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GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY
UNIVERSITY, ODISHA, GUNUPUR
(GIET UNIVERSITY)

M.C.A (Second Semester) Regular/Supplementary Examinations, May–2025

MCA23204 - Theory of Computation

(MCA)

Time: 3hrs | Maximum: 60 Marks

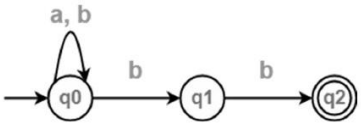
(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. Construct a DFA over Σ= (a,b) accept all the string containing a.	CO1	K2
b. What is Regular Expression?	CO2	K3
c. What do you mean by null production?	CO3	K2
d. Specify the use of context free grammar.	CO4	K2
e. What are the applications of Turing Machine?	CO5	K1

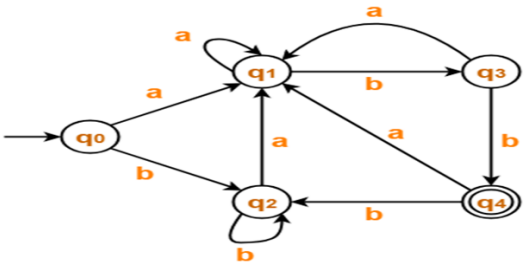
PART – B **(10 x5=50 Marks)**

Answer ***ALL*** questions	Marks	CO #	Blooms Level
2. a. Design an NFA with ∑ = {0, 1} accepts all string in which the third symbol from the right end is always 0.	5	CO1	K4
b. Convert the following NFA to DFA.	5	CO1	K3

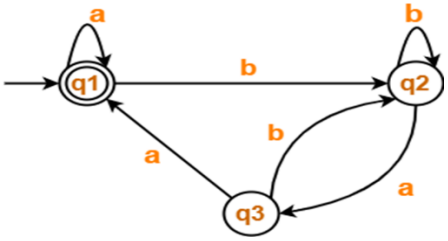


(OR)

c. Minimize the given DFA-	5	CO1	K3



d. Explain the steps to eliminate an epsilon moves from NFA.	5	CO1	K2
3.a. Design a FA from given regular expression 10 + (0 + 11)0* 1.	5	CO2	K3
b. Construct the regular expression for the given DFA	5	CO2	K4



(OR)

c.	Write the regular expression for the language starting with ‘a’ but not having consecutive b's.	5	CO2	K2
d.	Design a FA from given regular expression a(a + b)*ab	5	CO2	K4
4.a.	Convert following grammar into CNF. S→ Aba , A→ aab , B→ AC	5	CO3	K3
b.	Check whether the given grammar ambiguous or not: S→a|abSb|aAb A→bS|aAAb	5	CO3	K3
	(OR)			
c.	Explain pumping lemma for Context Free Grammar with suitable example.	5	CO3	K2
d.	Check whether the given string ” baaba“ is a valid member of the following CFG or not. S→AB|BC , A→BA|a , B→CC|b , C→AB|a	5	CO3	K3
5.a.	Design a push down automata for the language L={ww^R|w=(a+b)*}	5	CO4	K4
b.	Construct a Moore machine that prints ‘a’ whenever the sequence ‘01’ is encountered in any input binary string.	5	CO4	K4
	(OR)			
c.	Construct a Turing machine that accept the language L={$a^N b^N$, N.=1}	5	CO5	K4
d.	Define Turing Machine. What are the roles of Turing machine?	5	CO5	K2
6.a.	Differentiate between Moore machine ad mealy Machine.	5	CO4	K2
b.	Design a Mealy machine for a binary input sequence such that if it has a substring 101, the machine output A, if the input has substring 110, it outputs B otherwise it outputs C.	5	CO4	K4
	(OR)			
c.	Explain Universal Turing Machine.	5	CO5	K2
d.	Draw a Turing Machine to draw a palindrome over{a,b}.	5	CO5	K4

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