NTA CUET (UG) - 2025
Sample Paper-2
Section II - Mathematics

Time Allowed : 60 Minutes **Marks :** 100

General instructions:

(i) For every correct answer, 4 marks will be awarded.

(ii) 1 mark will be deducted for every wrong answer.

(iii) The question paper has two sections

Section A (Common) : 10 mandatory questions covering both Mathematics and Applied Mathematics

Section B1 (Core Mathematics) : 18 questions out of which 15 questions are compulsory

Section B2 (Applied Mathematics) : 18 questions on Applied mathematics out of which 15 questions are compulsory.

(iv) Out of **Section B1 and Section B2**, the candidate has to **attempt 15 questions only in any one section**.

ⓘ Number of Questions to be answered : **10+15 = 25**.

ⓘ This Sample paper is prepared for the students of **Core Mathematics**; therefore it does **not** contain Section B2.

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Section A : Common
(Compulsory Section)

01. If $y = \log_e\left(\frac{x^2}{e^2}\right)$, then $\frac{d^2y}{dx^2}$ equals

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

02. Let $A = \begin{bmatrix} 2 & 50 \\ 10 & 200 \end{bmatrix}$ and $B = \begin{bmatrix} 50 & 2 \\ -40 & -3 \end{bmatrix}$, then $|AB|$ is equal to

(a) –7000 (b) 2000 (c) 3000 (d) 7000

03. $\int \frac{\cos 2x}{(\sin x + \cos x)^2} dx =$

(a) $-\frac{1}{\sin x + \cos x} + c$ (b) $\log|\sin x + \cos x| + c$

(c) $\frac{1}{(\sin x + \cos x)^2} + c$ (d) $\log|\sin x - \cos x| + c$

04. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \left[\sin|x| - \cos|x|\right] dx =$

(a) 1 (b) 2 (c) –2 (d) 0

05. The area bounded by the curve $y = \sqrt{x}$, Y-axis and between the lines $y = 0$ and $y = 3$ is

(a) $2\sqrt{3}$ sq. units (b) 27 sq. units (c) 9 sq. units (d) 3 sq. units

06. Given $\frac{d}{dx}F(x) = \frac{1}{\sqrt{2x - x^2}}$ and $F(1) = 0$, then $F(x) =$

(a) $\sin^{-1}(x-1)$ (b) $\sin^{-1}(2x-1)$ (c) $2\sin^{-1}(x-1) + c$ (d) $\tan^{-1}(x-1)$

07. Which of the given values of x and y make the following pair of matrices equal?

$\begin{bmatrix} 3x+7 & 5 \\ y+1 & 2-3x \end{bmatrix}, \begin{bmatrix} 0 & y-2 \\ 8 & 4 \end{bmatrix}$

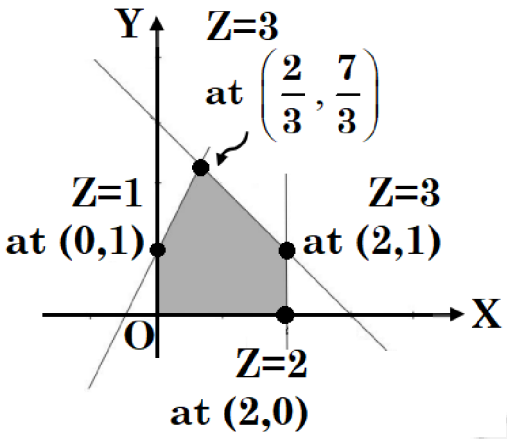
(a) $x = -\frac{7}{3}, y = 7$ (b) $y = 7, x = \frac{2}{3}$ (c) $y = 7, x = -\frac{2}{3}$ (d) Not possible

08. If x is real, the minimum value of $x^2 - 8x + 17$ is

(a) 2 (b) 1 (c) 0 (d) –1

09. Shown below is the feasible region of a linear programming problem (L.P.P.) whose objective function is : Maximize $Z = x + y$.

A student Drishti claimed that there exists **no optimal solution** for the L.P.P. as there is no unique maximum value at the corner points of its feasible region. Based on her statement, choose most appropriate option.



(a) Her claim is correct, as there are two corner points of its feasible region at which maximum value of Z occurs.

(b) Her claim is false, as there are exactly two corner points i.e., $\left(\frac{2}{3}, \frac{7}{3}\right)$ and $(2, 1)$ at which the maximum value of Z occurs, which is 3.

