GOVERNMENT OF KARNATAKA

KARNATAKA SCHOOL EXAMINATION AND ASSESSMENT BOARD

6TH CROSS, MALLESHWARAM, BENGALURU – 560 003

II PUC MODEL QUESTION PAPER – 2 (2025-2026)

SUBJECT: BASIC MATHEMATICS **MAXIMUM MARKS: 80**

TIME: 03 HOURS **NUMBER OF QUESTIONS:42**

Instructions:

i. The question paper has 5 Parts A, B, C, D and E. Answer all the Parts.

ii. Part - A carries 20 marks, Part - B carries 12 marks, Part - C carries 18 marks, Part - D carries 20 marks and Part - E carries 10 marks.

iii. Write the question number properly as indicated in the question paper.

PART-A

I. Answer ALL the multiple-choice questions: $10 \times 1 = 10$

1. If A

a) b) 25 c) 15 d) 10

2. Whe$= \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$ then the value of $A - A'$ is

a) $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ b) $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ c) $\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$ d) $\begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$

3. If $^{n}C_{10} = {}^{n}C_{15}$ then the value of n is

4. 20n an unbiased die is rolled, the probability of getting a prime number is

a) $\frac{2}{3}$ b) $\frac{3}{2}$ c) $\frac{1}{3}$ d) $\frac{1}{2}$

5. The inverse of the implication "$p \rightarrow q$" is

a) $\sim p \rightarrow q$ b) $p \wedge \sim q$ c) $\sim p \wedge q$ d) $\sim p \rightarrow \sim q$

6. The compound ratio of 3 : 5 and 4 : 7 is

a) 7 : 12 b) 12 : 20 : 35 c) 12 : 35 d) 21 : 20

7. The value of $\sin 15^0$ is

a) $\frac{\sqrt{3}-1}{2}$ b) $\frac{\sqrt{3}+1}{\sqrt{2}}$ c) $\frac{\sqrt{3}-1}{2\sqrt{2}}$ d) $\frac{\sqrt{3}+1}{2\sqrt{2}}$

8. If the equation of the parabola is $y^2 = -20x$ then the co-ordinates of focus is

a) $(5, 0)$ b) $(0, 5)$ c) $(-5, 0)$ d) $(0, -5)$

9. If $y = \log_e e$ then $\frac{dy}{dx}$ is

a) 1 b) $\frac{1}{e}$ c) 0 d) None

10. Evaluate: $\int \frac{9}{\sin^2 x}\,dx$

a) $9\tan x + C$ b) $-9\cot x + C$ c) $9\cot x + C$ d) $-9\tan x + C$

11. Evaluate: $\int \frac{1}{7x+8}\,dx$

a) $\frac{1}{7}\log(7x+8)+c$ b) $7\log(7x+8)+c$ c) $\log(7x+8)+c$ d) $-\frac{1}{(7x+8)^2}+c$

II. Match the following: $\mathbf{5 \times 1 = 5}$

12.

	A		B
a)	The value of $\begin{vmatrix} 101 & 102 \\ 103 & 104 \end{vmatrix}$ is	i)	$\frac{\sqrt{3}}{2}$
b)	The value of ${}^7P_3$ is	ii)	-2
c)	The consequent of 25 : 81 is	iii)	210
d)	The value of $3\sin 10° - 4\sin^3 10°$ is	iv)	-3
e)	The value of $\lim_{x \to 3} \frac{x^2 - 4x}{x - 2}$ is	v)	$\frac{1}{2}$
		vi)	81

III. Fill in the blanks by choosing appropriate answer from given options : $\mathbf{5 \times 1 = 5}$

$$\left(\log 2, \quad 12, \quad \frac{1}{2}, \quad 120, \quad \pm 6, \quad \log 1\right)$$

13. If $A = \begin{bmatrix} x & 12 \\ 3 & x \end{bmatrix}$ is a singular matrix then the value of x is _____

14. The number of ways 6 people can be seated around a table is _____

15. If 5 : 20 = 3 : x then the value of x is _____

16. If the length of the latus rectum of the parabola $y^2 = 8kx$ is 4, then the value of k is ____

17. $\int_1^2 \frac{1}{x}\,dx =$ _____

PART-B

IV. Answer any SIX questions. $\mathbf{6 \times 2 = 12}$

17. If $\begin{bmatrix} x+y & 3 \\ 5 & x-y \end{bmatrix} = \begin{bmatrix} 6 & 3 \\ 5 & 2 \end{bmatrix}$ then find x and y.

