# MATHEMATICS
# KARNATAKA CET - 2026

Version: **B-2**

## KEY ANSWERS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | **(3)** | 16 | **(1)** | 31 | **(1)** | 46 | **(1)** |
| 2 | **(2)** | 17 | **(3)** | 32 | **(2)** | 47 | **(4)** |
| 3 | **(1)** | 18 | **(1)** | 33 | **(4)** | 48 | **(2)** |
| 4 | **(2)** | 19 | **(3)** | 34 | **(3)** | 49 | **(3)** |
| 5 | * | 20 | **(4)** | 35 | **(2)** | 50 | **(2)** |
| 6 | **(1)** | 21 | **(2)** | 36 | **(1)** | 51 | **(3)** |
| 7 | **(2)** | 22 | **(2)** | 37 | **(1)** | 52 | **(3)** |
| 8 | **(3)** | 23 | **(4)** | 38 | **(4)** | 53 | **(2)** |
| 9 | **(2)** | 24 | **(2)** | 39 | **(4)** | 54 | **(1)** |
| 10 | **(4)** | 25 | **(3)** | 40 | **(4)** | 55 | **(3)** |
| 11 | **(4)** | 26 | **(1)** | 41 | **(4)** | 56 | **(1)** |
| 12 | **(1)** | 27 | **(2)** | 42 | **(4)** | 57 | **(3)** |
| 13 | **(1)** | 28 | **(2)** | 43 | **(3)** | 58 | **(3)** |
| 14 | **(3)** | 29 | **(4)** | 44 | **(1)** | 59 | **(2)** |
| 15 | **(3)** | 30 | **(4)** | 45 | **(3)** | 60 | **(4)** |

1. If $\vec{a}=\hat{i}+\hat{j}+\hat{k},\ \vec{b}=\hat{j}-\hat{k}$ and $\vec{a}\times\vec{c}=\vec{b},\ \vec{a}.\vec{c}=3,$ then $\vec{c}$ is

1) $\frac{5}{3}\hat{i}+\frac{2}{3}\hat{j}-\frac{2}{3}\hat{k}$ 2) $\frac{5}{3}\hat{i}-\frac{2}{3}\hat{j}+\frac{2}{3}\hat{k}$ 3) $\frac{5}{3}\hat{i}+\frac{2}{3}\hat{j}+\frac{2}{3}\hat{k}$ 4) $\frac{5}{3}\hat{i}-\frac{2}{3}\hat{j}-\frac{2}{3}\hat{k}$ **Ans.(3)**

**Solution:**
Go from the alternatives.
Only fir (3) : $\vec{a}\,.\,\vec{c}=\frac{5}{3}+\frac{2}{3}+\frac{2}{3}=3$

2. The value of $\lambda$ for which the vectors $\vec{a}=2\hat{i}+\lambda\hat{j}+\hat{k}$ and $\vec{b}=\hat{i}+2\hat{j}+3\hat{k}$ are orthogonal is

1) $\frac{5}{2}$ 2) $\frac{-5}{2}$ 3) $\frac{2}{5}$ 4) $\frac{-2}{5}$ **Ans.(2)**

**Solution:**
$\vec{a}\,.\,\vec{b}=0\Rightarrow 2+2\lambda+3=0\Rightarrow\lambda=\frac{-5}{2}$

3. The angle between the lines whose direction ratios are a, b, c and b – c, c – a, a – b is

1) $90^{o.}$ 2) 60° 3)30° 4) $0^0$ **Ans.(1)**

**Solution:**
As $a(b-c)+b(c-a)+c(a-b)=0,\theta=90^o$

4. The measure of the angle between the lines x = k + 1, y = 2k – 1, z = 2k + 3, k ∈ R and $\frac{x-1}{2}=\frac{y-2}{1}=\frac{z-3}{1}$ is

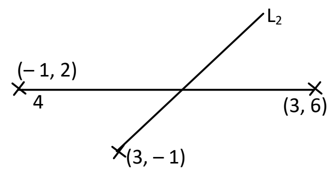
1) $\cos^{-1}\left(\frac{2}{3}\right)$ 2) $\cos^{-1}\left(\sqrt{\frac{2}{3}}\right)$ 3) $\cos^{-1}\left(\sqrt{\frac{3}{2}}\right)$ 4) $\cos^{-1}\left(\frac{3}{2}\right)$ **Ans.(2)**

