EVENING

[Total No. of Questions: 09]

19 JUN 2023

[Total No. of Pages: 02]

Uni. Roll No. ....

Program: B.Tech. (Batch 2018 onwards)
Semester: 5th
Name of Subject: Formal Language and Automata Theory
Subject Code: PCCS-110
Paper ID: 16430

Scientific calculator is not allowed.

Time Allowed: 03 Hours   **Max. Marks: 60**

NOTE:

1) Parts A and B are compulsory
2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
3) Any missing data may be assumed appropriately

Part – A   [Marks: 02 each]

Q1.

a) State Arden's Theorem.

b) Illustrate the acceptability of a string by a Finite Automata? Give an example for the same.

c) Compare Mealy Machines with Moore Machines.

d) How Turing machine is important in finding computation of different problems?

e) Find regular expression over (a,b) having set of all strings containing exactly two a's.

f) Differentiate between Push Down Automata and Finite Automata.

Part – B   [Marks: 04 each]

Q2. Explain the model of Linear Bounded Automata along with neat and clean diagram.

Q3. Describe the pumping lemma for regular set with the help of example.

Q4. Explain the Chomsky classification of formal languages by taking suitable example for each classification.

Q5. Construct and explain a PDA for language L = $\{0^n1^m2^m3^n\} \mid n >= 1, m >= 1\}$

Q6. Discuss the various representations of Turing machine.

Q7. Derive the regular expression for the following Transition Diagram.
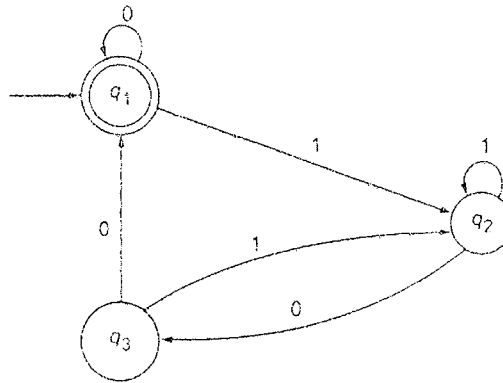
Part – C   **[Marks: 12 each]**

Q8. How will you differentiate deterministic and non-deterministic finite automata? Construct the deterministic automaton equivalent to the r.e. $10 + (0 + 11)0^*1$

OR

What you do mean by simplification of context free grammar? How a grammar can be simplified? Find the reduced grammar equivalent to the given grammar G, whose productions are given below:

$S \rightarrow aAa$, $A \rightarrow Sb | bCC | DaA$, $C \rightarrow abb | DD$, $E \rightarrow aC$, $D \rightarrow aDA$

Q9. Distinguish between PDA and TM. Also Discover a Turing Machine of the language $L = \{0^n1^n2^n \mid n>=1\}$. Write the complete explanation for it too.

OR

Explain Post Correspondence problem in detail. Also Develop a pushdown automata for language $\{a^nb^n \mid n > 0\}$ using final state. Give its state transition table and state transition diagram.

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