M.Sc. 1st Semester Examination, 2013

APPLIED MATHEMATICS WITH OCEANOLOGY AND COMPUTER PROGRAMMING

(*Graph Theory*)

PAPER—MTM-106

Full Marks : 25

Time : 1 hour

Answer **all** questions

The figures in the right-hand margin indicate marks

1. Answer any *two* questions : 2 × 2

(*a*) Show that in any graph the number of odd degree vertices is always even. 2

(*b*) Define Eulerian graph. Explain it with an example. 1 + 1

(*c*) Define perfect matching. Explain it with an example. 1 + 1

2. Answer any *four* questions : 4 × 4

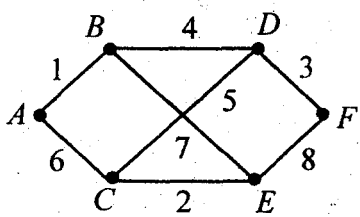
(*a*) Define dual of a graph. Show that the dual of a disconnected graph is a connected graph. 2 + 2

(*b*) Define path of a graph. If a graph has exactly two vertices of odd degree, show that there exists a path joining these two vertices. 1 + 3

(*c*) Find the chromatic polynomial for the graph  . Hence deduce the chromatic number of it. 3 + 1

(*d*) Define connected graph. If any two distinct vertices u and v of a simple graph with n vertices are such that $\deg.(u) + \deg.(v) \geq n$, show that graph is connected. 1 + 3

(*e*) Find the shortest path from the vertex A to the vertex F using Dijkstra's algorithm for the following weighted graph 4



(*f*) For every simple connected graph G, Show that $K(G) \leq K'(G) \leq \delta(G)$

Where $K(G)$, $K'(G)$ and $\delta(G)$ are the vertex connectivity, edge connectivity and minimum degree of the graph G respectively. 4

[*Internal Assessment* : 5 Marks]