**Solution:**
First time : $\frac{x-1}{1}=\frac{y+1}{2}=\frac{z-3}{2}$; its dr's are 1, 2, 2.
The dr's of second line are 2, 1, 1
$\cos\theta=\frac{2+2+2}{\sqrt{9}\,\sqrt{6}}=\frac{\sqrt{6}}{\sqrt{9}}=\sqrt{\frac{2}{3}}\ \therefore\ \theta=\cos^{-1}\sqrt{\frac{2}{3}}$

5. The line $L_1$ joining the two points (–1, 2) and (3, 6) divides the line $L_2$ which passes through (3, –1) in the ratio 1 : 3 internally, then the equation of $L_2$ is

1) 4x – 3y – 9 = 0 2) 4x – 3y + 9 = 0 3) 4x + 3y – 9 = 0 4) 4x + 3y + 9 = 0

**Solution:**

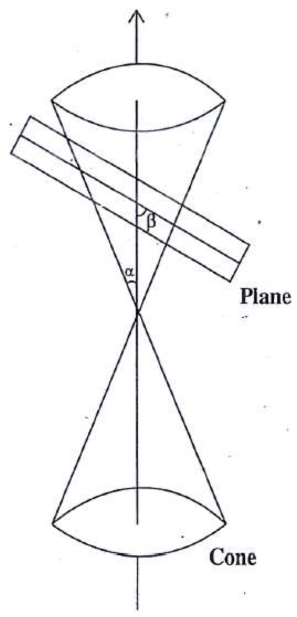



**Remarks:** It is a meaningless question! How can $L_1$ divides $L_2$ internally….?!

6. In the figure

Statement I: When $\alpha > \beta \geq 0$, the section is hyperbola

Statement II: When $\beta > 90°$, the section is ellipse



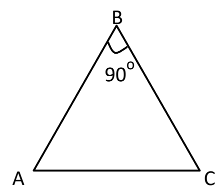

Which of the following is correct?

1) Statement I is true, Statement II is false
2) Statement I is false, Statement II is true
3) Both the Statements are true
4) Both the Statements are false **Ans.(1)**

7. The three points A (2, 4, 3), B (4, a, 9) and C (10, –1, 7) form a right-angled triangle with $\angle B = 90°$, then the value of "a" is

1) 1 or 4 2) –1 or 4 3) 1 or – 4 4) –1 or – 4 **Ans.(2)**

**Solution:**




$AC^2 = AB^2 + BC^2$

$64 + 25 + 16 = 4 + (a-4)^2 + 36 + 36 + (a+1)^2 + 4$

$25 = a^2 - 8a + 16 + a^2 + 2a + 1 \Rightarrow 2a^2 - 6a = 8 \Rightarrow a = -1 \text{ or } 4$

8. If $\lim_{x\to 3}\left(\frac{x^2 - ax - 3b}{x-3}\right) = 5$, then a + b =

1) 1 2) 2 3) 3 4) 4 **Ans.(3)**

**Solution:**

$3^2 - 3a - 3b = 0 \Rightarrow a + b = 3$

9. If $f(x) = \begin{cases} x^2 - 1 & \text{if } x \geq 2 \\ x + 1 & \text{if } x < 2 \end{cases}$, then $\lim_{x\to 1} f(x) + \lim_{x\to 2} f(x) =$

1) 3 2) 5 3) 7 4) 9 **Ans.(2)**

**Solution:**

$\lim_{x\to 1} f(x) = \lim_{x\to 1}(x+1) = 2$

$\lim_{x\to 2} f(x) = 2^2 - 1 \text{ or } 2 + 1 = 3$

$\therefore$ Then sum = 5

10. If $y = \sqrt[3]{\tan x + y}$, then $\frac{dy}{dx} =$

1) $\frac{\tan x}{3y^2 - 1}$ 2) $\frac{\sec^2 x}{3y - 1}$ 3) $\frac{\tan x}{3y - 1}$ 4) $\frac{\sec^2 x}{3y^2 - 1}$ **Ans.(4)**

