S.D.E.

M.C.A. SEM - IV : WINTER - 2017

SUBJECT: THEORY OF AUTOMATA

Day: **Thursday**
Date: **21/12/2017**

W-2017-4429

Time: **02.00 P.M. TO 05.00 P.M.**
Max. Marks: 80

N.B.:

1) Attempt any **FIVE** questions from section –I and any **TWO** questions from Section –II.
2) Figures to the right indicate **FULL** marks.
3) Answers to both the section should be written in **SEPARATE** answer book.

SECTION-I

Q.1 Define the following with example: **(10)**
i) Function ii) Symbols iii) Set
iv) Graph v) Trees

Q.2 **a)** Design Mealy machine for incrementing the values of any binary number by one. The output should also be a binary number with value one more than the number given. **(05)**

b) Design a FA that reads strings made up of letters in the word 'CHARIOT' and recognize those string that contain the word 'CAT' as a substring. **(05)**

Q.3 Convert NFA $M = (\{q_0, q_1\}, \{0,1\}, \delta, q_0, \{q_1\})$ whose δ is shown in table to an equivalent DFA. **(10)**

Q \ Σ	0	1
q_0	$\{q_0, q_1\}$	$\{q_1\}$
q_1	ϕ	$\{q_0, q_1\}$

Q.4 Prove that the following language is non- regular using pumping lemma $\{a^n b^{n+1} \mid n > 0\}$ **(10)**

Q.5 Consider the following grammar **(10)**
$S \to aB \mid bA \quad A \to a \mid aS \mid bAA \quad B \to b \mid bS \mid aBB$
With 'S' as the string symbol. Find the left most and right most derivations for the string "bbaaba" and "aaabbb".

Q.6 Give the PMT system generates strings with equal number of '0' s and '1' s. **(10)**

Q.7 Write short notes on: **(10)**
i) Application of context free Grammar ii) DPDA and NPDA

SECTION-II

Q.8 Construct post Machine which accept language $L = \{a^n b^m \mid n \geq 0,\ m \geq 0\}$. **(15)**

Q.9 Design Turing Machine for recognition of binary palindromes. **(15)**

Q.10 Design PDA that checks the Well- formedness of parentheses. **(15)**

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