

T.C.S.

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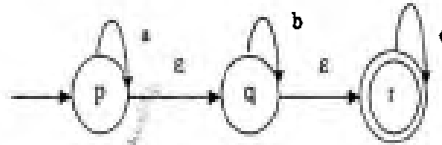
Q.P. Code :

(3 Hours)

[Total Marks : 100

- N.B. :** (1) Question Number 1 is compulsory.
 (2) Attempt any **three** questions out of remaining **five** questions.
 (3) **Assumptions** made should be **clearly** stated.
 (4) **Figures** to the **right** indicate **full** marks.
 (5) Assume suitable **data** whenever **required** but **justify** the same.

1. (a) Consider the following grammar $G = (V, T, P, S)$, $V = \{S, X\}$, $T = \{0, 1\}$ and 5
 productions P are
 $S \rightarrow 0 \mid 0X1 \mid 01S1$
 $X \rightarrow 0XX1 \mid 1S$
 S is start symbol. Show that above grammar is ambiguous.
 (b) State and prove the halting problem. 5
 (c) Convert following ϵ -NFA to NFA without ϵ . 5



- (d) Prove that Language $L = \{0^n 10^n \text{ for } n = 0, 1, 2, \dots\}$ is not regular. 5
2. (a) Consider the following grammar $G = (V, T, P, S)$, $V = \{S, X, Y\}$, $T = \{a, b\}$ and 10
 productions P are
 $S \rightarrow XYX$
 $X \rightarrow aX \mid \epsilon$
 $Y \rightarrow bY \mid \epsilon$
 Convert this grammar in Chomsky Normal Form (CNF).
 (b) Design DPDA to accept language $L = \{x \in \{a, b\}^* \mid N_a(x) > N_b(x)\}$, 10
 $N_a(x) > N_b(x)$ means number of a's are greater than number of b's in string x .
3. (a) Design Turing machine to accept the language $L =$ set of strings with equal 10
 number of a's and b's.
 (b) Design the DFA to accept the language containing all the strings over 10
 $\Sigma = \{a, b, c\}$ that starts and ends with different symbols.

[TURN OVER