2021

Computer Science

[HONOURS]

(CBCS)

(B.Sc. Fifth Semester End Examination-2021)

PAPER-C12T

Full Marks: 60 ***Time: 03 Hrs***

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Illustrate the answers wherever necessary

Group A

1. Answer any FIVE questions of the following: 5x2=10

a) What do you mean by 'Dead state' in context of DFA?

b) Write regular expression for all strings of letters that contain the five vowels in order.

c) Construct the grammar for the language $a^n b^n$, where n>=0.

d) What are the characteristics of CFG?

e) Define left linear and right linear grammar.

f) What do you mean by Kleene's star?

g) What is positive closure? Give an example.

h) Prove that CFLs are not closed under intersection.

i) Define context free grammar.

j) A NFA has four states. If we construct a DFA that is equivalent to this NFA, how many states will be there this DFA?

k) Define DFA.

l) Give two difference between DFA and NFA.

m) Can we say for every non deterministic PDA there will be a deterministic PDA?

n) What is chomsky normal form?

o) Define Turing machine.

Group B

Answer any FOUR questions of the following: 5x4 = 20

2. Let to be the grammar $S \to aB / ba, B \to b / bs / aBB$. For the string $aa\ a\ bb\ a\ bbb\ a$, find right most derivation.

3. Design an NFA which accepts set of all binary strings containing 1100 or 1010.

4. Design a TM that accepts $\{0^n 1^n | n\rangle = 1\}$

5. Construnt CFG for the following

   i) Palindrome for binary numbers.

   ii) $L = \{a^n b^n c^m d^m | m, n\rangle 0\}$

6. Define DFA. Derive the DFA for the regular language o(0+1)*1 for the symbols $\sum = \{0,1\}$

7. Prove that $(1+00^*1)+(1+00^*1)(0+10^*1)^*(0+10^*1) = 0^*1(0+10^*1)^*$

Group C

Answer any TWO questions of the following: 10x1 = 10

8. a) Show that the language $L = \{a^n b^n : n \geq 0\}$ is not regular.

   b) Construnt a PDA for the grammar 5+5

   $S \to aA$

   $A \to aABD / bB / a$

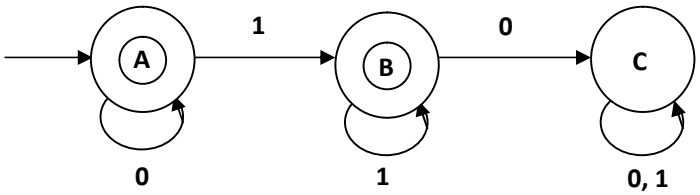
   $B \to b$

   $D \to d$

9. a) What is ambiguous grammar? Check whether the following grammar is ambiguous or not.

   $S \to aSa / bsb / a / b / \in$

   b) Construct RE for the following DFA 5+5



10. a) What is pumping lemma for regular language?

    b) Prove that the language L=$\{a^p |$ P is prime$\}$ is not regular.

c) What is Chomsky's classification of different languages? 2+5+3

11. a) Design a Pushdown automata (pda) that accept the language

$L = \{a^n b a^n : n \geq 1\}$.

b) Design a DFA that accepts any binary string whose decimal equivalent is divisible by 5. 6+4
