Total No. of Printed Pages:3

SUBJECT CODE NO:- P-379
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(CSE/IT) Examination MAY/JUNE-2016
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.No.5 and from Q.No.7 to Q.No.10 of each section.
iii) Figures to the right indicate full marks.

Section A

Q.1 Attempt any five from the following: 10

a) Define NFA with suitable example.
b) What is the relation between finite automata and regular expressions?
c) Define CFG and CFL with example.
d) Define alphabet and string in the concept of finite automata.
e) Define Moore machine with example.
f) What is pumping lemma?
g) Distinguish between DFA and NFA.
h) Define ambiguous grammar with an example.

Q.2 a) Construct a DFA equivalent to an NDFA whose transition table is defined by following table. 08

States/ε	A	b
$\rightarrow q_0$	q_1, q_3	q_2, q_3
q_1	q_1	q_3
q_2	q_3	q_2
(q_3)	-	-

b) Using pumping lemma show that $L = \{0^n 1^n | \ n \geq 0\}$ is not regular language. 07

Q.3 a) Construct a Moore machine which is equivalent to the given Mealy machine described by the following transition table : 08

Present states	Next state			
	Input a=0 state O/P		Input a=1 state O/P	
$\rightarrow q_1$	q_3	0	q_2	0
q_2	q_1	1	q_4	0
q_3	q_2	1	q_1	1
q_4	q_4	1	q_3	0

b) Show that the given grammar is ambiguous grammar : 07
$E \rightarrow E + E | \ E * E \ | (E) | id$

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

States	0	1
$\rightarrow q_0$	q_1	q_5
q_1	q_6	q_2
(q_2)	q_0	q_2
q_3	q_2	q_6
q_4	q_7	q_5
q_5	q_2	q_6
q_6	q_6	q_4
q_7	q_6	q_2

b) Construct the finite automation equivalent to the regular expression 07
$(0+1)^*(00+11)(0+1)^*$

Q.5 Write short notes on 15
1) Central concepts of Automata theory
2) Ardens theorem
3) Ambiguity in grammars

Section B

Q.6 Attempt <u>any five</u> questions from the following: 10
a) Define Pushdown automata.
b) Define the language of a PDA.
c) Explain normal forms for CFG.
d) What is halting problem of TM?
e) The model of linear bounded automata.
f) Define unit production and null production in CFG.
g) What are the special features of TM?
h) Define the acceptance of string using PDA.

Q.7 a) Convert the following grammar into CNF: 08
$S \rightarrow aAbB$, $A \rightarrow aA|a$, $B \rightarrow bB|b$
b) What is pumping lemma for CFL? 07

Q.8 a) Consider the following productions: 08

$S \rightarrow aB|bA$, $A \rightarrow as|\ bAA|a$, $B \rightarrow bs|aBB|b$, for the string $aaabbabbba$. Find

i. Leftmost derivation
ii. Rightmost derivation
iii. Parse tree

b) Construct PDA for the language of all odd length palindromes over {a, b}. 07

Q.9 a) Explain in detail the model of linear bounded automata. 08

b) Explain deterministic pushdown automata. How does it differ from non-deterministic PDA? 07

Q.10 Write short notes on 15

1) Universal TM
2) Pumping lemma in CFL
3) Language of a PDA