B.Sc. (Honours) Semester -VI Examination 2016
Computer Science
Course : BCSC - 62
(Formal Language and Automata)

Time : Three Hours   **Full Marks : 40**

Questions are of value as indicated in the margin.

Answer Question No.**1** and **any four** from the rest.

1. Answer **any four** from the following :   2×4=8

   (a) State the properties of transition functions of a finite automata.

   (b) Identify the highest type number of the gramma which is the applied in the following :

   $S \rightarrow aS \mid bA \mid c \qquad A \rightarrow cA \mid d$

   (c) What is Chomsky Normal form?

   (d) What is the advantage of push down automata over finite automata?

   (e) Define Tuning Machine.

2. (a) Find a deterministic acceptor equivalent to M whose δ is given below   3+5=8

States \ Σ	0	1
$\rightarrow q_1$	q_1, q_2	q_3
q_2	q_1	q_2
q_3		q_1, q_2

   (b) Convert the following Moore machine to Mealy machine

Present State	Next State a = 0	a = 1	Output
$\rightarrow q_0$	q_0	q_1	0
q_1	q_0	q_1	0
q_2	q_0	q_2	0

   Draw the transition diagram for both the machines.

3. (a) Construct the grammar accepting the following set   3+3+2=8
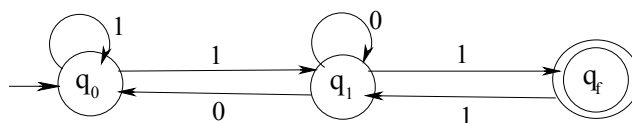
   $\{O^n 1^{2n} \mid n \geq 1\}$

   (b) Construct a grammar which generates all positive integers upto 998 which are divisible by 5.

   (c) State Arden's Thearem.

4. (a) Write the algorithm to remove Λ-moves in a transition system.   2+3+3=8

   (b) Find the strings recognized by the following transition system

P.T.O.

(c) How can you say whether two finite automata are equivalent or not?

5. (a) Shows that the set $L = \{O^i 1^i \mid i \geq 1\}$ is not regular.   4+4=8

(b) Constant a regular grammar G generating the regular set represented by P = a*b (a+b)*

6. (a) Consider the following production   6+2=8

S→ aB|bA   A→ aS|bAA|a   B→ aS|aBB|b

For the string aaabbabbba find leftmost derivation, right most derivation and parse tree.

(b) Show that the following grammar is ambiguous.

S→ aB|ab   A→ aAB|a   B→ ABb|b

7. (a) Design a Turing machine to recognize all strings consisting of odd number of 0's.   3+3+2=8

(b) Reduce the following grammar to chomsky normal form.

A → A0,   A→ 0B   B→ 0A   B→ 1

(c) State pumping lemma for context free languages.

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