PAGE No.
DATE

~~Ass~~ no 1

1) Write the foll in tabular form.
   i) $A = \{x / x^2 - 16 = 0\}$

2) If $A = \{x / x^3 - 6x^2 + 11x = 6\}$
   $B = \{x / x^2 - 5x + 4 = 0\}$
   $C = \{x / x^2 - 13x + 36 = 0\}$
   (i) $(A \cap B) \cup C$ (ii) $(A - B) \cup (C - B)$.

3) 9000 students appeared for two papers in Mathematics at a certain examination. Exactly 7400 and 6600 students passed in Paper I and II respectively. If 6400 students passed in both the papers. Find the number of students failed in both the papers using Venn diagram.

4) A company studies the product preferences of a certain number customers. It was found that each of the products A, B, C is liked 9620, 6230, 5980 customers respectively. 1500 customers liked all the three products. A and B are liked by 2580, A and C by 2100 and B and C by 1950 customers. Find the total no of customers.

5) State whether the statement is tautology, contradiction or neither.
   (i) $p \vee [\sim (p \wedge q)]$

PAGE No.
DATE

6) Prove by mathematical Induction

a) ~~$5^n + 3$ is divisible by 4~~

b) $\frac{1}{3 \cdot 8} + \frac{1}{8 \cdot 13} + \frac{1}{13 \cdot 18} + \cdots + \frac{1}{(5n-2)(5n+3)} = \frac{n}{5n+3}$

c) Let $P(n): 1^3 + 2^3 + 3^3 + \cdots + n^3 = \frac{n^2(n+1)^2}{4}$

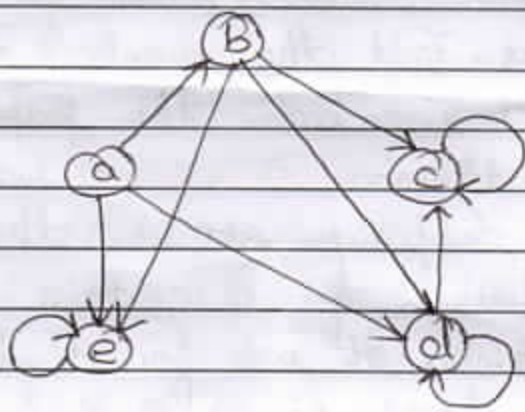
(a) Use $P(k)$ to show $P(k+1)$

(b) Is $P(n)$ true for all $n \geq 1$?

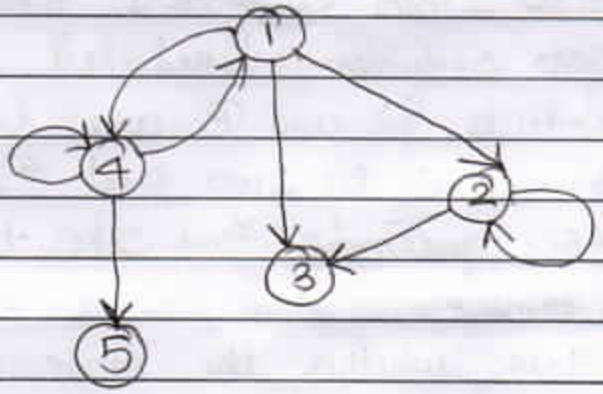
Ass no 2:-

a) Find the relation determined by the diagraph and its matrix

(a)



(b)



PAGE No.
DATE

Q.2) Do the qts for the given diagraph.

