Q-3. Show that the finite states machines are equivalent.

State	f input 1	f input 10	output 1
S_0	S_1	S_2	0
S_1	S_5	S_3	0
S_2	S_6	S_4	0
S_3	S_7	S_1	0
S_4	S_1	S_5	1
S_5	S_3	S_7	0
S_6	S_4	S_1	0
S_7	S_1	S_2	1

State	f input 1	f input 10	output 1
S_0	S_1	S_2	0
S_1	S_2	S_3	0
S_2	S_3	S_4	0
S_3	S_4	S_1	0
S_4	S_1	S_2	1

OR

Let S be any state in a finite state machine and x and y be any words. Then show that and

$$\lambda(S,xy)=\lambda(S(S,x),y)$$

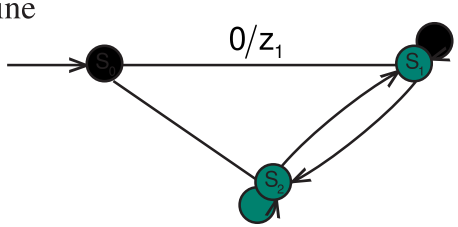
Q-4. Given $DFA, M=\{I,S,F,S_0,f\}$ where $I=\{0,1\}, S=\{S_0,S_1,S_2\}, F=\{S_1\}$ and f is given by

$f(S_0,0)=S_0$; $f(S_0,1)=S_1$;

$f(S_2,0)=S_2$; $f(S_2,1)=S_1$; Find the transition graph of M and also check whether it accepts 01 string or not.

OR

Construct a Moore machine equivalent to this Mealy machine



---x---

Roll No....................

Total No. of Section : 03
Total No. of Printed Pages : 04

Code No. : B/2013

Second Semester Examination, May 2017
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. **(2x10=20)**

Q-1. Let G be simple graph with 6 vertex and 11 edges. Check whether the graph G is connected or not.

Q-2. If a null graph is regular of degree zero then complete graph K_n is regular of how many degree?

Q-3. Draw a graph which is both regular and bipartile.

Q-4. If A is adjacency matrix, G is connected graph. If the matrix $B=A+A^2+A^3+--+A^{n-1}$ then show that B has no zero entries of the main diagonal.

Q-5. If G has two components G_1 and G_2 then show that the adjacency matrix A of G is .

Q-6. Show that $K_{3,3}$ is not planar.

Q-7. Write the Cayley's formula.

Q-8. How many degree of a pendent vertex are there in a graph of vertex?

Q-9. Show that a connected graph with n vertices and e edges has (n-1) tree branches and e-n+1 chords with respect to any spanning tree of this graph.

Q-10. Draw NFA that accepts all inputs with 011 in them over

.

Section-'B'

Answer the following short-answer-type questions.

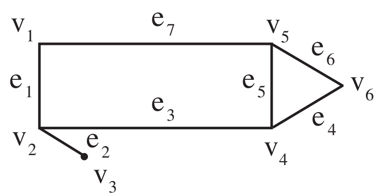
(5x4=20)

Q-1. Prove that the number of spanning tree in K_n is n^{n-2}.

OR

State and prove Handshaking lemma.

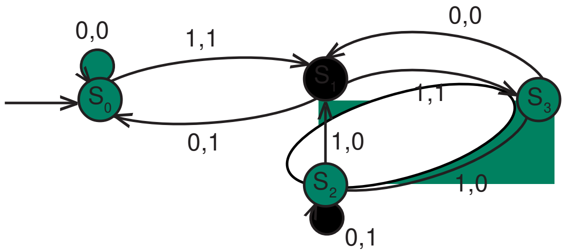
Q-2. Find the circuit matrix of



OR

If a simple graph G with n vertices had more than $\frac{(n-1)(n-2)}{2}$ edges then show that G is connected.

Q-3. Construct a state table corresponding to the state diagram.

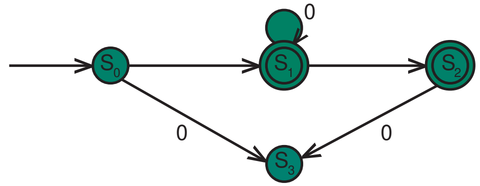


OR

Show that two states S_i and S_j are in the same equivalence class in iff S_i and S_j are in same equivalence class in

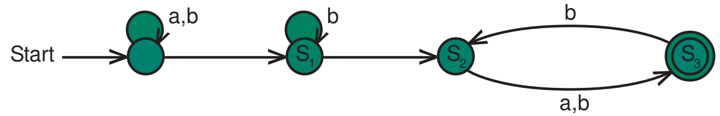
and for any input letter x, their next states $f(S_i, x)$ and are in the same equivalence class.

Q-4. Describe the language accepted by DFA whose transition graph is



OR

Convert the following NFA into DFA.



Section-'C'

Answer the following long-answer-type questions. (10x4=40)

Q-1. Show that a connected graph G is an Eulerian graph iff all vertices of G are of even degree.

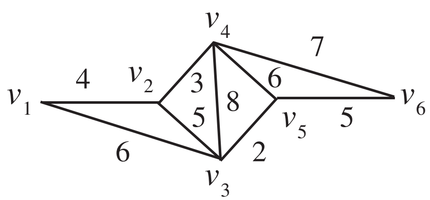
OR

Draw the bipartile graph $K_{2,4}$; $K_{2,5}$; $K_{3,4}$ and $K_{1,6}$. Assuming any number of edges.

Q-2. Prove that a non-empty connected graph G is Eulerian iff G is the union of some edges disjoint circuits.

OR

Find the S.D. from v_1 to v_6 using Dijkstra algorithm.



P.T.O.