

NTA CUET (UG) - 2026

Sample Paper-2

Section II - Mathematics

Time Allowed : 60 Minutes

Marks : 200

General instructions:

- (i) For every correct answer, 5 marks will be awarded.
- (ii) 1 mark will be deducted for every wrong answer.
- (iii) The question paper has two sections

Section A (Common) : 15 mandatory questions covering both Mathematics and Applied Mathematics

Section B1 (Core Mathematics) : 35 questions out of which 25 questions are compulsory

Section B2 (Applied Mathematics) : 35 questions on Applied mathematics out of which 25 questions are compulsory.

(iv) Out of **Section B1 and Section B2**, the candidate has to **attempt 25 questions only in any one section.**

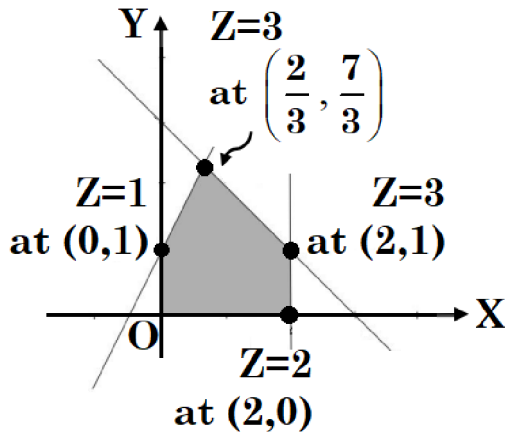
① Number of Questions to be answered : **15+25.**

② This Sample paper is prepared for the students of **Core Mathematics**; therefore it does **not** contain Section B2.

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



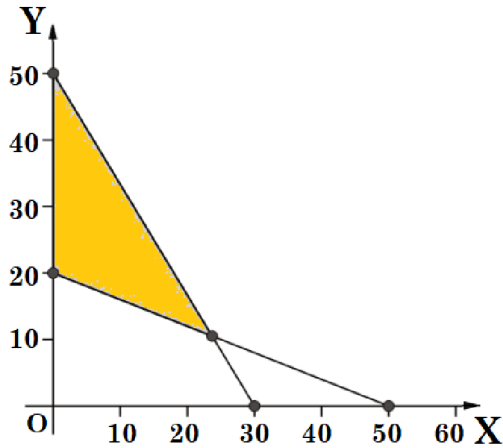
- (a) Her claim is correct, as there are two corner points of its feasible region at which maximum value of Z occurs.
- (b) Her claim is false, as there are exactly two corner points i.e., $(\frac{2}{3}, \frac{7}{3})$ and $(2, 1)$ at which the maximum value of Z occurs, which is 3.
- (c) Her claim is false, as every point on the line joining $(\frac{2}{3}, \frac{7}{3})$ 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) $X = 6, 4, 2, 0$
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 $S = \{(a, b) : a \leq b^2\}$.
 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) $x \in [-1, 0]$

Section B1 : Core Mathematics

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

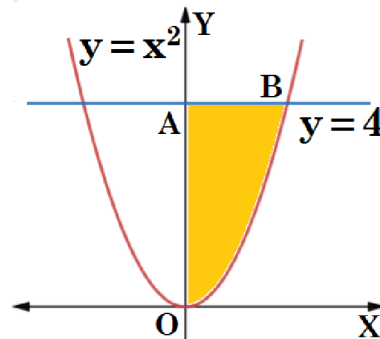
19. Shown below is the feasible region of a linear programming problem (L.P.P.). Which of the following inequalities is one of the constraints of the L.P.P.?



