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MATHEMATICS

CUET 2023

PREVIOUS YEAR QUESTION PAPER

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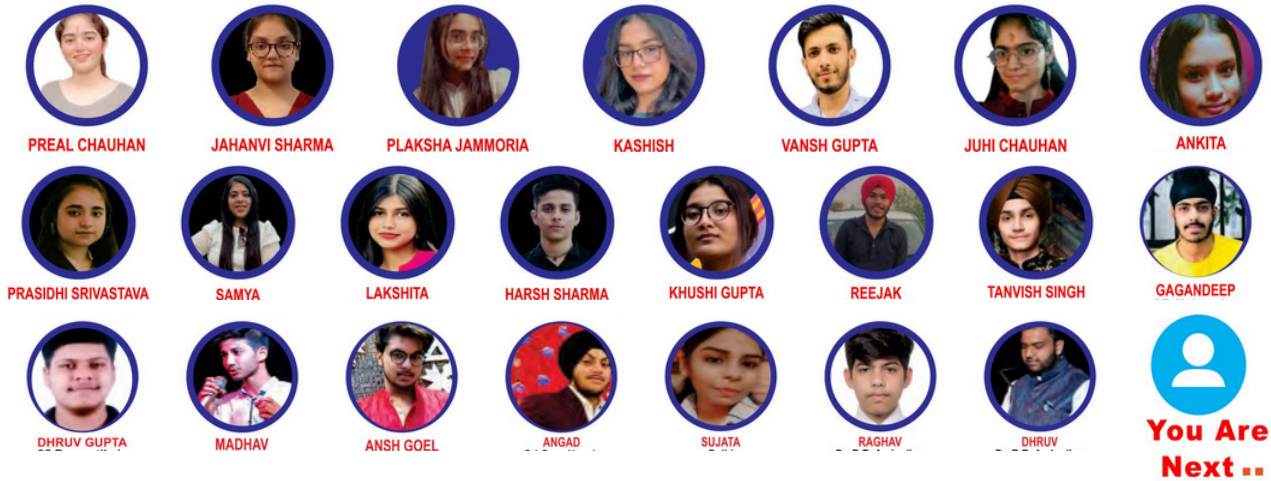


CUET Mathematics 2023

1. The value of the integral $I = \int_{-1}^{1}\left(x + x^3 + x^5\right)dx$ is

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

2. Which constraint correctly represents the situation "Mixture of x and y must be at least 8 units" ?

(a) $x + y > 8$ (b) $x + y < 8$

(c) $x + y \leq 8$ (d) $x + y \geq 8$

3. A die is thrown. If A is the event' 'the number appearing is a multiple of 3 and B is the event 'the number appearing is even', then A and B are;

(a) dependent events

(b) independent events

(c) $P(A \cap B) = \frac{1}{3}$

(d) $P(B) = \frac{1}{3}$

4. The feasible region for the constrains $x \geq 0$, $x + y \leq 1$ and $x - y \leq 1$, is situated in:

(A) I and II Quadrant.

(B) I Quadrant.

(C) II and IV Quadrant.

(D) IV Quadrant.

(E) I, II, III and IV Quadrant:

Choose the correct answer from the options given below:

(a) (A) only (b) (B) and (D) only

(c) (B) and (C) only (d) (E) only

5. Match List-I with List-II.

List - I Differential Equation	List - II Degree
(A) $\left(\frac{dy}{dx}\right)^3 + yx = 0$	(I) 2
(B) $e^{\frac{dy}{dx}} + y_1^2 + y'' = 0$	(II) 1
(C) $xyy'' + x\left(y'\right)^2 - yy' = 0$	(III) Not defined
(D) $\left(y''\right)^2 + y = 0$	(IV) 3

Choose the correct answer from the options given below:

(a) (A)-(IV), (B)-(III), (C)-(II), (D)-(I)

(b) (A)-(l), (B)-(II), (C)-(III), (D)-(IV)

(c) (A)-(II), (B)-(III), (C)-(IV), (D)-(I).

