Total No. of Printed Pages:3

SUBJECT CODE :- 114
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(CSE/IT) Examination Nov/Dec 2015
Theory of Computation
(Revised)

[Time: Three Hours] **[Max. Marks: 80]**

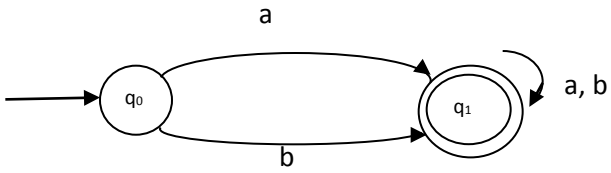
"Please check whether you have got the right question paper."

N.B i) Q.No.1 and Q.No.6 are compulsory.
ii) Attempt any two questions from Q.No.2 to Q.No5 and two questions from Q.No.7 to Q.No.10 of each section.
iii) Figures to the right indicate full marks.

SECTION-A

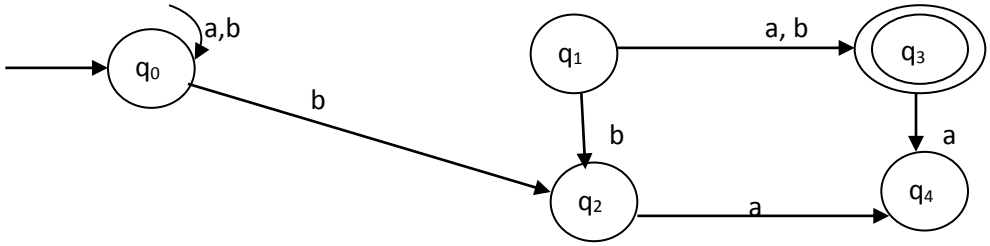
Q1. Attempt any five from the following 10

1) Define deterministic finite automata with suitable example
2) Determine the regular expression or language given by the following finite automata.



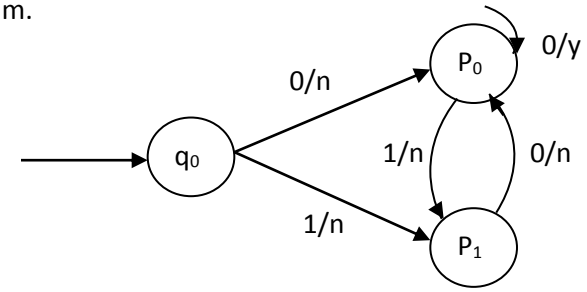
3) Define derivation tree in CFG
4) Explain closure properties of regular expressions
5) Define CFG. Give an example.
6) Define mealy machine and more machine
7) Find the regular expression for the set of strings over {0, 1} with exactly two OS.
8) Define null closure of set of states in NFA with null moves.

Q.2 a) Construct a DNA equivalent to the MDFA whose transition diagram is given by following fig. 08



07

b) Construct a more machine which is equivalent to the mealy machine described by the following transition diagram.



Q.3 a) Construct FA for the given regular expression: 08
$r = 01 + (01)^*$

b) Convert the given NFA to equivalent DFA. 07

K-2015

States/ϵ	a	b
$\rightarrow q_0$	$\{q_0, q_1\}$	$\{q_2\}$
q_1	$\{q_0\}$	$\{q_1\}$
$\boxed{q_2}$	-	$\{q_0, q_1\}$

Q.4 a) Construct a minimum state automation equivalent to a DFA whose transition table is defined by following table. 08

States	a	b
$\rightarrow q_0$	q_1	q_2
q_1	q_4	q_3
q_2	q_4	q_3
$\boxed{q_3}$	q_5	q_6
$\boxed{q_4}$	q_7	q_6
q_5	q_3	q_6
q_6	q_6	q_6
q_7	q_4	q_6

b) Consider the grammar: 07
$s \rightarrow sbs/a$.show that this is an ambiguous grammar. For the string abababa, find out:
i) Parse trees
ii) Leftmost derivation
iii) Rightmost derivation

Q.5 Write short notes on 15
i) Applications of IA.
ii) Pumping lemma for regular language
iii) Chomsky classification of languages

SECTION-B

Q.6 Attempt any five questions from the following 10
1) Deterministic PDA.
2) Explain the two normal forms for CFG.
3) State the application of TM.
4) Define unit production and null production in CFG.
5) Explain the component of PDA with neat diagram
6) Define the language of a PDA.
7) What is halting problem of TM?
8) Define instantaneous description for TM.

Q.7 a) Convert the following grammar into CNF: 08
$s \rightarrow a\ AD,\ A \rightarrow aB/bAB,$
$B \rightarrow b,\ D \rightarrow d.$

b) Construct a PDA A equivalent to the following context –free grammar: 07
$s \rightarrow OBB, B \rightarrow OS/IS/O$.test whether 010^4 is in N(A)

Q.8 a) Design a Turing machine to recognize all strings consisting of an even number of is 08

b) Show that $L = \{a^p | P\ is\ prime\ \}$ is not context free. 07

Q.9 a) Explain deterministic PDA. How does it differ from non deterministic PDA? 08

b) Explain in detail the model of linear bounded automata 07

Q.10 Write short notes on 15

1) Halting problem of TM
2) Decision problem in CFL
3) PDA and acceptance by PDA.