320

Total No. of Questions – 8] [Total No. of Printed Pages – 1

BE-V/12(A)
232045

COMPUTER ENGINEERING COURSE NO. COM – 504

(Automata & Formal Language)

Time Allowed: 3 Hours *Maximum Marks: 100*

Note: Attempt ***five questions*** in all selecting at least two questions from each Section. Each question carries 20 ***marks***.

Section – A

Q: 1 a. Prove that for every NFA that is accepting the language L there exists a DFA which accepts the same Language L.
b. What is a CFL? Generate a CFG for the language $\{0^n1^n/n>1\}$. [12, 8]

Q: 2 a. Compare the Mealy Machine and Moore machine with examples.
b. Convert the following expression into NFA with ε-Transition and then to a DFA:
i) 0* + 1* 101
ii) (0 + 1)* [4, 16]

Q: 3 a. Given NFA is shown in figure 1 and draw equivalent DFA
b. Find the minimal DFA of the given DFA shown in figure 2.

δ	a	b
q_0	q_0 ,q_1	q_0, q_3
q_1	q_2	q_1
q_2	q_1 ,q_3	q_3
(q_3)	q_3	q_2

figure 1

δ	a	b
q_0	q_1	q_3
q_1	q_3	q_1
q_2	q_1	q_2
q_3	q_3	q_6
q_4	q_1	q_4
q_5	q_4	q_6
(q_6)	q_6	q_6

figure 2

Q: 4 a. Design FA for a string is acceptable if number of 1's is equal to number of 0's.
b. Design FA for a string is acceptable if it contains odd number of 0's and even number of 1's.
c. Design FA to which all strings end with 00.
d. Design FA to set of all strings ending in '101' or '110'. [5, 5, 5, 5]

Section – B

Q:5 a. Define Pumping Lemma. How is it used in case of context free languages? Explain.
b. Obtain the derivation tree for the string 0011000 using grammar S →A0S | 0 | SS A →1S | S | 10
c. The language $\{a^p: p \text{ is prime}\}$ is context free or not. Justify. [8, 8, 4]

Q: 6 a. Convert the following grammar into CNF. S → aSa | SSa | a
b. Convert the following grammar into GNF. S → aAS | a A → SbA | SS | ba
c. Design a CFG for solving the simple expression for solving simple expression such as '+' and '*'.
d. Write CFG for expression (a+b) (a+b+0+1)*. [4, 4, 6, 6]

Q: 7 a. Design a Turing Machine which can be used to multiply two integers.
b. Generate a PDA which recognizes the set of palindromes over (0,1)*. [10, 10]

Q: 8 Write short notes on:
i) Church Hypothesis
ii) Post-Correspondence problem
iii) Multi-Tape Turing Machine [7, 7, 6]

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