(d) (A)-(IV), (B)-(III), (C)-(I), (D)-(II).

6. Area of the region bounded by the curve $x^2 = 4y$, x-axis and $x = 3$ is:

(a) $\frac{9}{2}$ sq units

(b) $\frac{9}{4}$ sq units

(c) $\frac{9}{5}$ sq units

(d) $\frac{9}{8}$ sq units

7. If a matrix has 24 elements, which of the following cannot be the possible order of the matrix?

(a) 6×4

(b) 12×12

(c) 8×3

(d) 1×24

8. Any function $f(x)$ is an increasing function in $[a, b]$ if:

(A) $\forall x_1, x_2 \in [a, b], f\left(x_1\right) \geq f\left(x_2\right)$ if $x_1 < x_2$

(B) $\forall x_1, x_2 \in [a, b], f\left(x_1\right) \geq f\left(x_2\right)$ if $x_1 > x_2$

(C) $\forall x_1, x_2 \in [a, b], f\left(x_1\right) \leq f\left(x_2\right)$ if $x_1 < x_2$

(D) $\forall x_1, x_2 \in [a, b], f\left(x_1\right) < f\left(x_2\right)$ if $x_1 > x_2$

Choose the correct answer from the options given below:

(a) (A), (D) only

(b) (B), (D) only

(c) (B), (C) only

(d) (A), (C) only

9. The values of a for which, the function $f(x) = a^x$ is increasing on R are given by:

(a) $0 < a < \infty$

(b) $-\infty < a < \infty$

(c) $1 < a < \infty$

(d) $0 \leq a < \infty$

10. If $|2\ 4\ 5\ 1| = |2x\ 4\ 6\ x|$, then x-is equal to:

(a) 1

(b) $2\sqrt{3}$

(c) $\pm\sqrt{3}$

(d) $\pm2\sqrt{3}$

11. If A and B are events such that $P(A/B) = P(B/A)$, then:

(a) $A = B$

(b) $A \cap B = \phi$
(c) $A \subset B$ but $A \neq B$
(d) $P(A) = P(B)$

12. The value of the integral $\int e^x\left(\frac{1}{x} - \frac{1}{x^2}\right)dx$ is

(a) $\frac{e^x}{x} + C$, where C is a constant
(b) $\frac{e^{-x}}{x} + C$, where C is a constant.
(c) $e^x + C$, where C is a constant.
(d) $e^{-x} + C$, where C is a constant.

13. Match List-I with List-II.

List-I Equation of curves	List- II Slopes of Tangent at x=2
(A) $y = x^3 - x$	(I) 8
(B) $y = (x-2)^2$	(II) 2/3
(C) $y = 2x^2 + 3$	(III) 11
(D) $y = \sqrt{4x+1}$	(IV) 0

Choose the correct answer from the options given below:
(a) (A)-(II), (B)-(I), (C)-(IV), (D)-(III)
(b) (A)-(I), (B)-(II), (C)-(IV), (D)-(II)
(c) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)
(d) (A)-(III), (B)-(IV), (C)-(II), (D)-(I)

14. The sum of the minor and the cofactor of the element 6 in the determinant $\Delta = \begin{vmatrix} 2 & 3 & 1 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix}$ is:
(a) -5
(b) -10
(c) 10
(d) 0

15. If $(x+1)e^y = 1$, then:
(a) $\frac{d^2y}{dx^2} = y^2$
(b) $\frac{d^2y}{dx^2} = \left(\frac{dy}{dx}\right)^2$
(c) $\frac{d^2y}{dx^2} = -y^2$
(d) $\frac{d^2y}{dx^2} = \frac{dy}{dx}$