(a) Write the Relation R (b) Write R^{-1}

(c) Write M_R (d) Write M_R^2

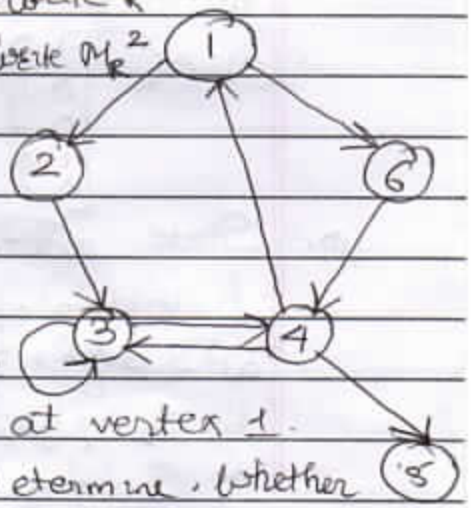
(e) Draw diagraph of R^2

(f) Write paths of length 1

(g) Write paths of length 2

(h) Write paths of length 3 starting from vertex 2.

(i) Write a cycle starting at vertex 1.



Q.3) Let $A = \{1,2,3,4,5,6\}$. Determine whether the relation R whose matrix M_R is given is reflexive, irreflexive, symmetric, asymetric, antisymmetric or transitive.

$$M_R = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 \\ 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 1 \end{bmatrix}$$

Q.4) Let R and S be the relations on $A = \{1,2,3,4\}$ defined by ~~$R = \{(1,1),(3,1),(3,4$~~

$R = \{(1,1),(3,1),(3,4),(4,2),(4,3)\}$

$S = \{(1,3),(2,1),(3,1),(3,2),(4,4)\}$ Find.

(a) $R \circ S$ (b) $S \circ R$ (c) $R^2 = R \circ R$ and M_R^2

(d) $S^2 = S \circ S$ and M_S^2 (e) $R^3 = R \circ R \circ R$ (f) R^{-1}

(g) $R \circ R^{-1}$ and $R^{-1} \circ R$.

Q.5) Let $A = \{1,2,3,4\}$ and $R = \{(2,1),(2,3),(3,2),(3,3)\}$

(a) Find the reflexive closure of R $(2,2),(4,2)$

(b) Find the symmetric closure of R

Q.6) Find the transitive closure R∞ by warshalls Algorithm

(a) $M_R = \begin{bmatrix} 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 \end{bmatrix}$

Q.7) State with reason which of the foll are partitions of $S = \{1, 2, \ldots, 8, 9\}$

a) $S_1 = \{\{1, 3, 5\}, \{2, 6\}, \{4, 8, 9\}\}$

b) $S_2 = \{\{1, 3, 5\}, \{2, 4, 6, 8\}, \{5, 7, 9\}\}$

c) $S_3 = \{\{1, 3, 5\}, \{2, 4, 6, 8\}, \{7, 9\}\}$

Q.8) Find domain range, M_R, R^{-1} and draw diagraph of the relation R for the foll. $A = \{1, 2, 3, 4, 8\}$; aRb if and only if $a+b \leq 9$.

Q.9) Let A be the set of real numbers. Define relation on A as aRb if $a^2+b^2=25$ Find Dom (R) and Ran (R)

Q.10) Let $A = \{a, b, c, d\}$ and R be a relation on A whose matrix is $M_R = \begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 1 \end{bmatrix}$

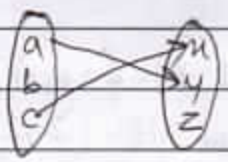
a) Prove that R is a partial order

b) Draw the Hasse diagram of R.

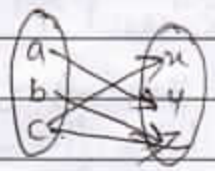
Ass no 3:-

1) State whether each diagram defines a funct^n $A = \{a, b, c\}$ and $B = \{x, y, z\}$

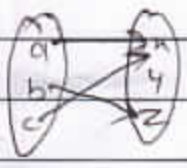
(a)



(b)



(c)



PAGE No.
DATE

(2) ~~Ans~~ no 3 Continue.

Q.2) Let $A=\{a,b,c,d\}$ $B=\{1,2,3\}$.
Determine whether each relation from A to B is a function. If it is a function give its range.

