Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY MCA Integrated- SEMESTER- I • EXAMINATION – WINTER 2016

Subject Code: 4410604 Date:-07						
Su Tir Inst	Subject Name: Basic Mathematics for IT Time:10:30 AM TO 01:00 PM Total Mark Instructions:					
	1. 2. 3.	Attempt all questions. Make suitable assumptions wherever necessary. Figures to the right indicate full marks.				
Q.1	(a)	 (i) Do as directed: 1. If f and g are the function R -> R defined by f(x) = 2x -3, g(x) = x² + 1 then find gOf. 2. Define Singleton. 3. If A = (1, 2) then find P(A) 	03			
		 (ii) Let A be a set of all lines in a plane.Let R ⊆ A X A where R = {(l,m) l,m ∈ A, 1 m} then Determine relations R are equivalence relations or not. 	04			
	(b)	Find Eigen values and Eigen vectors of following matrix : $\begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$	07			
Q.2	(a)	In a certain government office there are 400 employees; there are 150 men, 276 university graduates, 212 married persons.94 male university graduates, 151 married university graduates, 119 married men, 72 married male university	07			
	(b)	graduates. Find the number of single women who are not university graduates. Solve the equations using matrix inversion method. x + 2y - z = 3 $3x - y + 2z = 1$ $2x - 2y + 3z = 2$				
	(b)	Define Rank of matrix .Find rank of following matrix . $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$	07			
Q.3	(a)	 (i) Define universal quantifier and Existential quantifier. (ii) Determine whether following statement is TRUE or FALSE(with Reason): P ∧ T = T where P is proposition. ∀x (x²+2 ≥ 1) where domain is set of integers. 	07			
	(b)	 5. ∀y∃!x(x.y=0) where domain is set of integers. Express the following using predicates ,quantifiers and logical connectives .Also verify the validity of the consequence. It is not sunny this afternoon and it is colder than yesterday. We will go swimming only if it is sunny. If we do not go swimming then we will take a cannoy trip. If we take cannoy trip then we will be home by sunset leads to conclusion we will be home by sunset. 	07			
Q.3	(a)	(i) Prove without using truth that statement A is logically equivalent	03			
		to statement B. A : $(P \rightarrow (Q \rightarrow P))$ and B: $\neg Q$. (ii) State D'morgan's both laws and prove any one law using truth	04			

(ii) State D'morgan's both laws and prove any one law using truth

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table.

	(b)	(i)	Prove the following theorem using direct proof method. For all interaction is a difference of r_{1}^{2} is a difference of the set of the se	03
		(ii)	Integer x , if x is odd then x^2 is odd. Prove the following theorem using contraposition proof method For all integer n if $3n+2$ is odd then n is odd	04
			method. For an integer 11,11 511+2 18 odd ,then it is odd.	
Q.4	(a)	Use n	nathematical induction to prove that 2^{2}	07
	(b)	1 + 2	$+2^{2} + \dots +2^{n} = 2^{n+1} - 1$ for all nonnegative integers n.	02
	(0)	(i)	An employee joined a company in 1999 with a starting salary of	02
		(11)	50.000 Rs. Every year this employee receives a raise of 1000Rs	02
			plus 5% of the salary of the previous year.	
			a) Set up a recurrence relation for the salary of this employee n	
			years after 1999.	
			b) What will the salary of this employee be in 2007?	
0.4	(a)	Uso n	OR nathematical induction to prove that	07
Q.4	(a)	111+	(-2.2) + (-2.2) + n n! = (n+1)! - 1 Where n is positive integer	07
	(b)	(i)	How many students must be in a class to guarantee that at least	02
			two students receive the same score on the final exam, if the exam	
			is graded on a scale from 0 to 100 point?	
		(ii)	Suppose that a person deposits \$10,000 in saving account at a	05
			bank yielding 11% per year with interest compounded annually.	
			now much will be in the account after 50 years?	
Q.5	(a)	(i)	If $a=3i+j+2k$ and $b=2i-2j+4k$ Find	02
		(;;)	(1) $a - b$ (11) $a + 3b$ Show using vectors that the line joining the middle points of two	05
		(11)	slides of a triangle is parallel to third side and is half of it	05
	(b)	(i)	Find the slope of the line $\sqrt{3}v = x - 2\sqrt{3}$	01
		(ii)	Find the equation of the circle passing through the origin and	03
		()	making intercepts a and b on the axes.	
		(iii)	If the join of points (2,3) and (-1,5) subtends a right angle at the	03
			point P, Find the locus of P.	
0.5	(\mathbf{a})	(\mathbf{i})	OR Show that the sum of the three vectors determined by the sides of	0.2
Q.5	(a)	(1)	show that the sum of the three vectors determined by the sides of a triangle taken in order is the zero vector	03
		(ii)	The position vectors of the points A.B.C.D are given by	04
		(11)	a = 3i + 4j + 5k,	•••
			$\mathbf{b} = 4\mathbf{i} + 5\mathbf{j} + 6\mathbf{k},$	
			c = 7i + 9j + 3k,	
		<i>(</i> •)	d = 4i + 6j. show that AB and CD are parallel.	0.1
	(b)	(1)	Find the slope of the joining points $(-2,-1)$ and $(-1,3)$.	01
		(11)	$x^2+y^2-2x+4y-11 = 0$ to the origin	03
		(iii)	Find the equation to the locus of a point which is always	03
		()	equidistant from the points (a+b, a-b) and (a-b, a+b).	
