

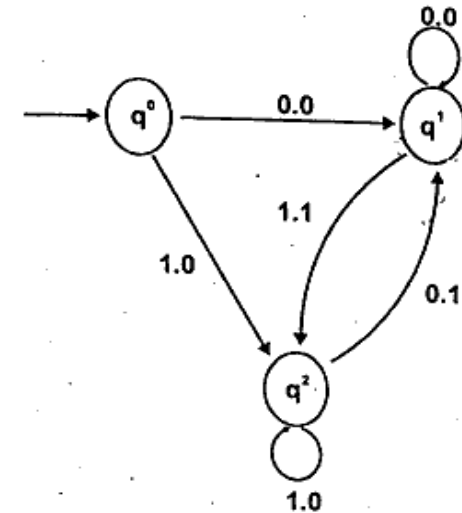
Note: Question 1 is compulsory. Attempt five questions in total selecting one question from each section.

1. (a) Design a transition diagram of PDA for language $L = \{a^n b a^n \mid n \geq 1\}$
- (b) Design a transition diagram of DFA to accept a string containing even number of 0's and any number of 1's.
- (c) What is Normal form in CFG. Explain the rule to write the productions in CNF and GNF.
- (d) Short note on Bottom-up Parsing.
- (e) Define NDTM mathematically?
- (f) Explain PCP.
- (g) Write short note on Decidable problems.
- (h) Define Reducibility? 8 × 2.5 = 20

Section-A

2. (a) Convert the given grammar into GNF 10
 $S \rightarrow AA \mid a$
 $A \rightarrow SS \mid b$

- (b) Explain in detail the methods of Ambiguity removal in CFG by taking suitable example. 10
3. (i) Convert the following Mealy Machine to Moore Machine by dividing the states into substates method. 10



- (ii) Design a DFA that accept all strings in which number of 0's is multiple of 3 and number of 1's is divisible by 2. 10

Section-B

4. (i) Construct a PDA equivalent to the following CFL. 10
 $S \rightarrow 0BB$
 $A \rightarrow 0S \mid 1S \mid 0$
 Test whether 010^4 is in $N(P)$?

(3)

22642

- (ii) Construct a PDA for the language. 10

$$L = \{wCw^r \mid w \in \{a, b\}^*\}$$

5. (i) Design a top-down parser for the expression $x+y*z$ for the grammar G with the following production rules. 10

$$S \rightarrow S + X \mid X.$$

$$X \rightarrow X * Y \mid Y.$$

$$Y \rightarrow (S) \mid id.$$

- (ii) Construct a PDA for the language 10

$$L = \{w w^r \mid w \in \{a, b\}^*\}$$

Section-C

- (i) Given two regular languages L_1 and L_2 , is the problem of finding whether a string 'w' exists in both L_1 and L_2 , a decidable problem or not. 5
- (ii) Design a Turing Machine which decrements input decimal number by 1. 5
- (iii) Design a Turing Machine that performs the coping of strings with transition diagram, table and trace of machine. <https://www.mdustudy.com> 10
- (i) Explain different variants of Turing Machine. 8
- (ii) Design a T.M. to perform multiplication. Draw only transition diagram. 6
- (iii) Find out whether the following problem is decidable or not -Is a number 'm' prime? 6

22642

[P. T. O.]

(4)

22642

Section-D

8. (a) Show that the Addition and exponentiation function is primitive recursive. 10

- (b) Write a detailed note on undecidable problems from language theory. 10

9. Write notes on 7+7+6

- (a) Theory of optimization in Automata
 (b) Recursive Enumerable Language
 (c) Church Turing thesis

<https://www.mdustudy.com>

Whatsapp @ 9300930012

Send your old paper & get 10/-

अपने पुराने पेपर्स भेजे और 10 रुपये पायें,

Paytm or Google Pay से

22642