

GOVERNMENT OF KARNATAKA
KARNATAKA SCHOOL EXAMINATION AND ASSESSMENT BOARD
II PUC MODEL QUESTION PAPER-1 (2024-2025)
BASIC MATHEMATICS (75)

TIME: 3 Hours

Max.

Marks: 80

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 × 1 = 10

1. If $\left| \frac{3}{4} x \right| = -2$ then the value of x is
a) $\frac{17}{4}$ b) $-\frac{17}{4}$ c) $\frac{15}{4}$ d) $\frac{13}{4}$
2. If ${}^n C_8 = {}^n C_{12}$ then the value of n is
a) 8 b) 12 c) 20 d) 10
3. If $P(A') = 0.65$, then $P(A)$ is
a) 1 b) 0 c) 0.35 d) 0.65
4. **Negate:** $\sim p \rightarrow q$
a) $p \rightarrow \sim q$ b) $\sim p \wedge \sim q$ c) $\sim p \wedge q$ d) $p \wedge q$
5. The mean proportion of 9 and 16 is
a) 144 b) 25 c) 12.5 d) 12
6. The value of $3 \sin 10^\circ - 4 \sin^3 10^\circ$ is
a) $\frac{1}{2}$ b) $\frac{1}{\sqrt{2}}$ c) $\frac{\sqrt{3}}{2}$ d) 0
7. If the focus of the parabola is $(0, -6)$ then equation of directrix is
a) $x = 6$ b) $x = -6$ c) $y = 6$ d) $y = -6$
8. If $y = \log e^e$ then $\frac{dy}{dx}$ is
a) -1 b) 0 c) e d) $\frac{1}{e}$

9. Evaluate: $\int \frac{1}{5e^{-x}} dx$

- a) $e^x + C$ b) $\frac{e^x}{5} + C$ c) $5e^x + C$ d) $\frac{1}{5e^x} + C$

10. Evaluate: $\int_0^1 x^2 dx$

- a) 1 b) 0 c) $\frac{1}{2}$ d) $\frac{1}{3}$

II. Match the following:

5 × 1 = 5

11.

A

B

- | | |
|--------------------------------------------------------------------------------------|-------------------------------------|
| a) If $A = \begin{bmatrix} 1 & -1 \\ 2 & 4 \end{bmatrix}$ then the value of $ A $ is | i) $\frac{\sqrt{3} + 1}{2\sqrt{2}}$ |
| b) The value of 8P_3 is | ii) 6 |
| c) The value of x in $5:15 = 3:x$ | iii) 336 |
| d) $\sin 15^\circ$ is | iv) 9 |
| e) The value of $\lim_{x \rightarrow 1} \frac{x^3 + 4}{1+x}$ is | v) $\frac{\sqrt{3} - 1}{2\sqrt{2}}$ |
| | vi) $\frac{5}{2}$ |

III. Fill in the blanks by choosing appropriate answer from given options: 5 × 1 = 5

$\left(\log x + c, \quad 0, \quad 9, \quad 2, \quad 24, \quad -\frac{1}{x^2} + c \right)$

12. A square matrix A is a singular matrix if $|A| =$ _____
13. The number of ways 5 people can be seated around a table is _____.
14. The third proportional of 4 and 6 is _____
15. If the length of the latus rectum of the parabola $x^2 = 4ky$ is 8, then the value of k is _____
16. $\int \frac{1}{x} dx =$ _____

PART-B

IV. Answer any SIX questions.

6 × 2 = 12

17. If $A = \begin{bmatrix} 2 & 3 & 1 \\ 1 & -2 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -2 & 4 \\ 1 & 3 & 2 \end{bmatrix}$ find $2A - 3B$
18. Find the number of parallelograms that can be formed from a set of 6 parallel lines intersecting another set 4 of parallel lines.
19. If $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$, $P(A \cup B) = \frac{7}{12}$, find $P(B|A)$

20. What must be added to the terms of the ratio 2: 3 so that it becomes 5: 6
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 $y = 2$*
23. If $y = x^{\sin x}$, find $\frac{dy}{dx}$
24. The total revenue function is given by $R = 400x - 2x^2$ and the total cost function given by $C = 2x^2 + 40x + 4000$ find the marginal revenue and marginal cost function
25. Find the area enclosed by the curve $y = x^2 + 2x$ between the ordinates $x = 0$ and $x = 2$

PART-C

V. Answer any SIX questions.

6 × 3 = 18

26. If $A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$ then show that: $A^2 - 4A + 3I = 0$
27. Find the number of permutations of the letters of the word 'MISSISSIPPI'. How many of these
 - a) all 4S's are together
 - b) Begin with MISS
28. Monthly incomes of A and B are in the ratio 2: 3 and their monthly expenditures are in the ratio 3: 5. If each saves ₹100 per month, find the monthly incomes of A and B
29. A bill for ₹3500 due for 3 months was drawn on 27 March 2012 and discounted on 18 April 2012, at the rate of 7% p.a. Find the Bankers Discount and discounted value of the bill.
30. Which is the better investment: 7.5% stock at 125 or 5% stock at 75
31. Bharath bought a shirt for ₹336 including 12% sales tax and a neck tie for ₹110 including 10% sales tax. Find the printed price of shirt and neck tie together.
32. A circular patch of oil spreads on water, the area growing at the rate of $16\text{cm}^2/\text{min}$. How fast are the radius and the circumference increasing when the diameter is 12cms?
33. Evaluate: $\int \frac{1}{x(x+2)} dx$
34. Evaluate: $\int_0^1 \frac{2x+5}{x^2+5x+3} dx$

PART-D

VI. Answer any FOUR questions.

4 × 5 = 20

35. Solve by matrix method: $x + y + z = 5$, $2x + y - z = 2$, $2x - y + z = 2$
36. Resolve into partial fraction: $\frac{2x^2+10x-3}{(x+1)(x-3)(x+3)}$
37. Verify whether the proposition $(\sim p \wedge q) \wedge \sim r$ is a Tautology, contradiction or neither.

38. An engineering company has 80% learning effect and spends 1000 hours to produce 1 lot of the product. Estimate the labour cost of producing 8 lots of the product if the labour cost is ₹100 per hour.
39. Maximize: $Z = 5x + 3y$
subject to the constraints $3x + 5y \leq 15$, $5x + 2y \leq 10$, $x \geq 0$, $y \geq 0$
40. Prove that: $\cos 10^\circ \cos 30^\circ \cos 50^\circ \cos 70^\circ = \frac{3}{16}$
41. If $y = (x + \sqrt{1 + x^2})^m$ Prove that : $(1 + x^2)y_2 + xy_1 - m^2y = 0$

PART-E

VII. Answer the following questions.

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

(OR)

Show that the points $(0, 0)$, $(1, 1)$, $(5, -5)$ and $(6, -4)$ are concyclic

43. The angle of elevation of an object from a point 100m above a lake is 30° and angle of depression of its image in the lake is 45° . Find the height of the object above the lake.

(OR)

Find the value of $(0.99)^5$ using Binomial theorem, upto 4 decimal places. (4 marks)