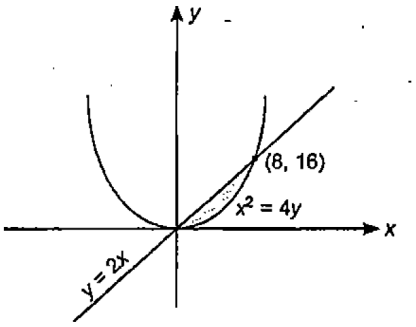
16. Let $A = \begin{bmatrix} 1 & \cos\theta & 1 \\ -\cos\theta & 1 & \cos\theta \\ -1 & -\cos\theta & 1 \end{bmatrix}, 0 \le \theta \le 2\pi$, then:
(a) $|A| = 0$
(b) $|A| \in [2, 4]$
(c) $|A| \in (2, 4)$
(d) $|A| \in (2, \infty)$

17. Which of the following statements is/are correct?
(A) $|x|$ is continuous everywhere in its domain.
(B) $|x|$ is differentiable everywhere in its domain.
(C) $[x]$ is continuous at every integral point.
(D) $[x]$ is discontinuous at every integral point.
Choose the correct answer from the options given below:
(a) (A), (C) only
(b) (B), (D) only
(c) (B), (C) only
(d) (A), (D) only

18. Vector in the direction of $\hat{i} + \hat{j} + \hat{k}$ with magnitude 5 units is:
(a) $\frac{\hat{i}-\hat{j}+\hat{k}}{\sqrt{3}}$
(b) $\frac{\hat{i}+\hat{j}+\hat{k}}{\sqrt{3}}$
(c) $\frac{5(\hat{i}+\hat{j}+\hat{k})}{\sqrt{3}}$
(d) $\frac{5}{3}(\hat{i} + \hat{j} + \hat{k})$

19. The general solution of the differential equation $ydx - \left(x + 2y^2\right)dy = 0$ is:
(a) $x = 2y^2 + Cy$; C is a constant.
(b) $y = 2x^2 + Cy$, C is a constant.
(c) $y = 2x^2 + Cx$, C is a constant.
(d) $x = 2x^2 + Cy$, C is a constant.

20. Which of the following is the correct equation to find the area of the shaded region, with reference to the figure given below?



(a) $A = 2\int_0^8 \left(2x - x^2\right)dx$ (b) $A = 2\int_0^4 \left(2x - x^2\right)dx$

(c) $A = 2\int_0^4 \left(2x - \frac{x^2}{4}\right)dx$ (d) $A = 2\int_0^8 \left(2x - \frac{x^2}{4}\right)dx$

21. Corner points of the feasible region for a linear programming problem are $(0, 2), (3, 0), (6, 0), (6, 8)$ and $(0, 5)$. Let $F = 4x + 6y$ be the objective function. Then the minimum value of F occurs at:

(a) $(0, 2)$ only
(b) $(3, 0)$ only
(c) The mid point of the line segment joining the points $(0, 2)$ and $(3, 0)$ only
(d) Every point on the line segment joining the points $(0, 2)$ and $(3, 0)$

22. The tangent to the curve $y = x^3 - 11x + 5$ at $x = 2$ is parallel to:

(A) $y = x + 1$
(B) $y = -x + 2$
(C) $2y = x + 3$
(D) $2y = 2x + 4$

Choose the correct answer from the options given below:

(a) (A), (B) only
(b) (B), (C) only
(c) (A), (D) only
(d) (B), (D) only

23. Consider a binary operation $*$ on N defined as $a * b = a^3 + b^3$, choose the correct answer:

(a) * is both associative and commutative.
(b) * is associative but not commutative.
(c) * is commutative but not associative.
(d) * is neither commutative nor associative.

