GOVERNMENT OF KARNATAKA
KARNATAKA SCHOOL EXAMINATION AND ASSESSMENT BOARD
II PUC MODEL QUESTION PAPER-3 (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: $\mathbf{10 \times 1 = 10}$

1. If $\begin{bmatrix} 0 & -7 \\ 7 & x \end{bmatrix}$ is a skew-symmetric matrix then the value of x is

a) 7 b) -7 c) 1 d) 0

2. How many ways can 6 flowers of different colours be strung together to form a garland?

a) 720 b) 360 c) 120 d) 60

3. $P(Impossible\ event) =$

a) 1 b) 0 c) 0.5 d) 0.75

4. **Negate:** $p \vee \sim q$

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

5. The antecedent of $2:7$ is

a) 2 b) -2 c) 7 d) -7

6. Find the value of: $\sin 80^0 \cos 10^0 + \cos 80^0 \sin 10^0$

a) 2 b) -1 c) 0 d) 1

7. Find the coordinates of the focus of the parabola $y^2 = 16x$

a) $(-4, 0)$ b) $(0, -16)$ c) $(4, 0)$ d)$(16, 0)$

8. If $y = \frac{x+1}{x}$ $then$ $\frac{dy}{dx}$ is

a) $-\frac{1}{x}$ b) $-\frac{1}{x^2}$ c) $\frac{1}{x}$ d) $\frac{1}{x^2}$

9. Evaluate: $\int 4\,cosec^2\,x\,dx$

a) $\sec^2 x + C$ b) $4\sec^2 x + C$ c) $-\cot x + C$ d) $-4\cot x + C$

10. Evaluate: $\int_1^2 \frac{1}{2x+3}\,dx$

a) $\log\left({}^{7}/_{5}\right)$ b) $\log\left({}^{5}/_{7}\right)$ c) $\frac{1}{2}\log\left({}^{5}/_{7}\right)$ d) $\frac{1}{2}\log\left({}^{7}/_{5}\right)$

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

11.

	A		**B**
a)	$\begin{bmatrix} 3 & x \\ 7 & 9 \end{bmatrix}$ is symmetric matrix then the value of x is	i)	720
b)	Number of permutations of the word MONDAY	ii)	35
c)	The fourth proportional of 6,14, 15 is	iii)	$\frac{1}{8}$
d)	If $\cos A = \frac{3}{4}\ then\ \cos 2A$ is	iv)	2
e)	The value of $\lim_{x\to 0}\left(\frac{\sin 4x}{\sin 2x}\right)$ is	v)	$\frac{1}{2}$
		vi)	7

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

$$\left(7,\quad -\frac{1}{x}+C,\quad -32,\quad 4,\quad 8:27,\quad 6:9\right)$$

12. $\begin{vmatrix} 400 & 404 \\ 408 & 412 \end{vmatrix} =$ _____

13. If $nP_3 = 210,\ then\ the\ value\ of\ n =$ _____

14. Find the triplicate ratio of $2:3$ is_____

15. If the length of the latus rectum of the parabola $2x^2 = 4ky\ is\ 8$, then k is _____

16. $\int \frac{1}{x^2}\,dx =$ _____

PART-B

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

17. If $A = \begin{bmatrix} 2 & 3 \\ -1 & 4 \end{bmatrix}$ *and* $B = \begin{bmatrix} 1 & -1 \\ 2 & 4 \end{bmatrix}$ *then find* $A'B$

18. Find the number of diagonals in a Decagon.

19. Two coins are tossed simultaneously find probability of getting

a) getting exactly two heads

b) atleast one head

20. If $a : b = 2 : 3$ *and* $b : c = 6 : 13$ *find* $a : b : c$

21. The Banker's gain on a certain bill due six months hence is ₹27, the rate of interest being 6% p.a. Find the face value of the bill.

22. Find the equation of the parabola whose focus is $(-4,0)$ and directrix is $x = 4$

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

24. If the total cost $C(x) = x^2 + 2x + 1$, find the marginal cost and average cost

25. Evaluate: $\int_1^2 (x + e^x)\, dx$

PART-C

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

26. If $2A + B = \begin{bmatrix} 3 & -1 \\ -2 & 5 \end{bmatrix}$ *and* $A - 2B = \begin{bmatrix} 4 & 2 \\ -1 & 5 \end{bmatrix}$ *then find* A *and* B

27. Find the number of permutations of the letters of the word '**ENGINEERING**'. How many of these

a) Begin with GRIN

b) Have all 3E's together

28. 3 carpenters can earn ₹360 in 6 days working 9 hours a day. How much will 8 carpenters earn in 12 days working 6 hours a day?

29. The Banker's gain on a bill is $1/5^{th}$ of the banker's discount and the rate of interest is 20% p.a. Find the unexpired period of the bill.

30. Prathik sells out ₹6000 of 7.5% stock at 108 and reinvests the proceeds in 9% stock. If Prathik's income increases by ₹270, at what price did Prathik buy 9% stock?

31. Shopkeeper bought a TV at a discount of 30% of the listed price of ₹24,000. The shopkeeper offers a discount of 10% of the listed price to the customer. If the VAT is 10%, find:

a) The amount paid by the customer

b) The VAT to be paid by the shopkeeper

32. The side of an equilateral triangle is increasing at the rate $\sqrt{3}cm/s$. Find the rate at which its area is increasing when its side is 200cms.

33. Evaluate: $\int \frac{4x+5}{(x-1)(x+2)}\,dx$

34. Evaluate: $\int_1^2 xe^x\,dx$

PART-D

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

35. Solve by matrix method: $x - y + 2z = 3$, $2x + z = 1$, $3x + 2y + z = 4$

36. Resolve into partial fraction: $\frac{x^2-10x+13}{(x+1)(x^2-5x+6)}$

37. Verify whether the proposition $\sim(p \to q) \vee [(\sim p \wedge q) \leftrightarrow \sim q]$ is a Tautology, contradiction or neither.

38. A company has 80% learning effect and spends 500 hours for the prototype. Estimate the labour cost of producing 7 engines of new order if the labour cost is ₹40 per hour.

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

40. Prove that: $\frac{\sin 5A+\sin 4A+\sin 2A+\sin A}{\cos 5A+\cos 4A+\cos 2A+\cos A} = \tan 3A$

41. If $y = \log\left(x + \sqrt{x^2+1}\right)$ $Prove\ that: (x^2+1)y_2 + xy_1 = 0$

PART-E

VII. Answer the following questions.

42. 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, $(4,8)$, $(8,6)$, $(-1,3)$ and $(0,0)$ $are\ concyclic$.

43. A person is at the top of a tower 75 feet high. From there, he observes a vertical pole and finds the angles of depressions of top and bottom of the pole which are 30^0 and 60^0 respectively. Find the height of the pole. **(4 marks)**

(OR)

Find the value of $(1.2)^5$ using Binomial theorem, upto 5 decimal places