

BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)

Computer Science & Business Systems

B. Tech. Sem - III :SUMMER : 2023

SUBJECT : FORMAL LANGUAGE & AUTOMATA THEORY

Day : Tuesday

Time : 02:30 PM-05:30 PM

Date : 09-05-2023

S-24142-2023

Max. Marks : 60

N.B.

- 1) All questions are **COMPULSORY**.
- 2) Figures to the **RIGHT** indicate **FULL** marks.
- 3) Use of non-programmable calculator is **allowed**.
- 4) Assume suitable data **WHEREVER** necessary.
- 5) Draw neat diagram **WHEREVER** necessary.

Q.1 Explain types of the graphs with diagram. (10)

OR

Q.1 What is tree? Explain spanning tree with example. (10)

Q.2 Design DFA for accepting language of even no. of 1's and even no. 0's for  $\Sigma (0,1)$  (10)

OR

Q.2 Minimize the following DFA (10)

	a	b
$\rightarrow q_0$	$q_1$	$q_2$
$q_1$	$q_3$	$q_4$
$q_2$	$q_3$	$q_5$
* $q_3$	$q_3$	$q_1$
* $q_4$	$q_4$	$q_5$
* $q_5$	$q_5$	$q_4$

Q.3 Consider the following grammar (10)

$S \rightarrow ASA \mid BSB \mid ASB \mid BSA \mid 1$ .

Derive the string 00101 using both left and right derivation.

OR

Q.3 Convert the following CFG to GNF (10)

$S \rightarrow ABA \mid AB \mid BA \mid AA \mid A \mid B$

$A \rightarrow aA \mid a$

$B \rightarrow bB \mid b$ .

Q.4 Design Turing Machine to compute  $m+n$  where  $m$  &  $n$  are positive integers. (10)

OR

Q.4 Design Turing Machine that replaces all occurrences of 111 by 101 from sequence of 0's & 1's. (10)

Q.5 Explain applications of Turing Machine with example. (10)

OR

Q.5 Prove that post correspondence problem is undecidable. (10)

Q.6 Write note on P & NP complete problem with example. (10)

OR

Q.6 Explain how to use lexical analyzer in finite automata? (10)

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