Roll No. ....

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EF-460

M.A./M.Sc. IIIrd Semester (Reg./Pvt./ATKT)

Examination, 2021-22

Mathematics

Paper - III

Advanced Graph theory-I

Time : 3 Hours]   [Maximum Marks : **Reg. 85**
                                                                Pvt. 100

Note :- Attempt all the questions.

SECTION - 'A'

Objective Type Questions

1. Choose the correct answers.

(i) In a graph G = (V, E), E is a null set then graph is called :

   (a) Isolated

   (b) Pendent

   (c) Null

   (d) None of these

(ii) If number of edges of a graph G = (V, E) is n, them $\sum_{v \in V} \deg(v) =$:

   (a) $(n-1)$

   (b) $n(n-1)/2$

   (c) $n(n-1)$

   (d) $2n$

(iii) The maximum number of edges in a simple graphy with n vertices is :

   (a) $\dfrac{n(n-1)}{2}$

   (b) $\dfrac{n(n+1)}{2}$

(c) $\dfrac{(n-1)}{2}$

(d) $\dfrac{(n+1)}{2}$

(iv) Maximum number of edges in a complete bipartite graph of n vertices is $\dfrac{n^2}{4}$

(a) $\dfrac{n^2}{4}$

(b) $\dfrac{n^2}{2}$

(c) $\dfrac{n(n-1)}{2}$

(d) $\dfrac{n(n+1)}{2}$

(v) The number of vertices of odd degree in a graph is always :

(a) Odd

(b) Even

(c) (a) and (b) both

(d) None of the above

SECTION - 'B'

Short Answer Type Questions   5×5=25

1. Define Isomorphic graph along with example.

OR

Define Finite graph and infinite graph along with example.

2. Define Walk and Path of graph along with example.

OR

Define Circuit and Connected graph along with example.

3. Explain properties of trees.

OR

Explain rooted and binary tree.

4. What do you understand by cut set ?

OR

Write properties of a cut set.

Define planner graph with example.

OR

Explain dual of a sub-graph.

SECTION - 'C'

Long Answer Type Questions 9×5=45

1. Prove that in a simple graph of 'n' vertices have maximum number of edges will be $\dfrac{n(n-1)}{2}$

OR

Prove that in any graph the number of vertices of odd degree is always even.

2. Prove that the maximum number of edges in a complete bi-partite graph of n vertices is $\dfrac{n^2}{4}$

OR

Explain traveling salesman problem.

3. Prove that a graph is a tree if and only if there is one and one path between every pair of vertices.

OR

What is Minimal Spanning tree? Explain with examples.

4. Prove that every cut-set in a connected graph G contains at least one branch of every spanning tree of G.

OR

Prove that every circuit has an even number of edges in common with any cut-set.

5. If H is a subdivision of a graph G and H is planar graph, then prove that G is plannar graph.

OR

Prove that in a planar embedding of a graph that is at least 2-connected, every face is completely bounded by a cycle.

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