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SAMPLE PAPER- OOE

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. If A is a 3×2 matrix, B is a 3×3 matrix and C is a 2×3 matrix, then the elements in A, B and C are respectively

(a) 6, 9, 8 (b) 6, 9, 6 (c) 9, 6, 6 (d) 6, 6, 9

2. If $x = a\sin\theta$ and $y = a\cos^2\theta$, then $\frac{dy}{dx}$ is equal to

(a) $-2\cos\theta$ (b) $2\cos\theta$ (c) $2\sin\theta$ (d) $-2\sin\theta$

3. The value of $\cos\left(\sin^{-1}\frac{1}{\sqrt{2}} + \cos^{-1}\frac{1}{\sqrt{2}}\right)$ is

(a) 0 (b) 1 (c) -1 (d) None of these

4. The principal value of $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$ is

(a) $-\frac{2\pi}{3}$ (b) $-\frac{\pi}{3}$ (c) $\frac{4\pi}{3}$ (d) $\frac{5\pi}{3}$

5. If $A = \begin{bmatrix}1 & -1\\ 0 & 4\end{bmatrix}$, then A^2 is

(a) $\begin{bmatrix}1 & 5\\ 0 & 16\end{bmatrix}$ (b) $\begin{bmatrix}1 & -5\\ 0 & 16\end{bmatrix}$ (c) $\begin{bmatrix}0 & 16\\ 1 & -5\end{bmatrix}$ (d) $\begin{bmatrix}-5 & 1\\ 16 & 0\end{bmatrix}$

6. The product $\begin{bmatrix} a & b \\ -b & a \end{bmatrix}\begin{bmatrix} a & -b \\ b & a \end{bmatrix}$ is equal to

(a) $\begin{bmatrix} a^2+b^2 & 0 \\ 0 & a^2+b^2 \end{bmatrix}$ (b) $\begin{bmatrix} (a+b)^2 & 0 \\ (a+b)^2 & 0 \end{bmatrix}$

(c) $\begin{bmatrix} a^2+b^2 & 0 \\ a^2+b^2 & 0 \end{bmatrix}$ (d) $\begin{bmatrix} a & 0 \\ 0 & b \end{bmatrix}$

7. If $A=\begin{bmatrix} 2 & 3 \\ -4 & -6 \end{bmatrix}$, then which of the following is true?

(a) $A(\text{adj } A) \neq |A|\, I$ (b) $A(\text{adj } A) \neq (\text{adj } A)\, A$

(c) $A(\text{adj } A) = (\text{adj } A)\, A = |A|\, I$ (d) None of these

8. If $\sqrt{x}+\sqrt{y}=1$, then $\frac{dy}{dx}$ at (5, 5) is equal to

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

9. If $M_{11}=-40$, $M_{12}=-10$ and $M_{13}=35$ of the determinant $\Delta=\begin{vmatrix} 1 & 3 & -2 \\ 4 & -5 & 6 \\ 3 & 5 & 2 \end{vmatrix}$, then the value of Δ is

