



**GOVERNMENT OF KARNATAKA**  
**KARNATAKA SCHOOL EXAMINATION AND ASSESSMENT BOARD**  
**WEIGHTAGE FRAMEWORK FOR MQP 2: II PUC MATHEMATICS(35):2024-25**

Chapter	CONTENT	Number Of Teaching hours	PART A 1 mark		PART B 2 mark	PART C 3 mark	PART D 5 mark	PART E		Total
			MCQ	FB				6 mark	4 mark	
1	RELATIONS AND FUNCTIONS	9	1			1	1			9
2	INVERSE TRIGONOMETRIC FUNCTIONS	6	2	1		1				6
3	MATRICES	9	1			1	1			9
4	DETERMINANTS	12	1		1		1		1	12
5	CONTINUITY AND DIFFERENTIABILITY	20	2	1	1	1	1		1	17
6	APPLICATION OF DERIVATIVES	10	1		2	1				8
7	INTEGRALS	22	1	1	1	1	1	1		18
8	APPLICATION OF INTEGRALS	5					1			5
9	DIFFERENTIAL EQUATIONS	10	1		1		1			8
10	VECTOR ALGEBRA	11	2	1	1	1				8
11	THREE D GEOMETRY	8	1		1	1				6
12	LINEAR ROGRAMMING	7						1		6
13	PROBABILITY	11	2	1	1	1				8
	<b>TOTAL</b>	<b>140</b>	<b>15</b>	<b>5</b>	<b>9</b>	<b>9</b>	<b>7</b>	<b>2</b>	<b>2</b>	120



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**Model Question Paper -2**  
**II P.U.C MATHEMATICS (35):2024-25**

Time : 3 hours

Max. Marks : 80

**Instructions :**

- 1) The question paper has five parts namely A, B, C, D and E. Answer all the parts.
- 2) PART A has 15 MCQ's ,5 Fill in the blanks of 1 mark each.
- 3) Use the graph sheet for question on linear programming in PART E.
- 4) For questions having figure/graph, alternate questions are given at the end of question paper in separate section for visually challenged students.

**PART A**

**I. Answer ALL the Multiple Choice Questions 15×1 = 15**

1. If a relation R on the set  $\{1, 2, 3\}$  is defined by  $R = \{(1, 1)\}$ , then R is  
(A) symmetric but not transitive (B) transitive but not symmetric  
(C) symmetric and transitive. (D) neither symmetric nor transitive.

2.  $\sin(\tan^{-1}x)$ ,  $|x| < 1$  is equal to

(A)  $\frac{\sqrt{1-x^2}}{x}$  (B)  $\frac{x}{\sqrt{1-x^2}}$  (C)  $\frac{1}{1+x^2}$  (D)  $\frac{x}{\sqrt{1+x^2}}$ .

3. Match List I with List II

List I	List II
a) Domain of $\sin^{-1} x$	i) $(-\infty, \infty)$
b) Domain of $\tan^{-1} x$	ii) $[0, \pi]$
c) Range of $\cos^{-1} x$	iii) $[-1, 1]$

Choose the correct answer from the options given below:

- A) a-i , b-ii, c-iii                      B) a-iii, b-ii, c-i  
C) a-ii, b-i, c-iii                        D) a-iii, b-i, c-ii

4. Statement 1: If A is a symmetric as well as a skew symmetric matrix, then A is a null matrix

Statement 2: A is a symmetric matrix if  $A^T = A$  and A is a skew symmetric matrix if  $A^T = -A$ .

- A) Statement 1 is true and Statement 2 is false.  
B) Statement 1 is false and Statement 2 is false.  
C) Statement 1 is true and Statement 2 is true, Statement 2 is not a correct explanation for Statement 1  
D) Statement 1 is true and Statement 2 is true, Statement 2 is a correct explanation for Statement 1



## II. Fill in the blanks by choosing the appropriate answer from those

given in the bracket (-1, 0, 1, 2, 3, 5, )

5×1 = 5

16. The value of  $\cos\left(\frac{\pi}{3} + \sin^{-1}\left(\frac{1}{2}\right)\right) =$  \_\_\_\_\_
17. The number of points at which  $f(x)=[x]$ , where  $[x]$  is greatest integer function is discontinuous in the interval  $(-2, 2)$  is \_\_\_\_\_
18.  $\int_0^{\frac{\pi}{2}} \left(\sin^2 \frac{x}{2} - \cos^2 \frac{x}{2}\right) dx =$
19. If  $(2\vec{a} - 3\vec{b}) \times (3\vec{a} - 2\vec{b}) = \lambda(\vec{a} \times \vec{b})$ , then the value of  $\lambda$  is \_\_\_\_\_
20. Probability of solving a specific problem independently by A and B are  $\frac{1}{2}$  and  $\frac{1}{3}$  respectively. If both try to solve the problem then the probability that the problem is solved is  $\frac{k}{3}$ , then the value of k is \_\_\_\_\_

### PART B

Answer any SIX questions:

