Total No. of Printed Pages: 2

PRN NO.		PAPER CODE	U313-2104-ESE

DECEMBER 2023 (ENDSEM) EXAM

TY(INFORMATION TECHNOLOGY) (SEMESTER - I)

COURSE NAME: FORMAL LANGUAGE & AUTOMATA THEORY

COURSE CODE: ITUA31204

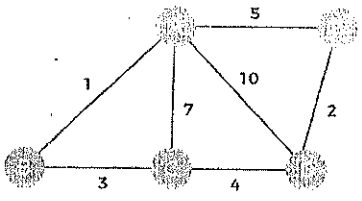
(PATTERN 2020)

Time: [1Hr. 30 Min] **[Max. Marks: 40]**

Instructions to candidates:

1) **Figures to the right indicate full marks.**
2) **Use of scientific calculator is allowed**
3) **Use suitable data wherever required**
4) **All questions are compulsory. Solve any one sub question from Question 3 and any two sub questions each from Questions 4, 5 and 6 respectively.**

Q. No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	a) Explain Finite automata with its type and draw the transition diagram and transition table with respect to an example.	[2]	1	2
Q2	a) Explain how the properties of regular set are applied to finite automata.	[2]	2	2
Q3.	a) Distinguish the types of grammar with an example. Write down languages and production rules with respect to an example.	[6]	3	2
	b) Illustrate the conditions applied to solve the Chomsky normal forms with an example.	[6]	3	2
Q.4	a) Give the formal definition of Pushdown Automata (PDA). Describe the types of PDA. List various applications of PDA.	[5]	4	2
	b) Construct a PDA equivalent to the given Context Free Grammar (CFG). S -> aBc | ab B -> SB | ε	[5]	4	3
	c) Construct a PDA that accepts L= $\{0^n1^n \mid n>=0\}$. Simulate the working of this PDA.	[5]	4	3
Q.5	a) Compare Finite State Machine (FSM) and Turing machine (TM). Discuss about the power of TM over FSM.	[5]	5	2
	b) Design a Turing machine that will replace every occurrence of 11 by 10 from a sequence of 0's and 1's. Show the stimulation for a string 011001110 using instantaneous description.	[5]	5	3
	c) Illustrate various elements of a Turing machine. Explain the variations of Turing machine with a diagram.	[5]	5	2

Q.6)	a) Describe the Post correspondence problems with examples. b) Discuss the Properties of Recursively enumerable languages. c) Discuss the Kruskal's algorithm with minimum spanning tree and find out the total cost of MST.  	[5] [5] [5]	6 6 6	2 2 3

Note: BT Level- 1-Remember,2- Understand, 3-Apply, 4-Analyse,5-Evaluate,6-Create