

The University of Burdwan

M.Sc. 3rd Semester Examination, 2020(CBCS)

Subject: Computer Science and Application

Paper: MCSA-301 (Theory of Computations)

Full Marks: 40

Time: 2 Hours

Answer any eight questions (All questions contain equal marks) (8 X 5 =40)

1. $E \rightarrow E + E$

$E \rightarrow id$

$E \rightarrow E * E$

$id \rightarrow a/b/c$

$a=2, b=3, c=4$

Check whether the grammar is ambiguous or not for: $a+ b*c$.

2. $N=\{S\}$ $T=\{a,b\}$ $P=\{ 1. S \rightarrow aSb \ 2. S \rightarrow ab \ 3. S \rightarrow SS\}$ S is the Start Symbol.

Generate the language using this grammar.

3. $N=\{S,B\}$ $T=\{a,b,c\}$ $P=\{1. S \rightarrow aSBc \ 2. S \rightarrow abc \ 3. cB \rightarrow Bc \ 4. bB \rightarrow bb\}$ and S is the start symbol. What is the language generated by the grammar? Prove by induction hypothesis.

4. Consider a grammar which will generate FORTRAN identifier.

5. $S \rightarrow AB$

$A \rightarrow aAb$

$A \rightarrow ab$

$B \rightarrow bB$

$B \rightarrow b$

$C \rightarrow cCd$

$C \rightarrow cd$

$C \rightarrow cCd$

$C \rightarrow cd$

S is the start symbol. Remove the useless symbols/productions from the above grammar.

6. L is a set of strings consisting of at least one **a** and exactly two **b**. Draw the DFA of the language over $\Sigma = \{a, b\}$.
7. Prove that $L = \{a^i : i \text{ is perfect square}\}$ over $\Sigma = \{a\}$ is not a regular language.
8. Draw a TM for the language $L = \{a^n b^n c^n : n \geq 0\}$ over $\Sigma = \{a, b, c\}$.
9. Draw a PDA for the language $L = \{ww^r : w \text{ belongs to } \Sigma^*\}$ over $\Sigma = \{a, b\}$.
10. Define Finite Automata and Transition Diagram in brief.