Class XII Maths

Blue Print

S.No.	Name of Chapter	Topic	VSA(1)	SA(2)	SA(4)	LA(60	Total
1	Relation & function	Rel & function			1		
2	Inverse Tri Function		2	1			8
3	Matrices	Algebra	2				
4	Determinant			1		1	10
5	Differentation	Calculas	4	1			
6	Application of Derivative		2	1	1		
7	Integral		2	1		1	
8	Application of integral					1	
9	Diff .equation		1		1		35
10	Vector & 3D	Vector & 3D Geo.	2	1	1	1	10
11	LPP	LPP	1		1		5
12	Probability	Probability	4		1		8
13	Total		20(20)	6(12)	6(24)	4(24)	36(80)

CLASS: XII

MATHEMATICS (041)

Time Allowed: 3 Max. **Max. Marks : 80**

General instructions –

(i) All questions are compulsory.
(ii) The question paper consists of 36 questions divided in to three sections viz. A, B and C. Section A comprises of 20 questions of 1 mark each, Section B comprises of 6 questions of 2 marks each and Section C comprises of 6 questions of 4 marks each,Section D consisits of 4 questions of 6 marks.
(iii) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.
(iv) There is no overall choice. However, internal choice has been provided in 4 questions of four marks each and 2 questions of six marks each. You have to attempt only one of the alternatives in all such questions.
(v) Use of calculators is not permitted.

SECTION A

1. If A is a matrix of order 2x3 and each element of A has 2 choice 7 and 11. Then how many such matrices can be formed.

2. Write all possible order of a matrix contain 8 elements.

3. Find the condition for λ, if the vectors $\mathrm{i} - \hat{\jmath} + \hat{k}$, $\widehat{3\imath} + \hat{\jmath} + 2\hat{k}$ and $\hat{\imath} + \lambda\hat{\jmath}\_3\hat{k}$ are coplanar.

OR

Find the projection of the vector $\vec{a} = 2\hat{\imath} + 3\hat{\jmath} + 2\hat{k}$ on the vector $\vec{b} = \hat{\imath} + 2\hat{\jmath} + \hat{k}$.

4. Find a unit vector perpendicular to sum of the vectors $\vec{a}$ and $\vec{b}$,where $\vec{a} = \hat{i} + \hat{j} + \hat{k}$ and $\hat{b} = \hat{i} + 2\hat{j} + 3\hat{k}$

5. Differentiate $\sin(\cos(x^2))$ with respect to x.

6. Find the value of $\cos^{-1}(\cos 5\pi/3) + \sin^{-1}(\sin 5\pi/3)$

7. What is the principal value branch of $\sin^{-1}x = y$.

8. If Rolle's theorem is applied on $f(x)=x^2+2$ in the interval [-2,4].Then what should be the value of x.

9. Find the second order derivative of logx.

10. Find all the points of discontinuity of f ,where f is defined by:

$$f(x)=\begin{cases} |x|/x & ,\text{if } x \neq 0 \\ 0 & ,\text{if } x=0 \end{cases}$$

OR

Find all the points of discontinuity of greatest integer function [x].

11. The radius of an air bubble is increasing at the rate of ½ cm/sec.At what rate is the volume of the bubble increasing when the radius is 1 cm.

12. State whether the tangents to the curve $y=7x^3+11$ at the points where x=2 and x= -2 are parallel.

13. Find the integral of $Sin^2x-cos^2x/sinx\ cosx$

14. $\int_{-\pi/2}^{\pi/2} sin7x\ dx$.

OR

Find the integral of $\frac{(x3-1)1/3}{x2}$

15. Which curve is represented by the solution of differential equation $2x\frac{dy}{dx} - y=3$?

16. State true or false:

The minimum value of the objective function Z=ax+by in a linear programming problem always occurs at only one corner point of the feasible region .

OR

State true or false:

If feasible region for a linear programming problem is bounded ,then the objective function Z=ax+by has both a maximum and a minimum value on R

17 If A and B are two independent events such that P(A)=3/5 and P(B)=4/9,then P(A'∩B')

(a) 4/15 (b) 8/45 (c) 1/3 (d) 2/9

18 Two cards are drawn at random without replacement from a deck of 52 playing cards .Find the probability that the both cards are black.