(a) -80 (b) 60 (c) 70 (d) 100

10. If $\Delta=\begin{vmatrix} 1 & a & bc \\ 1 & b & ca \\ 1 & c & ab \end{vmatrix}$, then the minor M_{31} is

(a) $-c(a^2-b^2)$ (b) $c(b^2-a^2)$ (c) $c(a^2+b^2)$ (d) $c(a^2-b^2)$

11. The matrix $P=\begin{bmatrix} 0 & 0 & 4 \\ 0 & 4 & 0 \\ 4 & 0 & 0 \end{bmatrix}$ is a

(a) square matrix (b) diagonal matrix

(c) unit matrix (d) None of these

12. If $y=(x^2+1)^2$, then $\frac{dy}{dx}$ at $x=\frac{1}{2}$ is equal to

(a) $\frac{5}{2}$ (b) 5 (c) $\frac{5}{4}$ (d) $\frac{2}{5}$

13. The equation of tangent to the curve $y=x^2+x-2$ at (1, 0) is given by

(a) $3x-y=3$ (b) $3x-y=-3$ (c) $x-3y=1$ (d) None of these

14. Which one of the following statements is correct?

(a) e^x is an increasing function

(b) e^x is a decreasing function

(c) e^x is neither an increasing nor a decreasing function

(d) e^x is a constant function

15. If $\sin^{-1} x = y$, then

(a) $0 \le y \le x$ (b) $\frac{-\pi}{2} \le y \le \frac{\pi}{2}$ (c) $0 < y < \pi$ (d) $\frac{-\pi}{2} < y < \frac{\pi}{2}$

16. If $A=\begin{bmatrix}2(x+1) & 2x\\ x & x-2\end{bmatrix}$ is a singular matrix, then $\frac{x}{2}$ is equal to

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

17. If $A=\begin{bmatrix}1 & 2\\ 3 & 1\end{bmatrix}$ and $B=\begin{bmatrix}x+1 & 4\\ 6 & y\end{bmatrix}$, then the value of $y-x$, if $A^2=B$ is

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

18. If A is an invertible matrix of order 2, then det (A^{-1}) is equal to

(a) det (A) (b) $\frac{1}{\det(A)}$ (c) 1 (d) zero

19. If $2X+\begin{bmatrix}2 & 1\\ 3 & 5\end{bmatrix}=\begin{bmatrix}4 & 7\\ 1 & 1\end{bmatrix}$, then X is equal to

(a) $\begin{bmatrix}1 & 3\\ -1 & -2\end{bmatrix}$ (b) $\begin{bmatrix}1 & 3\\ 1 & 2\end{bmatrix}$ (c) $\begin{bmatrix}1 & -1\\ 3 & -2\end{bmatrix}$ (d) $\begin{bmatrix}1 & 3\\ -1 & 2\end{bmatrix}$

20. The greatest integer function $f:R\to R$, given by $f(x)=[x]$ is

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

Section B

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

21. If the curve $ay+x^2=7$ and $x^3=y$, cut orthogonally at (1, 1), then the value of a is

(a) 1 (b) 0 (c) -6 (d) 6

22. If $y=\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, then $\frac{dy}{dx}$ at $x=1$ is equal to

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

23. If $f(x)=|\sin x|$, then

(a) f is everywhere differentiable
(b) f is everywhere continuous but not differentiable at $x=n\pi$, $n\in Z$
(c) f is everywhere continuous but not differentiable at $x=(2n+1)\frac{\pi}{2}$, $n\in Z$
(d) None of the above

24. The function $f(x)=\begin{cases}\frac{k\cos x}{\pi-2x}, & \text{if } x\neq\frac{\pi}{2}\\ 3, & \text{if } x=\frac{\pi}{2}\end{cases}$ is continuous at $x=\frac{\pi}{2}$, when k equals

(a) -6 (b) 6 (c) 5 (d) -5

25. If $y=x^x$, then $\frac{dy}{dx}$ is equal to

(a) $x^x(1+\log x)$ (b) $x^x(1-\log x)$
(c) $x(1+\log x)$ (d) None of these

26. The maximum value of $\frac{(\log x)}{x}$ is

(a) 1 (b) $\frac{2}{e}$ (c) e (d) $\frac{1}{e}$

27. If $y = x(x-3)^2$ decreases for the values of x given by

(a) $1 < x < 3$ (b) $x < 0$ (c) $x > 0$ (d) $0 < x < \frac{3}{2}$

28. The relation R in the set of natural numbers N defined as $R = \{(x, y) : y = x + 5 \text{ and } x < 4\}$ is

(a) reflexive (b) symmetric (c) transitive (d) None of these

29. The maximum value of the function $f(x) = x^3 + 2x^2 - 4x + 6$ exists at

(a) $x = -2$ (b) $x = 1$ (c) $x = 2$ (d) $x = -1$

30. Area of the triangle whose vertices are $(a, b + c)$, $(b, c + a)$ and $(c, a + b)$, is

(a) 2 sq units (b) 3 sq units (c) 0 (d) None of these

31. The set of all 2×2 matrices which is commutative with the matrix $\begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}$ with respect to matrix multiplication is

