Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**MCA Integrated - SEMESTER– 1 EXAMINATION – WINTER 2018**

**Subject Code: 2618604 Date: 08-01-2019**

**Subject Name: Basic Mathematics for IT**

**Time: 10.30 am to 1.00 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)** Give definition of the following terms: **07**

1) Null set
2) Union of two sets
3) Symmetric Matrix
4) Universal Quantifiers
5) Reflexive Relation
6) Mixed Graph
7) Isolated vertex

**(b)** Let U = {a,b,c,d,e,f,g,h,p,q,r}X = {a,b,c,d,e}Y = {c,d,e,f,g,h}Z = {h,p,q,r}Compute, $X \cup Y$, $Y \cap Z \cap X$, $X-(Y \cup Z)$, $(X \cup Y)'$, $X'$, $X' \cap Y'$, $X \Delta Y$, using Venn Diagram. (Note: $X \Delta Y = (X-Y) \cup (Y-X)$) **07**

**Q.2** **(a)** Check whether the statements are tautology or not.(using truth table) **07**

i) $(P \rightarrow (\neg P)) \rightarrow (\neg P)$

ii) $(P \rightarrow (Q \rightarrow R)) \rightarrow ((P \rightarrow Q) \rightarrow (P \rightarrow R))$

**(b)** Each student in a class of 40 plays at least one indoor game chess, carrom and scrabble. 18 play chess, 20 play scrabble and 27 play carrom. 7 play chess and scrabble, 12 play scrabble and carrom and 4 play chess, carrom and scrabble. Find the number of students who play (i) chess and carrom. (ii) chess, carrom but not scrabble. **07**

**OR**

**(b)** Using Predicate, Quantifier and rule of inference determine the given argument is valid or not "All student in the class understand logic. Xavier is a student in this class. Therefore, Xavier understand logic." **07**

**Q.3** **(a)** For an integer x prove that the following statements are equivalent: **07**

*p: x is divisible by 10.*

*q: x is divisible by 2 and 5.*

*r: x is an even number and x is divisible by 5.*

**(b)** If $A = \begin{bmatrix} 1 & -2 & 3 \\ -4 & 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \\ 2 & 1 \end{bmatrix}$ then find AB, BA. Show that $AB \neq BA$ **07**

**OR**

**Q.3** **(a)** Let X = {1,2,3,4,5} R={<x,y> | x>y}. Draw a graph of R and also give its matrix. Check whether the given relation an equivalence relation? **07**

**(b)** $1^3 + 2^3 + 3^3 + ..... + n^3 = \left[ \frac{n(n+1)}{2} \right]^2$ **07**

**Q.4** **(a)** Define Composition of a function. Let X={1,2,3} and *f,g,h*and *s* be functions from X to X given by *f* = {<1,2>,<2,3>, <3,1>} *g* = {<1,2>,<2,1>, <3,3>} *h* = {<1,1>,<2,2>, <3,1>} *s* = {<1,1>, <2,2>, <3,3>} **07**

Find f*og ,gof, fohog, sog, gos, sos.*

**(b)** Name different techniques of proof. Explain "the method of proof by contradiction", giving suitable example. **07**

**OR**

**Q.4** **(a)** Explain basic properties of integer with examples. **07**

**(b)** Let X = {1,2,3,4,5} and R,S,T be the relation as follows: R={(x,y)/x+y=5} S={(1,2),(3,4),(2,2)}T = {(4,2),(2,5),(3,1),(1,3)} (i) Write properties of *R* . (ii) Write matrix of *R* .(iii) Find *S* o*T, R* o *S and S* o *R* . **07**

**Q.5** **(a)** Define node base of a diagraph. Find all node base of the digraph given below **07**

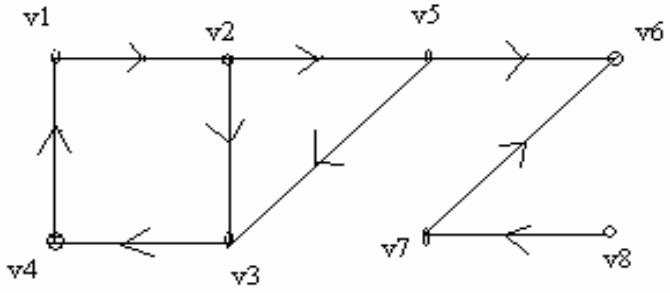



fig-2

**(b)** Define adjacency matrix of a graph and obtain the adjacency matrix (A) for the following graph. Find $A^T$. Also draw graph of $A^T$ and find Path matrix P. **07**

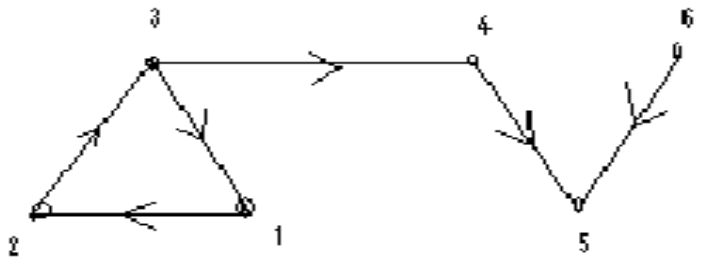
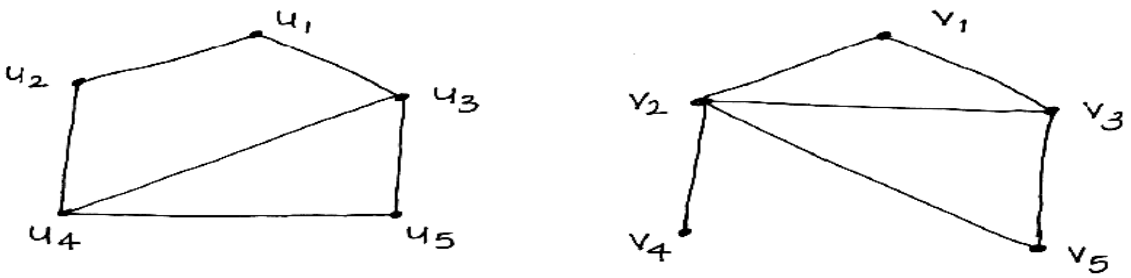



fig-1

**OR**

**Q.5** **(a)** Define Binary tree. Convert the given tree into the Binary tree (v0(v1(v2)(v3)(v4))(v5(v6)(v7)(v8)(v9))(v10(v11)(v12))). **07**

**(b)** Define: Isomorphic Graph. Verify the following graphs are isomorphic or not.(Justify) **07**

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