BLUEPRINT FOR MODEL QUESTION PAPER-1

SUBJECT:MATHEMAMATICS(35)

CLASS : IIPUC :2024-2025

SL. NO	CHAPTER/ DOMAIN/	NO OF T. HOURS	MARKS	REMEMBER						UNDERSTAND						APPLY							CREATE/EVALUATE							TOTAL
				PART-A		PART-B	PART-C	PART-D	PART-E	PART-A		PART-B	PART-C	PART-D	PART-E	PART-A		PART-B	PART-C	PART-D	PART-E		PART-A		PART-B	PART-C	PART-D	PART-E		
				1 MARK MCQ	1 MARK FB	2 MARK SA	3 MARK SA	5 MARK LA	4 MARK LA	1 MARK MCQ	1 MARK FB	2 MARK SA	3 MARK SA	5 MARK LA	4 MARK LA	1 MARK MCQ	1 MARK FB	2 MARK SA	3 MARK SA	5 MARK LA	6 MARK LA	4 MARK LA	1 MARK MCQ	1 MARK FB	2 MARK SA	3 MARK SA	5 MARK LA	6 MARK LA	4 MARK LA	
1	RELATIONS AND FUNCTIONS	9	9					1		1			1																	9
2	INVERSE TRIGONOMETRIC FUNCTIONS	6	6	1								1							1											6
3	MATRICES	9	9					1		1			1																	9
4	DETERMINANTS	12	12					1		1					1			1												12
5	CONTINUITY ANDDIFFERENTIABILITY	20	17							1		1	1	1			1					1	1							17
6	APLLICATION OFDERIVATIVES	10	8							1							1	1					1			1				8
7	INTEGRALS	22	18	1				1		1		1	1								1									18
8	APPICATION OFINTEGRATIO	5	5					1																						5
9	DIFFERENTIAL EQUATIONS	10	8		1			1										1												8
10	VECTORALGEBRA	11	8	1						1	1	1	1																	8
11	THREEDIMENSIONAL GEOMETRY	8	6	1								1							1											6
12	LINEARPROGRAMMING	7	6																								1			6
13	PROBABILITY	11	8		1					1		1	1										1							8
TOTAL		**140**	**120**	5	2	0	0	6	0	8	1	6	6	1	1	0	2	3	2	0	1	1	3	0	0	1	0	1		**120**

DESIGN OF THE QUESTION PAPER

SECOND PUC: MATHEMATICS(35): 2024-25

Pattern of the Question Paper:

Part	Type of questions	Number of questions to be set	Number of questions to be answered	TOTAL MARKS	Remarks
A	1 mark Questions	15+5=20	15+5=20	20(20)	Compulsory part(MCQ+FB)
B	2 marks Questions	9	6	9× 2=18 (6× 2=12)	
C	3marks Questions	9	6	9× 3=27 (6× 3=18)	
D	5marks Questions	7	4	7× 5=35 (4× 5=20)	Questions must be asked from 7 specific topics
E	6 and 4 marks Questions (Both Internal choice)	2+2	1+1	6× 2=12 (6× 1=6) 4× 2=8 (4× 1=4)	Questions must be asked from 4 specific topics

The weightage marks distribution across different dimensions shall be as follows:

A. Weightage to Objectives.

Objective	**Weightage**	**Marks**
Remember	40%	36/120
Understand	30%	48/120
Apply	20%	24/120
Analyse/Create/Evaluate	10%	12/120

B.Weightage/marks across difficulty level:

Level	Weightage	Marks
Easy	40%	48/120
Average	40%	48/120
Difficult	20%	24/120

C: Weightage Framework:

Chapter No.	Chapter	No. of teaching Hours	Marks
1	RELATIONS AND FUNCTIONS	9	9
2	INVERSE TRIGONOMETRIC FUNCTIONS	6	6
3	MATRICES	9	9
4	DETERMINANTS	12	12
5	CONTINUITY AND DIFFERENTIABILITY	20	17
6	APPLICATION OF DERIVATIVES	10	8
7	INTEGRALS	22	18
8	APPLICATION OF INTEGRALS	5	5
9	DIFFERENTIAL EQUATIONS	10	8
10	VECTORS	11	8
11	THREE D GEOMETRY	8	6
12	LINEAR PROGRAMMING	7	6
13	PROBABILITY	11	8
TOTAL		140	120

Quality & Length of the Question Paper

1.While framing a question, the time required to solve it should be decided properly and the marks should be awarded accordingly.

