

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  $\Sigma = (a,b)$ . Regular expressions are  $((a+bb)^*aa)^*$  and  $\epsilon + (a+bb)^*aa$ . (10)

OR

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

Q.3 Construct a grammar in GNF equivalent to the grammar given  
 $S \rightarrow AA \mid a$  and  $A \rightarrow SS \mid b$  (10)

OR

Q.3 Show that every CFL without  $\epsilon$  is generated by a CFG all of whose productions are of the form  
 $A \rightarrow a, A \rightarrow aB$  and  $A \rightarrow aBC$  (10)

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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