19 If A and B are two events such that P(A)=1/4 ,P(B)=1/2 and P(A∩B)=1/8,Find P(not A and not B).

20 .Two events A and B will be independent if :

(i) A and B are mutually exclusive

(ii) P(A'/B')=[1-P(A)][1-P(B)]

(iii) P(A)=P(B)

(iv) P(A)+P(B)=1

SECTION: B

21. $\tan^{-1}$ [(cos x-sin x) / (cos x + sin x)] , x<π

OR

If $\sin^{-1}x-\cos^{-1}x=\pi/6$,find x.

22. What is the value of determinant

$$\Delta = \begin{vmatrix} \sqrt{23}+\sqrt{3} & \sqrt{5} & \sqrt{5} \\ \sqrt{15}+\sqrt{46} & 5 & \sqrt{10} \\ 3+\sqrt{115} & \sqrt{15} & 5 \end{vmatrix}$$

OR

. If $A = \begin{pmatrix} \sin\alpha & \cos\alpha \\ -cos\alpha & \sin\alpha \end{pmatrix}$, verify that A' A = I

23.Find the intervals in which the function f given by f(x) = $x^2 - 4x + 6$ is: strictly decreasing.

24. Show that the function defined by f(x) = I cosx I is a continuous function.

OR

If y = $log\{x + \sqrt{x^2 + a^2}\}$ prove that $(x^2 + a^2)\, y_2 + x\, y_1 = 0$

25. Evaluate $\int (1/\sqrt{7-6x-x^2})\, dx$

.26. If $\vec{a} \times \vec{b} = \vec{c} \times \vec{d}$ and $\vec{a} \times \vec{c} = \vec{b} \times \vec{d}$, show that $(\vec{a}-\vec{d})\times(\vec{b}-\vec{c})=0$.

SECTION C

27 A window is in the form of a rectangle surrounded by a semi-circular opening. The total perimeter of window is 10 meters. Find the dimensions of the window so as to admit maximum light through the whole opening.

OR

Show that the total surface area of a closed cuboid with square base and given volume is minimum , when it is a cube.

28 .Consider $f: R_+ \to [-5,\infty)$ *given by* $f(x)=9x^2+6x-5$. Show that f is invertible with

$$f^{-1}(y)=\left(\frac{\left(\sqrt{y+6}\right)-1}{3}\right).$$

.

29 Solve the following differential equation:

$$x\cos\left(\frac{y}{x}\right)\frac{dy}{dx}=y\cos\left(\frac{y}{x}\right)+x$$

Find the general solution of the differential equation (1+y²)+(x-e^{tan-1x})$\frac{dy}{dx}$=0

30 Find the shortest distance between the lines :

$$\frac{x+1}{7}=\frac{y+1}{-6}=\frac{z+1}{1} \text{ and } \frac{x-3}{1}=\frac{5-y}{2}=\frac{z-7}{1}$$

.

31 A manufacturer produces two products A and B. Both the products are processed on two different machines. The available capacity of the I machine is 12 hours and that of II machine is 9 hours. Each unit of product A requires 3 hrs. On both machine and each unit of product B requires 2 hrs on I machine and 1 hr. on II machine. Each unit of product A is sold at a profit of Rs. 5 and B at a profit of Rs. 6. Find the production level for maximum profit graphically.

32. In a bolt factory, machines A, B and C manufacture 25%, 35% and 40% of the total. Of their output 5%, 4%, 2% are defective. A bolt is drawn at random from the product. a) What is the probability that the bolt drawn is defective? b) If the bolt drawn is found to be defective, find the probability that it is a product of machine B?

SECTION D

33. Prove that: $\int_0^a f(x)dx = \int_0^a f(a-x)dx$ and hence, prove that $\int_0^{\pi/2} \frac{\sin x}{\sin x + \cos x} dx = \frac{\pi}{4}$.

OR

Evaluate $\int(\sqrt{\cot x} + \sqrt{\tan x})dx$

34. Find the area of region $\{x,y: 0 \le y \le x^2+1, 0 \le y \le x+1, 0 \le x \le 2\}$

OR

Find the area of the circle $4x^2+4y^2=9$ interior to the parabola $x^2=4y$

35. Find the coordinates of the foot of the perpendicular and the perpendicular distance of the point (1, 3, 4) from the plane 2x – y + z + 3 = 0. Find also, the image of the point in the plane.