6 × 2 = 12

21. Find 'k' if area of the triangle with vertices  $(2, -6)$ ,  $(5, 4)$  and  $(k, 4)$  is 35 square units.
22. If  $x = 4t$ ,  $y = \frac{4}{t}$ , then find  $\frac{dy}{dx}$ .
23. The radius of an air bubble is increasing at the rate of 0.5 cm/s. At what rate is the volume of the bubble is increasing when the radius is 1 cm ?
24. Find the two numbers whose sum is 24 and product is as large as possible.
25. Evaluate:  $\int \frac{x^3 - x^2 + x - 1}{x - 1} dx$ .
26. Find the general solution of the differential equation  $\frac{dy}{dx} = \sqrt{1 - x^2 + y^2 - x^2 y^2}$ .
27. Find the area of the parallelogram whose adjacent sides are the vectors  $3\hat{i} + \hat{j} + 4\hat{k}$  and  $\hat{i} - \hat{j} + \hat{k}$ .
28. Find the angle between the pair of lines  $\frac{x+3}{3} = \frac{y-1}{5} = \frac{z+3}{4}$  and  $\frac{x+1}{1} = \frac{y-4}{1} = \frac{z-5}{2}$ .
29. A couple has two children. Find the probability that both children are males, if it is known that at least one of the children is male.

### PART C

Answer any SIX questions:

6 × 3 = 18

30. Let L be the set of all lines in a plane and R be the relation in L

defined as  $R = \{(L_1, L_2) : L_1 \text{ is perpendicular to } L_2\}$ . Show that R is symmetric but neither reflexive nor transitive.

31. Solve:  $2 \tan^{-1}(\cos x) = \tan^{-1}(2 \operatorname{cosec} x)$ .

32. Find 'x', if  $[x \quad -5 \quad -1] \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix} \begin{bmatrix} x \\ 4 \\ 1 \end{bmatrix} = 0$ .

33. If  $y = 3e^{2x} + 2e^{3x}$ , prove that  $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = 0$ .

34. Find the intervals in which the function f is given by  $f(x) = x^3 + \frac{1}{x^3}$  is  
a) decreasing b) increasing.

35. Evaluate:  $\int \frac{3x-2}{(x+1)^2(x+3)} dx$ .

36. Show that the position vector of the point R, which divides the line joining the points P and Q having the position vectors  $\vec{a}$  and  $\vec{b}$  internally in the ratio  $m:n$  is  $\frac{m\vec{b}+n\vec{a}}{m+n}$ .

37. Derive the equation of the line in space passing through a given point and parallel to a given vector in the vector form.

38. A man is known to speak truth 3 out of 5 times. He throws a die and reports that it is a six. Find the probability that it is actually a six.

## PART D

Answer any FOUR questions:

4 × 5 = 20

39. Consider the function  $f: A \rightarrow B$  defined by  $f(x) = \left(\frac{x-2}{x-3}\right)$ . Is  $f$  one-one and onto? Justify your answer.

40. If  $A = \begin{bmatrix} 1 \\ -4 \\ 3 \end{bmatrix}$  and  $B = [-1 \quad 2 \quad 1]$ , verify that  $(AB)' = B'A'$ .

41. Use the product  $\begin{pmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{pmatrix} \begin{pmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{pmatrix}$  to solve the system of equations

$$x - y + 2z = 1, \quad 2y - 3z = 1, \quad 3x - 2y + 4z = 9.$$

42. Find the values of a and b such that

$$f(x) = \begin{cases} 5 & \text{if } x \leq 2 \\ ax + b & \text{if } 2 < x < 10 \\ 21 & \text{if } x \geq 10 \end{cases} \quad \text{is continuous function.}$$

43. Find the integral of  $\frac{1}{\sqrt{x^2+a^2}}$  w.r.t x and hence evaluate  $\int \frac{1}{\sqrt{x^2+121}} dx$ .

44. Find the area of the region bounded by the ellipse  $\frac{x^2}{16} + \frac{y^2}{9} = 1$  by integration method.
45. Solve the differential equation  $ydx - (x + 2y^2)dy = 0$ .

**PART E**

**Answer the following questions:**

46. Prove that  $\int_a^b f(x)dx = \int_a^c f(x)dx + \int_c^b f(x)dx$  and hence evaluate  $\int_{-1}^2 |x^3 - x| dx$ .

**OR**

Solve the following problem graphically: Maximize and minimize

$Z = 3x + 2y$ , Subject to the constraints,  $x + 2y \leq 10, 3x + y \leq 15, x, y \geq 0$ . **6**

47. Show that the matrix  $A = \begin{bmatrix} 5 & 6 \\ 4 & 3 \end{bmatrix}$  satisfies the equation  $A^2 - 8A - 9I = O$ , where

$I$  is  $2 \times 2$  identity matrix and  $O$  is  $2 \times 2$  zero matrix. Using this equation, find  $A^{-1}$ .

**OR**

Differentiate  $(\sin x)^x + \sin^{-1} x$  w.r.t.  $x$ .

**4**

**PART F**

**(For Visually Challenged Students only)**

6. For the function  $f(x) = |x-1|$ , consider the following statements 1 and 2

Statement 1: The given function is differentiable at  $x=1$

Statement 2: The given function is continuous at  $x=0$

- A) Statement 1 is true and Statement 2 is false  
 B) Statement 1 is false and Statement 2 is true  
 C) Both Statement 1 and 2 are true  
 D) Both Statement 1 and 2 are false

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