PG (NEW) CBCS
M.Sc. Semester-I Examination, 2019
MATHEMATICS
PAPER: MTM-106
(Unit: 1 GRAPH THEORY)

Full Marks: 20 **Time: 1 Hours**

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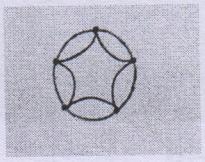
1. Answer any two questions of the following: **2×2=4**

a) Define the terms eccentricity and center in a tree.
b) Find the chromatic number of the following graph



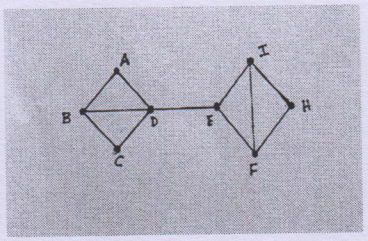
c) Give an example of an Eulerian graph which is not Hamiltonian with proper justification.
d) Explain incidence and adjacency matrix of a graph G.

2. Answer any two questions of the following: **2×4=8**

a) There are 17 telephones in MCC. Is it possible to connect them with wires so that each telephone is connected with exactly 7 others.
b) Draw the multi-graph associated with the following adjacency matrix

$$\begin{bmatrix} 1 & 5 & 1 & 0 \\ 5 & 0 & 1 & 0 \\ 1 & 1 & 2 & 1 \\ 0 & 0 & 1 & 3 \end{bmatrix}$$

c) Consider the following graph G. Find diameter, centre, cut points and bridge of G.



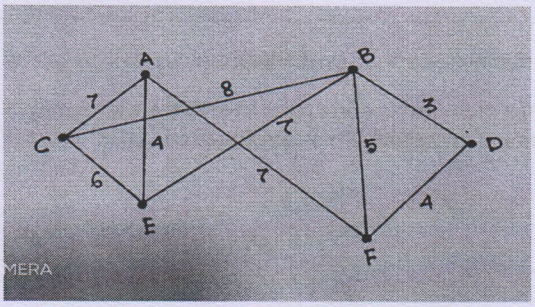
d) Define Planar graph and prove that the graph K_5 (Kuratowski's first graph) is non-planar.

(Turn Over)

3. Answer any one question of the following: **1×8=8**

a) State and prove Euler's theorem for a connected planar graph. Hence, if G is connected planar graph with with n (≥ 3) vertices and e edges, then prove that $e \leq 3n - 6$. **4+4**

b) Find the minimal spanning tree of the following weighted graph.



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