36. Use product of matrices $\begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix}\begin{bmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{bmatrix}$ to solve the following equations.

$$\begin{aligned} x - y + 2z &= 1 \\ 2y - 3z &= 1 \\ 3x - 2y + 4z &= 2 \end{aligned}$$

Class-XII

Sub:-Mathematics

Time:-3 hrs. **M.M:-80**

General Instructions:-

(1) All questions are compulsory.

(2) The Question paper consists of 29 questions divided into three sections A , B,C and C-Section A comprises of 20 Questions of one mark each, Section B comprises of 6 Questions of Two mark each , Section C comprises of 6 Questions of 4 mark each and Section D comprises of 4 Questions of 6 mark each

(3) All questions in section A are to be answered in one word, one sentence or as per the exact requirement of the question.

Section A

1. A line makes angles of 45^0 and 45^0 with x and y- axis res. Find the angle it make with the z- axis.

2. If A and B are invertible matrices of order 3, $|A|=2$ and, $|(AB)^{-1}| = - 1/6$. Find $|B|$

3. What is the value of $\tan^{-1}(\sqrt{3}) - \cot^{-1}(-\sqrt{3})$

OR

If $\tan^{-1} x + \tan^{-1} y = \pi/4$,xy< 1 find x+y+xy.

4. Evaluate

$$\int_{-\pi/2}^{\pi/2} x^3 \sin^8 x \, dx$$

5. Evaluate $\int 1/[x(2+\log x)^2]\, dx$

OR

Evaluate $\int [1/(1+x^2) \tan^{-1}x]dx$

6. State the reasons why the relation R={(a,b): a≤ b^3 } on the set R of real numbers is not reflexive.

OR

If the function f:R→R defined by f(x) =3x-4 is invertible, then find $f^{-1}(11)$.

7. **Differentiate $\tan^2$** (x^3) w.r.t.x

8. The corner points of the feasible region determined by the following system of linear inequalities:

2x+y ≤10, x+3y ≤ 15 , x,y ≥ 0 are (0,0),(5,0),(3,4) and (0,5).Let Z= px+qy , where p,q >0.Under What condition

on p and q so that the maximum of Z occurs at both (3,4) and(0,5)

9. If A and B are square matrices of the same order 3,such that |A|=2 and AB=2I,write the value of |B|

OR

If A is a Skew-symmetric matrix of order,then prove that det A=0

10. If a = i + 4j + 2k , b = 3i –2j +7k and c= 2i –j - 4k, find unit vector in the direction a + b + c .

OR

| a | = 2, | b| = 5 and | a × b | = 8, find a . b

11.If X is the random variable with distributions given below:

X_i	0	1	2	3
p_i	k	3k	2k	k

Find k.

12. Prove that the function $f(x) = x^2+3x+5$ is strictly increasing for all real values of x.

13.Determine the value of 'K' for which the following function is continous at x=3;

$$F(x) = \begin{cases} [(x+3)^2-36]/(x-3) & , x \neq 3 \\ K & , x=3 \end{cases}$$

.14. **Differentiate $x^{\sin x}$** w.r.t.x

15. Find dy/dx , If $y = \sin^{-1}\left(2\tan\sqrt{x} / (1+\tan^2\sqrt{x})\right)$

OR

Find dy/dx , If $y = \tan^{-1}[(1+\sin x)/\cos x]$

16. Find the marginal revenue for the revenue function $R(x) = 3x^2 + 36x + 5$,when the level of production is 5.

17. From the differential equation which corresponds the given family of curve. x=a Cosx

18. A fair die is rolled. Consider the events E={ 1,3,5} and F={ 2,3} .Find P(E/F)

19. A bopx contains 4 white,3 black and 5 red balls.3 balls are drawn one by one without replacement. Find the probability of 2 white and 1 black ball.

20. The Probability of A hitting target is 4/5 and B is 2/3.They both fire the target,find the probability that only A will hit the target.

Section B

21. Prove that $\cos^{-1}(12/13) + \sin^{-1}(3/5) = \sin^{-1} 56/65$

22 . Prove that $\begin{vmatrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix} = (x-y)(y-z)(z-x)$

23. If $x=a(1-\cos\theta)$, $y=a(\theta+\sin\theta)$. Find $\frac{dy}{dx}$

OR

If $y = \tan^{-1} 4x / (1+5x^2)$,find dy/dx

24. Find the points on the curve $x^2 + y^2 - 2x - 3 = 0$ at the tangents parallel to x-axis.

25. Evaluate $\int [\sin x / \sin(x+a)]\, dx$

OR

Evaluate $\int (x-3)\, e^x / (x-1)^3\, dx$

26. If a =2i + 2j +3k ,b = -i +2j + k and c= 3i + j are such that a +λ b is perpendicular to c , find λ

OR

Find the area of parallelogram whose adjacent sides are given by a = 3i + j + 4k , b= i –j + k.