(a) $\begin{bmatrix} p & q \\ r & r \end{bmatrix}$ (b) $\begin{bmatrix} p & q \\ q & r \end{bmatrix}$ (c) $\begin{bmatrix} p-q & p \\ q & r \end{bmatrix}$ (d) $\begin{bmatrix} p & q \\ q & p-q \end{bmatrix}$

32. The value of $\tan^{-1}\left(\frac{-1}{\sqrt{3}}\right) + \cot^{-1}\left(\frac{1}{\sqrt{3}}\right) + \tan^{-1}\left(\sin\left(-\frac{\pi}{2}\right)\right)$ is

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{12}$
(c) $-\frac{\pi}{12}$ (d) $\frac{\pi}{3}$

33. If $A = \begin{bmatrix} 1 & 1 \\ 0 & -1 \end{bmatrix}$ and $f(x) = 1 - x^2$, then $f(A)$ is

(a) $\begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ (c) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ (d) None of these

34. For the set $A = \{1, 2, 3\}$, define a relation R in the set A as follows

$R = \{(1, 1), (2, 2), (3, 3), (1, 3)\}$

Then, the ordered pair to be added to R to make it the smallest equivalence relation is

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

35. If $\Delta = \begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix}$, then the cofactor A_{31} is

(a) $-(hc + fg)$ (b) $hf - bg$ (c) $fg + hc$ (d) $hc - fg$

36. If $y = \log(\sin e^x)$, then $\frac{dy}{dx}$ is equal to

(a) $e^x \cot(e^x)$ (b) $-e^x \cot(e^x)$
(c) $e^x \tan(e^x)$ (d) None of these

37. The number of all one-one functions from set $A = \{1, 2, 3\}$ to itself is

(a) 2 (b) 6 (c) 3 (d) 1

38. If $y = \log_a x + \log_x a + \log_x x + \log_a a$, then $\frac{dy}{dx}$ is equal to

(a) $\frac{1}{x} + x \log a$ (b) $\frac{\log a}{x} + \frac{x}{\log a}$

(c) $\frac{1}{x \log a} + x \log a$ (d) None of these

39. If $y = ax^3 + bx^2 + cx + d$, then $\frac{d^2y}{dx^2}$ at $x = \frac{-b}{3a}$ is equal to

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

40. The differential coefficient of $\sin(\cos(x^2))$ w.r.t. x is.

(a) $-2x \sin x^2 \cos(\cos x^2)$ (b) $2x \sin(x^2) \cos(x^2)$

(c) $2x \sin(x^2) \cos(x^2) \cos x$ (d) None of these

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 function $f(x) = \frac{4 - x^2}{4x - x^3}$ is

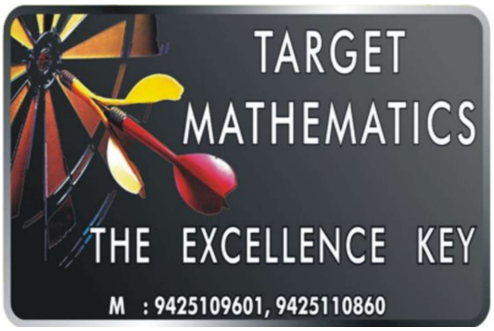
(a) discontinuous at only one point (b) discontinuous at exactly two points

