CLASS: MCA   SEMESTER : II
BRANCH: MCA   SESSION : SP/2022

SUBJECT: CA417 THEORY OF COMPUTATION

TIME: 2 HOURS   FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Candidate may attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. **Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q1 (a)	Describe the model of Finite Automata? Describe use of each component of model. Also give its mathematical definition.	5
(b)	Design a Deterministic Finite Automata (DFA) over input {0, 1} to accept all strings that have even number '0' and odd number of '1'.	5
Q2 (a)	Write regular expression for string that have two 0's in its last two places. From the regular expression written by you, derive the corresponding DFA.	5
(b)	Design a suitable Finite Automata with output that will generate a 'A' for every 4th '0' in input and 'B' for rest of input symbols over input {0, 1}	5
Q3 (a)	Explain with suitable example the use of Pumping Lemma for Regular Languages.	5
(b)	Design a Grammar that will generate character variable declaration statement with initialization.	5
Q4 (a)	Construct a PDA that accept the language generated by the following grammar $P= \{ S \to aB, B \to bA|b, A \to aB \}$. Also show an ID for the string "*abab*" for the PDA generated.	5
(b)	Define Turing Machine with suitable block diagram. Design a TM that will take a string of 0's as input string and will reduce it to half (length wise) in the same place.	5
Q5 (a)	With suitable example, discuss the Halting problem of Turing Machine	5
(b)	What is Chomsky Hierarchy of languages? Explain with suitable examples.	5

02/05/2022 E