B.Tech. SEM -V Info. Tech. 2014 Course (CBCS) : WINTER - 2018

SUBJECT: THEORY OF AUTOMATA AND FORMAL LANGUAGES

Day: Thursday
Date: 22/11/2018

W-2018-2412

Time: 02.30 PM TO 05.30 PM
Max Marks : 60

N.B. :

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Draw neat diagrams wherever necessary.

Q.1 Design finite automata to check whether given DECIMAL NUMBER is divisible by four. Justify your answer with suitable example. **(10)**

OR

Q.1 Design finite automata for a mod-5 tester for ternary input. **(10)**

Q.2 Show equivalence of regular expression over alphabet $\sum$ = (a,b). Regular expressions are ((a+bb)*aa)* and ε + (a+bb)*aa. **(10)**

OR

Q.2 Write a short note on 'Recursive sets'. **(10)**

Q.3 Construct a grammar in GNF equivalent to the grammar given **(10)**

$$S \rightarrow AA \mid a \quad and \quad A \rightarrow SS \mid b$$

OR

Q.3 Show that every CFL without ε is generated by a CFG all of whose productions are of the form **(10)**

$$A \rightarrow a,\ A \rightarrow aB \quad and \quad A \rightarrow aBC$$

Q.4 Show how PDA can be used for expression conversion. **(10)**

OR

Q.4 Design a PDA to detect the strings of type $a^n.b^{n+1}$ **(10)**

Q.5 Design a TM to find 2's complement of a BINARY NUMBER. **(10)**

OR

Q.5 Design a TM which will recognize strings containing equal number of 0's and 1's in BINARY string. **(10)**

Q.6 Explain application of regular expression in text editor **(10)**

OR

Q.6 Discuss the powers of FA, PDA and TM **(10)**

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