PODAR INTERNATIONAL SCHOOL (CBSE)

AURANGABAD

STD – XII MARKS- 80

SUB- Mathematics Duration- 3 hrs

Read instructions twice . Attempt your paper with honesty.

I want to know that how many concepts are clear to you.

General Instructions:

1. This question paper contains two parts A and B. Each part is compulsory. Part A carries 24 marks and Part B carries 56 marks

2. **Part-A** has Objective Type Questions and **Part -B** has Descriptive Type Questions

Part – A:

1. It consists of two sections- I and II.

2. Section I comprises of 16 very short answer type questions.

3. Section II contains 2 case studies. Each case study comprises of 5 case-based MCQs. An examinee is to attempt any 4 out of 5 MCQs.

Part – B:

1. It consists of three sections- III, IV and V.

2. Section III comprises of 10 questions of 2 marks each.

3. Section IV comprises of 7 questions of 3 marks each.

4. Section V comprises of 3 questions of 5 marks each.

Part – A (STEPS ARE REQUIRED) (**24 Marks 16 + 8 = 24)**

Q1. If f : R → R and g : R → R defined by $f(x) = 2x + 3$ and $g(x) = x^2 + 7$, then the value of x for which $f(g(x)) = 25$

Q2. What is the range of $\sin^{-1} x + \cos^{-1} x + \tan^{-1} x$.

Q3. If $A^2 – A + I = O$, then find the inverse of A .

Q4. Which two properties of matrices satisfied in given matrices..

If $A = \begin{bmatrix} 2 & 1 \\ -1 & 2 \end{bmatrix}, B = \begin{bmatrix} 1 & -2 \\ 2 & 1 \end{bmatrix}, C = \begin{bmatrix} 1 & -3 \\ 2 & 1 \end{bmatrix}$, **then**

Q5. Write the number of discontinuous functions y(x) on [-2, 2] satisfying $x^2 + y^2 = 4$.

Q6. if $y = (1 + x)(1 + x^2)(1 + x^2).....(1 + x^2n)$, then the value of dy/dx at x = 0

Q7 Find the local minimum value of the function f(x) = sin4x + cos4x, 0 < x < π/2

Q8The area of a right-angled triangle of the given hypotenuse is maximum what type of triangle is, give reason.

Q9 Cosecx, Tanx , x^2 , |x – 1| function which is neither decreasing nor increasing in (π/2,3π/ 2) is

Q10.

If $A = \begin{matrix} 5 & 6 & -3 \\ -4 & 3 & 2 \\ -4 & -7 & 3 \end{matrix}$ Then write the cofactors of the elements a_{21} of its 2^{nd} row.

Q11. What is the objective function of a L.P.P. Explain it.

Q12. What is the type of function if f : A → B defined by f(x) = 4x + 7, x ∈ R . Explain

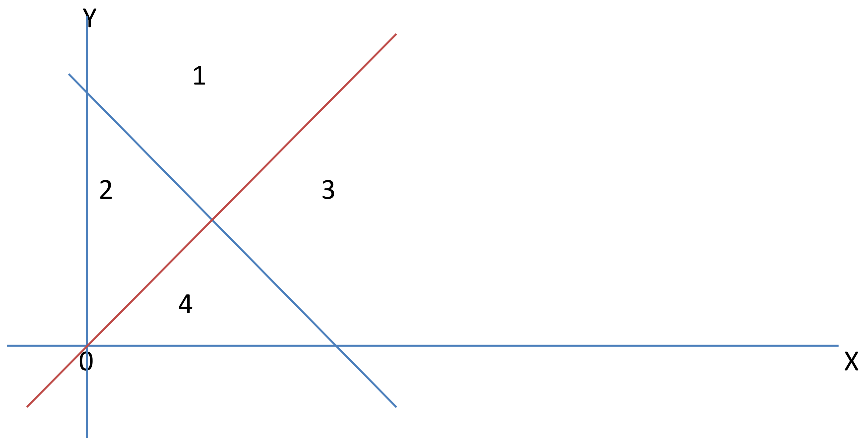
Q13. Find the derivative of e^x/ sinx

Q14. $\int_0^{\frac{\cap}{2}} SINX^2 + \cos X^2$ dx (sign is pie)

Q15. Show that function f : R – R Is a function defined by f(x) = 3x _ 2 is one one.

Q16.Find the value of $\tan^{-1}$ (tan $\frac{1260}{6}$)

Q17.



Chose the Correct option for the foll8wing (Single option is correct).

1. Objective Function of a L.P.P. is

(a) A constraint

(b) A function to be opptimised

(c) A relation between the variables

(d) None of these

26. Solution set of inequation x ≥ 0 is

(a) Half-plane on the left of y-axis.

(b) Half-plane on the right of y axis excluding the points on y-axis.

(c) Half-plane on the right of y-axis including the points on y-axis.

(d) None of these

.

3 8. Regions represented by equations $x \geq 0$, $y \geq 0$ is

(a) first quadrant (b) Second quadrant

(c) Third quadrant (d) Fourth quadrant

. 4. If the constraints in a liner programming problem are changed, then

(a) The problem is to be re-evaluled

(b) S lution not defined

(c) The objectiv function has to be modified

d) (d) The change in constraints is ignored.