**Solution:**

$y^3 = \tan x + y \Rightarrow 3y^2 y' = \sec^2 x + y' \Rightarrow y' = \frac{\sec^2 x}{3y^2 - 1}$

11. If $f(x) = \begin{cases} ax + 7 & \text{if } x < 1 \\ 3x - 1 & \text{if } x = 1 \\ \frac{x+3}{b} & \text{if } x > 1 \end{cases}$ is continuous at x = 1, then

1) a = 5, b = 2 2) a = –5, b = – 2 3) a = 5, b = – 2 4) a = –5, b = 2 **Ans.(4)**

**Solution:**

LHL = f(1) = RHL

$\Rightarrow a + 7 = 3 - 1 = \frac{1+3}{b} \Rightarrow a + 7 = 2$ and $b = 2$

12. The second order derivative of $\cos^{-1}(4x^3 - 3x)$ with respect to $\cos^{-1}(2x^2 - 1)$, where $\frac{1}{2} < x < 1$ is

1) 0 2) $\frac{-1}{\sqrt{1-x^2}}$ 3) $\frac{3}{2}$ 4) $\frac{-3}{2}$ **Ans.(1)**

**Solution:**

$u = \cos^{-1}(4x^3 - 3x) = 3\cos^{-1}x;\ v = \cos^{-1}(2x^2 - 1) = 2\cos^{-1}x$

$\therefore u = \frac{3}{2}v \Rightarrow \frac{du}{dv} = \frac{3}{2}$ and $\frac{d^2u}{dv^2} = 0$

13. If $f(x) = \sin^{-1}\left(\frac{2x}{1+x^2}\right)$, then $f'\left(\frac{1}{2}\right) =$

1) $\frac{8}{5}$ 2) $\frac{5}{8}$ 3) $\frac{4}{5}$ 4) 0 **Ans.(1)**

**Solution:**

$f(x) = 2\sin^{-1}x \Rightarrow f'(x) = \frac{2}{1+x^2}$

$\therefore f'\left(\frac{1}{2}\right) = \frac{2}{1+\frac{1}{4}} = \frac{8}{5}$

14. If $\sqrt{x}\sqrt[3]{y} = (x+y)^n$ and $x\frac{dy}{dx} - y = 0$, then n =

1) 1 2) $\frac{6}{5}$ 3) $\frac{5}{6}$ 4) $\frac{4}{9}$ **Ans.(3)**

**Solution:**

$x^{\frac{1}{2}} \cdot y^{\frac{1}{3}} = (x+y)^n \Rightarrow \frac{dy}{dx} = \frac{y}{x}$ if $\frac{1}{2} + \frac{1}{3} = n$ i.e. $n = \frac{5}{6}$

15. In a Mahakumbh, a drone camera is moving along $3y = x^3 - 3$. When y-coordinate changes 9 times as fast as x-coordinate, it captures good quality pictures. Then one of the precise positions of the drone at that instant is

(1) (–3, –8) (2) (3, – 8) (3) (3, 8) (4) (–3, 8) **Ans.(3)**

**Solution:**

$3y = x^3 - 3 \Rightarrow 3\frac{dy}{dt} = 3x^2\frac{dx}{dt}$

By data, $\frac{dy}{dt} = \frac{dx}{dt} \Rightarrow 3 \times 9 = 3x^2 \Rightarrow x^2 = 9 \Rightarrow x = \pm 3$

When x = 3, 3y = 27 – 3 ⇒ y = 8

When x = – 3, 3y = – 27 – 3 = ∞ – 30 ⇒ y = – 10 ∴ (3, 8) is the answer

16. A Youtube short video is getting viral according to $f(t) = -2t^3 + 3t^2 + 5$. At what time does the video get maximum number of shares? (t is in hours)

1) 1 2) 2 3) 3 4) 4 **Ans.(1)**

**Solution:**

$f(t) = -2t^3 + 3t^2 + 5$

$f'(t) = -6t^2 + 6t$: $f''(t) = -12t + 6$

For maximum $f'(t) = 0 \Rightarrow t = 0$ (minimum) : t = 1 (maximum)