(c) discontinuous at exactly three points (d) None of these

42. The equation of the tangent to the curve $x^2 - 2yx + y^2 + 2x + y - 6 = 0$ at (2, 2) is

(a) $2y + x = 6$ (b) $2x + y = 6$

(c) $x + y = 4$ (d) $x = y$



43. If $y^x = e^{y-x}$, then $\frac{dy}{dx}$ is equal to

(a) $\frac{1 + \log y}{y \log y}$ (b) $\frac{(1 + \log y)^2}{y \log y}$

(c) $\frac{1 + \log y}{(\log y)^2}$ (d) $\frac{(1 + \log y)^2}{\log y}$

44. If $y = Ae^{mx} + Be^{nx}$ and $\frac{d^2y}{dx^2} - (m + n)\frac{dy}{dx} + mny = k$, then k is equal to

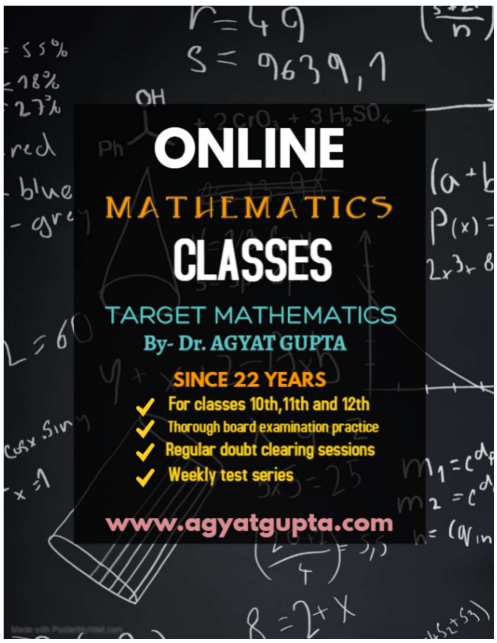
(a) 1 (b) 0

(c) -1 (d) None of these

45. If $\cos y = x \cos(a + y)$ with $\cos a \neq 1$, then $\frac{dy}{dx}$ is equal to

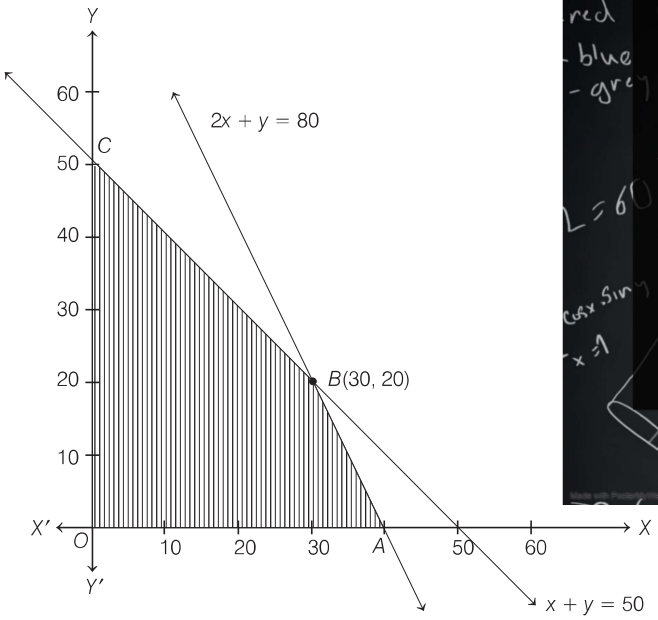
(a) $\frac{\sin^2(a + y)}{\sin a}$ (b) $\frac{\cos^2(a + y)}{\sin a}$

(c) $\sin^2(a + y) \sin a$ (d) None of these



CASE STUDY

If feasible solution of a LPP is given as follows:



And the objective function is $Z = 10500x + 9000y$.
Based on above information, answer the following question.

46. The feasible solution consists
(a) (10, 10) (b) (50, 10)
(c) (0, 55) (d) (30, 21)

47. Objective function is maximum at the point
(a) (0, 0) (b) (30, 20)
(c) A (d) C

48. Objective function has the value 420000 at
(a) point A (b) point B
(c) point C (d) point O

49. $Z|_{(20, 20)} - Z|_{(10, 10)}$ is
(a) 200000 (b) 195000
(c) 205000 (d) 190000

50. Sum of values of Z at all corner points is
(a) 1365000 (b) 1360000
(c) 1355000 (d) 1350000