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FOR KARNATAKA CLASS 12 PREPARATION

Karnataka 2nd PUC Model Question Paper 2027 for Mathematics (Paper 2)

EXAM	YEAR	TYPE	SUBJECT
Karnataka Class 12	2027	Sample Paper	Maths

GOVERNMENT OF KARNATAKA
KARNATAKA SCHOOL EXAMINATION AND ASSESSMENT BOARD

Model Question Paper - 2

II P.U.C: MATHEMATICS (35): 2026-27

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 x 1 = 15**

1. If a relation R on the set {1, 2, 3} be defined by R = {(1, 1), (2, 2)}, then R is

(A) symmetric but not transitive (B) transitive but not symmetric
(C) symmetric and transitive. (D) neither symmetric nor transitive.

2. Match Column I with Column II

Column I	Column II
a) Domain of $sec^{-1}x$	i) $R-(-1,1)$
b) Range of $cosec^{-1}x$	ii) $(0,\pi)$
c) Range of $cot^{-1}x$	iii) $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]-\{0\}$

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-i, b-iii, c-ii (D) a-iii, b-i, c-ii

3. The matrix $A=\begin{bmatrix}0 & 2b & -2\\ 3 & 1 & 3\\ 3a & 3 & -1\end{bmatrix}$ is a symmetric matrix. Then the value of a and b respectively are:

(A) $-\frac{2}{3},\frac{3}{2}$ (B) $-\frac{1}{2},\frac{1}{2}$ (C) $-2,2$ (D) $\frac{3}{2},\frac{1}{2}$

4. A and are invertible matrices of the same order such that $|AB|=8$ if $|A|=2$ *then* $|B|$ *is*

(A) 4 (B) 16 (C) 1/4 (D) 1/16

5. The function $f(x) = [x]$, where [.] is greatest integer function is _____

(A) discontinuous only for integral x (B) a constant function
(C) continuous for all x (D) derivable for all x

6. The derivative of $e^{\log_e x}$ with respect to x is

(A) $e^{log_e x}$ (B) $\frac{1}{x}$ (C) 1 (D) $\frac{e^{log_e x^2}}{x}$

7. The total revenue in rupees received from the sale of x units of a product is R (x) = $3x^2 + 36x + 5$, then the marginal revenue when $x = 15$ is ..... Rupees
(A) 116 (B) 96 (C) 90 (D) 126

8. 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

9. $\int \frac{2-3\sin x}{\cos^2 x} dx$ =
(A) $2\tan x - 3\sec x + c$ (B) $2\tan x + 3\sec x + c$
(C) $2\tan x - 2\sec x + c$ (D) $2\sec x - 3\tan x + c$

10. $\int_1^{\sqrt{3}} \left(\frac{1}{1+x^2} \right) dx =$
(A) $\frac{\pi}{3}$ (B) $\frac{2\pi}{3}$ (C) $\frac{\pi}{6}$ (D) $\frac{\pi}{12}$

11. **Statement 1:** If either $|\vec{a}| = 0$ or $|\vec{b}| = 0$ then $\vec{a}.\vec{b} = 0$
Statement 2: If $\vec{a} \times \vec{b} = \vec{0}$, *then* $\vec{a} \perp$ *to* $\vec{b}$.
(A) Statement 1 is true and Statement 2 is false
(B) Statement 1 is false and Statement 2 is true
(C) Statement 1 is true and Statement 2 is true
(D) Statement 1 is false and Statement 2 is false

12. If $|\vec{a}.\vec{b}| = -|\vec{a}||\vec{b}|$ then the angle between $\vec{a}$ & $\vec{b}$ *is*
(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{2}$ (C) π (D) $\frac{\pi}{3}$

13. The direction ratios of x -axis.
(A) 0, k, 0 (B) 0, 0, k (C) k, 0, 0 (D) k, k, k

14. If $P(A) = \frac{1}{2}$ *and* $P(B) = 0$ then find $P(B|A)$ is
(A) $\frac{1}{2}$ (B) 0 (C) 1 (D) *not defined*

15. Two balls are drawn at random with replacement from a box containing 10 black and 8 red balls, then the probability that both are red
(A) $\frac{25}{81}$ (B) $\frac{16}{81}$ (C) $\frac{20}{81}$ (D) $\frac{28}{153}$

II. Fill in the blanks by choosing the appropriate answer from those given in the bracket $(0, -1, 2, 3, 5, 10)$ **5 x 1= 5**

16. $\frac{d}{dx}(3x^x)$ at x =1 is = ____

17. Minimum value of f(x) = $|x + 2| - 1$ is_____

18. Find the number of arbitrary constants in the particular solution of a differential equation of third order is _____

19. The scalar product of $\lambda i + j - 3k$ and $3i - 4j + 7k$ is -10, then the value of λ is _____

20. If $P(A) = \frac{3}{5}, P(B) = \frac{5}{10}$ and A and B are independent events then $P(A \cap B) = \frac{3}{k}$,then k=_____

PART –B

III. Answer Any Six Questions **6 x 2 =12**

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

22. Find the equation of the line joining the points $(3,1)$ and $(9,3)$ using determinants

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

24. Find the rate of change of the area of a circle with respect to its radius r at $r = 6\ cm$.

25. Find $\int \sin 2x \cos 3x dx$

26. Find the general solution of the differential equation $\frac{dy}{dx} = \frac{x+1}{2-y}, (y \neq 2)$

27. Find the projection of the vector $\vec{a} = 2\vec{i} + 3\vec{j} + 2\vec{k}$ on the vector $\vec{b} = \vec{i} + 2\vec{j} + \vec{k}$.