17. $\int x\, f(x)\, dx + \frac{f(x)}{2} = 0$, then f(x) is equal to

1) $e^{-2x}$ 2) $e^{2x}$ 3) $e^{-x^2}$ 4) $e^{x^2}$ **Ans.(3)**

**Solution:**

Let f(x) = y then $xy + \frac{1}{2}\frac{dy}{dx} = 0$

$\Rightarrow 2xdx + \frac{dy}{y} = 0 \Rightarrow x^2 + \log y = 0 \therefore y = e^{-x^2}$

∴ (3) $y = e^{-x^2}$ is the correct option

18. One of the possible functions f(x) which satisfies $\int_{-2}^{2} f(x)\, dx = 0$ is

1) $\log\left(\frac{2+x}{2-x}\right)$ 2) sin (2 + x) 3) $2x^3 + 2x + 1$ 4) 2x tan x **Ans.(1)**

**Solution:**

$\int_{-2}^{2} f(x)dx - 0$, when f(x) is odd

And $\log\frac{2+x}{2-x}$ is an odd function

19. $\int_{a-6}^{b-6} f(x+6)\, dx$ is equal to

1) $\int_a^b f(x-6)\, dx$ 2) $\int_a^b f(x+6)\, dx$ 3) $\int_a^b f(x)\, dx$ 4) $\int_a^b f(-x)\, dx$ **Ans.(3)**

**Solution:**

$I = \int_{-2}^{2} f(x-6)dx$ ; $[\text{Put } t = x + 6] = \int_a^b f(t)dt = \int_a^b f(x)\, dx$

20. If 'n' is a natural number, then $\int \frac{\sin^n x}{\cos^{n+2} x} dx =$

1) $\frac{\tan^{n-1} x}{n-1} + C$ 2) $\frac{\tan^n x}{n} + C$ 3) $\frac{\tan^{n+2} x}{n+2} + C$ 4) $\frac{\tan^{n+1} x}{n+1} + C$ **Ans.(4)**

**Solution:**

$I = \int \tan^n x \,.\, \sec^2 x\, dx = \frac{\tan^{n+1} x}{n+1} + c$

21. $\int e^{-x \log 2} 2^x dx =$

1) $\log x + C$ 2) $x + C$ 3) $\frac{1}{x} + C$ 4) $\frac{x^2}{2} + C$ **Ans.(2)**

**Solution:**

$I = \int e^{\log_2 - x} . e^x dx = \int 2^{-x} . 2^x dx = x + c$

22. The area of the region bounded by the curve $y^2 = x^3$, the y-axis and the lines y = 1 and y = 8is

1) $\frac{155}{3}$ sq. units (2) $\frac{93}{5}$ sq. units (3) 93 sq. units (4) *155* sq. units **Ans.(2)**

**Solution:**

$A = \int_1^8 y^{\frac{2}{3}} dy = \frac{3}{5} y^{\frac{5}{3}} \Big|_1^8 = \frac{3}{5}(2^5 - 1) = \frac{93}{5}$ sq.units

23. The area enclosed by the curve x $x = \sqrt{3} \cos \theta, \ y = \sqrt{3} \sin \theta$ is

1) $\sqrt{3}\pi$ sq. units 2) $9\pi$ sq. units 3) $6\pi$ sq. units 4) $3\pi$ sq. units **Ans.(4)**

**Solution:**

Curve is a circle of radius $\sqrt{3}$ units

$\therefore$ Its area = $3\pi$ sq. units

24. Sum of the squares of the order and degree (if defined) of a differential equation $2y' + (y'')^2 = \sqrt{y'' - 3}$ is