- (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 $\vec{a} \cdot \vec{b} = 0$. 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) $\frac{2}{3}$
29. Let $\tan^{-1} : \mathbb{R} \rightarrow \left(\frac{\pi}{2}, \frac{3\pi}{2}\right)$. Then $\tan^{-1}(-1) =$
 (a) $-\frac{\pi}{4}$ (b) $\frac{3\pi}{4}$ (c) $\frac{5\pi}{4}$ (d) $\frac{7\pi}{4}$
30. Two independent events A and B are such that $P(A) = 0.6$ and $P(B) = 0.5$. Based on this information, which of the following options is **incorrect**?
 (a) $P(A \cap B) = 0.3$ (b) $P(A \cup B) = 0.8$ (c) $P(A|B) = P(A)$ (d) $P(B|A) = P(A)$
31. Integration factor of the differential equation $\left(\frac{dy}{dx}\right) - \frac{y}{x} = x^2$ is denoted by $f(x)$. Then $f'(x) =$
 (a) $\frac{1}{x}$ (b) $-\frac{1}{x}$ (c) $\frac{1}{x^2}$ (d) $-\frac{1}{x^2}$
32. If $y = x^e$, then $\frac{dy}{dx} =$
 (a) x^e (b) $e \cdot x^{e-1}$ (c) $e \cdot x^e$ (d) $x^e \times \log x$
33. The direction angle made by the line $\frac{x-1}{1} = \frac{y+1}{\sqrt{2}} = \frac{z-2}{-1}$ with positive direction of x-axis, is
 (a) $\frac{\pi}{3}$ (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{6}, \frac{5\pi}{6}$
34. If $|\vec{a}| = 2, |\vec{b}| = 2\sqrt{3}$ and $\vec{a} \perp \vec{b}$, then the value of $|\vec{a} + \vec{b}|$ is
 (a) 16 (b) ± 4 (c) 4 (d) ± 16
35. For what value/s of k , the function $f(x) = x + \cos x + k$ is strictly decreasing over \mathbb{R} (set of real numbers)?
 (a) $b > 0$ (b) $b < 0$ (c) $b \leq 0$ (d) No value of b exists
36. If $f(x) = \begin{cases} \frac{\log(1+4x) - \log(1-x)}{x}, & \text{if } x \neq 0 \\ k, & \text{if } x = 0 \end{cases}$ is continuous at $x = 0$, then the value of k is
 (a) 5 (b) -5 (c) 3 (d) 1
37. If $\vec{p} + \vec{q} + \vec{r} = \vec{0}$ and $|\vec{p}| = 3, |\vec{q}| = 5, |\vec{r}| = 7$, then the angle between \vec{p} and \vec{q} will be
 (a) $\frac{\pi}{3}$ (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{4}$ (d) $\frac{5\pi}{6}$

38. For events E and F, $P(E) = 0.4$, $P(F) = 0.5$ and $P(E \cup F) = 0.7$. Then $P(E|F) + P(F|E)$ equals
 (a) 0.1 (b) 0.8 (c) 0.9 (d) 0.2
39. Two positive numbers x and y, whose sum is 15 and the sum of whose squares is minimum, are
 (a) $x = 8, y = 7$ (b) $x = \frac{15}{2}, y = \frac{15}{2}$ (c) $x = 12, y = 3$ (d) $x = 1, y = 14$
40. The domain of the function $\cos^{-1}(0.2x - 1)$ is $x \in$
 (a) $[0, 10]$ (b) $[-1, 1]$ (c) $[0, 1]$ (d) $[0, \pi]$
41. If $M = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 1 \end{bmatrix}$, then the value of $|\text{adj } M|$ is
 (a) 6 (b) $\frac{1}{6}$ (c) 36 (d) 216
42. If matrices A, B and C are such that $A_{p \times 4} \cdot B_{q \times 5} = C_{2 \times 5}$, then the value of $p^2 - q^2$ is
 (a) 12 (b) -12 (c) 16 (d) -16
43. The graph of $x \leq 3$ and $y \geq 3$ lies in
 (a) 1st and 2nd quadrant (b) 2nd and 3rd quadrant
 (c) 3rd and 4th quadrant (d) 1st and 4th quadrant
44. Let $L_1: \vec{r} = (8 + 3\lambda)\hat{i} - (9 + 16\lambda)\hat{j} + (10 + 7\lambda)\hat{k}$ and $L_2: \vec{r} = 15\hat{i} + 29\hat{j} + 5\hat{k} + \mu(3\hat{i} + 8\hat{j} - 5\hat{k})$.
 Then the shortest distance (in units) between the given lines L_1 and L_2 , is
 (a) $\sqrt{14}$ (b) 12 (c) $2\sqrt{3}$ (d) 14
45. If the point P(a, b, 0) lies on the line $\frac{x+1}{2} = \frac{y+2}{3} = \frac{z+3}{4}$, then (a, b) is
 (a) (1, 2) (b) $(\frac{1}{2}, \frac{2}{3})$ (c) $(\frac{1}{2}, \frac{1}{4})$ (d) (0, 0)
46. The Range of $f(x) = \sin^{-1} x + 2 \cos^{-1} x$, where $-1 \leq x \leq 1$, is
 (a) $[-\frac{\pi}{2}, \frac{\pi}{2}]$ (b) $[\frac{\pi}{2}, \frac{3\pi}{2}]$ (c) $[0, \pi]$ (d) $[\pi, \frac{3\pi}{2}]$
47. $\int_0^a \frac{dx}{x + \sqrt{a^2 - x^2}} =$
 (a) $\frac{\pi}{3}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{2}$ (d) $\frac{\pi}{6}$
48. If the relation R in the set of integers Z defined as $R = \{(a, b) : 2 \text{ divides } (a+b)\}$ is an equivalence relation, then
 (a) $[3] = \{\pm 1, \pm 3, \pm 5, \dots\}$ (b) $[3] = \{\pm 1, \pm 2, \pm 3, \dots\}$
 (c) $[3] = \{0, \pm 1, \pm 3, \pm 5, \dots\}$ (d) $[3] = \{0, \pm 1, \pm 2, \pm 3, \dots\}$
49. $\int_{-1}^1 (2^x - 2^{-x})(3^x + 3^{-x}) dx =$
 (a) -1 (b) 1 (c) 2 (d) None of these

