

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 ತೀಟನ್ನು ಬಳಸಬೇಕು.
5. ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯಲ್ಲಿ ನಮೂದಿಸಿರುವ ಪ್ರಶ್ನೆ ಸಂಖ್ಯೆಯನ್ನೇ ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿಯೂ ಬರೆಯಬೇಕು.
6. ಗ್ರಾಫ್ ಒಳಗೊಂಡ ಪ್ರಶ್ನೆಗೆ ಪರ್ಯಾಯವಾಗಿ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ಕೊನೆಯಲ್ಲಿ ಪ್ರತ್ಯೇಕ ಭಾಗ - ಎಫ್ ನಲ್ಲಿ ದೃಷ್ಟಿ ವಿಕಲಬೇತನ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ವಿವರಣಾತ್ಮಕ ಪ್ರಶ್ನೆಯನ್ನು ಕೇಳಲಾಗಿದೆ.

(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 ${}^nC_{10} = {}^nC_5$ 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) $\frac{1}{\log(7x+8)} + C$

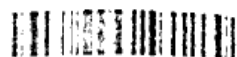
10) $\int x^5 dx$ is

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) $\lim_{x \rightarrow 0} \frac{\sin 4x + 2}{\sin 2x + 1}$

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)

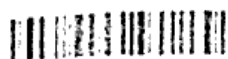
12) If $\begin{bmatrix} -9 \\ 2 \end{bmatrix} - \begin{bmatrix} 5 \\ -1 \end{bmatrix} = \begin{bmatrix} -14 \\ x \end{bmatrix}$ then value of 'x' is _____.

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) $\int_0^{\frac{\pi}{2}} \sin x \, dx =$ _____.

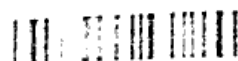


PART – B

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.

$$\text{Maximize } Z = 10500x + 9000y$$

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 $\lim_{x \rightarrow a} \left(\frac{x^n - a^n}{x - a} \right) = n \cdot a^{n-1}$ 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.