1) 3 2) 20 3)8 4)16 **Ans.(2)**

**Solution:**

Order = 2, degree = 4

Sum of their squares = 4 + 16 = 20

25. If A = {a, b, c, d, e, f}, then the number of subsets of A which contains at least 2 elements is

1) 64 2) 65 3) 57 4) 59 **Ans.(3)**

**Solution:**

$n(A) = 6; n[P(A)] = 2^6 = 64$

Required = 64 – (1 + 6) = 57

26. If A = {1, 2, 3, 4, . . ., 10}, then the number of non empty subsets of A containing only even number is

1) 31 2)32 3) 30 4) 29 **Ans.(1)**

**Solution:**

Set containing only even numbers = {2, 4, 6, 8, 10}

Number of non-empty subsets of A = $2^5 - 1 = 31$

27. The domain of the function $\sqrt{\frac{x-7}{9-x}}$ is

1) (7, 9) 2) [7, 9) 3) [7, 9] 4) (7, 9] **Ans.(2)**

**Solution:**

$f(x) = \frac{\sqrt{(x-7)(9-x)}}{9-x}$

$(x - 7)(9 - x) \geq 0$ and $x \neq 9 \quad \therefore 7 \leq x < 9$

28. If n(A) = 2 and the number of relations from set A to set B is 1024, then n(B) is

1)2 2)5 3) $2^5$ 4)$5^2$ **Ans.(2)**

**Solution:**

Let n(B) = n $\therefore 2^{2n} = 1024 = 2^{10} \Rightarrow n = 5$

29. Probability of at least one of the events A and B occur is 0.6. If A and B occur simultaneously with probability 0.2, then $P(\bar{A}) + P(\bar{B})$ is

1) 1 2) 0.8 3) 0.6 4) 1.2 **Ans.(4)**

**Solution:**

$P(A \cup B) = 0.6$ ; $P(A \cap B) = 0.2$ ; $P(A \cup B) + P(A \cap B) = P(A) + P(B)$

$P(\bar{A}) + P(\bar{B})$

$= 1 - P(A) + 1 - P(B) = 2 - 0.8 = 1.2$

30. The maximum value of $\sin(x + \pi/6) + \cos(x + \pi/6)$ is attained at x =

1) $\pi/2$ 2) $\pi/4$ 3) $\pi/6$ 4) $\pi/12$ **Ans.(4)**

**Solution:**

$x + \frac{\pi}{6} = \frac{\pi}{4} \Rightarrow x = \frac{\pi}{12}$ [$\because$ $\cos\theta + \sin\theta$ attains maximum at $\theta = \frac{\pi}{4}$]

31. The angles of a triangle are in A.P and the greatest angle is double the least angle, 'then sine of the third angle is

1) $\frac{\sqrt{3}}{2}$ (2) $\frac{1}{\sqrt{2}}$ 3) $\frac{1}{2}$ 4) 0 **Ans.(1)**

**Solution:**

A, B, C are in A.P $\Rightarrow$ $B = 60^o$ and $C = 2A$

Required = $\sin B = \frac{\sqrt{3}}{2}$

32. The mean and standard deviation of 100 items are 50 and 4, respectively then the sum of all squares of the items is

1) 250000 2) 251600 3) 256100 4) 265100 **Ans.(2)**

**Solution:**

$\sigma^2 = \frac{\sum x^2}{n} - (\bar{x})^2 \Rightarrow 16 + 2500 = \frac{\sum x^2}{100} \Rightarrow \sum x^2 = 251600$

33. Probability of occurrence of an event A is 1/2 and that of B is $\frac{3}{10}$. If A and 'B are mutually exclusive, then the probability of occurrence of neither A nor B is

(1) $\frac{4}{5}$ (2) $\frac{3}{5}$ (3) $\frac{2}{5}$ (4) $\frac{1}{5}$ **Ans.(4)**

**Solution:**

$P(A) = \frac{1}{2}$ ; $P(B) = \frac{3}{10}$ , $P(A \cap B) = 0$

Required = $P(A' \cap B') = P\left[(A \cup B)'\right] = 1 - \left[P(A) + P(B)\right] = 1 - \left(\frac{1}{2} + \frac{3}{10}\right) = \frac{2}{10} = \frac{1}{5}$

34. Let R be the relation in the set N given by R = {(a, b) : a = b – 2, b > 6}. Which of the following is the correct answer?

(1) $(2, 4) \in R$ (2) $(3, 8) \in R$ (3) $(6, 8) \in R$ (4) $(8, 7) \in R$ **Ans.(3)**

**Solution:**

6 = 8 – 2 i.e. a = b – 8, b > 6

35. $f(x) = (x + 1)^2$ for $x \geq 1$, g(x) is a function whose graph is the reflection of the graph of f(x) in the line y = x, then g(x) is

(1) $-\sqrt{x} - 1$ (2) $\sqrt{x} + 1$ 3) $\sqrt{x} - 1$ 4) $\sqrt{x - 1}$ **Ans.(2)**