Section C

27. If R is a relation in N×N, show that the relation R is defined by (a , b) R (c , d) iff a + d =b + c

is an equivalence relation.

OR

Let $f : R_+ \to [-5,\infty)$ be defined by $f(x) = 9x^2 + 6x - 5$,show that f is invertible. Also find f^{-1}.

28.Show that the semi-vertical angle of a cone of maximum volume and given slant height is $\tan^{-1}\sqrt{2}$

29. Solve the differential equation: $(1+y^2)dx=(\tan^{-1}y - x)dy$,$y(0)=0$

OR

Solve the differential equation: $x^2\, dy + y(x+y)\, dx=0$,given that y=1 when x=1

30. Find the foot of the perpendicular from the point (3 ,-1 ,11) on the line $\frac{x}{2} = \frac{y-2}{3} = \frac{z-3}{4}$.

Also find the length of perpendicular.

31. An airplane of an airline can carry a maximum of 250 passengers profit of Rs.1500 is made on each first-class ticket and a profit of Rs.1000 is made on each economy-class ticket. The airline reserves at least 25 seats for first class. However, at least 3 times as many passengers prefer to travel by economy class than first class. Determine how many of each type of tickets of must be sold in order to maximize the profit for the airline. what is the maximum profit ? Solve graphically

32. An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. probability of an accident involving a scooter, a car and a truck is .01,.03 and .15 respectively. One of the insured persons meets with an accident. What is the probability that he is scooter driver?

Section D

33. Find the equation of the plane through the points(3, 4,1) and (0 , 1, 0) and parallel to the line

$$\frac{x+3}{2} = \frac{y-3}{7} = \frac{z-2}{5} .$$

34. Find the area of the region enclosed between the circles $x^2 + y^2 = 4$ and $(x - 2)^2 + y^2 = 4$

OR

Find the area of the region enclosed between the ellipse $x^2/4 + y^2/9 = 4$ and line $x/2 + y/3 = 1$.

35.Find A^{-1} if $A = \begin{pmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{pmatrix}$

and hence, solve the system of linear equation

$$\begin{aligned} 2x - 3y + 5z &= 11 \\ 3x + 2y - 4z &= -5 \\ x + y - 2z &= -3 \end{aligned}$$

36 .Using properties of definite integral, Evaluate

$$\int_0^{\pi/2} [\, \sin^2 x / (\cos x + \sin x)]\, dx$$

KENDRIYA VIDYALAYA SANGATHAN

SAMPLE PAPER GROUP - 3

SUBJECT: - MATHEMATICS CLASS: - XII

Time: - 03 hours **Max. Marks: 80**

General Instructions:

(i) *All questions all compulsory.*
(ii) *The question paper consists of 36 questions divided into four sections A, B, C and D. Section A comprises of 20 questions of one mark each, Section B comprises of 6 questions of two marks each, Section C comprises of 6 questions of four marks each, Section D comprises of 4 questions of six marks each.*
(iii) *All questions in section A are to be answered in one word, one sentence or as per the exact requirement of the question.*
(iv) *There is no overall choice. However, internal choice has been provided in 6 questions of one mark, 3 questions of 2 marks each, 3 questions of four marks each and 2 questions of six marks each. You have to attempt only one of the alternatives in all such questions.*

SECTION- A (01 x 20 =20)

Q1 If f:R→R is defined by f(x)= 3x+2 find f{(f(x)} or

If the function f:R→R defined by f(x)= 3x-4 is invertible find f^{-1}

Q2 What is the range of the function f(x)= $\frac{|x-1|}{x-1}$

Q3 find the value of $\cos^{-1}(cos\frac{13\pi}{6})$

Q4 find the value of $\sin^{-1} 5$

Q5write the matrix which is symmetric as well as skew symmetric

OR $For\ what\ value\ of\ x\ is\ the\ matrix\ \ A = \begin{bmatrix} 0 & 1 & -2 \\ -1 & 0 & 3 \\ x & -3 & 0 \end{bmatrix}$ a skew symmetric ans x=2

Q6 If A is a square matrix of order 3 and detA=7 write the value of $|adjA|$.