(a) $f=\{(a,3),(b,2),(c,1)\}$

(b) $g=\{(a,1),(b,1),(c,1),(d,1)\}$

(c) $h=\{(a,2),(c,3),(d,3),(b,4)\}$

Q.3) Let $A=B=\{1,2,3,4\}$ and let $f=\{(1,3),(2,1),(3,4),(4,3)\}$ and $g=\{(1,2),(2,3),(3,1),(4,1)\}$
Find (a) fog (b) gof (c) fof.

Q.4) Let f, g and h are functions from $\mathbb{R}$ to $\mathbb{R}$ defined as $f(x)=2x^3-7$, $g(x)=3x^2$, $h(x)=5x+4$
Find (a) $((g \circ f) \circ h)(1)$
(b) $(f \circ (h \circ g))(-1)$
(c) $(f \circ (g \circ g))(i)$

Q.5) Let $A=B=R$ and let $f(x)=2x^3-1$, $g(x)=\left(\frac{x+1}{2}\right)^{1/3}$. Find fog and gof.

Q.6) Find (a) $\lfloor 13.2 \rfloor$ (b) $\lceil 13.2 \rceil$ (c) $\lfloor -13.2 \rfloor$
(d) $\lceil -13.2 \rceil$ (e) $\lfloor -0.17 \rfloor$ (f) $\lceil -0.17 \rceil$ (g) $\lfloor 13 \rfloor$ (h) $\lceil 13 \rceil$

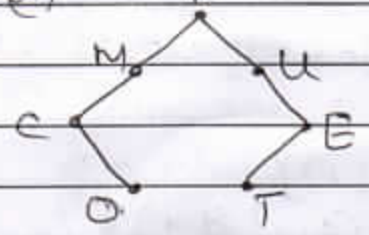
Q.7) How many relative must you have to guarantee atleast five of them will have birthdays in the same month?

PAGE No.
DATE

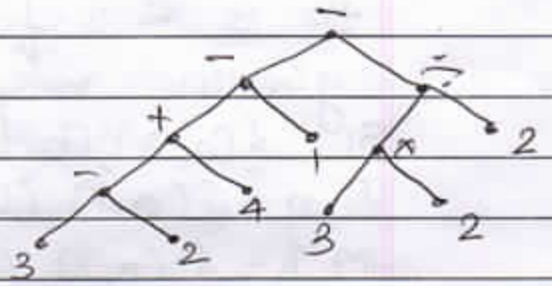
Ass no 4:-

(1) Perform Preorder, Postorder and Inorder

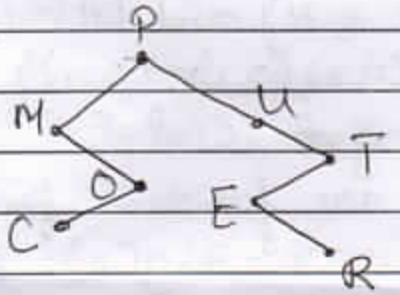
(a)



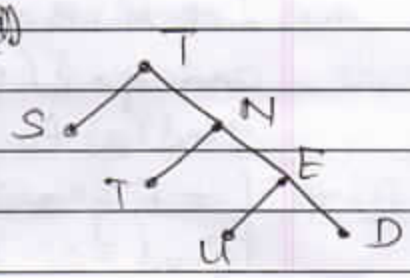
(b)



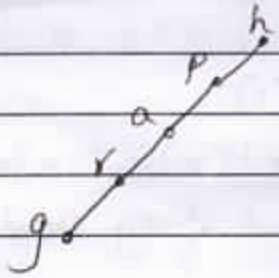
(c)



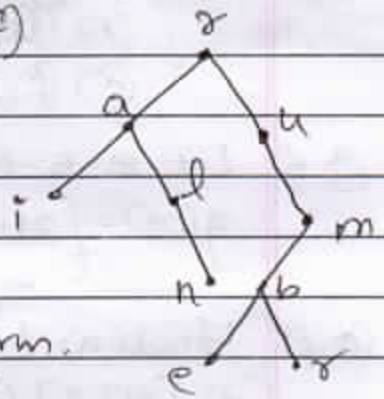
(d)



