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SAMPLE PAPER-OOF

MATHEMATICS

*A Highly Simulated Practice Questions Paper for CBSE **Class XII** (Term I) Examination*

Instructions

*1. This question paper contains **three sections - A, B and C**. Each section is compulsory.*
*2. **Section - A** has 20 MCQs, attempt **any 16 out of 20**.*
*3. **Section - B** has 20 MCQs, attempt **any 16 out of 20**.*
*4. **Section - C** has 10 MCQs, attempt **any 8 out of 10**.*
5. There is no negative marking.
6. All questions carry equal marks.

Roll No. | | | | | | | |

Maximum Marks : 40
Time allowed : 90 min

Section A

In this section, attempt any 16 questions out of Questions 1-20. Each question is of 1 mark weightage.

1. The principal value of $\cot^{-1}(-1)$ is

(a) $\frac{\pi}{4}$ (b) $-\frac{\pi}{4}$ (c) $\frac{3\pi}{4}$ (d) None of these

2. If $A=\begin{bmatrix} 2 & -1 & 3 \\ -4 & 5 & 1 \end{bmatrix}$ and $B=\begin{bmatrix} 2 & 3 \\ 4 & -2 \\ 1 & 5 \end{bmatrix}$, then

(a) only AB is defined (b) only BA is defined
(c) AB and BA both are defined (d) AB and BA both are not defined

3. If $\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}=\theta$, then the value of x is

(a) $\cot^{-1}\theta$ (b) $2\cot^{-1}\theta$ (c) $\sin^{-1}\theta$ (d) $\cos^{-1}\theta$

4. If product of rows and colums of matrix is 8, then number of possible different ordered matrices are

(a) 4 (b) 3 (c) 1 (d) 2

5. The interval of increase of the function $f(x)=x-e^x+\tan\left(\frac{2\pi}{7}\right)$ is

(a) $(-\infty, 0)$ (b) $(0, \infty)$ (c) $(1, \infty)$ (d) $(-\infty, 1)$

6. If $A=\begin{bmatrix}2 & 3\\ 1 & 2\end{bmatrix}$, $B=\begin{bmatrix}1 & 3 & 2\\ 4 & 3 & 1\end{bmatrix}$, $C=\begin{bmatrix}1\\ 2\end{bmatrix}$ and $D=\begin{bmatrix}4 & 6 & 8\\ 5 & 7 & 9\end{bmatrix}$, then which of the following is defined?

(a) $A+B$ (b) $B+C$ (c) $C+D$ (d) $B+D$

7. If $y=\dfrac{\sin x}{1+\sin x}$, then $\dfrac{dy}{dx}$ at $x=\dfrac{\pi}{2}$ is equal to

(a) 1 (b) 0 (c) 2 (d) 3

8. If $\begin{vmatrix}x & 2\\ 18 & x\end{vmatrix}=\begin{vmatrix}6 & 2\\ 18 & 6\end{vmatrix}$, then x is equal to

(a) 6 (b) ± 6 (c) -6 (d) 0

9. If $f(x)=\begin{cases}\dfrac{\sin 4x}{2x}+\cos 2x, & x\neq 0\\ \alpha, & x=0\end{cases}$ is continuous at $x=0$, then the value of α is

(a) 1 (b) 4 (c) 3 (d) -1

10. If $f(x)=\dfrac{1-\cos x}{x^2}$ is continuous at $x=0$, then $f(0)$ is equal to

(a) 1 (b) $\dfrac{1}{2}$ (c) $\dfrac{3}{2}$ (d) 4

11. If $y=\sin^3 2x$, then $\dfrac{dy}{dx}$ at $x=\dfrac{\pi}{2}$ is equal to

(a) 0 (b) 1 (c) -1 (d) 3

12. If the area of a ΔABC, with vertices $A(1, 3)$, $B(0, 0)$ and $C(k, 0)$ is 3 sq units, then the value of $\dfrac{k}{2}$ is

(a) ± 2 (b) ± 1 (c) 4 (d) 5

13. The value of $\tan^{-1}\left[2\sin\left(2\cos^{-1}\dfrac{\sqrt{3}}{2}\right)\right]$ is

(a) $\dfrac{\pi}{3}$ (b) $\dfrac{2\pi}{3}$ (c) $\dfrac{-\pi}{3}$ (d) $\dfrac{\pi}{6}$

14. The value of $\cos^{-1}\left[\cos\left(\dfrac{13\pi}{6}\right)\right]$ is

(a) $\dfrac{13\pi}{6}$ (b) $\dfrac{\pi}{6}$ (c) $\dfrac{\pi}{3}$ (d) $\dfrac{2\pi}{3}$