18. There are 15 points in a plane of which 5 are collinear. Find the number of straight lines can be formed.

19. If three cards are drawn at random from a pack of 52 cards, what is the probability that atleast two of them are kings?

20. Find the ratio between two numbers such that their sum is 40 and their difference is 8.

21. BD and BG on a certain bill due after sometime are ₹1250 and ₹50 respectively. Find the face value of the bill.

22. Find the equation of the parabola whose vertex is $(0, 0)$ and directrix is $y = -6$.

23. If $y = \sqrt{x + \sqrt{x + \sqrt{x + \cdots \infty}}}$ then prove that $\frac{dy}{dx} = \frac{1}{2y-1}$

24. The displacement s of a particle at time t is given by $s = 4t^3 - 6t^2 + t - 7$. Find the velocity and acceleration, when t = 2 sec.

25. Find the area enclosed by the curve $y = x^2$, x-axis and the lines $x = 0$ and $x = 1$.

PART-C

V. Answer any SIX questions. $6 \times 3 = 18$

26. If $A = \begin{bmatrix} 2 & 3 \\ 4 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 5 \\ 6 & 2 \end{bmatrix}$ then show that $(AB)' = B'A'$

27. A family of 4 brothers and 3 sisters is to be arranged for a photograph in one row. In how many ways can they be seated if

a) all the sisters sit together b) no two sisters sit together

28. Walking 4 kmph a student reaches his college 5 minutes late and if he walks at 5 kmph then he reaches the college 2.5 minutes early. What is the distance from his house to the college?

29. The present value of a bill due sometime hence is ₹1100 and the true discount is ₹110. Find the banker's discount.

30. Ramesh holds ₹2100 of 3% stock. He sells at ₹121 and invests the proceeds in 5% stock. There by his income increases by ₹14. Find the market price of 5% stock.

31. When the rate of sales tax is decreased from 9% to 7% for a radio, Gowri has to pay ₹632 less for it. What is the listed price of the radio?

32. The edge of a variable cube is increasing at the rate of 6 cm/min. How fast is the volume and its surface area increasing when the edge is 10 cm long.

33. Evaluate: $\int x . \log x \, dx$

34. Evaluate: $\int_2^3 \frac{1}{(x+1)(x+2)} dx$

PART-D

VI. Answer any FOUR questions. $4 \times 5 = 20$

35. If $A = \begin{bmatrix} 2 & 3 \\ 1 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 1 & 4 \\ 0 & 1 & 3 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & -3 & -1 \\ -2 & 4 & 5 \\ 1 & 3 & -2 \end{bmatrix}$. Verify (AB)C = A(BC).

36. Resolve into partial fraction: $\frac{2x+1}{(x-1)(x-2)(x-3)}$

37. Verify whether the propositions $[(p \wedge \sim q) \vee q]$ and $p \vee q$ are logically equivalent.

38. A company requires 100 hours to produce the first 10 units at ₹15 per hour. The learning curve effect is 80%. Find the total labour cost to produce a total of 160 units.

39. Maximize: $Z = 60x + 15y$
Subject to the constraints $x + y \leq 50, 3x + y \leq 90$ and $x \geq 0, y \geq 0$

40. Prove that: $\sin 20° . \sin 40° . \sin 60° . \sin 80° = \frac{3}{16}$

41. If $y = x + \sqrt{x^2 - 1}$ show that $(x^2 - 1)y_2 + xy_1 - y = 0$

PART-E

VII. Answer the following questions.

42. a) P.T: $\lim_{x \to a} \left(\frac{x^n - a^n}{x - a}\right) = na^{n-1}$, for all rational values of n **(6 marks)**

(OR)

Show that the points $(2, -4), (0, 0), (3, -1)$ and $(3, -3)$ are concyclic

b) From the top of a cliff, the angle of depression of two boats in the same vertical plane as the observer are 30^0 and 45^0. If the distance between the boats is 100 meters, find the height of the cliff. **(4 marks)**

(OR)

Find the value of $(0.99)^4$ using Binomial theorem, upto 4 decimal places

PART-F
(only for visually challenged students)

39. Nikhil pesticide company must produce 200 kg mixture consisting of chemicals A and B daily. A costs ₹3 per kg and B costs ₹8 per kg. Maximum 80 kg of chemical A and at least 60 kg of chemical B should be used. Formulate L.P.P. model to minimize the cost.