2.Marks allotted for each question should be properly mentioned in the question paper.

General Instructions:

1.Question paper should be prepared by preparing separate blueprint by keeping the weightage of marks allotted to each chapter in mind.

2. Weightage allotted to each topic cannot be changed but the question setter has the liberty to choose the question type as per instructions given.

4. Miscellaneous worked examples and exercise problems can also be included in the Question paper.

5. Question order in the question paper need not to be in accordance with the chapters in the textbook.

6. The problems that are based on the concepts discussed in the book [prescribed by the Department of School Education (Pre-university)] can be asked. However, this does not mean that problems should be given as they appear in the textbook.

7.No question should be asked from the historical notes and appendices given in the textbook.

8.Questions should not be split into subdivisions.

9.Questions should be clear, unambiguous, understandable and all unwanted data in the questions should be avoided.

10.Instructions to use graph sheet in linear programming problem should be given in the question paper.

11.Repetition of the same concepts, laws, facts etc. which generate the same concept in different parts of the question paper should be avoided.

12. In MCQ section, stimulus questions, comprehensive, identifying the true or false statements should be asked but then should not exceed three questions.

13. Six numerical options should be given for the five Fill in the blanks questions.

14.Questions for Part D should be given from the following 7 specific topics only.

i).RELATIONS AND FUNCTIONS
ii).MATRICES
iii).DETERMINANTS
iv).CONTINUITY AND DIFFERENTIABILITY
v).INTEGRALS
vi).APPLICATION OF INTEGRALS
vii).DIFFERENTIAL EQUATIONS

15.Questions for Part E should be given from the following 4 specific topics only.

(Both Six marks and Four marks questions should have internal choice.)

i).INTEGRALS
ii).LINEAR PROGRAMMING
iii).CONTINUITY AND DIFFERENTIABILITY
iv).DETERMINANTS

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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

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KARNATAKA SCHOOL EXAMINATION AND ASSESSMENT BOARD

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.

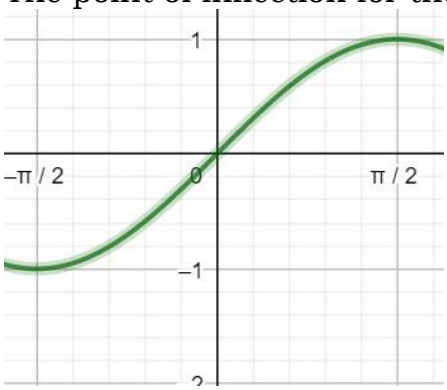
6. The derivative of log(secx+tanx) with respect to x is

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. $\int x \sin x dx =$

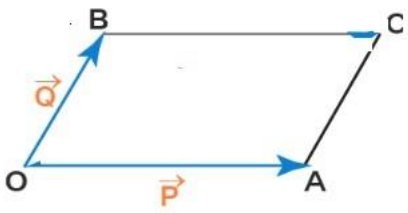
A) $-xcosx - sinx + c$ B) $xcosx + sinx + c$

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 $\sin^{-1}\left(2x\sqrt{1-x^2}\right) = 2\sin^{-1}(x)$, $-\frac{1}{\sqrt{2}} \leq x \leq \frac{1}{\sqrt{2}}$.

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** $\to$**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 $(0 \leq x \leq \pi/2)$.

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 $x + 3y \leq 60,\ x + y \geq 10,\ x \leq y,\ x \geq 0,\ y \geq 0$ 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 $f(x) = \begin{cases} kx+1, & if \quad x \leq 5 \\ 3x-5, & if \quad x > 5 \end{cases}$, 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 $(AB)^{-1} = B^{-1}A^{-1}$.

4

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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