Q7 $Evaluate\ \int 2^x$dx

OR $Evaluate \int \frac{1}{\sqrt{1-x^2}}$dx

Q8 $\int_0^1 (3x^2 + 2x + k)dx = 0$

Q9 write the point at which the following function is not continuous f(x)= 1/(x-5)

Q10Find the derivative of f(x)=$\sqrt{tan\sqrt{x}}$ w.r.t x.

Q11If Rolle's theorem is applied on f(x) = x^2 + 2 in the interval [-2 , u] . Then what should be the value of u.

,

Q12 Find the angle between the vectors $\vec{a}\,\vec{i} - \vec{j} + \vec{k}$ and $\vec{b} = \vec{i} + \vec{j} - \vec{k}$.

Q13Write a vector of magnitude 9 units in the direction of the vector $\vec{a} = \overrightarrow{-2i} + \vec{j} + \overrightarrow{2k}$

Q14 Write the order and degree of the following differen tial equations $y'' + (y')^3 + 2y = 0$

OR

Show that $y = e^{-x} + ax + b$ is the solution of $e^x\, d^2y/dx^2 = 1$.

Q15Find the differential equations of $y = Ae^{2x} + Be^{-2x}$ where A and B are arbitrary constants.

Q16Given P (A) = 0.2, P (B) = 0.3 and P $(A \cap B) = 0.1$. Find P (A/B)

Q17Given P(A) = ½ , P(B) = 1/3 and P(A$\cap B) = 1/6$. Are the events A and B independent?

Q18 Find dr's of a line parallel to the line $\frac{2x-1}{3} = \frac{1-y}{4} = \frac{10z-4}{5}$.

Q19.Find the equation of line parallel to the line $\frac{x-1}{3} = \frac{1-y}{4} = \frac{z-4}{5}$ and passing through point (1,2,-1)

Q20 Define objective function in L.P.P.

SECTION B

Q21 Prove that $3\sin^{-1} x = \sin^{-1}(3x - 4x^3)$ x$\in \left[-\frac{1}{2}, \frac{1}{2}\right]$

Or simplify $\cot^{-1}\frac{1}{\sqrt{1-x^2}}$

Q22 Given A =$\begin{bmatrix} 2 & -3 \\ -4 & 7 \end{bmatrix}$, compute A^{-1} and show that $2A^{-1} = 9I-A$

Q23 Show that the relation R in the set { 1,2,3} given by R= { (1,2), (2,1) } is symmetric but neither reflexive

Nor transitive. Or Define identity function and give one example

Q24 Prove that if E and F are independent events then the events E and F' are also independent.

Q25 Evaluate $\int xe^x dx$ or

$\int logx$dx

Q26.**A balloon which always remains spherical has a variable diameter** $\frac{3}{2}(2x+3)$ **. Find the rate of change of its**

Volume w.r.t.x .

SECTION C

Q 27-Find the intervals in which the function
$1-12x-9x^2-2x^3$ is increasing or decreasing.

OR

Find the equation of the normal line to the curve $y(x-2)(x-3)-x+7=0$ at the point where it meets the x −axis.

Q28 Evaluate :

$$\int\frac{5}{(x+1)(x^2+4)}dx$$

Q29 Solve the differential equation ($1+e^{\frac{x}{y}}$) dx + $e^{\frac{x}{y}}$ ($1-\frac{x}{y}$) dy = 0

OR

Find the general solution of the differential equation: $(1+y^2)dx=(\tan^{-1}y-x)dy$.

Q30 Express the vector $\vec{a}=5\hat{\imath}-2\hat{\jmath}+5\hat{k}$ as the sum of two vectors such that one is parallel to the vector $\vec{b} = 3\hat{\imath} + \hat{k}$ and other is perpendicular to $\vec{b}$

Q31 By examining the chest X-ray , the probability that TB is detected when a person actually Suffering is 0.99 . The probability of incorrect diagnosis is 0.001. In a certain city one in thousand persons suffer from TB . A person selected at random and is diagnosed to have TB. What is the chance that he actually has TB ?