**Solution:**

$y = (x + 1)^2 \Rightarrow x + 1 = \pm\sqrt{y} \therefore x = 1 \pm \sqrt{y}$ $\therefore f^{-1}(y) = 1 \pm \sqrt{y}$ i.e. $f^{-1}(x) = 1 + \sqrt{x}$ or $1 - \sqrt{x}$

36. If $\sin^{-1} x + \sin^{-1} y = \pi/2$, then $x^2$ is equal to

1) $1 - y^2$ 2) $1 + y^2$ 3) $\sqrt{1-y^2}$ 4) $\sqrt{1+y^2}$ **Ans.(1)**

**Solution:**

$x^2 + y^2 = 1 \Rightarrow x^2 = 1 - y^2$

**Note**: this question is from the deleted syllabus.

37. $\tan^{-1}\left(\frac{1}{1+1\times 2}\right)+\tan^{-1}\left(\frac{1}{1+2\times 3}\right)+......+\tan^{-1}\left(\frac{1}{1+n(n+1)}\right)=$

1) $\tan^{-1}\left(\frac{n}{n+2}\right)$ 2) $\tan^{-1}\left(\frac{n+1}{n}\right)$ 3) $\tan^{-1}\left(\frac{n}{n+1}\right)$ 4) $\tan^{-1}\left(\frac{n+2}{n}\right)$ **Ans.(1)**

**Solution:**

$$S_n = \sum_1^n \tan^{-1}\left(\frac{(n+1)-n}{1+(n+1)n}\right) = \sum_1^n \left(\tan^{-1}(n+1)\ \tan^{-1} n\right)$$

$$= \tan^{-1}(n+1) - \tan^{-1} = \tan^{-1}\left(\frac{n+1-1}{1+(n+1)1}\right) = \tan^{-1}\frac{n}{n+2}$$

**Note**: this question is from the deleted syllabus.

38. The corner points of the feasible region determined by the system of linear constraints are (0, 10), (5, *5),* (15, 15), (0, 20). Let $z = px + qy$ where $p, q > 0$. The relation between p and q, so that the maximum z occurs at both points (15, *15)* and (0, 20) is

1) $p = q$ 2) $p = 2q$ 3) $q = 2p$ 4) $q = 3p$ **Ans.(4)**

**Solution:**

By data, $15p + 15q = 20q \Rightarrow q = 3p$

39. In Linear Programming Problem (LPP), the objective function $Z = ax + by$ has the same maximum value at two corner points. The number of points at which $Z_{max}$ occurs is

(1)1 (2)2 (3) 0 (4) Infinity **Ans: (4)**

40. Probability of obtaining an even prime number on each die when a pair of dice is rolled is

1) 0 2) $\frac{1}{6}$ 3) $\frac{1}{12}$ 4) $\frac{1}{36}$ **Ans.(4)**

**Solution:**

P(even prime number on a dice) $= \frac{1}{6}$

Required $= \frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36}$

41. The probability that a man and his wife live after 20 years are $\frac{1}{4}$ and $\frac{1}{3}$ respectively. The probability that neither the man nor his wife live after 20 years is

1) $\frac{3}{4}$ 2) $\frac{1}{12}$ 3) $\frac{7}{12}$ 4) $\frac{1}{2}$ **Ans.(4)**

**Solution:**

$P(M) = \frac{1}{4}$ ; $P(W) = \frac{1}{3}$ ; Required $= P(\bar{m} \text{ and } \bar{w}) = P(\bar{m}) \,.\, P(\bar{w}) = \frac{3}{4} \cdot \frac{2}{3} = \frac{1}{2}$

42. Integrating factor of the differential equation $(1-x^2)\frac{dy}{dx} - xy = 1$ is

1) $1 - x^2$ 2) $\frac{1}{2}\log|1-x^2|$ 3) $\frac{x}{1+x^2}$ 4) $\sqrt{1-x^2}$ **Ans.(4)**

**Solution:**

$$\text{I.F.} = e^{\int -\frac{x}{1-x^2}dx} = e^{\frac{1}{2}\log(1-x^2)} = \sqrt{1-x^2}$$

43. Recent studies suggest that 12% of the world population is left handed. Depending on parents' hand usage, the chances of having left handed children are as follows:

A: Both parents are left handed, chances of having left handed children = 24%

B: Both parents are right handed, chances of having left handed children = 9%

C: Father left handed and mother right handed, chances of having left handed children = 17%

D : Father right handed and mother left handed, chances of having left handed children = 22%

Given P(A) = P(B) = P(C) = P(D) = 1/4 and L denotes child is left handed. What is the probability that P(A | L)?

