

[Total nos of questions : 8]

ROLL No. :

[Total No. of Pages : 2]

T.E. (Computer Engineering)

THEORY OF COMPUTATION

(2015 Pattern) (Semester -I) (5th Sem.)

Time : 2½ Hour]

[Max. Marks : 70]

Instructions to the candidates:

- 1) Answer four questions [(Q.1 or Q.2), (Q.3 or Q.4), (Q.5 or Q.6), Q.7 or Q.8].
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume Suitable data if necessary.

- Q1) a) Design a DFA which accepts a ternary number divisible by 4 [6]
b) Construct DFA for language defined by {a, b} where [6]
S = { strings containing only a's }
S = { strings containing only b's }
S = { strings containing only a's or b's }
c) Define the following term with example. [3]
1. Alphabets 2. String 3. Regular expression
d) Explain application of Regular Expression in text search & replace [5]

OR

- Q2) a) Write short notes on CNF and GNF. [6]
b) Eliminate the useless symbols in the grammar below [6]
 $S \rightarrow Aa \mid Bb$
 $A \rightarrow Aa \mid a$
 $B \rightarrow Bb$
 $D \rightarrow ab \mid Ea$
 $E \rightarrow Ac \mid d$
c) Construct a DFA accepting the following language over the alphabets { a, b } [8]
i) Set of all string that begin with the substring ab
ii) Set of all strings with at most two consecutive b's

- Q3) a) Define TM. And Explain recursively enumerable set [4]
b) Obtain TM to accept language $L = \{ 0^n 1^n \mid n \geq 1 \}$ [6]
c) Construct TM for $L = \{ \text{All string with equal nos of a's and b's} \}$ [8]

OR

Q4) a) Write a short notes on

1) Unsolvability problem 2) Application Turing Machine [4]

b) Design TM to add unary number [6]

c) Design a TM to accept language

$L = \{ w / w (0 + 1)^* \}$ containing the substring 001. [8]

Q5) a) Convert following CFG to PDA [4]

$S \rightarrow aSb \mid A$

$A \rightarrow bSa \mid S \mid \epsilon$

b) Construct PDA that accepts all palindrome string over $\{a, b\}$. Specify simulation for string 'aba' [6]

c) Define PDA. What are different types of PDA? [6]

OR

Q6) a) Differentiate between FA and PDA. [4]

b) Construct post Machine that accepts the following language. [6]

$L = \{ a^n b^n a^n \mid n \geq 0 \}$ [6]

c) Design a PDA for the following Language

$L = \{ a^n b^{2n} \mid n \geq 0 \}$

s

Q7) a) Difference between P and NP class [04]

b) What is Kruskal's algo. Write algo using Turing machine [6]

c) Explain polynomial time reduction with example. [6]

OR

Q8) a) Prove that satisfiability problem is NP-complete. [04]

b) Explain Node vertex problem with example [6]

c) Explain what do you mean by NP-problem? Justify Travelling salesman problem is NP Problem. [6]