Q32 A manufacturing company makes two types of teaching aids A and B of mathematics for class XII. Each type of A requires 9 labour hours for fabricating and 1 labour hour for finishing. Each type of B requires 12 labour hours for fabricating and 3 labour hours for finishing. For fabricating and finishing , the maximum labour hours available are 180 and 30 , respectly. The company makes a profit of Rs. 80 on each piece of type A and Rs. 120 on each piece of type B . Using LPP find how many pieces of type A and B should be manufactured per week to get a maximum profit? What is the maximum profit per week?

Q33 Using the properties of determinants , prove that:

$$\begin{vmatrix} x & x^2 & 1+px^3 \\ y & y^2 & 1+py^3 \\ z & z^2 & 1+pz^3 \end{vmatrix} = (1+pxyz)(x-y)(y-z)(z-x)$$

Q34A point on the hypotenuse of a right –angled triangle is at distance a and b from the sides. Show that the maximum length of the hypotenuse is $(a^{\frac{2}{3}} + b^{\frac{2}{3}})^{\frac{3}{2}}$.

Q35-Find the area of region included between the parabolas $y^2=4ax$ and $x^2=4ay$ where a>0

OR

Using integration, find the area of the triangle whose vertices are $A(1,0), B(2,2)\ and\ C(3,1)$

Q36-Find the foot of the perpendicular drawn from the point A(1,0,3) to the line joining the points B(4,7,1) C(3,5,3).

KENDRIYA VIDYALAYA SANGATHAN

SAMPLE PAPER GROUP - 3

SUBJECT: - MATHEMATICS CLASS: - XII

Time: - 03 hours **Max. Marks: 80**

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SECTION – A

Q.1 Find $gof(-3)$ if $f(x) = |x|$ and $g(x) = |5x - 2|$

Q.2Evaluate $Sin\left\{\frac{1}{2}\cos^{-1}\left(\frac{4}{5}\right)\right\}$

Q.3Evaluate $\begin{vmatrix} \cos 70^0 & \sin 20^0 \\ sin70^0 & cos20^0 \end{vmatrix}$

Q.4 Find a unit vector parallel to the sum of vectors $\vec{a} = 2\hat{i} + 4\hat{j} - 5\hat{k}$ and $\vec{b} = \hat{i} + 2\hat{j} + 3\hat{k}$

Q5. – Set A = { 1, 2, 3}, find the number of equivalence relations containing (1, 2).

Q6- Simplify $\sin^{-1}(\frac{x}{\sqrt{1+x^2)}})$.

Q7- If Matrix A = [1 2 3] , then find A A'.

OR

If A = $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, then find A + A'.

Q8- If A is a square matrix of order 3 and Det(A)=7, write the value of $|Adj\ (A)|$. Ans:49

Q09- If y = cot(x +y), find dy/dx.

OR

If y = $\sqrt{\sin(x+y)}$ then find dy/dx.

Q10- the volume of dphere is increasing at the rate of 3cm cube/sec. find the rate at which the radius increases when radius is 2 cm. .

Q11- Evaluate : $\int \frac{dx}{\sqrt{9x-4x^2}}$.

OR

Evaluate $\int \frac{dx}{sin^2xcos^2x}$.

Q:12 evaluate : $\int_1^{\sqrt{3}} \frac{dx}{1+x^2}$.

Q13-Area of the region bounded by the curve $y^2 = 4ax$, y axis and the line y =3.

Q14- find the degree of the differential equation$(\frac{d^2y}{dx^2})^2 - \frac{dy}{dx} = y^3$.

Q15- Find the value of $\hat{\imath}.(\hat{\jmath} \times \hat{k}) + \hat{\jmath}.(\hat{\imath} \times \hat{k}) + \hat{k}.(\hat{\imath} \times \hat{\jmath})$

OR

Find the value of x if x(i+j+k) is a unit vector.

Q16- .If a is a unit vector then find $|x|$if (x-a).(x+a)=12

Q17- Find dr's of a line parallel to the line $\frac{2x-1}{3} = \frac{1-y}{4} = \frac{10z-4}{5}$.

OR

Find the equation of line parallel to the line $\frac{x-1}{3} = \frac{1-y}{4} = \frac{z-4}{5}$ and passing through point (1,2,-1)

Q18-Given P (A) = 0.2, P (B) = 0.3 and P $(A \cap B) = 0.1$. Find P (A/B) Ans. 1/3.

OR

Given P(A) = ½ , P(B) = 1/3 and P(A$\cap B) = 1/6$. Are the events A and B independent?

