[Total No. of Questions - 9] [Total No. of Printed Pages - 3]
(2064)

14648

B. Tech 4th Semester Examination

Theory of Automata Computation (N.S.)

IT-223

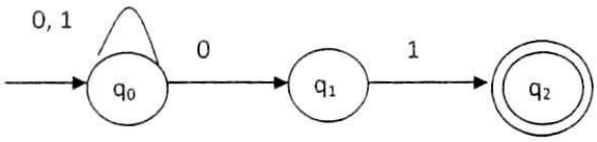
Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Each question carries 20 marks. Attempt one question from each section. Section E is compulsory and carries 20 marks.

SECTION - A

1. (a) Explain the steps to convert NFA into DFA. Covert the following NFA into DFA



(b) Differentiate between Finite state machine and finite automata. (20)

2. (a) Construct a DFA for following

(i) All strings that contain exactly four zero's

(ii) All strings that don't contain the substring 110.

(b) Construct the equivalent DFA for the NFA which accept the language (a/b)*abb. (20)

SECTION - B

3. (a) Discuss the closure properties of regular languages.

   (b) Using pumping lemma for regular sets prove that the language

   $L = \{0^m 1^n 0^{m+n} \mid m \geq 1 \text{ and } n \geq 1\}$ is not regular. (20)

4. (a) Discuss Myhill- Nerode Theorem.

   (b) Define regular expression and show that

   (1+00*1)+(1+00*1)(0+10*1)*(0+10*1)=0*1(0+10*1)* (20)

SECTION - C

5. (a) Explain in detail the ambiguity in context free grammar.

   (b) Convert the grammar S→ABb|a, A→aaA|B, B→bAb into Greibach Normal form (20)

6. (a) Convert the following into GNF

   S→XY1/0 X→00X/Y Y→1X1

   (b) Construct the left linear grammar for S→abA, A→baB, B→aA|bb. (20)

SECTION - D

7. (a) Construct a Turing machine to perform multiplication.

   (b) Prove the equivalence of two-way infinite tape with standard Turing machine. (20)

8. (a) State the Halting problem of Turing Machines. Prove that the Halting problem of Turing machine over {0,1}* unsolvable.

   (b) Describe Chomsky Hierarchy of grammars and indicate their recognizers. (20)

SECTION - E

9. Write short notes on:

(a) Let Σ={a,b}. Write regular expression for the set of all strings in Σ^* with no more than three a's.

(b) State the mathematical definition of DFA.

(c) Define Context Free grammar.

(d) What is configuration of a Turing machine?

(e) When do we say that a function is Turing - computable?

(f) When do we say that a function is Primitive recursive?

(g) Define the class NP.

(h) State Pumping lemma for regular languages.

(i) Construct NFA equivalent to regular expression: (0+1)01.

(j) Define recursive sets. (2×10=20)