15. The minor of a_{32} of the matrix $\begin{bmatrix}1 & 6 & 1\\ 5 & 3 & 0\\ 2 & 2 & 9\end{bmatrix}$ is

(a) 5 (b) -5 (c) 7 (d) 8

16. If the points $(2, -3)$,$(k, -1)$ and $(0, 4)$ are collinear, then the value of k is

(a) $\dfrac{10}{7}$ (b) $\dfrac{7}{140}$ (c) 47 (d) $\dfrac{40}{7}$

17. If $y=(1+x^{1/6})(1+x^{1/3})(1-x^{1/6})$, then $\frac{dy}{dx}$ at $x=1$ is equal to

(a) $\frac{2}{3}$ (b) $-\frac{2}{3}$ (c) 3 (d) $\frac{-4}{3}$

18. The conditions $x \geq 0$, $y \geq 0$ are called

(a) restrictions only (b) negative restrictions
(c) non-negative restrictions (d) None of these

19. The sum of minor of 6 and cofactor of 4 respectively in the determinant $\Delta = \begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix}$ is

(a) 0 (b) 1 (c) -1 (d) 4

20. Let S be any set and $P(S)$ be its power set. We define a relation R on $P(S)$ by ${}_A R_B$ which mean $A \subseteq B \; \forall A, B \in P(S)$. Then, R is

(a) equivalence relation
(b) only reflexive and transitive
(c) only reflexive and symmetric
(d) None of the above

Section B

In this section, attempt any 16 questions out of Questions 21-40. Each question is of 1 mark weightage.

21. $f: N \to N$ where $f(x) = \begin{cases} x+1, & \text{if } x \text{ is odd} \\ x-1, & \text{if } x \text{ is even} \end{cases}$, then f is

(a) one-one and into (b) many-one and into
(c) one-one and onto (d) many-one and onto

22. If $y = \log x^x$, then the value of $\frac{dy}{dx}$ is

(a) $x^x (1+\log x)$ (b) $\log(ex)$ (c) $\log \frac{e}{x}$ (d) $\log\left(\frac{x}{e}\right)$

23. If $y = \sqrt{\sin x + y}$, then $\frac{dy}{dx}$ is equal to

(a) $\frac{\cos x}{2y-1}$ (b) $\frac{\cos x}{1-2y}$ (c) $\frac{\sin x}{1-2y}$ (d) $\frac{\sin x}{2y-1}$

24. 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) None of these

25. If $A = \begin{vmatrix} 2 & \lambda & -3 \\ 0 & 2 & 5 \\ 1 & 1 & 3 \end{vmatrix}$, then A^{-1} exists, if

(a) $\lambda = 2$ (b) $\lambda \neq 2$ (c) $\lambda \neq -2$ (d) None of these

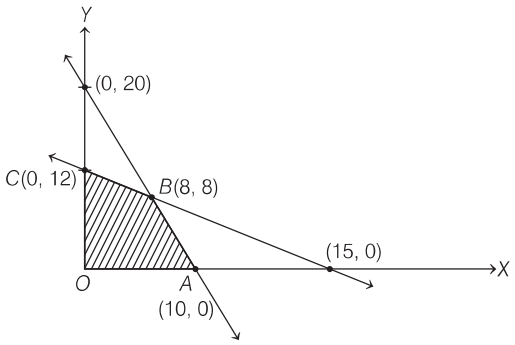
26. If $x = a \sec\theta$ and $y = a \cot\theta$, then $\frac{dy}{dx}$ at $\theta = \frac{\pi}{4}$ is equal to

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

27. Total number of possible matrices of order 3×3 with each entry 2 or 0 is
(a) 9 (b) 27 (c) 81 (d) 512

28. If A and B are square matrices of the same order and $AB = 3I$, then A^{-1} is equal to
(a) $3B$ (b) $\frac{1}{3}B$ (c) $3B^{-1}$ (d) $\frac{1}{3}B^{-1}$

29. The maximum value of $Z = 2x + 4y$, if the feasible region for an LPP is as shown below, is



(a) 56 (b) 50 (c) 36 (d) 55

30. The curve $y = x^{1/5}$ has at (0, 0)
(a) a vertical tangent (parallel to Y-axis) (b) a horizontal tangent (parallel to X-axis)
(c) an oblique tangent (d) no tangent

31. The area of the triangle whose vertices (–2, 6), (3, – 6) and (1, 5) is
(a) 30 sq units (b) 35 sq units
(c) 40 sq units (d) 15.5 sq units

32. 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) $x = \frac{-1}{3}$ and $y = 7$ (b) not possible to find
(c) $y = 7$ and $x = \frac{-2}{3}$ (d) $x = \frac{-1}{3}$ and $y = \frac{-2}{3}$

