ನೋಂದಣಿ ಸಂಖ್ಯೆ :
Registration No. :

X1 – 2025

ವಿಷಯ ಸಂಕೇತ / Subject Code	75 (NS)

ಮೂಲ ಗಣಿತಶಾಸ್ತ್ರ / BASIC MATHEMATICS

(Kannada and English Versions)

[ಸಮಯ: 3 ಗಂಟೆಗಳು] [ಒಟ್ಟು ಪ್ರಶ್ನೆಗಳ ಸಂಖ್ಯೆ : 43] [ಗರಿಷ್ಠ ಅಂಕಗಳು : 80]

[Time : 3 Hours] [Total No. of questions : 43] [Max. Marks : 80]

(Kannada Version)

ಸೂಚನೆಗಳು : 1. ಈ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯಲ್ಲಿ 5 ಭಾಗಗಳಿವೆ. ಭಾಗ–ಎ, ಬಿ, ಸಿ, ಡಿ ಮತ್ತು ಇ ಎಂಬ ಎಲ್ಲಾ ಭಾಗಗಳನ್ನು ಉತ್ತರಿಸಿ.

2. *ಭಾಗ – ಎ – 20 ಅಂಕಗಳು*
   ಭಾಗ – ಬಿ – 12 ಅಂಕಗಳು
   ಭಾಗ – ಸಿ – 18 ಅಂಕಗಳು
   ಭಾಗ – ಡಿ – 20 ಅಂಕಗಳು
   ಭಾಗ – ಇ – 10 ಅಂಕಗಳು ಇರುತ್ತವೆ.
3. *ಭಾಗ – ಎ ನಲ್ಲಿರುವ ಪ್ರಶ್ನೆಗಳಿಗೆ ಪ್ರಥಮವಾಗಿ ಬರೆದ ಉತ್ತರಗಳನ್ನು ಮಾತ್ರ ಮೌಲ್ಯಮಾಪನದಲ್ಲಿ ಪರಿಗಣಿಸಲಾಗುವುದು.*
4. *ಭಾಗ – ಡಿ ನಲ್ಲಿನ LPP ಯ 39 ನೇ ಪ್ರಶ್ನೆಗೆ ಗ್ರಾಫ್ ಶೀಟ್‌ನ್ನು ಬಳಸಬೇಕು.*
5. *ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯಲ್ಲಿ ನಮೂದಿಸಿರುವ ಪ್ರಶ್ನೆ ಸಂಖ್ಯೆಯನ್ನೇ ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿಯೂ ಬರೆಯಬೇಕು.*
6. *ಗ್ರಾಫ್ ಒಳಗೊಂಡ ಪ್ರಶ್ನೆಗೆ ಪರ್ಯಾಯವಾಗಿ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ಕೊನೆಯಲ್ಲಿ ಪ್ರತ್ಯೇಕ ಭಾಗ – ಎಫ್ ನಲ್ಲಿ* **ದೃಷ್ಟಿ ವಿಕಲಚೇತನ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ** *ವಿವರಣಾತ್ಮಕ ಪ್ರಶ್ನೆಯನ್ನು ಕೇಳಲಾಗಿದೆ.*

P.T.O.

(English Version)

Instructions : 1. *The question paper has 5 parts namely, A, B, C, D and E. Answer ALL the Parts.*

2. *Part – A carries 20 marks*
   Part – B carries 12 marks
   Part – C carries 18 marks
   Part – D carries 20 marks
   Part – E carries 10 marks.

3. *For Part – A questions, only the first written answers will be considered for evaluation.*

4. *In the Part – D, use graph sheet for the question number 39 on LPP.*

5. *Write the question numbers properly as indicated in the question paper.*

6. *For question having graph, alternate question is given at the end of the question paper in a separate section in the Part – F for* ***Visually Challenged Students.***

PART – A

I. Answer all the multiple choice questions : **(10 × 1 = 10)**

1) If $A = \begin{bmatrix} 3 & 2 \\ 2 & 4 \end{bmatrix}$ then $2A'$ is

a) $\begin{bmatrix} 6 & 1 \\ 4 & 2 \end{bmatrix}$

b) $\begin{bmatrix} 6 & 2 \\ 4 & 8 \end{bmatrix}$

c) $\begin{bmatrix} 6 & 2 \\ 8 & 4 \end{bmatrix}$

d) $\begin{bmatrix} 6 & 4 \\ 4 & 8 \end{bmatrix}$

2) If ${}^{n}C_{10} = {}^{n}C_{5}$ then value of 'n' is

a) 15 b) 25

c) 5 d) 10

3) Two coins are tossed simultaneously. The probability of getting exactly two heads is

