Roll No.....

Total No. of Sections : 03
Total No. of Printed Pages : 05

Code No. :02/503(B)

Second Semester Examination, May-2018

M.Sc. MATHEMATICS

Paper - V

ADVANCED DISCRETE MATHEMATICS

Time : 3 Hrs. **Max.Marks : 80**

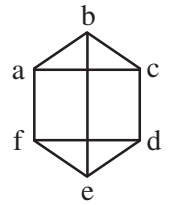
Note : Section 'A' consists of 10 very short answer type questions, all of which are compulsory and should be attempted first. Section 'B' consists of four short answer type questions with internal options. Section 'C' consists of four long answer type questions with internal choice.

Section - 'A'

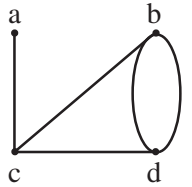
Answer the following very short-answer-type questions in one or two sentences : (2×10=20)

Q.1 Draw complete graph K_5.

Q.2 Find two different subgraphs of the graph.



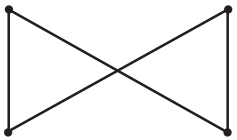
Q.3 Find the adjacency matrix of the following graph.



P.T.O.

Q.4 Draw any two trees with six vertices.

Q.5 Draw all the spanning trees of the following graph.



Q.6 Define finite state machine.

Q.7 Draw the state diagram of the finite state machine

$A=\{a, b\}, O=\{0,1\}$ and $S=\{S_0, S_1\}$

	f		g	
S \ A	a	b	a	b
S_0	S_0	S_1	0	0
S_1	S_1	S_1	1	0

Q.8 When are two finite state machines said to be equivalent?

Q.9 What is Turing machine?

Q.10 Construct the transition and output table for Moore machine given in the following figure.

Section - 'B'

Solve the following questions. **(5×4=20)**

Q.1 A connected graph *G* is an Euler graph if all its vertices are of even degree. Prove.

Q.3 Construct a finite state machine that accepts all binary sequences that end with digit 101.

OR

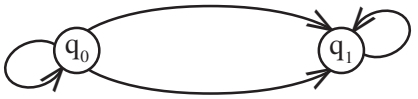
Minimize finite state machine M, where M is given by the following state table :

State	Input 0	Input 1	Output
S_0	S_3	S_1	1
S_1	S_4	S_1	0
S_2	S_3	S_0	1
S_3	S_2	S_3	0
S_4	S_1	S_0	1

Q.4 Define Turing machine. How is it represented? Design a Turing machine to recognise all strings consisting of even numbers of 1's.

OR

Differentiate between Moore and Mealy machine. Convert the given Mealy machine into an equivalent Moore machine.



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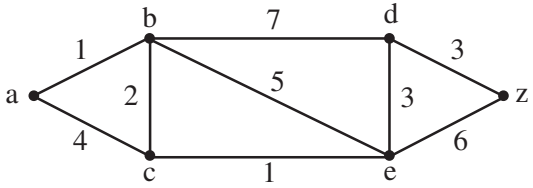
OR

Prove that every connected graph has at least one spanning tree.

Q.2 Explain Warshall's Algorithm with suitable example.

OR

Use Dijkstra's Algorithm to find shortest path from a to z in the graph shown where numbers associated with the edges are the weights.



Q.3 Design a finite state machine which can add two binary numbers.

OR

If , then prove that for any input sequence

where $S_i \equiv S_j$ are any state in finite state machine.

Q.4 Describe Mealay machine with example.

OR

Find the transition diagram of the non-deterministic finite state automation with the state table shown below.

S \ O	0	1
S_0	ϕ	$\{S_1, S_2\}$
S_1	$\{S_2\}$	$\{S_0, S_1\}$
S_2	$\{S_0\}$	

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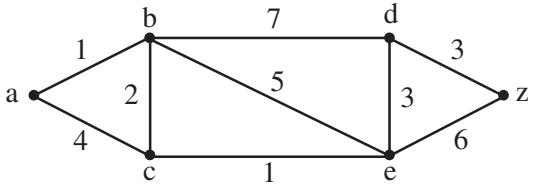
OR

Prove that every connected graph has at least one spanning tree.

Q.2 Explain Warshall's Algorithm with suitable example.

OR

Use Dijkstra's Algorithm to find shortest path from a to z in the graph shown where numbers associated with the edges are the weights.



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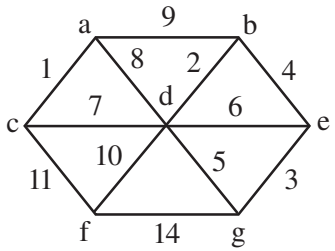
Section - 'C'

Solve the following questions. **(10 4=40)**

Q.1 Find the minimal spanning tree for the following graph using Kruskal Algorithm method.



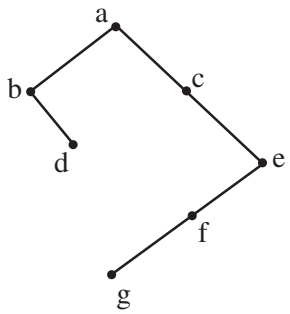
OR

Define cut set of a graph with suitable example. Prove that every circuit has an even number of edges in common with any cut set.

Q.2 An undirected graph possesses an Eulerian path if and only if it is connected and has two vertices of odd degree.

OR

Show that the result of performing preorder, inorder and postorder searches of the following binary tree.



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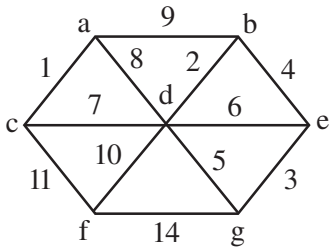

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Show that the result of performing preorder, inorder and postorder searches of the following binary tree.