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

THIRD SEMESTER (CBCSS–UG) DEGREE EXAMINATION NOVEMBER 2021

B.C.A.

BCA 3C 06—THEORY OF COMPUTATION

(2019—2020 Admissions)

Time : Two Hours   Maximum : 60 Marks

Section A

*Answer atleast **eight** questions.*
Each question carries 3 marks.
All questions can be attended.
Overall ceiling 24.

1. What is Set and explain various ways of describing a set ?

2. What is a mealy machine ?

3. Explain relations. What are its properties ?

4. Define one-to-one function with example.

5. Define Grammar.

6. Explain parse tree in detail.

7. Define top down parsing.

8. Define Pushdown automata.

9. If $n \geq 1$, show that $1.1! + 2 .2! + ... + n. n! = (n + 1)! - 1$.

10. What are the identities for regular expression ?

11. What is a transition system ?

12. Show that $f : R \to R - \{1\}$ given by $f(x) = (x + 1)/(x - 1)$ is onto.

($8 \times 3 = 24$ marks)

Section B

*Answer atleast **five** questions.*
Each question carries 5 marks.
All questions can be attended.
Overall ceiling 25.

13. Show that a connected graph G with n vertices and $n - 1$ edges $(n \geq 3)$ has at least one leaf.

14. Explain Chomsky classification of languages.

Turn over

15. Explain tree and its properties.

16. Explain ambiguous grammars. If G is the grammar $S \rightarrow SbS \mid a$, check G is ambiguous or not.

17. Explain Normal Forms for Context free Grammars.

18. Prove the theorem by induction : A tree with n vertices has $(n-1)$ edges.

19. Define Turing Machine.

$(5 \times 5 = 25 \text{ marks})$

Section C

Answer any **one** *question.*
Each question carries 11 marks.

20. Prove that the theorem, if L is then there set accepted by NDFA, then there exists a DFA which also accepts L.

21. Define Chomsky normal form. Find a grammar in CNF equivalent to :

$S \rightarrow aAD, A \rightarrow aB \mid bAB, B \rightarrow b, D \rightarrow d.$

$(1 \times 11 = 11 \text{ marks})$