28. Find the vector and Cartesian equation of the line passing through the point (5,2,-4) and parallel to the vector $3\vec{i} + 2\vec{j} - 8\vec{k}$

29. A die is tossed thrice. Find the probability of getting an odd number at least once

PART – C

IV. Answer Any Six Questions **6 x 3 =18**

30. Show that the relation R on the set $A = \{x \in Z : 0 \le x \le 12\}$, given by

R = {(a, b) : $|a-b|$ is a multiple of 4} is an equivalence relation

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

32. Prove that for any square matrix A with real number entries, $A + A'$ is a symmetric matrix and $A - A'$ is a skew symmetric matrix.

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

34. Find the intervals in which the function f given by $f(x) = 2x^3 - 3x^2 - 36x + 7$ is strictly decreasing

35. Find $\int x \tan^{-1} x dx$

36. Find the unit vector perpendicular to each of the vectors $(\vec{a} + \vec{b})$ & $(\vec{a} - \vec{b})$, where $\vec{a} = 3\vec{i} + 2\vec{j} + 2\vec{k}$ & $\vec{b} = \vec{i} + 2\vec{j} - 2\vec{k}$.

37. Find the distance between the lines
$\vec{r} = \vec{i} + 2\vec{j} - 4\vec{k} + \lambda(2\vec{i} + 3\vec{j} + 6\vec{k})$ & $\vec{r} = 3i + 3\vec{j} - 5\vec{k} + \mu(2\vec{i} + 3\vec{j} + 6\vec{k})$

38. Of the students in a college, it is known that 60% reside in hostel and 40% are day scholars (not residing in hostel). Previous year results report that 30% of all students who reside in hostel attain A grade and 20% of day scholar attain A grade in their annual examination. At the end of the year, one student is chosen at random from the college and he has an A grade, what is the probability that the student is a hostile?

PART – D

V. Answer Any Four Questions **4 x 5 = 20**

39. Consider $f : R \to R$ given by f(x) = 4x +3. Show that f is invertible. Find the inverse.

40. If $A = \begin{bmatrix} 1 & 2 & -3 \\ 5 & 0 & 2 \\ 1 & -1 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 3 & -1 & 2 \\ 4 & 2 & 5 \\ 2 & 0 & 3 \end{bmatrix}$ and $C = \begin{bmatrix} 4 & 1 & 2 \\ 0 & 3 & 2 \\ 1 & -2 & 3 \end{bmatrix}$

Then compute (A + B) and (B – C). Also, verify that A + (B – C) = (A + B) – C

41. Solve the system of equations $x + y + z = 6$, $y + 3z = 11$ and $x - 2y + z = 0$ by matrix method.

42. If $y = \sin^{-1} x$, then prove that $(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} = 0$.

43. *Find* the integral of $\frac{1}{x^2 - a^2}$ with respect to x and evaluate $\int \frac{dx}{x^2 - 16}$

44. Using the method of integration, find the area enclosed by the circle $x^2 + y^2 = a^2$

45. Find the general solution of the differential equation $\frac{dy}{dx} + y\cot x = 4x\,\mathrm{cosec}\,x (x \neq 0)$.

PART – E

VI. Answer The Following Questions

46. Prove that $\int_{-a}^{a} f(x)dx = \begin{cases} 2\int_0^a f(x)dx & \text{if f(x) is even} \\ 0 & \text{if f(x) is odd} \end{cases}$ hence evaluate $\int_{-\pi/2}^{\pi/2} (x^3 + x\cos x + \tan^5 x)dx$. **6M**

OR

Solve the following graphically, Minimize Z = 200x + 500y, subject to the constraints $x + 2y \geq 10$, $3x + 4y \leq 24$, x ≥ 0, y ≥ 0.

47. If $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$ satisfies the equation $A^2 - 4A + I = O$, then find the inverse of A using this equation, where I is the identity matrix of order 2 and O is the zero matrix of order 2 **4M**

OR

Determine the value of k, if $f(x) = \begin{cases} \frac{k\cos x}{\pi - 2x}, & if\ x \neq \frac{\pi}{2} \\ 3, & if\ x = \frac{\pi}{2} \end{cases}$ is continuous at $x = \frac{\pi}{2}$.

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