1) $\frac{17}{100}$ 2) $\frac{19}{25}$ 3) $\frac{1}{3}$ 4) $\frac{2}{3}$ **Ans.(3)**

**Solution:**

$$P(A/L) = \frac{P(A \cap L)}{P(L)} = \frac{\frac{24}{100}}{\frac{24}{100}+\frac{9}{100}+\frac{17}{100}+\frac{22}{100}} = \frac{24}{72} = \frac{1}{3}$$

44. If α and β are acute angles such that α + β and α – β satisfy the equation $\tan^2\theta - 4\tan\theta + 1 = 0$, then α and β are respectively,

1) 45°, 30° 2) 30°, 45° 3) 30°, 60° 4) 60°, 45° **Ans.(1)**

**Solution:**

$\tan(\alpha+\beta) + \tan(\alpha-\beta) = 4;\ \tan(\alpha+\beta)\,.\,\tan(\alpha-\beta) = 1$

$\left(2+\sqrt{3}\right)+\left(2-\sqrt{3}\right) = 4$ and $\left(2+\sqrt{3}\right).\left(2-\sqrt{3}\right) = 1$

$\Rightarrow \tan(\alpha+\beta) = 2+\sqrt{3}$ and $\tan(\alpha-\beta) = 2-\sqrt{3}\ \ \therefore \alpha = 45^\circ,\ \beta = 30^\circ$

**Note**: Trigonometric equations are deleted from the syllabus.

45. $\sum_{n=1}^{4}\left(\sqrt{-1}\right)^{2n} =$ ____

1) 2 2) –i 3) 0 4) I **Ans.(3)**

**Solution:**

$S = \left(\sqrt{-1}\right)^2+\left(\sqrt{-1}\right)^4+\left(\sqrt{-1}\right)^6+\left(\sqrt{-1}\right)^8 = i^2+i^4+i^6+i^8 = -1+1-1+1 = 0$

46. The solution of $3(x-1) \le 2(x-3)$ is

1) $x \le -3$ 2) $x \ge -3$ 3) $x \le 3$ 4) $x > 3$ **Ans.(1)**

**Solution:**

$3x - 3 \le 2x - 6 \Rightarrow x \le -3$

47. 10 distinct points are taken on a circle. Then using these points

Statement I : The number of triangles that can be formed is 100

Statement II: The number of chords that can be formed is 45

Which of the following is correct?

1) Both Statement I and Statement II are true 2) Both Statement I and Statement II are false

3) Statement I is true and Statement II is false 4) Statement I is false and Statement II is true **Ans.(4)**

**Solution:**

Number of triangles ${}^{10}C_3 = 120$ ∴ Statement I is false.

Number of chords = ${}^{10}C_2 = 45$, which is true.

48. How many ways can you arrange all the letters and numbers in "KCET 2025" which start with K and end with 5?

(1) 720 (2) 360 (3) 120 (4) 180 **Ans.(2)**

**Solution:**

k | □ .... □ | 5 (6 spaces)

$\therefore$ Required $= \frac{n!}{2!} = 360$

49. The value at x = 2 for $\frac{x^3+3x^2+3x+1}{x^4+4x^3+6x^2+4x+1} =$ ______

1) 3 2) $\frac{25}{61}$ 3) $\frac{1}{3}$ 4) $\frac{19}{73}$ **Ans.(3)**

**Solution:**

$$\text{G.E} = \frac{(x+1)^3}{(x+1)^4} = \frac{1}{x+1} = \frac{1}{3} \text{ at } x = 2$$

50. If we insert two numbers between $\sqrt{2}$ and 4 so that the resulting sequence is in G.P, then the inserted numbers in the order are

1) 8, $\sqrt{2}$ 2) 2, $\sqrt{8}$ 3) $\sqrt{8}$, 2 4) $\sqrt{2}$, 8 **Ans.(2)**

**Solution:**

$\sqrt{2}, (\sqrt{2})^2, (\sqrt{2})^3, (\sqrt{2})^4$ are in G. P $\therefore$ Correct answer is $2, 2\sqrt{2}$ i.e. option (2)

