

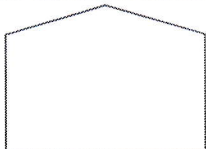
PG (CBCS)
M.SC. Semester- I Examination, 2023
APPLIED MATHEMATICS
 PAPER: MTM 106
(GRAPH THEORY)

**Full Marks: 25****Time: 1 Hour**

The figures in the right-hand margin indicate full marks.
 Candidates are required to give their answers in their own words as far as practicable.

GROUP-A**1. Answer any TWO of the following questions:****2×2=4**

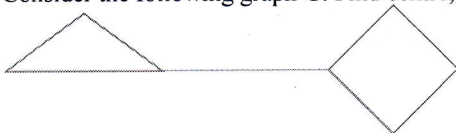
- a) Draw a graph with six vertices containing a Hamiltonian circuit but not Eulerian circuit.
- b) Can a simple graph exist with 13 vertices, each of degree five? Justify your answer.
- c) Find the chromatic number $\chi(G)$ of the following graph G.



- d) Find the number of edges of a k-regular graph containing n vertices.

GROUP-B**2. Answer any TWO of the following questions:****4×2=8**

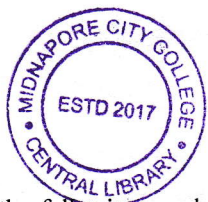
- a) How many non-isomorphic graphs are possible with 6 edges and 6 vertices, each of degree 2?
- b) Consider the following graph G. Find centre, diameter, cutpoints and bridge of G.



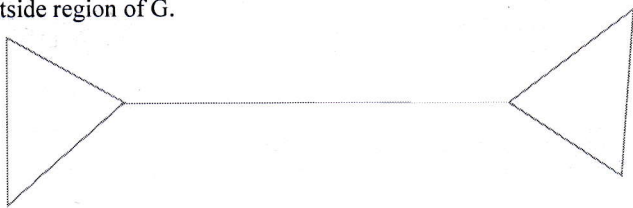
- c) Draw the multigraph associated with the following adjacency matrix

$$\begin{pmatrix} 1 & 3 & 0 & 0 \\ 3 & 0 & 1 & 1 \\ 0 & 1 & 2 & 2 \\ 0 & 1 & 2 & 0 \end{pmatrix}$$

(P.T.O)



b) Verify Euler's formula for the following graph G and also find the degree of the outside region of G.



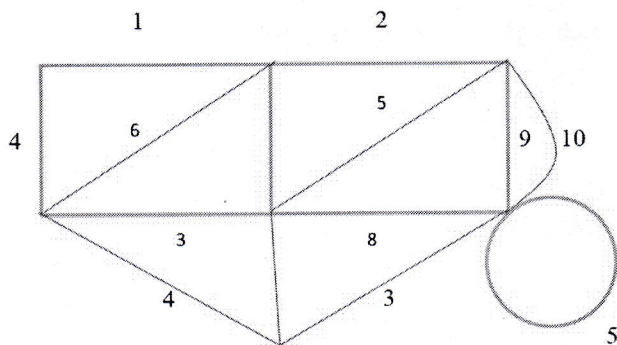
3+1

GROUP-C

3. Answer any **ONE** of the following questions:

1×8=8

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



b) Write short notes on **any two** of the following graphs:

2x4

- i) Intersection Graph
- ii) Homeomorphic Graph
- iii) Complete Bipartite Graph
- iv) Dual Graph

[Internal Assessment-5 Marks]

(2)