(c) Her claim is false, as every point on the line joining $\left(\frac{2}{3}, \frac{7}{3}\right)$ and $(2, 1)$ gives the maximum value of Z, which is 3.

(d) Her claim is false, as the maximum value of Z occurs at (2, 0), which is 2.

10. Let X represent the difference between the number of heads and the number of tails obtained when a coin is tossed 6 times. What are possible values of X?

(a) $X = 6, 4, 2$ (b) $X = 6, 4, 0$ (c) $X = 4, 2, 0$ (d) $X = 6, 4, 2, 0$

Section B1 : Core Mathematics

11. The value of determinant $\begin{vmatrix} 1 & x & x+1 \\ 2x & x(x-1) & x(x+1) \\ 3x(1-x) & x(x-1)(x-2) & x(x-1)(x+1) \end{vmatrix}$ is

(a) $6x^2(1-x^2)$ (b) $6x^2(x^2-1)$ (c) $6x^2(x^2+1)$ (d) $6x(1-x^2)$

12. If the direction cosines of a line are k, k, k, then

(a) $k > 0$ (b) $k = 1$ (c) $0 < k < 1$ (d) $k = \frac{1}{\sqrt{3}}$ or $-\frac{1}{\sqrt{3}}$

13. If a relation R on the set $\{1, 2, 3\}$ be defined by $R = \{(2, 3)\}$, then R is

(a) reflexive (b) transitive (c) symmetric (d) non transitive

14. Let the relation S in the set of all real numbers $(\mathbb{R})$, be defined by $S = \{(a, b) : a \le b^2\}$.

If $(x, x) \in S$, then

(a) $x \in \mathbb{R} - 0$ (b) $x \in \mathbb{R} - (0, 1)$ (c) $x \in \mathbb{R} - (0, -1)$ (d) $x \in \mathbb{R} - 1$

15. Domain of $f(x) = \cos^{-1}(2x - 3)$ is

(a) $x \in [-1, 1]$ (b) $x \in [-1, 2]$ (c) $x \in [1, 2]$ (d) $x \in [-1, 0]$

16. If A and B are any two events such that $P(A) + P(B) - P(A \text{ and } B) = P(A)$, then

(a) $P(B|A) = 1$ (b) $P(A|B) = 1$ (c) $P(B|A) = 0$ (d) $P(A|B) = 0$

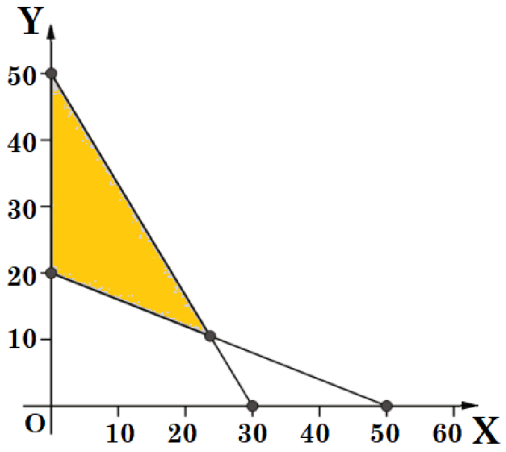
17. For the function $f(x) = x + \frac{1}{x}$, (minimum value) – (maximum value) is

(a) –4 (b) 2 (c) 4 (d) –2

18. The set of points where the function f given by $f(x)=|2x-1|\sin x$ is differentiable is

(a) R (b) $R-\left\{\frac{1}{2}\right\}$ (c) $(0,\infty)$ (d) $R-\left\{-\frac{1}{2}\right\}$

19. Shown below is the feasible region of a linear programming problem (L.P.P.). Which of the following inequalities is one of the constraints of the L.P.P.?



