GOVERNMENT OF KARNATAKA
KARNATAKA SCHOOL EXAMINATION AND ASSESSMENT BOARD
WEIGHTAGE FRAMEWORK FOR MQP 1: 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	1		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	2	1	1	1				8
7	INTEGRALS	22	2		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
	TOTAL	**140**	**15**	**5**	**9**	**9**	**7**	**2**	**2**	120

GOVERNMENT OF KARNATAKA

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Model Question Paper -1

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. Let the relation R in the set A = { x ∈ Z: 0 ⩽ x ⩽ 12}, given by R={(a, b):|a-b| is multiple of 4}, then [3], the equivalence class containing 3 is

A) {1,5,9} B) ϕ C)A D) {3, 7,11}

2. If $\cot^{-1}x = y$, then

(A) $0 \le y \le \pi$ (B) $0 < y < \pi$ (C) $-\frac{\pi}{2} \le y \le \frac{\pi}{2}$ (D) $-\frac{\pi}{2} < y < \frac{\pi}{2}$.

3. If $A = [a_{ij}]$ is a symmetric matrix of order $m \times n$ then

(A) m=n and a_{ij}=0 for i=j B) m=n and $a_{ij}=a_{ji}$ for all i,j

(C) $a_{ij}=a_{ji}$ for all i,j D) m=n and $a_{ij}=-a_{ji}$ for all i,j

4. If $\begin{vmatrix} 3 & x \\ x & 1 \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 4 & 1 \end{vmatrix}$ then the value of x is equal to

A) 2 B) 4 C) 8 D) $\pm 2\sqrt{2}$.

5. Statement 1**:** Left hand derivative of $f(x) = |x|$ at x = 0 is -1.
Statement 2**:** Left hand derivative of f(x) at x = a is $\lim_{h\to 0} f(a-h)$

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

6. The derivative of log(secx+tanx) with respect to x is

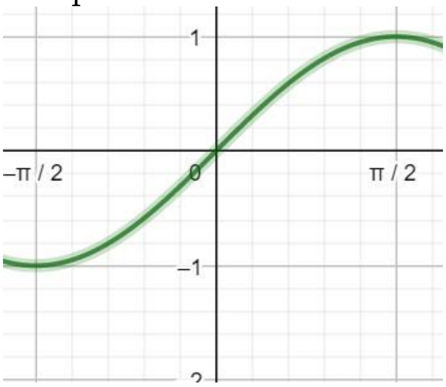
A)secx B) tanx C) secx.tanx D) $\frac{1}{secx+tanx}$

7. The absolute maximum value of the function f given by

$f(x) = x^3$, $x \in [-2, 2]$ is

A)-2 B)2 C)0 D)8

8. The point of inflection for the following graph is



A)$-\frac{\pi}{2}$ B) $\frac{\pi}{2}$ C) 0 D) point of inflection does not exist

9. $\int e^x \left(\frac{1}{x} - \frac{1}{x^2}\right) dx$ =

A) $e^x + c$ B) $\frac{e^x}{x^2} + c$ (C) $\frac{e^x}{x} + c$ (D) $\frac{-e^x}{x} + c$

10. $\int x \sin x dx$ =

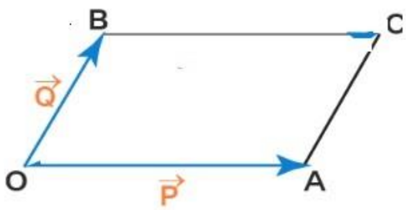
A) $-xcosx - sinx + c$ B) $xcosx + sinx + c$

C) $xcosx - sinx + c$ D) $-cosx - sinx + c$

11. The projection vector of the vector $\overrightarrow{AB}$ on the directed line l, if angle $\theta = \frac{\pi}{2}$ will be.

A) $Zero$ vector. B) $\overrightarrow{AB}$ C) $\overrightarrow{BA}$ D) $Unit$ vector.

12. For the given figure, $\vec{P} - \vec{Q}$ is



A) $\overrightarrow{OC}$ B) $\overrightarrow{CO}$ C) $\overrightarrow{BA}$ D) $\overrightarrow{AB}$

13. The direction cosines of negative z-axis.

(A) -1 , -1 , 0 (B) 0 , 0 , -1 (C) 0 , 0 , 1 (D) 1 , 1 , 0

14. If P(A) = $\frac{1}{2}$, P (B) = 0, then P (A|B) is

A) 0 B) $\frac{1}{2}$ C) 1 D) not defined

15. An urn contains 10 black and 5 white balls, 2 balls are drawn one after the other without replacement, then the probability that both drawn balls are black is

A) $\frac{3}{7}$ B) $\frac{4}{9}$ C) $\frac{2}{3}$ D) $\frac{2}{9}$

II. Fill in the blanks by choosing the appropriate answer from those given in the bracket (0, 1, 2, 3, 4, 5) **5 × 1 = 5**

16. The number of points in R for which the function f(x) = |x|+ |x + 1| is not differentiable, is_________

17. The value of $\hat{\imath}.(\hat{\jmath} \times \hat{k}) - \hat{\jmath}.(\hat{k} \times \hat{\imath}) - \hat{k}.(\hat{\jmath} \times \hat{\imath})$ is________

18. The sum of the order and degree of the differential equation.

$2x^2\left(\frac{d^2y}{dx^2}\right) - 3\left(\frac{dy}{dx}\right) + y$ is_____

19.The total revenue in rupees received from the sale of x unit of a product is given by R(x)=$2x^2 - 4x + 5$,The marginal revenue when x=2 is________

20. If P(A) = $\frac{3}{k}$, P(A∩ B) = $\frac{2}{5}$ and P(B|A) = $\frac{2}{3}$, then k is _______

PART B

Answer any SIX questions: **6 × 2 = 12**

21. Show that $\sin^{-1}\left(2x\sqrt{1-x^2}\right) = 2\sin^{-1}(x), \ -\frac{1}{\sqrt{2}} \le x \le \frac{1}{\sqrt{2}}$.

