(i) Printed Pages : 3

(ii) Questions : 9

Roll No. .....

Sub. Code : 2 6 0 4 4

Exam. Code : 0 4 6 1

M.Sc. Information Technology 3rd Semester

(2124)

THEORY OF COMPUTATION

Paper : MS-69

Time Allowed : Three Hours] **[Maximum Marks : 80**

Note :— Attempt **five** questions in all. Q. No. 9 (Section E) is compulsory and selecting **one** question each from Sections A to D.

SECTION—A

1. (i) Define each type of Grammar as Type-0, 1, 2 and 3. 8

   (ii) Design DFA for a string over {0,1} that accept even number of 1's and even number of 0's. 8

2. (i) Design Moore and Mealy machines to generate 1's complement of given binary number. 8

   (ii) Write short notes on deterministic and non-deterministic finite machines. 8

SECTION—B

3. (i) Give an example that convert NFA to DFA. 8

   (ii) For the regular language L_1 and L_2, show that $L_1 \cup L_2$ and $L_1 \cap L_2$ are regular. 8

[Turn over

4. (i) Construct regular expression for the given DFA :

$\delta(q_1, 0) = q_1$, $\delta(q_1, 1) = q_2$, $\delta(q_2, 0) = q_3$, $\delta(q_2, 1) = q_2$, $\delta(q_3, 0) = q_3$, $\delta(q_3, 1) = q_3$ for $(\{q_1, q_2, q_3\}, \{0, 1\}, \delta, q_1, \{q_2\})$. 8

(ii) Discuss equivalence of two finite automata using suitable example. 8

SECTION—C

5. (i) Construct a PDA that accepts the language generated by grammar with productions $S \rightarrow aSbb \mid a$. 8

(ii) Define Chomsky and Greibach normal forms. 8

6. (i) The CFG ({S, A, B, C}, {a, b}, P, S), where P is $S \rightarrow AB \mid BC$, $A \rightarrow BA \mid a$, $B \rightarrow CC \mid b$, $C \rightarrow AB \mid a$. Using CYK, is $w \in L$ ture or not ? where w = "baaba". 10

(ii) Differentiate between deterministic and non-deterministic pda. 6

SECTION—D

7. (i) Construct a Turing machine to multiply two numbers. 8

(ii) Write short notes on universal turing machine and post machine. 8

8. (i) Construct a TM for checking the palindrome of the string of odd length. 8

(ii) Write short notes on LR (K). 8

SECTION—E

(Compulsory Question)

9. (i) Write short note on Chomsky hierarchy of languages.

(ii) What are limitations of finite state machine ?

(iii) Discuss use of parser design.

(iv) What is halting problem ? $4 \times 4 = 16$