**DAV PUBLIC SCHOOL, THERMAL COLONY, PANIPAT**

**Class - XII (Maths)**

**Sample Question Paper – 4**

**Time : 3 Hrs. MM: 100**

**General Instructions :**

a)Question 1-4 in Section A are very short answer type questions carrying 1 mark each.

b)Question 5-12 in Section B are short answer type questions carrying 2 marks each.

c)Question 13-23 in Section C are long answer-I type questions carrying 4 marks each.

d)Question 24-29 in Section D are long answer-II type questions carrying 6 marks each.

**Section - A**

1. Let f(x) = [x] and g(x) = |x| , find (f + 2g)(-1)
2. Let R be the equivalence relation in the set A = { 0,1,2,3,4,5} given by

R = { (a,b) : 2 divides (a-b) }. Write the equivalence class [0 ].

1. For what value of k , the matrix has no inverse?
2. If is a unit vector and (2 + ). (2 - )= 2, then find ||.

**Section - B**

1. Evaluate:
2. If = 0 , Find the values of x.
3. If x = ex/y , Prove that =
4. Find the least value of a so that the function f(x) = x2 + ax + 1 is strictly

increasing on (1,2)

1. Evaluate : dx
2. Solve the differential equation: = x + 1
3. Prove that = 0
4. In a binomial distribution , the sum of its mean and variance is 1.8

Find the probability of two success if the event was conducted 5 times.

**Section - C**

1. If A = , then find A-1. Hence solve the system of equations

x - 2y – 4 = 0 and 5y - 3x + 7 = 0

1. Find k , if f(x) = is continuous at x=0

**Or**

Differentiate w.r.t

1. If x cos(a + y) = cos y , then prove that =

Hence, show that sin a + = 0

1. Evaluate : dx
2. Find the equation of the normal to the curve = 4y which passes

through the point (1,2)

**Or**

Water is dripping out from a conical funnel at a uniform rate of 4cm3/sec.

through a tiny hole at the vertex in the bottom . When the slant height of

the water is 3cm , find the rate of decrease of the slant height of the water-

cane. Given that the vertical angle of the funnel is 1200.

1. If the length of three sides of a trapezium other than base are equal to 10cm ,

then find the area of trapezium when it is maximum.

1. Show that the area of a parallelogram whose diagonals are represented by the

vectors and is equal to ½| x |. Also find the area of the parallelogram

whose diagonals are 2 -+ and + 3-

1. Find the equation of the perpendicular drawn from the point P( 2,4,-1)

to the line = =

1. A bag contains 4 balls. Two balls are drawn at random and are found to be

white . What is the probability that all balls are white.

1. A discrete random variable X has the probability distribution as given below:

X: 0.5 1 1.5 2

P(X): k k2 2k2 k

(i) Find the value of k (ii) Determine the mean of the distribution.

1. Find the particular solution of the differential equation

(3xy + y2) dx + (x2 + xy) dy = 0 for x = 1 , y = 1

**Or**

Solve the differential equation: y + (xy) = x(sinx +logx)

**Section - D**

1. Let N be the set of all natural numbers and let R be a relation on NxN , defined by

(a,b)R(c,d) ⇔ ad=bc for all (a,b),(c,d)є NxN.Show that R is an equivalence relation

on NxN. Also, find the equivalence class [(2,6)].

**Or**

Consider the binary operations and o on R defined as ab= |a-b| and aob = a

for all a,b є R. Show that is commutative but not associative , o is associative but

not commutative. Also show that a(boc)= (ab) o (ac) a,b,cє R.

Is ao(bc)=(aob) (aoc) true for a, b, c є R ? Justify your answer.

1. Using properties of determinants, Prove that :

= 2(abc) (a + b + c)3

If A = and A3- 6A2+ 7A + k I3= 0 , Find k. Hence find A-1

1. Sketch the graph of f(x) =

Evaluate: , what does the value of this integral represent on the graph?

1. Evaluate: dx

**Or**

Evaluate: (1 – x + x2) dx

1. Find the distance of the point (1,-2,3) from the plane x – y + z = 5 measured

parallel to the line whose direction cosines are proportional to 2, 3, -6.

1. The postmaster of a local post office wishes to hire extra helpers during the

Deepawali season, because of a large increase in volume of mail handling and

delivery. Because of limited office space and budgetary conditions, the number

of temporary helpers must not exceed 10. According to past experience , a man

can handle 300 letters and 80 packages per day, on the average and a woman

can handle 400 letters and 50 packages per day. The postmaster believes that the

daily volume of extra mail and packages will be no less than 3400 and 680 resp.

A man receive Rs. 225 a day and a woman receive Rs. 200 a day. How many man

and woman helpers should be hired to keep the pay- roll at a minimum?

In the above question What values are being reflectd in the postmaster.

**Answer Key (SP-4)**

1. 1
2. { 2,4}
3. 10/3
4. 0 , -3/2

8) a=-2

9) 2 + C

10) y= x log(x+1) – x +log(x+1)+ C

12) 0.2048

13) x = -6 , y = -5

14) k=1/2

Or

-1/2

16) (3 - 4x - x2)3/2 + (x+2) + +C

17) x + y -3 = 0

Or

cm/sec

18) cm2

19) sq units

20) = =

21) 3/5

22) (i) 1/3 (ii) 23/18

23) y2 +2xy =

Or

yx2 = -x2cosx + 2( x sinx +cosx) + logx – + C

24) [ (2,6) ] = { (1,3), (2,6), (3,9), (4,12)------------}

25) k = 2, A-1 =

26) sq units

27) π2

Or

28) 7/6

29) 6 men and 4 women should be hired to keep the pay-roll minimum and the

minimum pay-roll is Rs 2150 per day.