2018

M.Sc.

1st Semester Examination

APPLIED MATHEMATICS WITH OCEANOLOGY AND COMPUTER PROGRAMMING

PAPER—MTM-106

Full Marks : 25

Time : 1 Hour

The figures in the 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) Define degree of vertex and isolated vertex.

   (b) Prove that if in a graph G there is one and only one path between every pair of vertices, G is a tree.

   (c) Describe cut-sets and cut vertices in a connected graph.

   (d) Explain fundamental circuit with respect to a spanning tree.

(Turn Over)

2. Answer any *two* questions : 2×4

(a) Show that any connected planar graph with n vertices, e edges and f faces satisfies the equation $n - e + f = 2$.

(b) Show that every tree has either one or two centre.

(c) Define binary tree. Find the number of pendant vertices in a binary tree with n vertices.

(d) In a connected graph G, prove that any minimal set of edges containing at least one branch of every spanning tree of G is a cut-set.

3. Answer any *one* question :

(a) State and prove handshaking lemma. State the Königsberg bridge problem and write a brief note about its solution. 3+5

(b) Let T be a tree with n vertices. Prove that it has precisely $(n - 1)$ edges. Let G be a circuit free graph with n vertices and k connected components, prove that G has $(n - k)$ edges. 5+3

[Internal Assessment — 05 Marks]

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