24. The value of

$$a+b+c+d \text{ if } \begin{bmatrix} 2a+b & a+2b \\ 2c+d & c+2d \end{bmatrix} = \begin{bmatrix} 8 & 4 \\ 3 & 3 \end{bmatrix}$$

(a) 4
(b) 2
(c) 6
(d) 8

25. The derivative of $\cos^{-1}\left(\frac{\sin x+\cos x}{\sqrt{2}}\right), -\frac{\pi}{4} < x < \frac{\pi}{4}$ with respect to x is :

(a) $\frac{1}{\sqrt{2}}$
(b) 1
(c) ~ 1
(d) $\frac{-1}{\sqrt{2}}$

26. If A is square matrix such that $A^2 = A$, then $(I + A)^3 - 8A$ is equal to:

(a) I
(b) A
(c) $I - A$
(d) $3A$

27. Match List-I with List-II.

List 1 (Function y)	List - II (Derivatives $\frac{dy}{dx}$)
(A) $y = \cos\sqrt{x}$	(I) $\frac{\sec^2\sqrt{x}}{2\sqrt{x}}$ $\sec(\tan\sqrt{x})\tan(\tan\sqrt{x})$
(B) $y = \sqrt{\sin x}$	(II) $-3x^2\cos\left(x^3\right)\sin\left(\sin\left(x^3\right)\right)$
(C) $y = \sec(\tan\sqrt{x})$	(III) $\frac{\cos x}{2\sqrt{\sin x}}$
(D) $y = \cos\left(\sin\left(x^3\right)\right)$	(IV) $\frac{-1}{2\sqrt{x}}\sin\sqrt{x}$

Choose the correct answer from the options given below:

(a) (A)-(I), (B)-(IV), (C)-(II), (D)-(III)
(b) (A)-(IV), (B)-(III), (C)-(I), (D)-(II)
(c) (A)-(III), (B)-(II), (C)-(IV), (D)-(I)
(d) (A)-(II), (B)-(I), (C)-(III), (D)-(IV)

28. The direction cosines of the normal to the plane $x - y + z = 4$ are:

(a) $-\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}$
(b) $\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}$
(c) $\frac{1}{\sqrt{3}}, \frac{-1}{\sqrt{3}}, \frac{1}{\sqrt{3}}$
(d) $\frac{-1}{\sqrt{3}}, \frac{-1}{\sqrt{3}}, \frac{1}{\sqrt{3}}$

29. The integral $I = \int e^x\left(\frac{1+sinx}{1+cosx}\right)dx$ is:
(a) $e^x tanx + C$, where C is a constant.
(b) $e^x secx + C$, where C is a constant.
(c) $e^x tan\left(\frac{x}{2}\right) + C$, where C is a constant.
(d) $e^{-x} tan\left(\frac{x}{2}\right) + C$, where C is a constant.

30. The area lying between the curves $y^2 = 4x$ and $y = 2x$ is:
(a) $\frac{2}{3}$
(b) 1
(c) $\frac{1}{3}$
(d) $\frac{1}{4}$

31. The value(s) of x, for which the matrix $A = \begin{bmatrix} x-1 & 1 & 1 \\ 1 & x-1 & 1 \\ 1 & 1 & x-1 \end{bmatrix}$ is singular is/are
(a) 1
(b) $-1, 2$
(c) ± 1
(d) 1,2

32. If $A = [2 \ -3 \ 4]$, $X = [1 \ 2 \ 3]$, $Y = \begin{bmatrix} 2 \\ 3 \\ 4 \end{bmatrix}$, $B = \begin{bmatrix} 3 \\ 2 \\ 2 \end{bmatrix}$ then $AB + XY =$
(a) [28]
(b) [24]
(c) 28
(d) 24

33. The maximum value of the $f(x) = \frac{1}{4x^2+2x+1}$ is
(a) $\frac{4}{3}$
(b) $\frac{3}{4}$
(c) $\frac{-4}{3}$
(d) $-\frac{3}{4}$

34. Match List-I with List-II.

List -I Functions	List - II Range
(A) $cosec^{-1}x$	(I) $(0, \pi)$
(B) $\cdot sec^{-1}x$	(II) $\left[\frac{-\pi}{2}, \frac{\pi}{2}\right] - \{0$
(C) $tan^{-1}x$	(Im) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$
(D) $cot^{-1}x$	(IV) $[0, \pi\} - \left\{\frac{\pi}{2}\right\}$

