JHARKHAND Rai University
RANCHI

End Semester/Reappear (Semester V) Examination December, 2024

Programme: B. Tech CSE

Course: Formal Language & Automata Theory **Full Marks: 70**

Course Code: 3PCCCS302 **Time: 3 Hrs.**

Enrolment no. _____

Q. No.	Questions	CO	Bloom Taxonomy Category	Marks
	Section I			
1	**Short Answer type questions**			**4 x 5 = 20**
a	Describe the basic terminologies used in Automata.	CO1	Understand	
	or			
	Define DFA. Design a DFA with ∑ = {0, 1} accepts all strings starting with 1.	CO1	Apply	
b	Explain finite and infinite language with proper example.	CO2	Understand	
	or			
	State Regular Expression. Also mention its rule.	CO2	Understand	
c	Provide a concise explanation of a Pushdown Automaton (PDA). Discuss how a PDA operates on input strings and its computational capabilities.	CO3	Understand	
	or			
	Differentiate between DPDA and NPDA.	CO3	Analyze	
d	Describe a recognizable language with example.	CO4	Understand	
	or			
	Briefly describe why the Halting Problem is considered a challenge for computers.	CO4	Understand	
	Section II			
Long Answer type questions				**3 x 10 = 30**
2	Write down the closure properties of Context Free Languages.	CO2	Understand	
	or			
	Illustrate the steps to convert CFG to GNF using a suitable example.	CO2	Apply	
3	Explain parsing technique with proper example.	CO3	Understand	
	or			
	Explain ambiguous grammar. Test whether the grammar is ambiguous or not. S -> A | B A-> aAb | ab B-> abB | ϵ.	CO3	Understand	
4	Compare and contrast single-tape and multi-tape Turing Machines. Highlight the advantages of using multi-tape machines in terms of computational efficiency.	CO4	Analyze	
	or			
	Design a Turing Machine to accept the strings having equal number of 0's and 1's.	CO4	Apply	
	Section III			
	Application based questions			**1 x 20 = 20**
5	Discuss about the basic components and operation of a Turing Machine. Explain how Turing Machines are used to recognize languages. Provide a simple example of a language and demonstrate how a Turing Machine can accept or reject strings from that language.	CO4	Analyze	
	or			
	Design a Turing Machine that accept the Language L1= {anbncn } and L2={anbn}. Also define all tuples of Turing Machine.	CO4	Create	

COURSE OUTCOME

At the end the course the candidate will able to

CO1: Relate formal languages and mathematical models of computation.

CO2:Analyse different types of languages and the corresponding machines.

CO3: Analyse the Pushdown machine and its role in compiler construction.

CO4: Find the capability of real computers and learn examples of unsolvable problems.

CO5: Analyse classes of P, NP, NP-C and NP-Hard problems.