a) Prove that K3,3 is non-planar [5]

OR

(a) Define planer graph and prove that complete graph of five vertices is non-planer.

(b) Attempt any Two. [6]

1. Discuss BFS algorithm to find minimum spanning tree.
2. Prove that a branch bi, that determines a fundamental cut-set S, is contained in every fundamental circuit associated with the chords of S and in no other.
3. Prove that the maximum no of edges in a simple graph with n vertices is n(n-1)/2.

(c) If a graph has exactly two vertices of odd degree then prove that there must be a path joining these two vertices [3]

5(a) Define a minimal spanning tree and discuss Prime's algorithm to find minimum spanning tree. [5]

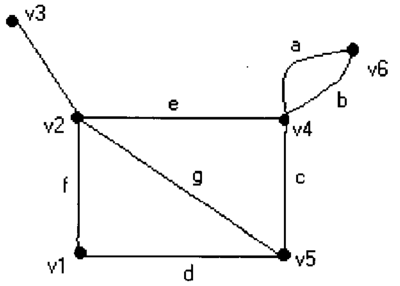
OR

(a) Discuss the observation about the adjacency matrix.

(b) Attempt any THREE. [6]

1. In a simple connected planar graph with f regions, n vertices and e edges $(e > 2)$. Show that (1)$e \geq \frac{3f}{2}$ and (2)$e \leq 3n - 6$.

2. 1. Define path matrix and make a path matrix between v4 and v5 of the following graph.



3. Discuss the observation about the path matrix.

(c) Define Rank and Nullity of a graph. [3]