Choose the correct answer from the options given below:
(a) (A)-(IV), (B)-(I), (C)-(II), (D)-(III)
(b) (A)-(II), (B)-(I), (C)-(IV), (D)-(II)
(c) (A)-(II), (E)-(IV), (C)-(III), (D)-(I)
(d) (A)-(I), (B)-(II), (C)-(II), (D)-(IV)

35. The value of $\frac{9}{4}sin^{-1}\frac{2\sqrt{2}}{3} + \frac{9}{4}sin^{-1}\frac{1}{3}$ is:
(a) $\frac{9}{4}$
(b) $\frac{9\pi}{4}$
(c) $\frac{\pi}{8}$
(d) $\frac{9\pi}{8}$

36. The two events E and F are independent. If $P(E) = 0.3$ and $P(E \cup F) = 0.5$, then $P(E/F) - P(F/E)$ is
(a) $\frac{2}{7}$
(b) $\frac{3}{35}$
(c) $\frac{1}{70}$
(d) $\frac{1}{7}$

37. If $\vec{a} + \lambda\vec{b}$ is perpendicular to $\vec{c}$, where $\vec{a} = -\hat{i} + 2\hat{j} + \hat{k}$, $\vec{b} = 3\hat{i} + 2\hat{j} + \hat{k}$ and $\vec{c} = \hat{i} - \hat{j}$ then
(a) $\lambda = -1$
(b) $\lambda = -3$
(c) $\lambda = 1$
(d) $\lambda = 3$

38. The greatest integer function $f: R \to R$ given by $f(x) = [x], x \in R$ and $[x]$ denotes the greatest integer less than or equal to x is:
(a) one-one
(b) onto

(c) both one-one and onto
(d) neither one-one nor onto

39. For $A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$ if M_y and A_{1j} are the minor and the cofactor of a_{ij} respectively, then $|A|$ equals to:

(A) $a_{11}A_{11} + a_{12}A_{12} + a_{13}A_{13}$
(B) $a_{21}A_{12} + a_{22}A_{22} + a_{23}A_{32}$
(C) $a_{11}M_{11} - a_{12}M_{12} + a_{13}M_{13}$
(D) $a_{11}M_{11} + a_{12}M_{12} + a_{13}M_{13}$

Choose the correct answer from the options given below:
(a) (A), (B) only
(b) (A), (C) only
(c) (C), (D) only
(d) (A), (C), (D) only

40. The value of the integral $\int_{-1}^{1} |x| dx$ is
(a) 2
(b) $\frac{1}{2}$
(c) 1
(d) 0

41. The probability that A speaks the truth is $\frac{4}{5}$. He throws a die and reports that it is a five. The probability that it is actually a five is:
(a) $\frac{4}{9}$
(b) $\frac{1}{2}$
(c) $\frac{2}{9}$
(d) $\frac{5}{9}$

The linear programming problem:

$$\text{minimise } z = 3x + 2y$$

subject to the constraints

$$x + y \geq 8,$$

$$3x + 5y \leq 15, x \geq 0, y \geq 0$$

has
(a) one solution
(c) no feasible solution
(b) two solutions
(d) infinitely many solutiôn

42. The general solution of the differential equation $\frac{dy}{dx} = sin^{-1}x$ is:

(a) $y = xsin^{-1}x - \sqrt{1 - x^2} + C$, where C is a constant.

(b) $y = xsin^{-1}x - \sqrt{1 + x^2} + C$, where C is a constant.

(c) $y = xsin^{-1}x + \sqrt{1 - x^2} + C$, where C is a constant.

(d) $y = -xsin^{-1}x - \sqrt{1 - x^2} + C$, where C is a constant.

