D 51307 (Pages : 2) Name..................................

Reg. No...............................

THIRD SEMESTER B.C.A. DEGREE EXAMINATION NOVEMBER 2018

(CUCBCSS—UG)

Complementary Course

BCA 3C 06—THEORY OF COMPUTATION

(2017 Admissions)

Time : Three Hours Maximum : 80 Marks

Section A

Answer **all** *the questions.*
Each question carries 1 *mark.*

1. What are the operations on sets ?
2. What are the characteristics of automaton ?
3. Define onto function with example.
4. What you meant by complement of a set ?
5. Define Finite automaton.
6. Define Parse Tree.
7. Define graph.
8. Find R^* if, $R = \{(a, b), (b, c), (c, a)\}$ is a relation in $\{a, b, c\}$.
9. What is the regular expression for the set of all strings containing at least 2a's if alphabet set is $\{a, b\}$.
10. Define relation.

(10 × 1 = 10 marks)

Section B

Answer **all** *the questions.*
Each question carries 2 *marks.*

11. Explain various ways of describing a Set.
12. Differentiate between Mealy machine and Moore machine.
13. Explain derivation trees.
14. Find the sets represented by the regular expression $(aa)^* + (aaa)^*$.
15. Explain representation of a digraph.

Turn over

16. Find the left most derivation for the string 00110101 if grammar G is :

$$S \rightarrow 0B \mid 1A,\ A \rightarrow 0 \mid 0S \mid 1AA,\ A \rightarrow 1 \mid 1S \mid 0BB.$$

17. Explain the properties of trees.

18. Find R+ , if R = {(1, 2), (2, 3), (2, 4) be a relation in {1, 2, 3, 4}.

(8 × 2 = 16 marks)

Section C

Answer any **six** *questions.*
Each question carries 4 *marks.*

19. Explain algebraic laws for regular expression.

20. Define top down parsing.

21. Prove that the number of vertices of odd degree in any graph is even.

22. Write the steps to replace $\wedge$-moves from a transition system.

23. Find L (G), if G = ({S, C}, {a, b}, {$S \rightarrow aCa$, $C \rightarrow aCa \mid b$}.

24. Explain the procedure for transforming a mealy machine into a moore machine.

25. Prove that every monotonic grammar G is equivalent a type 1 grammar.

26. Construct a regular grammar G generating the regular set represented by $P = a^*b\ (a + b)^*$.

27. Prove the following theorem by Induction : $1 + 2 + 3 + ... + n = n\ (n + 1)/2$.

(6 × 4 = 24 marks)

Section D

Answer any **three** *questions.*
Each question carries 10 *marks.*

28. How an NFA is converted to its equivalent DFA.

29. Explain Arden's theorem.

30. Explain Chomsky classification of languages.

31. Construct a grammar in Greibach Normal Form equivalent to the grammar

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

32. Construct a finite automaton equivalent to the regular expression $(0 + 1)^*\ (00 + 11)\ (0 + 1)^*$.

(3 × 10 = 30 marks)