Enrolment No: ___E2U OEU O8O7___   Name of Student: ___MADHAV GUPTA___

Department/ School: ___SCSET___

MID-TERM EXAMINATION, ODD SEMESTER 2024

COURSE CODE: CSET 302

COURSE NAME: Automata Theory and Computability

PROGRAM: B.Tech

MAX. DURATION: 1 HRS

TOTAL MARKS: 20

Mapping of Questions to Course and Program Outcomes								
Q.No.	A1	A2	A3	A4	B1	B2	B3	B4
CO	1	1	1	1	2	2	2	2
BTL	2, 3	4	1	1	3, 4	3	3	3

GENERAL INSTRUCTIONS: -

1. Do not write anything on the question paper except **name, enrolment number** and **department/school.**

2. Carrying mobile phones, smartwatches and any other non-permissible materials in the examination hall is an act of **UFM.**

COURSE INSTRUCTION:

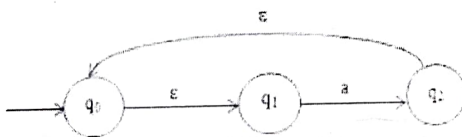a) Attempt all question from each section.

SECTION A

Marks: 08

A1) Consider r = (11 + 111)* over Σ = {0, 1}. Number of states in minimal NFA and DFA respectively:**(2 Marks)**

(a) N – 3, D – 4 ·   (b) N – 3, D – 3   (c) N – 3, D – 3   (d) N – 4, D – 4

A2) Consider NFA:

What will be δ* (q0, a) ?   **(2 Marks)**

(a) {q0, q1, q2} ·   (b) {q1, q2}   (c) {q0, q1}   (d) None

A3) L1 = {$a^m b^n$ | m+n = Even} ,   L2 = {$a^m b^n$ | m-n = 4}   **(2 Marks)**

(a) Both are Regular   (b) L1 is Regular, L2 is Not Regular

(c) Both are Non- Regular ·   (d) L2 is Regular, L1 is Not Regular

A4) Choose the correct option based on given statements. **(2 Marks)**
1) While converting an ε-NFA to its corresponding NFA, the final states of the NFA are those states which are reachable to final state only on reading ε.
2) While converting an ε-NFA to its corresponding DFA, All the states contain final state of ε - NFA are final sates in DFA.
3) In conversion of an ε-NFA to NFA, the total number of states in will remains same, whereas conversion of ε-NFA to DFA the total number of states will increase.
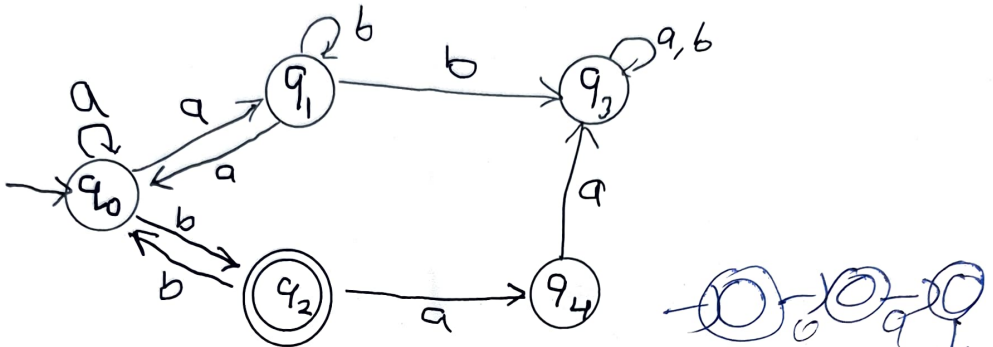
(a) 1   (b) 1, 2   (c) 2, 3   (d) 1, 2, 3 '

SECTION B

Marks: 12

B1) Construct an equivalent DFA for the given NFA by detailing the steps used in conversion.   **(3 Marks)**
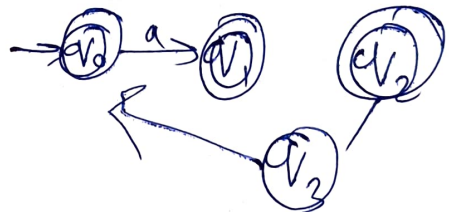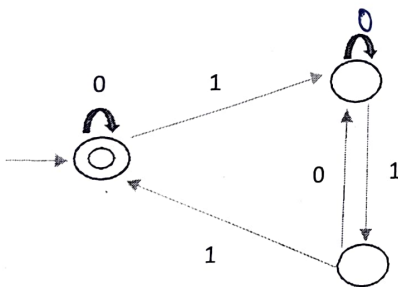

B2) Construct a DFA for the language L over input = {a} such that $L = \{a^n \mid n \geq 0, n \neq 3\}$ **(3 Marks)**

B3) Construct the regular expression for the following FA using any method. Also elaborate the steps used in the method that you use to get the r.e.   **(3 Marks)**

B4) Construct the Mealy machine that take the string of 0 and 1 as a input and provide the complement of given input as a output. For example if input is 11100101 then the output should be 00011010. Also get the Moore machine corresponding to mealy machine.   **(3 Marks)**