QP Code: RN22BTECH263 | Reg. No | | | | | | | | | | | AR 22

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)

B. Tech (Fifth Semester - Regular) Examinations, November – 2024

22BCSPC35003/22BCMPC35003/22BCDPC35003- Formal Languages and Automata Theory

(CSE,CSE(AIML), CSE(DS))

Time: 3 hrs | Maximum: 70 Marks

Answer ALL questions

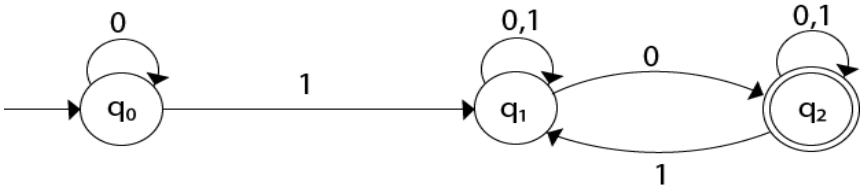
(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. Describe the DFA with its tuples.	CO1	K2
b. Construct a DFA for the following regular expression **$(a+b)^*abb$**	CO2	K3
c. Construct the PDA for the language $L= \{a^{3n}b^n : n>=1\}$	CO3	K3
d. Why Church Turing hypothesis is important? Write the key models of computation related to Church Turing hypothesis.	CO4	K3
e. Write the difference between Recursive and Recursively Enumerable sets with suitable example.	CO4	K2

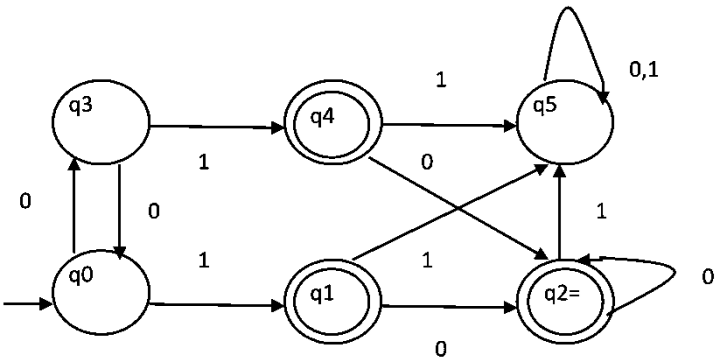
PART – B **(15 x 4 = 60 Marks)**

Answer ***All*** the questions	Marks	CO #	Blooms Level
2. a. Construct a DFA for accepting the binary numbers, which are not divisible by 3.	8	CO1	K4
b. Convert the following NFA to DFA.	7	CO1	K4



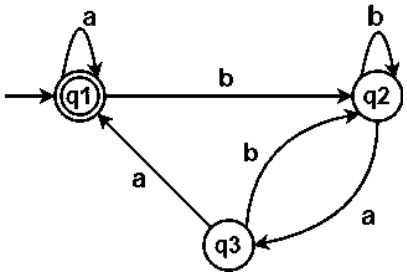
(OR)

c. Minimize the number of states of the given DFA.	8	CO1	K4



d. Construct ∈-NFA of Regular Language L = 0(0+1)*1 and L = (00)*1(11)*	7	CO1	K4

3.a.	Write Regular Expression for the language having a string which should have atleast one 0 and alteast one 1.	8	CO2	K3
b.	Write the regular expression for the language L over $\sum = \{0, 1\}$ such that all the string do not contain the substring 01.	7	CO2	K3
	(OR)			
c.	Construct the regular expression which represents the regular set accepted by the following finite automation.	8	CO2	K4



d.	"Regular expressions provide a powerful tool for textual search in computers" Justify the statement with suitable example.	7	CO2	K3
4.a.	Design a Turing machine for 2's complement of any binary number.	8	CO3	K4
b.	Construct a PDA equivalent to the following context-free grammar	7	CO3	K4

$$L = \{0^n1^m2^m3^n \mid n>=1, m>=1\}$$

(OR)

c.	Construct a PDA for language	8	CO3	K4

$$L = \{0^n1^m \mid n >= 1, m >= 1, m > n+2\}$$

d.	Describe CFG with its tuples.	7	CO3	K3
5.a.	Explain Polynomial time reducibility and how it is important in proving a problem is in NP-Complete? Illustrate with suitable Example.	8	CO4	K3
b.	Prove that the Travelling Salesman Problem is NP-complete.	7	CO4	K4
	(OR)			
c.	Explain how the Ackermann function serves as an example of a total, computable, but non-primitive recursive function.	8	CO4	K3
d.	Explain Gödel numbering. Discuss the importance of Gödel numbering in linking syntax and semantics of formal systems.	7	CO4	K3

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