Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – VI (OLD).EXAMINATION – WINTER 2016

Subject Code: 160704 Date: 26/10/2016

Subject Name: Theory of Computation

Time: 10:30 AM to 01:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Define Mathematical Induction principle and prove that for any n>=4, $n!>2^n$	**07**
	(b)	Explain following i. One to one and onto function ii. Properties of equivalence relation.	**07**
Q.2	**(a)**	Draw FA for each of the following RE. i. (0+1)*(1+00)(0+1)* ii. (0+1)*(01+110) iii. (111+100)*0	**07**
	(b)	Suppose that language L1 and L2 are the subsets given below. L1 = {x | 00 is not a substring of x} L2 = { x | x ends with 01} Draw FA for intersection L1 and L2	**07**
		OR	
	(b)	For each of the RE draw NFA-∧ i. (0+1)*(011+01010)(0+1)* ii.(0+1)(01)*(011)*	**07**
Q.3	**(a)**	Explain pumping lemma and it's application.	**07**
	(b)	For the following CFG, Find Chomsky normal form S->AACD A->aAb|∧ C-> aC|a D->aDa|bDb|∧	**07**
		OR	
Q.3	**(a)**	Find regular expression for following i. Language of all strings containing exactly two 0's. ii. Language of all strings that begins or ends with 00 or 11. iii. Language of all strings in which every 0 is followed immediately by 11.	**07**
	(b)	For the following CFG, Find Chomsky normal form S->AaA|CA|BbB A->aaBa|CDA|aa|DC B->bB|bAB|bb|aS C->Ca|bC|D D->bD|∧	**07**
Q.4	**(a)**	Write PDA for language of palindrome. Trace it with example.	**07**
	(b)	Explain Universal Turing Machine.	**07**
		OR	
Q.4	**(a)**	Write PDA for the string with equal number of a's and b's. Trace it with example.	**07**
	(b)	Draw a TM to accept { ss | s ϵ {a,b}* }.	**07**
Q.5	**(a)**	Draw a TM to copy strings.	**07**
	(b)	Find minimum state FA recognizing the language corresponding to following RE. i. (0*10+1*0)(01)* ii. (010)*1 + (1*0)*	**07**
		OR	
Q.5	**(a)**	Explain Primitive recursive Function.	**07**
	(b)	Explain P, NP and NP complete problem.	**07**

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