(e)



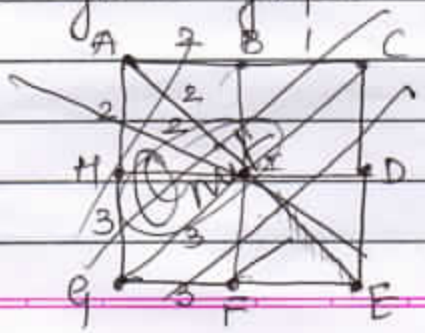
(f)



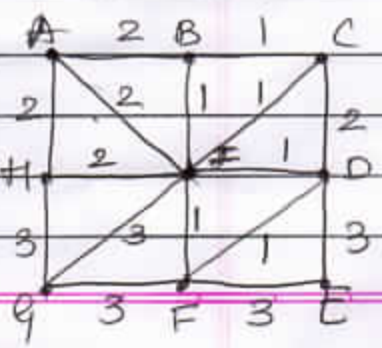
(2) Evaluate in polish form.

a) $+-\wedge 32 \wedge 23 \div 8-42$

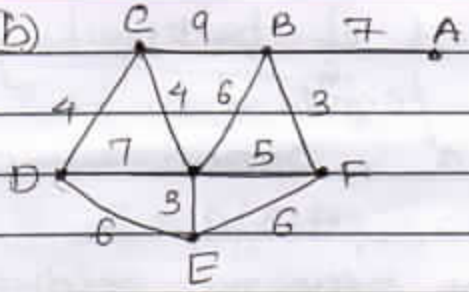
(3) Find the minimal spanning tree for the weighted graph.



(a).



(b)



~~Ass no~~ B:-

1) Find formula for the foll sequences
   a) 2, 16, 54, 128, 250, ...
   b) 2, 3, 7, 25, 121, 712, ...

2) Find first five terms of the sequence a_n where:
   (a) $a_n = 2(-3)^n + 5^n$.
   (b) $a_n = [n/2]$.

3) What are the values of the sums?
   (a) $\sum_{k=0}^{3} (3 \cdot 2^k - k^2 + 10)$
   (b) $\sum_{k=5}^{10} (2^k + k^2)$

4) What are the values of the sums? where $S = \{1, 3, 9\}$.
   (a) $\sum_{j \in S} (j^2 + 2)$
   (b) $\sum_{j \in S} 3j$

5) Find generating functions for the foll sequences:
   (a) 2, -2, 2, -2, 2 ....
   (b) 0, 0, 0, 5, 5, 5, 5, ...
   (c) ${}^5C_0, {}^5C_1, {}^5C_2, {}^5C_3, {}^5C_4, {}^5C_5, 0, 0, \ldots$

6) Find the generating functions for:
   (a) $a_k = 3^k$
   (b) $a_k = 3k$.

(7) By method of backtracking find an explicit formula for

(a) $a_n = n\,a_{n-1}$, $a_1 = 6$

(b) $a_n = 5a_{n-1} + 3$, $a_1 = 7$.

(8) Solve the recurrence relations using characteristic equation.

a) $a_n = 2a_{n-1}\ 2a_{n-2}$, $a_1 = 1$, $a_2 = 0$.

(b) $9b_n = 6a_{n-1} - a_{n-2}$ $a_1 = a_2 = 2$

(9) Solve the recurrence relation using generating function.

a) $a_n - 3a_{n-1} = 2$ $a_0 = 1$

(b) $a_n = 7a_{n-1}$, $a_0 = 5$

(c) $a_n = 3a_{n-1} + 4^{n-1}$ $a_0 = 1$

(d) ~~$a_n = 3a_{n-1} + 4^{n-1}$, $a_0 = 1$~~

(e) $a_n = 5a_{n-1} - 6a_{n-2}$, $a_0 = 6$, $a_1 = 30$.