5) which region excluded if $x \geq 0, y \geq 0$

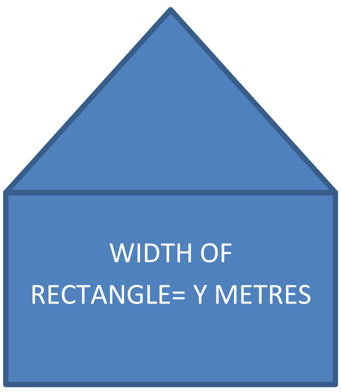
a) 1,2

b) 2,3

c) 3,4

d) none of tnese.

Q18. A window has the shape of a rectangular surmounted by an equilateral triangle with side x metres. If the perimeter of the window is 12 cm find the dimensions of rectangle so that it may produce area of window.



a) What is length of rectangle ?

1) y mt

2) x mt

3)xy mt

4) None of these.

b)What is the perimeter of window ?

1) x + y

2) 6x + 2y = 1m

3) 4x + 2y = 12m

4) none of these.

c) What is the area of window?

1) xy

2) xy+ ½

3) xy + $\frac{\sqrt{3}}{4}x^2$

4) xy + $\sqrt{3}$

d) Window area is maximum at the condition?

1) x = 12/55

2) 12/55(8 +$\sqrt{3\,)}$

3) y is maximum

4) Remains same every time.

E)What is length of rectangle?

1)138/55

2) 123/44

c) $\frac{138-24\sqrt{3}}{55}$

d) Not possible to find.

Section – B (56 MARKS) (20 + 21 + 15)

PART =1 (20 MARKS)

Q19 Solve $\int x \log 2x \, dx$

Q20. Find the maximum and minimum value of $f(x) = \sin x + \frac{1}{2}\cos 2x$ in $\left[0, \frac{\pi}{2}\right]$

Q21. If $f(x) = \begin{cases} x^3 + 3x + a & x \leq 1 \\ bx + 2 & x > 1 \end{cases}$ Is every where differentiable find the value of a and b.

Q22 Show that the determinant value of a skew-symmetric matrix of odd order is always zero.

Q23. Find the value of Øsatisfying determinant $\begin{matrix} 1 & 1 & sin3\emptyset \\ -4 & 3 & cos2\emptyset \\ 7 & -7 & -2 \end{matrix}$ =0

Q24. IF Y = e^x (Sinx + cos x) then show that $-\frac{d2y}{dx2}$ - $2\frac{dy}{dx}$ + 2y =0

OR

F ind the maximum and minimum values of $(x- 3)^5 (x+ 1)^4$

Q25. Relation R in the set A = {1, 2, 3, 4, 5,6,7} given by R = {(a, b): $|a-b|$ is even} Then find the number of set of all elements to related to 3 .

Q26 Evaluate $\int_0^2 x\sqrt{2-x}$ dx

Or $\int \log(1 + tanx)dx$

Q27. Where function f(x) = $2x^3 - 15x^2 + 36 x + 4$ is maximum.

Or

Find the interval in which function

F(x) = $2x^3 - 9 x^2 + 12 x + 15$ is increasing and decreasing.

Q28. Express the matrix $\begin{matrix} 2 & 3 & 1 \\ 1 & 1 & 2 \\ 4 & 1 & 2 \end{matrix}$ as the sum of symmetric and skew symmetric matrix.

PART = B (21Marks)

Q29 Find the local maxima and local minima of F(X)= $3 X^4 + 4X^3 -12X^2 + 12$

Q30. $\int_{\frac{\cap}{6}}^{\frac{\cap}{3}} \frac{1}{1+\sqrt{COTX}}$ dx (sign is pie)

Q31. Using integration, find the area of the region bounded by the line X –Y +2 =0 , X = $\sqrt{Y}$ and y axis.

Q32. A wire of length 28 cm is to be cut into two pieces . One of the piece is to be made into a square and other into a circle . What should be the length of two pieces so that the combined

area of them is minimum.

OR

Minimize Z = 13X-15Y , Subject of constraints

X+ y ≤ 7 , 2x -3y + 6≥ 0, x ≥ 0, y ≥ 0

Q33 $\int_0^{\pi/2} \log(tanA + CotA) = \pi log2$

Q34 A tank with rectangular base and rectangular sides open at the top is to be constructed so that its depth is 2 m and volume is 8m3. If building of tank costs Rs 70 per sq meters for base and Rs 45 per square meter for sides . What is the cost of least expensive tank.

Q35. Using Matrices solve the following system of linear equations

3X - 2y + 2z =3

x + 2y +3z = 6

2x – y + z =2

PART = C (15MARKS)

Q36. Solve the following problem graphically:

Minimise and Maximise Z= 3x +9y

Subject to the constraints: x + 3y ≤ 60 , x + y ≥ 10, x ≤ y, x ≥ 0, y≥ 0

Q37. Solve of the equation $\tan^{-1}(x – 1) + \tan^{-1} X + \tan^{-1}(x + 1) = \tan^{-1}(3x)$

OR

The sum of three numbers is -1. If we multiply the second number by 2 ,

third number by 3 and add them we get 5. If we subtract the third number

from the sum of first and second numbers we get -1. Represent it by a

system of equations . Find the three numbers using inverse of a matrix

Q38. Prove

$$\text{Cot}^{-1}\left(\frac{\sqrt{1+sinx} + \sqrt{1-sinx}}{\sqrt{1+sinx} - \sqrt{1-sinx}}\right) = \frac{x}{2}$$

or

Find the area enclosed between circle $x^2 + y^2 = 16$ exterior to parabola $y^2 = 6x$

Q21.

Q18.