

2015

M.Sc.

1st Semester Examination

**APPLIED MATHEMATICS WITH
OCEANOLOGY AND COMPUTER PROGRAMMING**

PAPER—MTM-106 (Unit-I)

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.

Illustrate the answers wherever necessary.

(Graph Theory)

1. Answer any two questions : 2×2
- (a) If a tree has two centres, show that they must be adjacent. 2
- (b) Define Hamiltonian graph. Give an example of Hamiltonian graph which is not an Eulerian graph. 1+1

(Turn Over)

(c) Define Chromatic number of a graph. Find the chromatic number of a cycle of odd length. 1+1

2. Answer any *four* questions :

(a) Define connected graph. Show that any connected graph G remains connected after removing an edge e from G if and only if e is in some circuit in G.

1+3

(b) Show that any connected graph is an Eulerian if and only if it can be decomposed into edge disjoint circuits.

4

(c) If every region of a simple planar graph with n vertices and e edges embedded in a plane is bounded by K edges, show that :

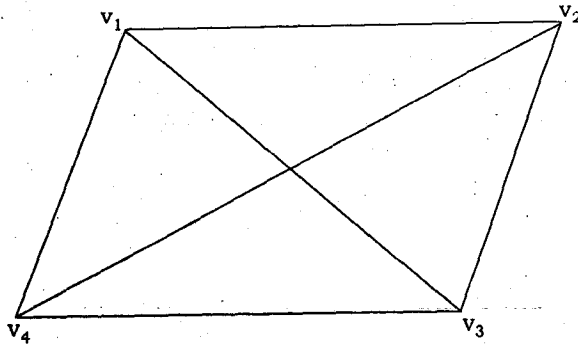
$$e = \frac{K(n-2)}{K-2} \quad 4$$

(d) Define separable graph. Show that vertex connectivity of any graph G can never exceed the edge connectivity of G.

1+3

o

- (e) Write down the properties of a dual of the planar graph. Find the dual of the following graph : 2+2



- (f) Show that a graph is bipartite if and only if all its cycles are even. 4

(Internal Assessment — 5 Marks)
