Duration: 2 hours   Max. Marks:80

Instructions:
1. All questions are compulsory (choice is internal).
2. Start each question on fresh page.
3. Figures to the right indicate full marks.
4. Non programmable Calculators are allowed.

Q1

a) Prove that, the following pairs of statements are equivalent.   5
$\sim (p \leftrightarrow q)$ and $(p \wedge \sim q) \vee (\sim p \wedge q)$

b) There are 200 individuals with a skin disorder,120 had been exposed to the chemical C_1 ,50 to   5
chemical C_2, and 30 to both the chemicals C_1 and C_2.Find the number of individuals exposed
to
i) Chemical C_1 but not chemical C_2 ii) Chemical C_2 but not chemical C_1
iii) Chemical C_1 or chemical C_2

c) From a committee of 8 persons, in how many ways can we choose a chairman and a vice   5
chairman assuming one person cannot hold more than one position?

d) If the 5th term of an A.P. is 35 and its 9th term is 59.Find first term and common difference.   5

OR

Q1

w) Find whether following statement is Tautology or Contradiction   5
$[(\sim p) \wedge q) \wedge (q \wedge r)] \wedge (\sim q)$

x) If U={1,2,3,4,5,6,7,8,9} , A={2,4,6,8} and B={2,3,5,7}.Verify that   5

i) $(A \cup B)' = A' \cap B'$ ii) $(A \cap B)' = A' \cup B'$

y) In how many ways can a team of 3 boys and 3 girls can be selected from 5 boys and 4 girls?   5

z) Given an Arithmetic Progression, with first term 5 and common difference 4, find for what   5
value of n ,its nth term T_n is 129.

Q2

a) Check the validity of the argument: 5
If it rains,there is a traffic jam
There was no traffic jam.
Therefore it did not rain.

b) Write all the subsets of set A={x/ $x^2-4x+3 =0$}   5

c) If $^nC_8 = {}^nC_2$, find $^nC_2$.   5

d) In a G.P., 3rd term is 24 and the 6th term is 192.Find the 4th term.   5

OR

w) Construct the truth table for   5

$$(p \vee q) \vee [q \rightarrow r) \rightarrow (p \rightarrow r)]$$

x) If A={x/ $x^2-4x-5=0$} and B={x/$x^2 -8x-9=0$}, find A-B and B-A.   5

y) How many numbers of 5 digits can be formed using the digits 1,2,3,4,5,6 such that   5
i) No digit is repeated.
ii) Repetition of digits is allowed.

z) Find three numbers in G.P. whose sum is 26 and the product is 216.   5

a) In how many ways can the letter of the word PERMUTATIONS be arranged if the   5
     i)   Words start with P and end with S
     ii)   Vowels are together

b) Find the sum of all the numbers between 200 and 400, which are exactly divisible by 3.   5

c) Find a matrix X such that 2X +3A-2B=O where   5

$$A=\begin{bmatrix} 2 & 3 \\ -1 & 4 \end{bmatrix} \quad B=\begin{bmatrix} -1 & 2 \\ 0 & 1 \end{bmatrix}$$

d) What should be subtracted from the terms which are in the ratio 4:5 so that the ratio become   5
7: 9

OR

w) In how many ways can 5 girls and 3 boys be seated in a row so that no two boys are together?   5

x) Radhika invested Rs. 25 in January 2014. If she doubles her investment per month, find out   5
how much she invested at end of the year 2014.Also find her total investment in the year
2014.

y) If $A=\begin{bmatrix} 2 & -1 & 1 \\ -2 & 3 & -2 \\ -4 & 4 & 3 \end{bmatrix}$ Show that $A^2 = A$ 5

z) If 8 men working 8 hours a day can complete a piece of work in 15 days. How many men can   5
complete the work in 6 days by working 10 hours a day.

Q4

a) If $A=\begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix}$ B$=\begin{bmatrix} 1 & 0 \\ -1 & 4 \end{bmatrix}$ Find the matrix X, such that AX =B   5

b) A Juice manufacturing firm produces 2 types of canned juice (i) Apple Juice. (ii) Guava juice.   5
The amount of labour and material required to produce each type of juices and the resources
utilized, per hour, by the firm is given in the following table. Find the number of cans of
Juices produced per hour, by the company.

	Apple Juice Cans	Guava Juice Cans	Utilization by the firm, per hour
Labour	2	1	32
Material	3	2	54

   5

c) 35% marks are required to qualify an examination.Gaurav gets 432 marks and is failed by 23
marks. Find the maximum marks in the examination.

d) A publisher sells 80 books of Business Mathematics for 6144.If the list price of the book is   5
96.Calculate the rate of trade discount.

OR

Q4

w) Solve the following equations by using Cramer's rule.   5
$$x - y - z = 7 \ ; \ x + 2y + z = 15; \ x - 4y - z = 1$$

x) If $A =\begin{bmatrix} 1 & -4 \\ -2 & 3 \end{bmatrix}$ B $=\begin{bmatrix} -1 & 6 \\ 3 & -2 \end{bmatrix}$ C $=\begin{bmatrix} 4 & -5 \\ 2 & 1 \end{bmatrix}$ .Verify A (B + C) =AB + AC   5

y) In examination 53% students passed in English and 43% passed in Hindi. If 18% students   5
pass in English and Hindi both, find the percentage of students failed in both the subjects.

z) A manufacturer offers 20%, 10%, 10% three successive discounts. Find the rate of equivalent   5
discount.