K17P 0185

Reg. No. : .....

Name : .....

Third Semester M.C.A. Degree (Regular/Suppl./Imp.) Examination, January 2017

(2014 Admn. Onwards)

MCA3C15 : THEORY OF COMPUTATION

Time : 3 Hours Max. Marks : 80

Instructions : *1) Answer **any ten** questions from Section – **A**. **Each** question carries **three** marks.*

*2) Answer **all** questions from Section – **B**. **Each** question carries **10** marks.*

SECTION – A

Note : Answer **any ten** questions from the following. **Each** question carries **three** marks. **(10×3=30)**

1. a) Define Finite Automata.

b) Construct NFA for 1*(01)*.

c) Generate CFG for (011 + 1)*.

d) Define Regular Expression.

e) Define PDA.

f) State the conditions for a PDA to be deterministic.

g) Define Chomsky Normal form.

h) State pumping lemma for context free languages.

i) What is meant by Turing Machine ?

j) List out the techniques for Turing Machine construction.

k) Define Multitape Turing Machine.

l) Differentiate recursive and non-recursive languages.

P.T.O.

SECTION – B

Note : Answer **all** questions. **Each** question carries **ten** marks. **(5×10=50)**

2. a) Design a DFA to accept the following languages.

   i) $L = \{ \omega : |\omega| \bmod 3 = 0, \omega \in (0 + 1)^*\}$

   ii) $L = \{(0\ 1)^i 1^{2j} \mid i \geq 1, j \geq 1\}$.

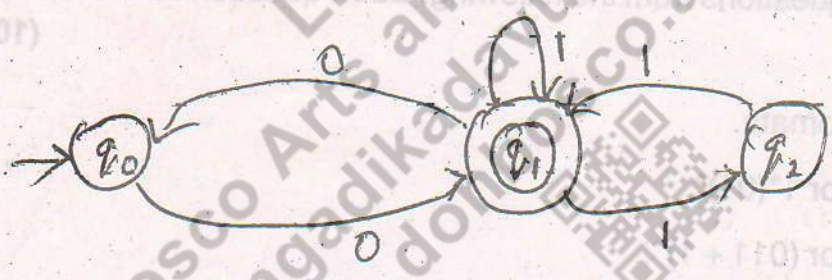
   b) Construct an NFA equivalent to the regular expression.

   $10 + (0 + 11)\ 0 * 1$.

   OR

3. a) Construct a NFA that accept the set of all strings {a, b} ending with "aba" as substring and construct DFA.

   b) Convert the following NFA to its equivalent DFA.



4. a) Write regular expression for the following languages :

   i) $L = \{a^n b^m : (m + n)$ is even$\}$

   ii) $L = \{ a^{2n} b^{2m+1} : m \geq 0, n \geq 0\}$.

   b) Define ambiguous grammar. Prove that the following grammar is ambiguous.

   $S \rightarrow a\ s\ b\ s$

   $S \rightarrow b\ s\ a\ s$

   $S \rightarrow \in$.

   OR

5. a) Obtain grammar to generate the language

$L = \{0^m 1^m 2^n \mid m \geq 1 \text{ and } n \geq 0\}$.

b) Show that the language

$L = \{a^n b^n \mid n \geq 1\}$ is unambiguous.

6. Find a Greibach normal form grammar equivalent to the following CFG

$S \rightarrow ASB \mid AB, A \rightarrow a, B \rightarrow b.$

OR

7. Explain in detail how context free language is accepted by PDA.

8. Show that the context free languages are closed under union, concatenation and Kleen closure.

OR

9. a) Using pumping lemma, show that the language $L = \{a^n b^n c^n \mid n \geq 1\}$ is not a CFL.

b) Discuss in detail about the models of Turing Machines.

10. Show that L is recognized by a Turing Machine with a two-way infinite tape if and only if it is recognized by a Turing Machine with a one way infinite tape.

OR

11. Explain post-correspondence problems and decidable and undecidable problems with examples.