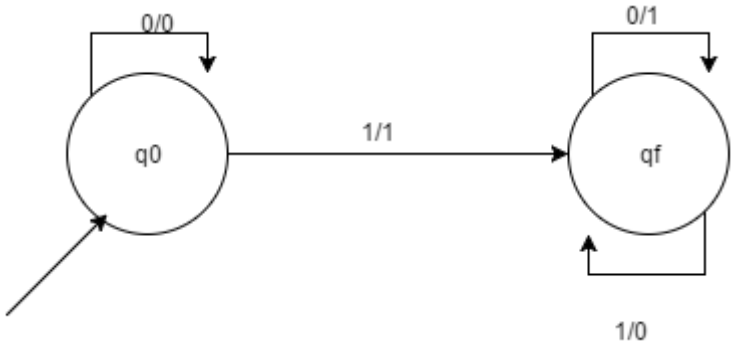
Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
Online End Semester Examination, Dec 2020

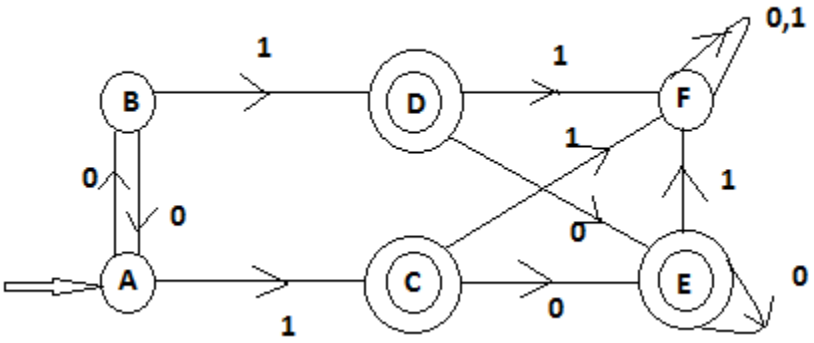
Course: Formal Languages and Automata Theory **Semester: VIth**
Program: B.Tech-CSE-All program **Time 180 minutes**
Course Code: CSEG 3004 **Max. Marks: 100**

SECTION A

1. **Each question will carry 5 Marks.**
2. **Instructions: Complete the statement / Select the correct answer(s)**

S. No.	Question	CO
Q 1	Predict the minimum number of state required in construction of a FA that accepts strings containing exactly 1 over input alphabet {0,1}.	**CO1**
Q2	Write the regular expression over alphabet (a,b,c) containing atleast one a, atleast one b and atleast one c.	**CO2**
Q3	Consider a grammar G = {{S},{0,1},P,S} Where elements of P are: S - SS S - 0S1 S - 1S0 S - ∈ The above grammar will generate _____type of language.	**CO1**
Q4	 Analyze the given mealy machine and recognize the output string generated through it.	**CO2**
Q5	Find the solution of following instance of PCP. $\binom{abab}{ababaaa}\binom{aaabbb}{bb}\binom{aab}{baab}\binom{ba}{baa}\binom{ab}{ba}\binom{aa}{a}$	**CO4**
Q6	For the given language L = { 0^n 1^m | n<=m } using pumping lemma concept, generate the string which doesn't exist in L.	**CO2**

SECTION B **1. Each question will carry 10 Marks with internal choice wherever applicable.** **2. Instruction: Write short / brief notes.**		
Q7	Prove that the language L = {$\mathbf{a^n\ b^n}$ for n = 0,1,2,3,……} is not regular.	**CO2**
Q8	Convert the following grammar G into Greibach Normal Form (GNF). S → XA|BB B → b|SB X → b A → a	**CO3**
Q9	Find out a regular expression for given transition function of a Finite Automaton where q1 is initial state and q4 is final state. (q1,0)-q1 (q1,1)-q2 (q2,0)-q3 (q2,1)-q2 (q3,0)-q1 (q3,1)-q4 (q4,0)-q1 (q4,1)-q2	**CO2**
Q10	Construct a mealy machine which calculate residue mod - 4 for each binary string treated as binary. Further also convert your constructed mealy machine into moore machine. OR Explain the Myhill-Nerode Theorem. Apply the theorem to minimize the following given DFA.	**CO2**

		
Q11	Design a Turing machine which computes the following function. $F(S) = SS^R$, where S^R is the reverse of string S. (S belongs to (a,b)*).	**CO4**
SECTION-C **1. Each Question carries 20 Marks.** **2. Instruction: Write long answer.**		
Q12	Explain the concept of CNF and also consider the following grammar G and write its equivalent CNF S - ABAC A - aA/∈ B - bB/∈ C - c Write step by step process of conversion and also explain the difference between CFG and CNF grammars. OR Write transition rules for a PDA corresponding to the following L={x|x ∈ $(a,b)^*$ and $n_a(x)=n_b(x)$} and show the processing of one valid and one invalid string	**CO3**