Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA Integrated- SEMESTER– I EXAMINATION – WINTER 2019

Subject Code: 4410604 Date:23/12/2019

Subject Name: Basic Mathematics for IT

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 : **07**

1. Function
2. Symmetric Relation
3. Unit Vector
4. Circle
5. Proposition
6. Scalar Matrix
7. Finite Set

(b) a) Construct a truth table for each of following compound propositions.

1. $(\sim p \leftrightarrow \sim q) \leftrightarrow (q \leftrightarrow r)$ **04**
2. $(p \rightarrow q) \wedge (\sim p \rightarrow r)$ **03**

b) List the following Stes: **07**

A={X/ x ∈ N and x ≤ 5}

B={X/ x ∈ Z and x <5}

C={X/ x ∈ Z and 1 ≤ x < 5}

Q.2 **(a)** Define Matrix. Solve the following equations using matrix inversion method. **07**

1. x + 2y - z = 3
2. 3x - y + 2z = 1
3. 2x - 2y +3z = 2

(b) 1. Consider the statement, "If today is Monday, then I will go for a walk". **05**
Write converse, inverse and contrapositive for the given statement.

2. Give an example of implication & bi-implication. **02**

OR

(b) Solve the following equations using Gauss elimination method: **07**

1. x + 2y + 3z = 14
2. 3x + y + 2z = 11
3. 2x + 3y + z = 11

Q.3 **(a)** Let p and q be the two propositions. **07**

p: It is below freezing.

q: It is snowing.

Write these proposition using p and q and logical connectives.

a) It is below freezing and snowing.

b) It is not below freezing & it is not snowing.

c) If it is below freezing, it is also snowing.

(b) Using indirect proof technique, show that if n^2+3 is odd, then n is even. **07**

OR

Q.3 **(a)** Consider these statements. The first two are called premises and the third is called the conclusion. The entire set is called an argument. Express the statement using quantifier and logical connectives. **07**

"All humming birds are richly colored."

"No large birds live on honey."
"Birds that do not live on honey are dull in color."
"Hummingbirds are small".

(b) Using mathematical induction show that if n is a positive integer, then **07**
$1 + 2 + 2^2 + \ldots + 2^n = 2^{n+1} - 1$

Q.4 **(a)** Answer the following questions. Justify your answer with proper explanation. **07**

(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?

(b) How many positive integers less than 1000 **07**

(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?

OR

Q.4 **(a)** Define Recurrence relation. **07**

Suppose that the number of bacteria in a colony triples every hour.

(i)Set up a recurrence relation for the number of bacteria after n hours have elapsed.

(ii)If 100 bacteria are used to begin a new colony, how many bacteria will be in the colony after 10 hours?

(b) A popular style of running shoe is available for both men and women. The woman's shoe comes in sizes 6, 7, 8, and 9, and the man's shoe comes in sizes 8, 9, 10, 11, and 12. The man's shoe comes in black and white, while the woman's shoe comes in white, black, and red. Use tree diagram to determine the number of different shoes that a store has to stock to have at least one pair of this type of running shoe for all available sizes and colors for both men and women. **07**

Q.5 **(a)** Find the angle between the vectors $3i + j + 2k$ and $2i - 2j + 4k$ **07**

(b) Find the intercept that the line $3x-2y-6=0$ makes on the axes. What is slope of this line? **07**

OR

Q.5 **(a)** Find the equation of the circle which passes through the points (1,3) , (2,-1) and (-1,1). **07**

(b) Find the point which divides the join of (1,2) and (3,4) in the ratio 2:5. **07**

****