(II) 10/10/2025

NEP - Semester End Examination – October 2025

Program: SYBSC CS – Semester III **Course:** Theory of Computation

Program Code: UGCS02 **Course Code:** NUCS302

Duration: 1 Hour **Max. Marks:** 30

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Draw neat diagrams wherever necessary.

Q. 1		**Attempt any TWO of the following.**	[10]	Course Outcome	Knowledge Level
	(a)	What is a transition function in a finite automaton?		CO1	L1
	(b)	Define a production rule in a grammar.		CO3	L1
	(c)	Construct a DFA that accepts all binary strings divisible by 3.		CO2	L4
	(d)	Define decidable and undecidable problems with two examples each.		CO4	L1
Q. 2		**Attempt any TWO of the following.**	[10]	Course Outcome	Knowledge Level
	(a)	Explain how reductions are used to prove undecidability.		CO4	L1
	(b)	What are the two methods of acceptance by a PDA?		CO3	L2
	(c)	Define a Turing Machine formally.		CO1	L1
	(d)	Design a PDA to accept the language $L = \{a^n b^n \mid n \geq 1\}$.		CO2	L2
Q. 3		**Attempt any TWO of the following.**	[10]	Course Outcome	Knowledge Level
	(a)	Construct a derivation tree for the string aabbaabbaabb using the grammar: S -> aSb | aS | aSb | e		CO2	L6
	(b)	Explain the Church–Turing Thesis and its implications.		CO4	L5
	(c)	What is the difference between NFA and DFA?		CO1	L4
	(d)	What is a formal grammar?		CO3	L1

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