

**Code No: A0505**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**

**M.Tech I Semester Examinations, March/April-2011**

**MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE**

**(COMPUTER SCIENCE)**

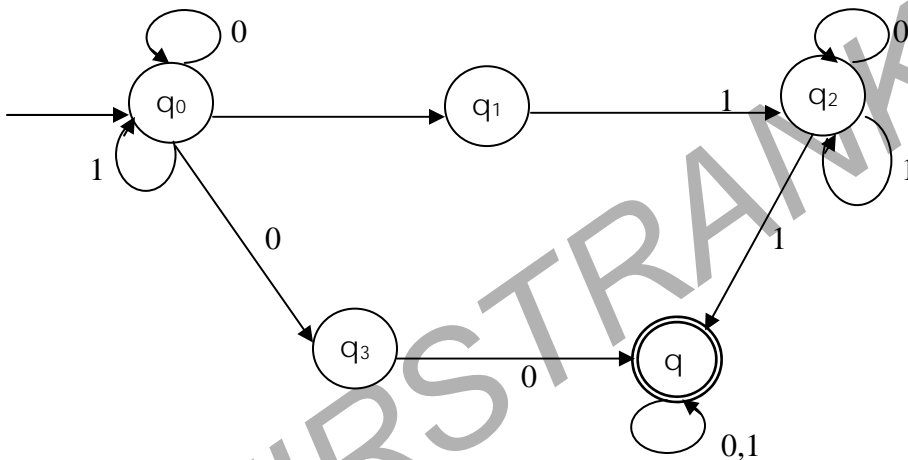
**Time: 3hours**

**Max. Marks: 60**

**Answer any five questions  
All questions carry equal marks**

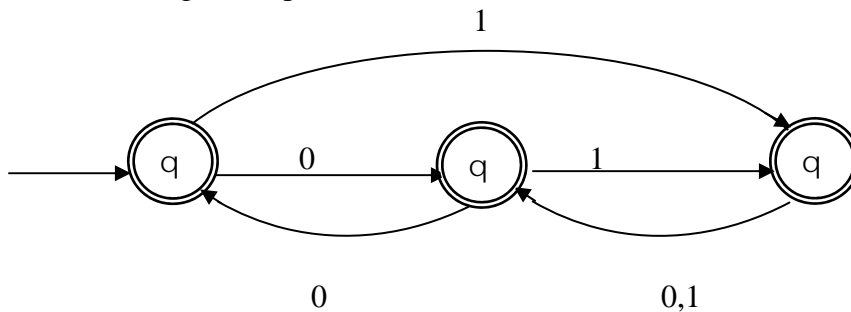
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1. a) Construct a DFA equivalent to NFA given by the following diagram. (8m)



b) Explain the terms deterministic finite Automaton and non deterministic finite Automaton. (4m)

2.a) Find the regular expression for the finite Automata (6m)



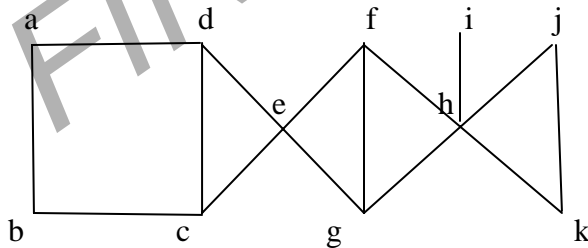
b) Design finite state Automaton for the following languages. (6m)

- i)  $0^* 1^*$
- ii)  $(0+1)^* 111^*$

**Contd...2**

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- 3.a) Construct Turing Machine to accept the following language and give its state transition table and diagram. Check the machine by taking a suitable instance  
 $L = \{a^n b^n a^n b^n \mid n \geq 1\}$  (6m)
- b) Construct a PDA equivalent the following context free grammar (6m)  
 $S \rightarrow 0 A$   
 $A \rightarrow 0 A B \mid 1$   
 $B \rightarrow 1$
4. Construct LR[0] items for the grammar given find its equivalent DFA. Check the Parsing by taking a suitable derived string. (12m)  
 $S \rightarrow a A B$   
 $A \rightarrow a A b \mid ab$   
 $B \rightarrow a B \mid a$
- 5.a) Define the combinations and permutations. (6m)
- b) In how many ways can 10 people be seated in a row so that a certain pair of them are not next to each other. (6m)
6. Solve the recurrence relation  $a_n - 9a_{n-1} + 26a_{n-2} - 24a_{n-3} = 0$  for  $n \geq 3$  (12m)
- 7.a) Define spanning tree. (6m)
- b) Derive DFS (Depth First Search) spanning tree for the graph shown below. (6m)



8. Prove that any 2 simple connected graphs with  $n$  vertices, all of degree 2 are isomorphic. (12m)

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