Q19 -Let A and B be two independent events with P(A) = 0.3 and P(B) = 0.4.

Find (i) $P(A \cap B)$, (ii) $P(A \cup B)$ (iii) P (A/B) (iv) $P(\frac{B}{A})$

Q20- In a LPP the linear function which has to be maximize or minimize is known as ..

SECTION – B

Q.21 **Write in the simplest form : tan** $^{-1}\left(\frac{1}{\sqrt{x^2-1}}\right)$ **where** $|x|>1$

Q.22 Define a Symmetric and Skew Symmetric Matrices with an example

Q.23 The volume of a cube is increasing at a rate of 9cubic cms per sec. How fast is the surface area increasing when the length of an edge is 10 cm?

OR

If the function f(x) given by: $f(x) = \begin{cases} 3ax+b, & if x>1 \\ 11 & x=1 \\ 5ax-2b if x<1 \end{cases}$,

is continuous at $x = 1$, find the value of a and b.

Q24 Evaluate $\int \sin^{-1}(\cos x)\ dx$

OR

Evaluate: $tan^{-1}\frac{1}{5} + tan^{-1}\frac{1}{7} + tan^{-1}\frac{1}{3} + tan^{-1}\frac{1}{8}$

Q.25. Find the degree and order $y = x\left(\frac{dy}{dx}\right)^2 + a\sqrt{1+\left(\frac{dy}{dx}\right)^2}$

Q26 Find the area of the parallelogram whose adjacent sides are determined by the vectors $\vec{a} = \hat{i} - \hat{j} + 3\hat{k}$ and $\vec{b} = 2\hat{i} - 7\hat{j} + \hat{k}$.

SECTION – C

Q.27. Evaluate: $\int \frac{(x^2+1)(x^2+4)}{(x^2+3)(x^2-5)}dx$

OR

Evaluate: $\int \frac{(3\sin\theta - 2)\cos\theta d\theta}{(5 - 4\sin\theta - \cos^2\theta)}$

Q28. Using properties of determinants , show that

$$\begin{vmatrix} 1+a^2-b^2 & 2ab & -2b \\ 2ab & 1-a^2+b^2 & 2a \\ 2b & -2a & 1-a^2-b^2 \end{vmatrix} = \left(1+a^2+b^2\right)^3$$

Q29. Find the shortest distance between the lines :

$$\frac{x+1}{7} = \frac{y+1}{-6} = \frac{z+1}{1} \, and \, \frac{x-3}{1} = \frac{5-y}{2} = \frac{z-7}{1}$$

Q30. Solve the following differential equation: $x\,dy - y\,dx = \sqrt{(x^2+y^2)}\,dx$

Q31. **Verify Rolle's theorem for the function f(x)= Sin2x in $\left[0, \frac{\pi}{2}\right]$**

Q32. A bag, A contains 8 white and 7 black balls while the other bag B contains 5 white and 4 black balls. One ball is randomly picked up from bag A and mixed up with the balls in the bag B. Then a ball is randomly drawn from it. Find the probability the ball drawn is white.

(OR)

Find the mean and variance of the number of heads in a two tosses of a coin

SECTION – D

Q.33. Two school A and B decided to award prizes to their students for three values honesty(x), punctuality (y) and obedience(z).School A decided to award a total of Rs 11000 for the three values of 5,4 and 3 students respectively while school B decided to award Rs 10700 for the three values of 4, 3 and 5 students respectively. If all the three prizes together amount to Rs. 2700, then:

(i)Represent the above situation by a matrix equation and form linear equations using matrix multiplication.

(ii)Is it possible to solve the system of equation so obtained using matrix? If yes, find the award money for each value

OR

Using the properties of determinants , prove that:

$$\begin{vmatrix} x & x^2 & 1+px^3 \\ y & y^2 & 1+py^3 \\ z & z^2 & 1+pz^3 \end{vmatrix} = (1+pxyz)(x-y)(y-z)(z-x)$$

Q34. Find the area lying above x-axis and included between the circle $x^2+y^2=8x$ and Parabola $y^2=4ax$.

Q.35. Evaluate: $\int_0^{\pi} \frac{x}{a^2cos^2x+ b^2sin^2x}dx$

Q.36. Find the equation of the plane passing through the point (-1, 3, 2) and perpendicular to each

of the planes $x + 2y + 3z = 5$ and $3x + 3y + z = 0$. Also find the angle between this plane and x-axis.