33. If $y = \cos^{-1} x$, then the value of $\frac{d^2y}{dx^2}$ in terms of y alone is
(a) $-\cot y \operatorname{cosec}^2 y$ (b) $\operatorname{cosec} y \cot^2 y$
(c) $-\cot y \operatorname{cosec} y$ (d) None of these

34. The interval in which the function $f(x) = 2x^3 + 9x^2 + 12x - 1$ is decreasing, is
(a) $[-1, \infty)$ (b) $[-2, -1]$ (c) $(-\infty, -2]$ (d) $[-1, 1]$

35. Let R be the relation on the set R of real numbers defined by $R = \{(a, b) | 1 + ab > 0\}$. Then, R is
(a) reflexive, symmetric but not transitive (b) reflexive, transitive but not symmetric
(c) transitive but not symmetric and reflexive (d) an equivalence relation

36. If f is a function from the set of natural numbers to the set of even natural numbers given by $f(x) = 2x$. Then, f is
(a) one-one but not onto
(b) onto but not one-one
(c) Both one-one and onto
(d) Neither one-one nor onto

37. Corner points of the feasible region for an LPP are (0, 5), (6, 0), (6, 8), (0,2), (3, 0). Let $Z = 2x + 3y$ be the objective function. The minimum value of Z occurs at
(a) only (0, 2)
(b) only (3, 0)
(c) the mid-point of the line segment joining the points (0, 2) and (3, 0)
(d) any point on the line joining the points (0, 2) and (3, 0)

38. If $y + \sin y = \cos x$, then $\frac{dy}{dx}$ is equal to
(a) $-\frac{\sin x}{1+\cos y}, y = (2n+1)\pi$ (b) $\frac{\sin x}{1+\cos y}, y \neq (2n+1)\pi$
(c) $-\frac{\sin x}{1+\cos y}, y \neq (2n+1)\pi$ (d) None of these

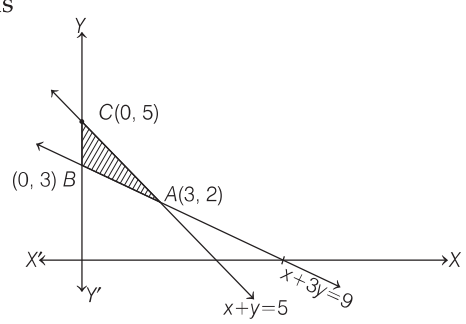
39. If $y = 1 + \cos^2(x^2)$, then $\frac{dy}{dx}$ at $x = \frac{\sqrt{\pi}}{2}$ is equal to
(a) π (b) $-\pi$ (c) $\sqrt{\pi}$ (d) $-\sqrt{\pi}$

40. If $A = \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$, such that $A + A' = I$, then the value of α is
(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$ (c) π (d) $\frac{3\pi}{2}$

Section C

In this section, attempt any 8 questions. Each question is of 1 mark weightage. Questions 46-50 are based on Case-Study.

41. The feasible region for an LPP is shown in the following figure. Then, the minimum value of $Z = 11x + 7y$ is



(a) 21 (b) 47 (c) 20 (d) 31

42. The tangent to the curve $y = e^{2x}$ at the point (0, 1) meets X-axis at
(a) (0, 1) (b) $\left(-\frac{1}{2}, 0\right)$ (c) (2, 0) (d) (0, 2)

43. The function $f(x) = 4\sin^3 x - 6\sin^2 x + 12\sin x + 100$ is strictly

(a) increasing in $\left(\pi, \frac{3\pi}{2}\right)$ (b) decreasing in $\left(\frac{\pi}{2}, \pi\right)$

(c) decreasing in $\left[\frac{-\pi}{2}, \frac{\pi}{2}\right]$ (d) decreasing in $\left[0, \frac{\pi}{2}\right]$

44. The function $f : R \to R$ defined by $f(x) = 4^x + 4^{|x|}$ is

(a) one-one and into (b) many-one and into

(c) one-one and onto (d) many-one and onto

45. An optimisation problem may involve finding

(a) maximum profit (b) minimum cost

(c) minimum use of resources (d) All of these

CASE STUDY

$P(x) = -6x^2 + 120x + 25000$ (in ₹) is the total profit function of a company where x denotes the production of the company.

Based on the above information, answer the following questions.

46. When the profit is maximum, production will be

(a) 8 (b) –8 (c) 10 (d) –10

47. The interval in which the profit is strictly increasing in

(a) (0, 10) (b) (0, 12) (c) (10, ∞) (d) (12, ∞)

48. The maximum profit is

(a) ₹ 25450 (b) ₹ 25500 (c) ₹ 25550 (d) ₹ 25600

49. Value of $P'(5)$ is

(a) 40 (b) 60 (c) 80 (d) 100

50. When the production is 3 units, the profit of the company will be

(a) ₹ 25106 (b) ₹ 25206 (c) ₹ 25306 (d) ₹ 24306