

M.Sc. 1st Semester Examination, 2013

APPLIED MATHEMATICS WITH OCEANOLOGY
AND COMPUTER PROGRAMMING

(*Graph Theory*)

PAPER— MTM - 106

Unit — I

Full Marks : 25

Time : 1 hour

The figures in the right-hand margin indicate marks

1. Answer any two questions : 2 × 2

(a) How many edges may have of a forest with n vertices and K components ? 2

(b) Show that the maximum number of edges in a simple graph with n vertices is

$$\frac{n(n-1)}{2} \quad \text{2}$$

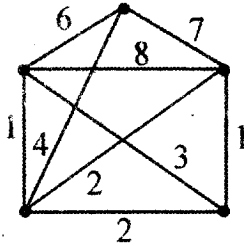
(Turn Over.)

(2)

(c) Give an example of a graph which contains a Hamiltonian cycle but not an Eulesian circuit. 2

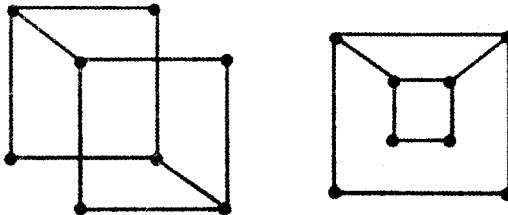
2. Answer any *four* questions : 4×4

(a) Define minimal spanning tree. Find the minimal spanning tree of the following graph : 4



(b) Show that any connected graph with n vertices and $(n - 1)$ edges is a tree. 4

(c) When two graphs are said to be isomorphic? Explain why the following two graphs are not isomorphic. $2 + 2$



(3)

- (d) Show that for any simple, connected planar graph with r regions, n vertices, and m edges ($m > 2$):

$$m \geq \frac{3}{2}r, \quad m \leq 3n - 6$$

Are these conditions sufficient? Justify with example. 2 + 2

- (e) Prove that every tree with two or more vertices is 2-chromatic. 4
- (f) Draw the digraph represented by the given adjacency matrix 4

$$\begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 1 & 1 & 0 & 0 \end{bmatrix}$$

[*Internal Assessment : 05 Marks*]