51. Match List-I with List-II

| | List-I | | List-II |
|---|---|---|---|
| (a) | A matrix which is no ta square matrix | (i) | Symmetric matrix |
| (b) | A square matrix $A' = A$ | (ii) | Null matrix |
| (c) | The diagonal elements of a diagonal matrix are same | (iii) | Rectangular matrix |
| (d) | A matrix which is both symmetric and skew symmetric | (iv) | Scalar matrix |

Codes:

1) a-iii, b –i, c-ii, d-iv 2) a –iii, b-ii, c-iv, d-i 3) a-iii, b-i, c-iv, d-ii 4) a-iii, b-iv, c-i, d-ii **Ans.(3)**

**Solution:**

(b) $\rightarrow$ (i) ; c $\rightarrow$ (iv)

52. Consider the following statements:

Statement I : If A is a non-singular matrix, then $A^{-1}$ exists.

Statement II: If A and B are symmetric matrices of same order, then (AB – BA) is a skew symmetric matrix

Choose the correct option.

1) Statement I is true and Statement II is false 2) Statement I is false and Statement II is false

3) Statement I is true and Statement II is true 4) Statement I is false. and Statement II is true **Ans.(3)**

**Solution:**

$$(AB - BA)' = (AB)' - (BA)' = B'A' - A'B' = BA - AB = -(AB - BA)$$

$\therefore$ Both the statements are true

53. A row matrix has only

1) One element 2) One row with one or more columns

3) One column with one or more rows 4) One row and one column **Ans: (2)**

54. Let X bee-a matrix of order $2 \times n$ and Z be a matrix of order $2 \times p$. If $n = p$, then the order of the matrix $8X - 9Z$ is

(1) $2 \times n$ (2) $p \times 2$ (3) $n \times 3$ (4) $p \times n$ **Ans: (1)**

55. Which of the following is correct?

(1) Determinant is a square matrix

(2) Determinant is a number associated to a matrix

(3) Determinant is a unique number associated to a square matrix

(4) Determinant is not defined for a square matrix **Ans: (3)**

56. If A and B are invertible matrices of same order, then which of the following is not correct?

1) A. (aclj A) = (aclj A) . A = AI 2) A(adj A) = (adj A) . A = |A| I

3) $(AB)^{-1} = B^{-1} A^{-1}$ 4) $|A| \neq 0, |B| \neq 0$ **Ans: (1)**

57. If A and B are invertible square matrices of order n, then which of the following is not correct?

1) det (AB) = det (A) . det (B) 2) $\det(kA) = k^n \det(A)$

3) det (A + B) = det (A) + det (B) 4) $\det(A') = \dfrac{1}{\det(A^{-1})}$ **Ans: (3)**

58. The area of the triangle with vertices (3, 8), (– 4, 2) and *(5,* 1) is $\frac{P}{4}$, then the value of P is

1) $\frac{61}{2}$ (2) $\frac{2}{61}$ 3) 122 4) $\frac{1}{122}$ **Ans.(3)**

**Solution:**

$$\frac{1}{2}\left[3(2-1)-4(1-8)+5(8-2)\right]=\frac{P}{4} \Rightarrow P = 2\left[3+28+30\right]=122$$

59. The system of equations $x + 2y = 3$ and $2x + 3y = 3$ has

1) No solution 2) Unique solution 3) Infinite solutions 4) Only two solutions **Ans: (2)**

60. If $\vec{a} = 2\hat{i} + 2\hat{j} - \hat{k}$, $\vec{b} = \alpha\hat{i} + \beta\hat{j} + 2\hat{k}$ and $|\vec{a} + \vec{b}| = |\vec{a} - \vec{b}|$, then $\alpha + \beta$ is equal to

1) 2 2) – 1 3)0 4)1 **Ans.(4)**

**Solution:**

$$\left|\vec{a}+\vec{b}\right| = \left|\vec{a}-\vec{b}\right| \Rightarrow \vec{a}\,.\,\vec{b} = 0 \quad \therefore 2\alpha + 2\beta - 2 = 0 \Rightarrow \alpha + \beta = 1$$