22. Show that points A (a, b + c), B (b, c + a), C (c, a + b) are collinear using determinants.

23. Find $\frac{dy}{dx}$, if $2x+3y=\sin x$.

24. Find the local maximum value of the function $g(x)=x^3-3x$.

25. Evaluate $\int \sin 3x \cos 4x \, dx$.

26. Find the general solution of the differential equation $\frac{ydx-xdy}{y} = 0$.

27. Find $|\vec{x}|$, if for a unit vector $\vec{a}$, $(\vec{x}-\vec{a})\cdot(\vec{x}+\vec{a}) = 15$.

28. Find the equation of the line in vector form that passes through the point with position vector $2\hat{\imath} - \hat{\jmath} + 4\hat{k}$ and is in the direction $\hat{\imath} + 2\hat{\jmath} - \hat{k}$.

29. Prove that if E and F are independent events, then so are the events E and F'.

PART C

Answer any SIX questions: **6×3 = 18.**

30. Show that the relation R in the set of real numbers **R** defined as $R = \{(a,b) : a \le b\}$,is reflexive and transitive but not symmetric.

31. Prove that $\cos^{-1}\frac{4}{5} + \cos^{-1}\frac{12}{13} = \cos^{-1}\frac{33}{65}$.

32. Express $\begin{bmatrix} 3 & 5 \\ 1 & -1 \end{bmatrix}$ as the sum of a symmetric and a skew symmetric matrix.

33. Find $\frac{dy}{dx}$ if $x = a(\cos\theta + \theta\sin\theta)$ and $y = a(\sin\theta - \theta\cos\theta)$.

34. Find the intervals in which the function $f(x)=(x-2)^3(x+4)^3$ is

a) increasing b)decreasing.

35. Find $\int \frac{x}{(x+1)\,(x+2)} dx$.

36. If $\vec{a}, \vec{b}$ & $\vec{c}$ are three vectors such that $|\vec{a}| = 3$, $|\vec{b}| = 4$, $|\vec{c}| = 5$ and each vector is orthogonal to sum of the other two vectors then find $|\vec{a} + \vec{b} + \vec{c}|$.

37. Find the distance between the lines $\vec{r} = 6\hat{\imath} + 2\hat{\jmath} + 2\hat{k} + \lambda(\hat{\imath} - 2\hat{\jmath} + 2\hat{k})$ and $\vec{r} = -4\hat{\imath} - \hat{k} + \mu(3\hat{\imath} - 2\hat{\jmath} - 2\hat{k})$.

38. Bag I contains 4 Red and 4 Black balls, Bag II contains 2 Red and 6 Black balls .One bag is selected at random and a ball is drawn is found to be Red. What is the probability that bag I is selected?

PART D

Answer any FOUR questions: **5× 4 = 20.**

39. State whether the function f: **R** →**R** defined by $f(x) = 3 - 4x$ is one-one, onto or bijective. Justify your answer.

40. If $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$, prove that $A^3 - 6A^2 + 7A + 2I = O$.

41. Solve the following system of equations by matrix method:
2x + y -z =1; x + y =z and 2x + 3y + z = 11.

42. If $y = 3\cos(\log x) + 4\sin(\log x)$, prove that $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 0$.

43. Find the integral of $\frac{1}{\sqrt{a^2 - x^2}}$ with respect to x and evaluate $\int \frac{dx}{\sqrt{7 - x^2}}$.

44. Solve the differential equation $\frac{dy}{dx}$ + y secx = tanx $(0 \le x \le \pi/2)$.

45. Find the area of the circle $x^2 + y^2 = a^2$ by the method of integration.

PART E

Answer the following questions:

46. Maximize and Minimise ; $z = 3x + 9y$ subject to constraints

$x + 3y \le 60,\ x + y \ge 10,\ x \le y,\ x \ge 0,\ y \ge 0$ by graphical method.

OR

Prove that $\int_a^b f(x)\,dx = \int_a^b f(a+b-x)\,dx$ and hence evaluate $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{1}{1+\sqrt{\tan x}}\,dx$. **6**

47. Find the value of k so that the function $f(x) = \begin{cases} kx+1, & if\ \ x \le 5 \\ 3x-5, & if\ \ x > 5 \end{cases}$, at $x = 5$ is a continuous function.

OR

If A = $\begin{bmatrix} 2 & 3 \\ 1 & -4 \end{bmatrix}$ and B = $\begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix}$ then verify that $(AB)^{-1} = B^{-1}A^{-1}$.

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PART F

(For Visually Challenged Students only)

8. The point of inflection of the function f(x)=sinx in the interval $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ is

A) $-\frac{\pi}{2}$ B) $\frac{\pi}{2}$ C) 0 D) point of inflection does not exist

12. In a parallelogram OACB, $\overrightarrow{OA} = \vec{P}$ and $\overrightarrow{OB} = \vec{Q}$, then $\vec{P} - \vec{Q}$ is

A) $\overrightarrow{OC}$ B) $\overrightarrow{CO}$ C) $\overrightarrow{BA}$ D) $\overrightarrow{AB}$

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