II B. Tech II Semester Supplementary Examinations, December - 2022
FORMAL LANGUAGES AND AUTOMATA THEORY
(Common to CSE, CST, CSE(AIML), CSE(AI), CSE(DS), CSE(AIDS), CSE(CS), CSE(IOTCSIBCT),
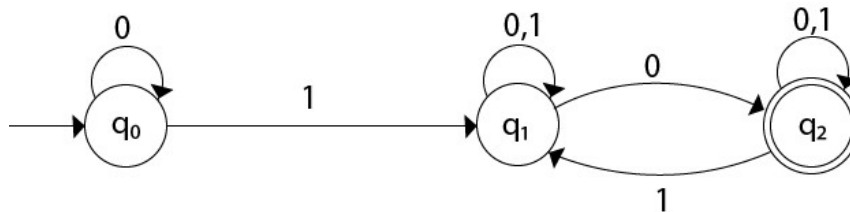CSE(IOT), AIDS, CS& AIML)

Time: 3 hours　　　　　　　　　　　　　　　　　　　　　　　　Max. Marks: 70

Answer any **FIVE** Questions each Question from each unit
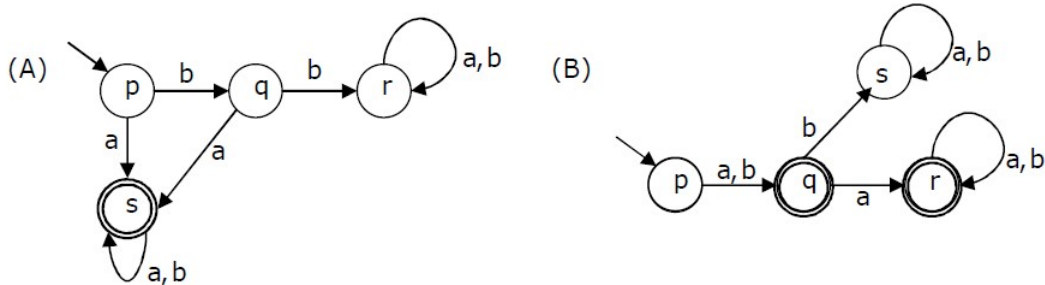All Questions carry **Equal** Marks

UNIT-I

1　a)　Construct DFA for the following: L = {w | w is in the form of 'X01Y' for some　[7M]
　　　string X and Y consisting of 0's and 1's}.

　b)　Convert the below NFA to DFA:　[7M]

OR

2　a)　With an example, explain the procedure for converting a Moore Machine into Melay　[7M]
　　　machine.

　b)　Check whether the two DFAs (A) and (B) given below are equivalent or not.　[7M]

UNIT-II

3　a)　Construct a regular grammar accepting L = {w ∈ {a, b}* | w is a string over {a. b}　[7M]
　　　such that the number of b's mod 4 is 3}.

　b)　Define regular expression. Explain the operations and properties of regular　[7M]
　　　expressions.

OR

4　a)　Using Pumping Lemma show that the language L = {$a^n b^n c^n$ | n≥1} is not a CFL.　[7M]

　b)　Express the following in the form of regular expressions:　[7M]
　　　(i)　The set of strings of 0's and 1's whose tenth symbol from the right end is 1.
　　　(ii)　The set of string of 0's and 1's with at most one pair of consecutive 1's.
　　　(iii) Language of 0's and 1's that has odd length.
　　　(iv) L be the set of length 6.

UNIT-III

5 a) Construct CFGs for the languages: L= { $0^i 1^j 0^k$ | j = i+k } and L= { $a^m b^n$| m ≤ n ≤   [7M]
   2m }.

  b) Let G be the grammar s →aB / bA, A→a/aS/bAA, B→b/bS/aBB. For the string   [7M]
   'aabbabab' find derivation tree, rightmost derivation and left most derivation.

OR

6 a) With a step wise procedure explain how to reduce a grammar into CNF.   [7M]

  b) Construct an equivalent unambiguous grammar for the following grammar: [7M]
   $$E→ E+E \mid E*E \mid (E) \mid id$$

UNIT-IV

7 a) Construct a PDA accepting by final state the languages given below: [7M]
   $$\{a^n b^m c^m d^n \mid m, n ≥ 1\}$$

  b) Define Push Down Automata (PDA). Discuss about the languages accepted by   [7M]
   PDA.

OR

8 a) Write about top-down parsing and bottom-up parsing using PDAs.   [7M]

  b) Construct a PDA equivalent to the following grammar: S→ aAA, A →aS|bS|a   [7M]

UNIT-V

9 a) Give the formal definition of Turing Machine. What are the components of Turing   [7M]
   Machine? What is id of a Turing Machine?

  b) Design a Turing Machine that computes f(x,y) = x+y   [7M]

OR

10 a) Write about halting problem in Turing machines.   [7M]

  b) Find whether post correspondence problem P = {(10,101), (011,11), (101,011)} has   [7M]
   match. Give the solution if exists.