(a) $5x+3y\geq 150$

(b) $5y+3x\leq 150$

(c) $2x+5y\geq 100$

(d) $2y+5x\leq 100$

20. Given that $\vec{a}\neq\vec{d}$; $\vec{b}\neq\vec{c}$. If $\vec{a}\times\vec{b}=\vec{c}\times\vec{d}$ and $\vec{a}\times\vec{c}=\vec{b}\times\vec{d}$, then $(\vec{a}-\vec{d})$ is

(a) parallel to $(\vec{b}-\vec{c})$ (b) perpendicular to $(\vec{b}-\vec{c})$

(c) parallel to $(\vec{b}+\vec{c})$ (d) perpendicular to $(\vec{b}+\vec{c})$

21. There are two non-zero vectors $\vec{a}$ and $\vec{b}$ such that $\vec{a}.\vec{b}=0$. Then the projection of $\vec{a}$ on $\vec{b}$ is

(a) 1 (b) 0 (c) 2 (d) can not be determined

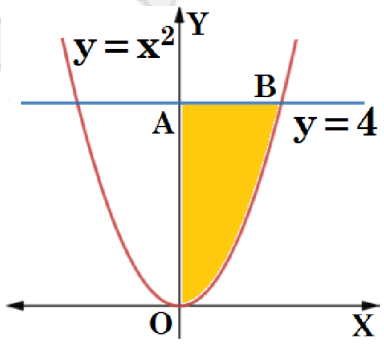
22. The degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^2+\left(\frac{dy}{dx}\right)^2=x^2\cos\left(\frac{dy}{dx}\right)$ is

(a) 1 (b) 2 (c) 3 (d) not defined

23. What is the value of shaded area (in sq. units) shown in the figure given below?

(a) $\frac{32}{3}$ (b) $\frac{16}{3}$

(c) $\frac{8}{3}$ (d) $\frac{4}{3}$



24. The integrating factor of differential equation $\cos x\frac{dy}{dx}+y\sin x=1$ is

(a) $\tan x$ (b) $\sin x$ (c) $\sec x$ (d) $-\cos x$

25. Let $I=\int_0^{\frac{\pi}{2}}\left(\frac{5\sin x+3\cos x}{\sin x+\cos x}\right)dx$. Then

(a) $I=2\pi$ (b) $I=\pi$ (c) $I=\frac{\pi}{2}$ (d) $I=-(\pi)$

26. $f(x)=\frac{\log x}{x}$ is strictly increasing when

(a) $x \in (0, e)$ (b) $x \in (e, \infty)$ (c) $x \in [0, e)$ (d) $x \in (-\infty, \infty)$

27. For any positive integer n, $\begin{vmatrix} (n-1)! & n! \\ -n & n \end{vmatrix} =$

(a) $n!$ (b) $(n+1)!$ (c) $(n-1)!$ (d) $(n+2)!$

28. If the two lines $L_1 : x = 5, \frac{y}{3-\alpha} = \frac{z}{-2}$ and; $L_2 : x = 2, \frac{y}{-1} = \frac{z}{2-\alpha}$ are perpendicular, then the value of 3α is

(a) $\frac{7}{3}$ (b) 3 (c) 7 (d) $\frac{2}{3}$

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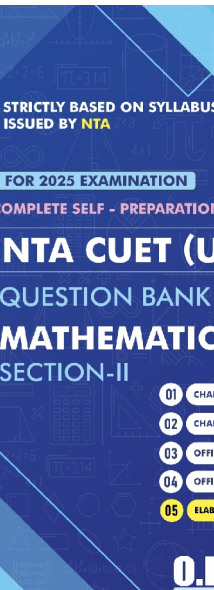

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08.	(b)	09.	(c)	10.	(d)	11.	(a)	12.	(d)	13.	(b)	14.	(b)
15.	(c)	16.	(b)	17.	(c)	18.	(b)	19.	(c)	20.	(a)	21.	(b)
22.	(d)	23.	(b)	24.	(c)	25.	(a)	26.	(a)	27.	(b)	28.	(c)

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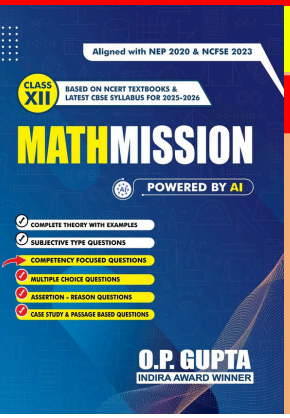

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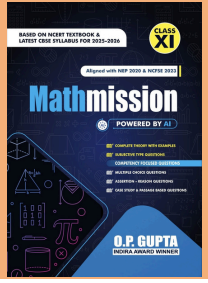

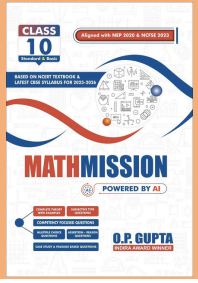

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