

322554(22)

BE (5th Semester)
Examination, Nov. - Dec., 2017

[New Scheme]

Theory of Computation

Time Allowed : 3 hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : (i) Part (a) of each question is compulsory. Attempt any **two** parts from (b), (c) and (d).

(ii) The figures in the right-hand margin indicate marks.

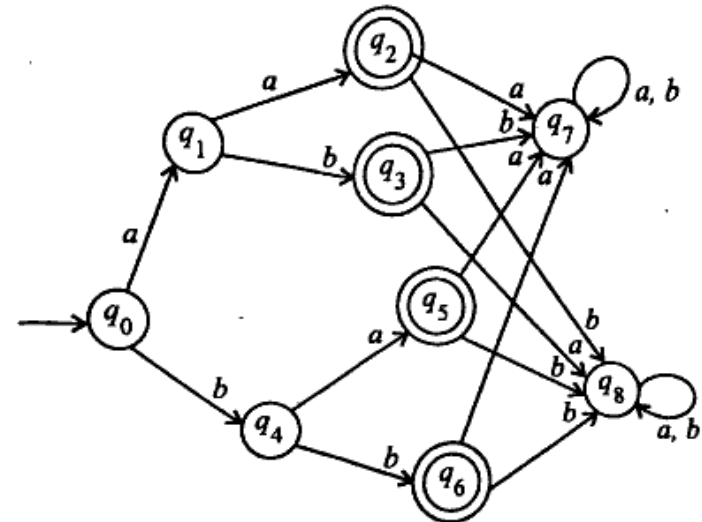
Unit-I

1. (a) What will be the length of output string for a Moore machine and a Mealy machine if the input string is of the length n ? [2]

(i) $n, n + 1$ (ii) n, n (iii) $n + 1, n$ (iv) $n + 1, n + 1$

Choose the correct one

- (b) (i) Design a DFA which accepts substring "USE" over $\Sigma = \text{"HOUSE"}$. [3½]
(ii) Design a DFA to accept string of a and b ending with ab or ba . [3½]
(c) Minimize the following DFA : [7]



- (d) Write the difference between NFA and DFA. [7]

Unit-II

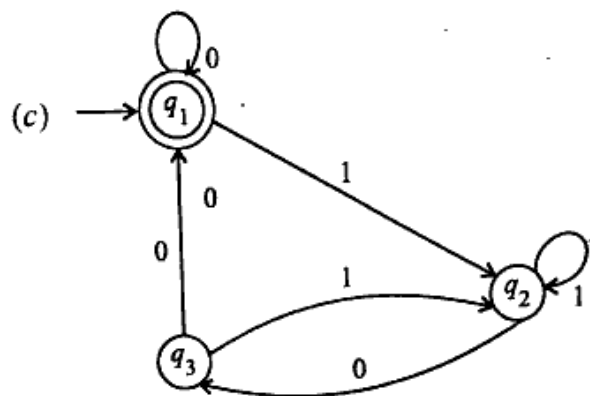
2. (a) Set of string consisting of any number of a (including null) followed by any number of b (including null) followed by any number of c (including null) is equivalent to [2]

(i) $a^+ b^+ c^+$ (ii) $a b c$ (iii) $(a + b + c)^*$ (iv) $a^* b^* c^*$

Choose the correct one

- (b) Convert the given regular expression into DFA: [7]

$$RE = (a + b)^* a b b$$



Calculate regular expression from the above transition system. [7]

- (d) Prove the following language is not regular: [7]

$$L = \{ 0^i 1^i / i \geq 1 \}$$

Unit-III

3. (a) Define Grammar. [2]
(b) Explain the Chomsky classification of Grammar. [7]

$$(c) E \rightarrow E + T / T$$

$$T \rightarrow T * F / F$$

$$F \rightarrow (E) / a$$

Convert into GNF. [7]

- (d) Consider the Grammar :

$$S = S + S / S * S / id$$

Construct leftmost derivation, rightmost derivation and derivation tree for the string

$$w = id + id * id \quad [7]$$

Unit-IV

4. (a) What is deterministic PDA? [2]

- (b) Design a PDA which accepts
 $L = \{ a^3 b^n c^n / n \geq 0 \}$ [7]

- (c) Design a Turing machine M that recognizes the language

$$L = \{ 1^n 2^n 3^n / n \geq 1 \} \quad [7]$$

- (d) Write short notes on any two: [7]

- (i) Church Hypothesis
- (ii) Post Correspondence Problem
- (iii) Halting Problem of Turing Machine

Unit-V

5. (a) Explain partial and initial functions. [2]
(b) Explain recursive and recursively enumerable language with example. [7]
(c) Explain space and time complexity with example. [7]
(d) What is computation? Explain Turing model for computation. [7]