BACHELOR OF SCIENCE (COMPUTER SCIENCE) (CBCS - 2016 COURSE)
T.Y.B.Sc.(Computer Science) Sem-V : WINTER- 2022
SUBJECT : THEORETICAL COMPUTER SCIENCE

Day : Friday | Time : 02:00 PM-05:00 PM

Date : 9/12/2022 | **W-14905-2022** | Max. Marks : 60

N. B. :

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Draw neat and labelled diagrams **WHEREVER** necessary.

Q. 1 Answer **ANY TWO**: **(12)**

a) Write a note on context free grammar.

b) What is meant by derivation tree? Explain with example.

c) Construct DFA for the following containing all strings starting with 'a' and ending with 'b' over $\Sigma = \{a, b, c\}$.

Q. 2 Answer **ANY TWO**: **(12)**

a) Construct a PDA for $L = \{a^n\ b^n | n >= 1\}$.

b) Differentiate between NFA and DFA.

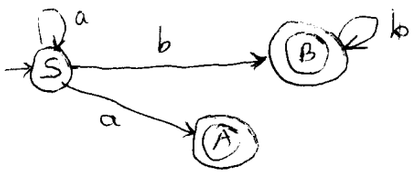
c) Construct regular expression for the following languages:

i) String of odd length over $\{a\}$.

ii) String over $\{0, 1\}$ where last digit is 0.

Q. 3 Answer **ANY TWO**: **(12)**

a) Construct regular grammar a for



b) Construct TM for $L = \{a^n\ b^m \mid n, m >= 1\}$.

c) Construct the equivalent grammar by eliminating useless and non-readable symbols.

$S \rightarrow aA | BD$

$A \rightarrow aA | aAB |$ aD

$B \rightarrow aB | aC | BF$

$C \rightarrow Bb | aAE | E$

$D \rightarrow bD | bC | b$

$E \rightarrow aB | bc$

$F \rightarrow aF | aC | a$

$G \rightarrow a | b$

P. T. O.

Q. 4 Answer **ANY THREE**: **(12)**

a) Construct the following grammar to CNF:

$S \rightarrow A|C$

$A \rightarrow aA|a|B$

$B \rightarrow bB|b$

$C \rightarrow cC|C|B$

b) Prove with suitable example DPDA and NPDA are not equivalent.

c) Construct FA for regular expression : $ab^*(a + b)^* + ba^*$.

d) Write a note on ambiguous grammar.

Q. 5 Answer **ANY FOUR**: **(12)**

a) Describe Moore and Mealy machine.

b) Explain Chomsky hierarchy in brief.

c) Explain Myhill – Nercode Theorem.

d) Define Turing Machine.

e) What is meant by regular language?

f) Describe GNF in brief.

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