Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA - Integrated - SEMESTER–I • EXAMINATION – SUMMER - 2016

Subject Code: 4410604 **Date: 01/06/2016**

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 : **07**

a) Domain of a function
b) Unit Vector
c) Power Set
d) Finite Set
e) Scalar Matrix
f) Conjunction
g) Diagonal Matrix

(b) i) What is Function? Explain types of Function with suitable example. **05**

ii) Distinguish between Vector & Scalar **02**

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

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

(b) Define Contradiction & Tautology. Show that each of this conditional statement is a tautology by using truth tables. **07**

(1) $(p \wedge q) \rightarrow p$
(2) $P \rightarrow (p \vee q)$
(3) $\sim p \rightarrow (p \rightarrow q)$
(4) $(p \wedge q) \rightarrow (p \rightarrow q)$
(5) $\sim (p \rightarrow q) \rightarrow p$

OR

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

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

Q.3 **(a)** i. Express the statement "If a person is female and is a parent, then this person is Someone's mother" as a logical expression involving predicates, quantifiers with a domain consisting of all people and logical connectives. **04**

ii. Let p and q be the two propositions. **03**

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 a^2+3 is odd, then a is even. **07**

OR

Q.3 **(a)** i. Consider the statement, "If today is Monday, then I will go for a walk". Write converse, inverse and contrapositive for the given statement. **04**

ii. Test whether the given arguments are logically valid or not. **03**

"If it rains, the prices of vegetables go up. The prices of vegetables go up. So it rains."

(b) Out of 1000 students who appeared for C.A. Intermediate Examination, 750 failed in Maths, 600 failed in Accounts and 600 failed in Costing, 450 failed in both Maths & Accounts, 400 failed in both Maths & Costing, 150 failed in both Accounts & Costing. The Students who failed in all the three subjects were 75. Prove that the above data is not correct. **07**

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) Suppose that "I Love New Jersey" T-Shirts come in five different sizes: S, M, L, XL and XXL. Further suppose that each size comes in four color, white, red, green and black, except for XL, which comes only in red, green and black and XXL, which comes only in green and black. How many different shirt does a souvenir shop have to stock to have at least one of each available size and color of the T-shirt? **07**

OR

Q.4 **(a)** 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?

(b) Find the radius and centre of the circle. **07**

$2x^2 + 2y^2 – x + 3y + 1 = 0$.

Q.5	**(a)**	i.	Find the distance between the points (4,-7) and (-1,5).	**03**
		ii.	Find the point which divides the join of (2,1) and (3,5) externally in the ratio 2: 3, the point lying towards the point (3,5)	**04**
	(b)		Find the equation of the circle which passes through the points (1,3), (2, -1) and (-1,1).	**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)	Let $a_n = 2^n + 5 \cdot 3^n$ for n = 0, 1, 2, 3,… (i) Find a_0, a_1, a_2, a_3 and a_4 (ii) Show that $a_2 = 5a_1 - 6a_0$	**07**

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