

Total No. of Printed Pages:3

SUBJECT CODE NO:- H-530
FACULTY OF SCIENCE AND TECHNOLOGY
T.E. (CSE/IT)
Theory Of Computation
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

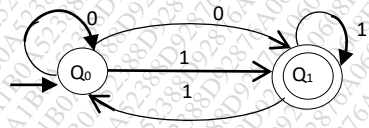
N.B

Please check whether you have got the right question paper.

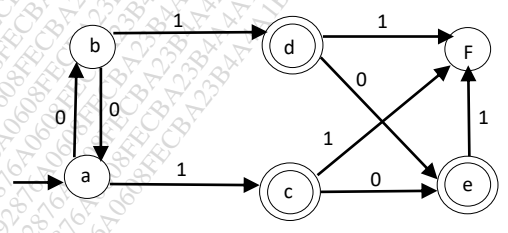
- i) Q.No.1 and Q.No.6 are compulsory.
- ii) Attempt any two questions from Q.No.2 to Q.No.5 and from Q.No.7 to Q.No.10 of each section.
- iii) Figures to the right indicate full marks.

Section A

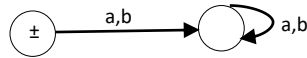
- Q.1 Attempt any five Questions from following. 20
- a) Give applications of finite automata
 - b) What is relation between FA and RE
 - c) Describe the sets for $(a+b)^*$ and $(a+b)^+$ State the difference in these two sets
 - d) Differentiate DFA and NFA with transition function
 - e) Find regular expression for given language
 $L=\{a, c, ab, cb, abb, cbb, \dots\}$
 - f) Define mealy machine with example
 - g) Give the restriction rules of CNF and GNF
 - h) Explain parse tree
- Q.2 a) Construct DFA for checking divisibility by 3 of integer number 08
 b) Convert following NFA to its Equivalent DFA. 07



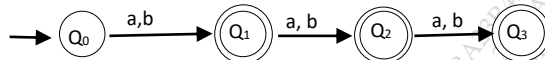
- Q.3 a) Minimize following DFA 07



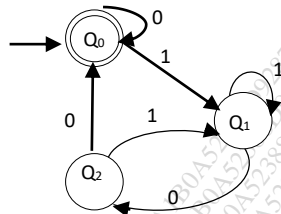
- b) Attempt following 08
- 1) Find regular expression for a language containing set of all strings over $\{0,1\}$ ending with "011"
 - 2) Find regular expression of a given Language $L(r) = \{\epsilon, a, aa, aaa, aaaa, aaaaa\}$
 - 3) For given DFA, find Regular expression



- 4) For given DFA, find Regular expression



- Q.4 a) Find out the Regular expression from given DFA by Arden's theorem. 08



- b) Prove that $L = \{ a^n \mid n \text{ is prime} \}$ not in Regular 07

- Q.5 a) Explain Chomsky classes for Grammar 08

- b) Consider the following Grammar 07

$$S \rightarrow 0B|1A$$

$$A \rightarrow 0|0S|1AA$$

$$B \rightarrow 1|1S|0BB$$

for a string "00110101" find leftmost and rightmost derivations.

Section B

- Q.6 Attempt any five Questions from following 10

- a) Explain the component of PDA with neat diagram.
- b) What is difference in LBA & TM?
- c) Define class P and class NP problems
- d) Define acceptance of string using PDA
- e) Define church-turing thesis
- f) Differentiate decidable and undecidable problem.
- g) Halting problem of TM.
- h) Define universal TM.

Q.7 a) Construct PDA accepting all strings from language $L = \{WW^R | W \in \{0,1\}^*\}$ by empty stack 08

b) Convert following CGF into PDA 07

$$\begin{aligned} S &\rightarrow SB|AB \\ A &\rightarrow CC \\ B &\rightarrow b \\ C &\rightarrow c \end{aligned}$$

Q.8 a) Explain multitape and multitrack variants of TM. 08

b) Design TM that read a binary string and replace every occurrence of 111 by 101 07

Q.9 a) Design a TM to accept all strings of even numbers of 1's 08

b) Show that $L = \{a^n b^n c^n | n \geq 1\}$ is not in CFL 07

Q.10 a) State and explain post correspondence problem and prove that following Domino's are undecidable 08

	A	B
1	10	101
2	011	11
3	101	011

b) Construct PDA even numbers of a's and b's. 07