50. The solution of D.E., $\frac{dy}{dx} = e^{x+y} - 1$ is

(a) $e^{x+y}(x+C) - 1 = 0$

(b) $e^{-x-y}(x+C) - 1 = 0$

(c) $e^{-x-y}(x+C) + 1 = 0$

(d) $e^{x+y}(x+C) + 1 = 0$

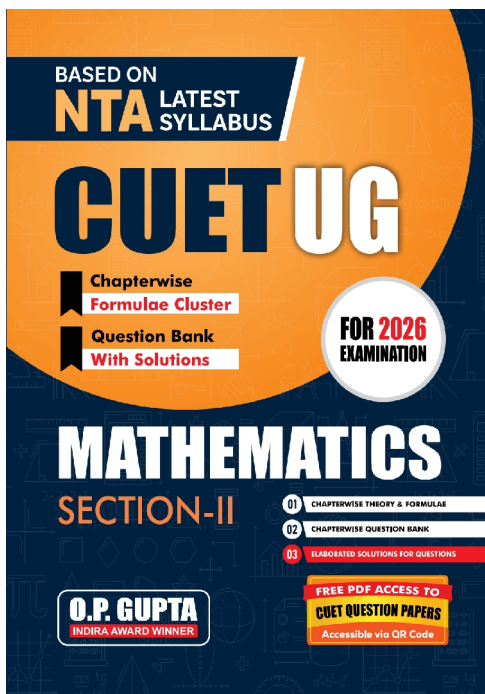
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| 15. (c) | 16. (b) | 17. (c) | 18. (b) | 19. (c) | 20. (a) | 21. (b) |
| 22. (d) | 23. (b) | 24. (c) | 25. (a) | 26. (a) | 27. (b) | 28. (c) |
| 29. (b) | 30. (d) | 31. (d) | 32. (b) | 33. (a) | 34. (c) | 35. (d) |
| 36. (a) | 37. (a) | 38. (c) | 39. (b) | 40. (a) | 41. (c) | 42. (b) |
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ABOUT THE AUTHOR

O.P. GUPTA having taught math passionately over a decade, has devoted himself to this subject. Every book, study material or practice sheets, tests he has written, tries to teach serious math in a way that allows the students to learn math without being afraid. Undoubtedly his mathematics books are best sellers on [amazon](#) and [Flipkart](#).

His resources have helped students and teachers for a long time across the country. He has contributed in CBSE Question Bank (issued in April 2021). Mr Gupta has been invited by many educational institutions for hosting sessions for the students of senior classes. Being qualified as an electronics & communications engineer, he has pursued his graduation later on with mathematics from University of Delhi due to his passion towards mathematics. He has been honored with the prestigious INDIRA AWARD by the Govt. of Delhi for excellence in education.

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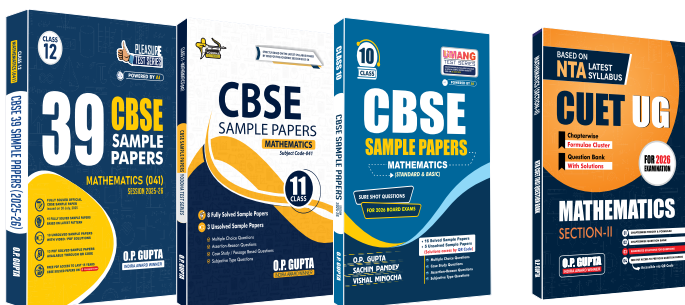
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