a) $\frac{1}{2}$ b) $\frac{3}{4}$

c) $\frac{1}{4}$ d) 1

4) The converse of $\sim p \rightarrow \sim q$ is

a) $\sim p \rightarrow q$ b) $q \rightarrow p$

c) $p \rightarrow q$ d) $\sim q \rightarrow \sim p$

5) The Compound ratio of 3 : 4 and 4 : 7 is

a) 3 : 12 b) 3 : 7

c) 7 : 3 d) 12 : 7

6) If $\sin A = \frac{1}{2}$ then value of $\sin 2A$ is

a) $\frac{\sqrt{3}}{2}$ b) $\frac{1}{2}$

c) 0 d) 1

7) The equation of the directrix of the parabola $x^2 = 8y$ is

a) $y = 2$ b) $x = 2$

c) $x = -2$ d) $y = -2$

8) If $y = 5e^x - \log x$ then $\frac{dy}{dx}$ is

a) $e^{5x} - \frac{1}{x}$ b) $5e^x - \frac{1}{x}$

c) $5e^x - x$ d) $5x - \frac{1}{x}$

9) $\int \frac{1}{7x+8} dx$ is

a) $\log(7x+8) + C$ b) $\frac{\log(7x+8)}{7} + C$

c) $7\log(7x+8) + C$ d) $\frac{1}{\log(7x+8)} + C$

10) $\int x^5 dx$ is

a) $5x^4 + C$ b) $\frac{x^5}{5} + C$

c) $\frac{x^4}{4} + C$ d) $\frac{x^6}{6} + C$

II. Match the following : **(5 × 1 = 5)**

11)	A	B
a)	If $\begin{vmatrix} 3 & x \\ 4 & 2 \end{vmatrix} = 2$ then value of 'x' is	i) 7
b)	If ${}^{n}p_{3} = 210$ then value of 'n' is	ii) $\frac{\sqrt{3}-1}{2\sqrt{2}}$
c)	Third proportional of 4, 6 is	iii) 2
d)	$\sin 15^{\circ}$ is	iv) 1
e)	$\lim_{x \to 0} \frac{\sin 4x + 2}{\sin 2x + 1}$	v) $\frac{\sqrt{3}+1}{2\sqrt{2}}$
		vi) 9

III. For questions **12** to **16** choose the appropriate answers from the given options : **(5 × 1 = 5)**

(35, 12, 1, 3, 30, 16)

12) If $\begin{bmatrix} -9 \\ 2 \end{bmatrix} - \begin{bmatrix} 5 \\ -1 \end{bmatrix} = \begin{bmatrix} -14 \\ x \end{bmatrix}$ then value of 'x' is _____.

13) The number of diagonals in a decagon is _____.

14) If 5 : 20 = 3 : x then 'x' = _____.

15) Length of the latus rectum of parabola $y^2 = 16x$ is _____.

16) $\int_{0}^{\frac{\pi}{2}} \sin x \, dx =$ _____.

PART – B

IV. Answer **any six** questions : **(6 × 2 = 12)**

17) Find matrix A if $2A+B=\begin{bmatrix}2 & 0\\ -1 & 3\end{bmatrix}$ where $B=\begin{bmatrix}1 & -1\\ 3 & 0\end{bmatrix}$.

18) In how many ways can 6 people be chosen out of 10 people if one particular person is always included?

19) If A and B are mutually exclusive events with $P(A)=\frac{2}{5}, P(B)=\frac{1}{7}$. Find $P(A\cup B)$.

20) If $a:b=3:4, b:c=8:15$ find $a:b:c$.

21) Banker's discount and Banker's gain on a certain bill due after sometime are ₹1,250 and ₹ 50 respectively. Find the face value of the bill.

22) Find equation of parabola given vertex is (0, 0) and focus is (–4, 0).

23) If $y=x^x$ find $\frac{dy}{dx}$.

24) The total cost function is given by $C=q^3-3q^2+15q+27$ where q is output. Find the marginal cost and fixed cost.

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

PART – C

V. Answer **any six** questions : **(6 × 3 = 18)**

26) Solve using Cramer's rule

$2x + y = 1$

$x - 3y = 4$

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

a) begin with GIN and end with GRIN

b) have all 3 E'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) Banker's gain on a bill due after 6 months at 4% p.a. is ₹ 24. Find true discount, Banker's discount and face value of the bill.

30) Prathik sells out ₹ 6,000 of 7.5% stock at ₹ 108 and reinvests the proceeds in 9% stock. If his income increases by ₹ 270, at what price did he buy 9% stock?

31) The price of a washing machine inclusive of sales tax is ₹ 13,530 if the sales tax is 10%. Find the basic price.

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 : $\int \frac{x}{(x-1)(x-2)} dx$.

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

PART – D

VI. Answer **any four** questions : **(4 × 5 = 20)**

35) Solve by matrix method

$$3x + 2y - z = 6$$
$$3x + y - 2z = 3$$
$$2x - 3y - z = -1$$

36) Resolve into partial fractions

$$\frac{9}{(x+1)(x+2)^2}.$$

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

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 ₹ 40 per hour.

39) Solve the LPP graphically.

Maximize $Z = 10500x + 9000y$

Subject to the constraints

$$x + y \leq 50$$
$$2x + y \leq 80$$
$$x, y \geq 0.$$

40) Prove that

$$\frac{\cos 7x + \cos 3x - \cos 5x - \cos x}{\sin 7x - \sin 3x - \sin 5x + \sin x} = \cot 2x .$$

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) Prove that $\underset{x \to a}{Lt}\left(\frac{x^n - a^n}{x - a}\right) = n \cdot a^{n-1}$ for all rational values of 'n'. **(6)**

OR

Show that the points (2, –4) (3, –1) (3, –3) (0, 0) are concyclic.

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

OR

Find the value of $(1.1)^4$ using binomial theorem upto 4 decimal places.

PART – F

(Only for Visually Challenged Students) **(1 × 5 = 5)**

39) A company owned by Shree group produces 2 products P and Q. Each P requires 4 hours of grinding and 2 hours of polishing and each Q requires 2 hours of grinding and 5 hours of polishing. The total available hours for grinding is 20 hours and for polishing is 24 hours. Profit per unit of *P* is ₹ 6 and that of Q is ₹ 8. Formulate the LPP to maximize the profit.