Seat No.: ________ Enrolment No.___________

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA Integrated - SEMESTER–I • EXAMINATION – SUMMER • 2015

Subject Code: 4410604 **Date: 12-05-2015**

Subject Name: Basic Mathematics for IT

Time: 10:30 am - 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 the following terms **07**

1. Power Set
2. Modulus of a vector
3. Proposition
4. Equivalence Relation
5. Coinitial Vectors
6. Diagonal Matrix
7. Circle

(b) I) If U = {x/x∈N, x Ò10} **04**

A = {x/x∈N, x is even integer, 1Òx Ò10}

B = {2, 3, 5, 7}

C = {1, 5, 6, 8, 10}

Find (i) A' (ii) A ï B (iii) A ∩ (B' - C) (iv) A ï (B ∩ C')

II) Construct a truth table for each of following compound propositions. **03**

(i) $p \rightarrow (\sim q \vee r)$ (ii) $(\sim p \leftrightarrow \sim q) \leftrightarrow (q \leftrightarrow r)$

(iii) $(p \rightarrow q) \wedge (\sim p \rightarrow r)$

Q.2 **(a)** Verify that $A(BC) = (AB)C$ for the following matrices **07**

$$A = \begin{bmatrix} 1 & 1 & 1 \\ 2 & 2 & 2 \\ 3 & 3 & 3 \end{bmatrix} \qquad B = \begin{bmatrix} 1 & 0 & -1 \\ 0 & -1 & 1 \\ -1 & 1 & 0 \end{bmatrix} \qquad C = \begin{bmatrix} -1 & -1 \\ 2 & 2 \\ 1 & 1 \end{bmatrix}$$

(b) Solve the following equations by using matrix inversion **07**

5x ï y + z = 4

3x + 2y ï 5z = 2

x + 3y ï 2z = 5

OR

(b) Solve the following system of linear equations by Gauss elimination method. **07**

$5x - y + z = 10$

$2x + 4y = 12$

$x + y + 5z = -1$

Q.3 **(a)** Give a direct proof of ñIf n is an odd integer, then n^2 is odd.ò **07**

(b) Using mathematical induction show that if n is a positive integer, then **07**

$1 + 2 + 2^2 +$ é $+ 2^n = 2^{n+1} - 1$

OR

Q.3 **(a)** Prove that ñif n is an integer and n^2 is odd, then n is oddò using proof by contraposition. **07**

(b) Answer the following questions. Justify your answer with proper explanation. **04**

(i) How many cards must be selected from a standard deck of 52 cards to guarantee that at least three cards of the same suit are chosen?

		(ii) How many cards must be selected to guarantee that at least three hearts are selected?	**03**
Q.4	**(a)**	Find the first six terms of the sequence defined by following recurrence relations and initial conditions $a_n = a_{n-1} - a_{n-2}$ $a_0 = 2$ $a_1 = -1$	**07**
	(b)	How many positive integers less than 1000 (i) are divisible by 7? (ii) are divisible by 7 but not by 11? (iii) are divisible by both 7 and 11? (iv) are divisible by either 7 or 11? (v) are divisible by neither 7 nor 11? (vi) have distinct digits? (vii) have distinct digits and are even?	**07**

OR

Q.4	**(a)**	Let $a_n = 2^n + 5Å3^n$ for n = 0, 1, 2, 3,é	
		(i) Find a_0, a_1, a_2, a_3 and a_4	**05**
		(ii) Show that $a_2 = 5a_1 - 6a_0$	**02**
	(b)	How many positive integers between 1000 and 9999 inclusive (i) are divisible by 9? (ii) are even? (iii) have distinct digits? (iv) are not divisible by 3? (v) are divisible by 5 or 7? (vi) are not divisible by either 5 or 7? (vii) are divisible by 5 and 7?	**07**
Q.5	**(a)**	Find the equation of the circle passing through the points (5, -8), (-2, 9) and (2, 1)	**07**
	(b)	Find the angle between the vectors 3i + j + 2k and 2i ï 2j + 4k	**07**

OR

Q.5	**(a)**	Find the area of the triangle, the co-ordinates of whose vertices are (1, 3), (1,2), (-1,1)	**07**
	(b)	Show that the points (8,-10), (7,-3) and (0, -4) are the vertices of a right triangle.	**07**

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