COMP/ SEM-V/ R-19 C-scheme/ Q.P. Code - 27752/ 23-05-23

(3 hours) [80 marks]

NOTE:

1. Question No 1 is compulsory
2. Attempt any three questions from remaining.
3. Assume suitable data if necessary and state the same.

Q1. [20]

a) Show that grammar represented by production rules given below is ambiguous.
$S \rightarrow S + S \mid S - S \mid S * S \mid S/S \mid (S) \mid a$

b) Construct a Moore machine to output remainder modulo 4 for any binary number.

c) Differentiate between NPDA and PDA.

d) Explain Chomsky Hierarchy.

Q2.

a) Write steps for converting CFG to CNF form. Convert the following CFG to CNF. [10]
$S \rightarrow ASB|\epsilon \quad A \rightarrow aAS|a \quad B \rightarrow SbS|A|bb$

b) Convert following RE to NFA-ϵ and convert it to minimised DFA corresponding to it
$(0+11)^*(10)(11+0)^*$ [10]

Q3.

a) Construct a PDA for accepting $L = \{a^n b^m c^n \mid m,n >= 1\}$ [10]

b) Give formal Definition of Pumping Lemma for Regular Language. Prove that the following language is not regular. $L = \{wrw^r \mid w \epsilon \{a,b\}^*, r \epsilon \{c\}, |w| >= 1\}$ [10]

Q4.

a) Construct CFG for following

i. Alternate sequence of 0 and 1 starting with 0 [03]

ii. Do not contain 3 consecutive a over {a,b} [04]

iii. $L=\{x \epsilon \{0,1\}^* \mid x$ has equal number of 0's and 1's$\}$ [03]

b) Explain applications for FA, PDA and TM [10]

Q5.

a) Construct a Moore machine to convert all occurrences of 100 to 101 in a string over {0,1}*. convert it to equivalent Mealy Machine [10]

b) Design a TM accepting all palindromes over {0,1} [10]

Q6. Write short note (Solve Any 4) [20]

a) Decision Properties of Regular Languages

b) Post Correspondence Problem

c) Variants of Turing Machine

d) Acceptance by a PDA

e) Conversion of Moore to Mealy Machines

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