

BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
B. Tech. Sem - III COMPUTER SCIENCE & BUSINESS SYSTEMS : SUMMER : 2024
SUBJECT: FORMAL LANGUAGE & AUTOMATA THEORY

Day : Wednesday
 Date : 08/05/2024

S-24142-2024

Time : 02:30 PM-05:30 PM
 Max. Marks : 60

N.B.

- 1) All questions are **COMPULSORY**.
- 2) Figures to the **RIGHT** indicate **FULL** marks.
- 3) Assume suitable data **WHEREVER** necessary.
- 4) Draw neat diagrams **WHEREVER** necessary.

Q.1 Define the following terms.

- a) Pseudograph
- b) Degree of vertex
- c) Alphabets
- d) String

(10)

OR

Q.1 Describes the relationship between Graphs and Trees.

(10)

Q.2 Draw DFA for following languages

(10)

- i) All strings with exactly two 1's
- ii) All strings containing at most two 0's.

OR

Q.2 Convert to a DFA the following NFA

(10)

	0	1
→ p	{p,q}	{p}
q	{r}	{r}
r	{s}	∅
s*	{s}	{s}

Q.3 Construct finite automata for following regular expression

(10)

- i) $[(a+b)^*(ab+aba)^*]ab$
- ii) $[(110+110)^*(110+011)]^*$

OR

Q.3 Explain Keen's theorem in detail.

(10)

Q.4 Let G be the Grammar

(10)

$$S \rightarrow aB | bA$$

$$A \rightarrow a | aS | bAA$$

$$B \rightarrow b | bS | aBB$$

For string *aaabbabbba* find

- i) Left most derivation
- ii) Right most derivation
- iii) Parse trees
- iv) Is the Grammar Unambiguous.

OR

Q.4 Remove ϵ -production from the given grammar

(10)

$$S \rightarrow AB$$

$$A \rightarrow aAA | \epsilon$$

$$B \rightarrow bBB | \epsilon$$

Q.5 Design Turing Machine that replaces every occurrences of abb by baa.

(10)

OR

Q.5 Design Turing Machine to perform right shift operation on binary number.

(10)

Q.6 Explain in detail p and Np hard problem.

(10)

OR

Q.6 Explain church-turing thesis in detail.

(10)
