Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA Integrated - SEMESTER–I • EXAMINATION – WINTER 2015

Subject Code:4410604 **Date:01/01/ 2016**

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 following: **07**

(i) Power set.
(ii) Reflexive relation.
(iii) Transitive relation.
(iv) One-one function.
(v) Onto function.
(vi) Unit vector.
(vii)Complement of a relation.

(b) (i)What is the difference between Vector and Scalar? **04**

(ii)List the following sets **03**

(a) A={x/ $x \in N$ and x ≤ 10 }
(b) B={x/ $x \in Z$ and x<6 }
(c) C={x/ $x \in Z$ and $2 \leq$ x ≤ 6 }

Q.2 **(a)** In a recent survey of 400 students in a school, 100 were listed as smokers and 150 as chewers of gum; 75 were listed as both smokers and gum chewers. Find out how many students are neither smokers nor gum chewers. **07**

(b) Solve the following system of equation using Gauss Elimination method **07**

$$x+2y+3z=14$$
$$3x+y+2z=11$$
$$2x+3y+z=11$$

OR

(b) Solve the following system of equation using Matrix inversion method **07**

$$5x-y+z=4$$
$$3x+2y-5z=2$$
$$x+3y-2z=5$$

Q.3 **(a)** Define: Tautology. **07**

Check Whether the following statements are tautology or not.
(i)~(pvq)→(q^p)
(ii)(~p^q)→r

(b) 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".

OR

Q.3 **(a)** Express the following using predicates, Quantifiers, and logical connectives. Also verify the validity of the consequence. **07**

If it snows, then the streets become slippery. If the streets become slippery, then accident happens. Accidents do not happen. Therefore it does not snow.

(b) (i) Use Direct proof technique to prove that "if n is odd integer then n^2 is also odd integer." **04**

(ii) Draw Venn Diagram of $(A-B)\cup(A-C)$ for the sets A, B, and C. **03**

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) Define Product rule. **07**

A multiple choice test contains 10 questions. There are four possible answers for each question.

(i) How many ways can a student answer the questions on the test if the student answers every question?

(ii)How many ways can a student answer the questions on the test if the student can a leave answers blank?

OR

Q.4 **(a)** Use mathematical Induction for the statement **07**

P(n): n^3-n is divisible by 3; for all positive integers n.

(i) What is the statement P(1)?

(ii) Show that P(1) is true.

(iii) What is inductive hypothesis?

(iv) Prove inductive step.

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

(b) Show that the points (8,-10), (7, -3) and (0, -4) are the vertices of a right triangle. **07**

OR

Q.5 **(a)** Find the intercept that the line 3x-2y-6=0 makes on the axes. What is slope of this line? **07**

(b) Find the radius and centre of the circle $x^2+y^2+x+y-1=0$. **07**

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