43. The distance of the point with position vector $(2\hat{i} + \hat{j} - \hat{k})$ from the plane $\vec{r} \cdot (-2\hat{i} + \hat{j} + 3\hat{k}) = 8$ is:
(a) $\frac{7}{\sqrt{14}}$
(b) $2\sqrt{14}$
(c) $\sqrt{14}$
(d) $\frac{\sqrt{14}}{7}$

44. The rate of change of the area of an equilateral triangle with respect to its side when its side $= 2$ is:
(a) $\frac{\sqrt{3}}{4}$
(b) $\sqrt{3}$
(c) $\frac{\sqrt{3}}{2}$
(d) $2\sqrt{3}$

45. The relation R in the set $A = \{1, 2, 3\}$ given by $R = \{(1, 2), (2, 1)\}$ is:
(a) Reflexive.
(b) Symmetric.
(c) Reflexive but not symmetric.
(d) Equivalence relation.

46. The function f is given by

$$f(x) = \begin{cases} x^3 + 3, & \text{if } x \neq 0 \\ 4, & \text{if } x = 0 \end{cases}$$

Then number of points of discontinuity for this function is:
(a) 0
(b) 1

(c) 2
(d) 3

47. Which of the following functions satisfies Rolle's theorem?
(a) $f(x) = x, x \in [1, 2]$
(b) $f(x) = x^2, x \in [-1, 1]$
(c) $f(x) = x^3, x \in [-1, 2]$ (d)
$f(x) = x^4, x \in [0, 2]$

48. Equation of a plane with intercept $\sqrt{3}$ on z-axis and parallel to XOY plane is:
(a) $x = \sqrt{3}$
(b) $z - \sqrt{3} = 0$
(c) $x + \sqrt{3} = 0$
(d) $z + \sqrt{3} = 0$

49. Two ropes are tied along the two diagonals of a cubic room. Ropes are inclined to each other at:
(a) 45°
(b) 30°
(c) $cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$
(d) $cos^{-1}\left(\frac{1}{3}\right)$

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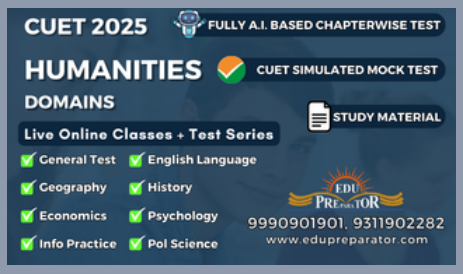

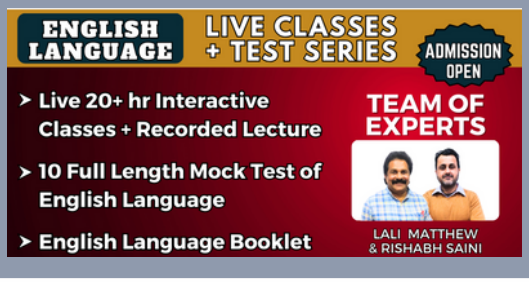

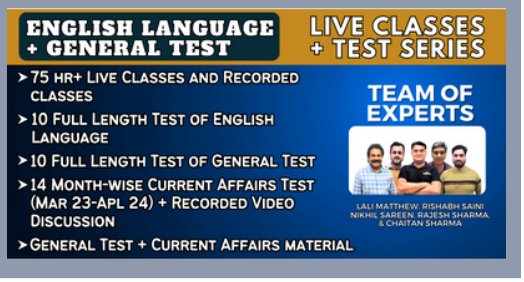

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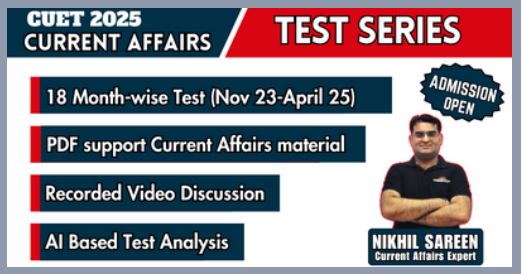

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