Q. P. Code: 40016

Duration: 3 Hours Marks :80

Note :

1. Question No.1 is compulsory.
2. Attempt any three question form remaining question.
3. Draw suitable diagram whenever necessary.
4. Assume suitable data if, necessary.

Q.1:

a) Design FA for decimal number divisible by 4 (05)

b) Write a regular expression for $a^n b^m c^k$ where n+m is odd and k is even (05)

c) Design NFA for binary number divisible by 4 or 6 (05)

d) Design Moore machine for binary adder. (05)

Q.2:

a) Convert the following Regular Expression to NFA with Null moves , then convert it to DFA (10)
$(0+1)^* 011 (0+1)^*$

b) Give the Regular expression and corresponding DFA for all the words that begin and end with double letter (10)

Q.3:

a) Design the Turing machine for $a^n b^n c^n$ **where n ≥ 1.** (10)

b) Write a Right linear grammar and left linear grammar for RE $(0+1)^*0$ and show derivation tree for 1010110. (10)

Q.4:

a) Construct CFG for the following

i. Alternate sequences of 0 and 1. (03)

ii. Do not contain 3 consecutive b's (04)

iii. $a^n b^m c^k$ where k=n+m (03)

b) Design CFG for $a^n b^n$ **where n ≥ 1**and convert it to Chomsky's Normal form (10)

Q.5:

a) What is Ambiguous Grammar, find if the following grammar is ambiguous or not? (10)

S--> S+S

S-->S*S

S-->a

S-->b

b) Design PDA for odd length palindrome, **let** $\sum = \{0,1\}$ **,L=** $\{ W X W^R$ **where** $W \in \sum^* \}$ (10)

Q.6:

a) Design Turing machine which adds 2 unary numbers and convert the Turing machine design to a Program (12)

b) Explain the Applications of Automata (FM,PDA,TM) in detail with example (08)

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