MODERN VIDYA NIKETAN

SUBJECT: MATHEMATICS (CLASS : XII)
REVISION TEST

Time : 90 Min. **Dated : 20.11.2021** **Max. Marks : 40**

General Instructions:

1. ***This Question Paper contains three sections – A, B and C. Each part is compulsory.***
2. ***Section A has 20 MCQ's. Attempt any 16 out of 20.***
2. ***Section B has 20 MCQ's. Attempt any 16 out of 20.***
2. ***Section C has 10 MCQ's. Attempt any 8 out of 10.***
5. ***There is no negative marking.***
6. ***All questions carry equal marks.***

Section – A

1. If area of Δ with vertices $(\lambda,1),(1,-1)$ and $(2,1)$ is one square unit. Then λ can take value.

(a) 1 only (b) 3 only (c) 1 or 3 (d) None of these

2. A and B are square matrices of order 2 such that 2A + 3B is null matrix such that |A| = 9, then |B| is

(a) 4 (b) –4 (c) –6 (d) 6

3. If $\theta \in \left(0,\frac{\pi}{2}\right)$; for what value of θ the matrix $\begin{bmatrix} 1 & 2\sin x \\ 2\sin x & 3 \end{bmatrix}$ is singular?

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{2}$

4. Let A = $[a_{ij}]$ be a square matrix of order 3 × 3 and |A| = –5, then the value of $a_{11}A_{11}+a_{21}A_{21}+a_{31}A_{31}$ is {where a_{ij} is the cofactor of element a_{ij}}

(a) 5 (b) –5 (c) 0 (d) 25

5. Value of $\tan^{-1}\left(\frac{1}{\sqrt{3}}\right)-\sec^{-1}(-2)$ is

(a) $\frac{\pi}{2}$ (b) $\frac{-\pi}{2}$ (c) $\frac{5\pi}{6}$ (d) $-\pi$

6. Value of $\cos^{-1}\left(\cos\frac{9\pi}{8}\right)$ is

(a) $\frac{9\pi}{8}$ (b) $\frac{\pi}{8}$ (c) $\frac{-\pi}{8}$ (d) $\frac{7\pi}{8}$

7. Domain of $\sin^{-1}(3-2x)$ is

(a) [–1, 1] (b) (–1, 1) (c) [1, 2] (d) (1, 2)

8. If A and B are two sets such that n(A) = 3 and n(B) = k. If number of injective function from A to B is 120. Then the value of k is

(a) 4 (b) 5 (c) 6 (d) 7

9. Let $f : R \to R$ be defined as $f(x) = x^3 + 1$. Then pre–image of –7 is:

(a) –342 (b) 2 (c) –2 (d) None of these

10. $l_1 R l_2$ iff $l_1 \perp l_2$, where l_1 and l_2 are straight lines in a plane. Then R is:

(a) symmetric (b) reflexive (c) transitive (d) equivalence relation

11. If $f(x) = x \sin\left(\frac{1}{x}\right)$, if $x \neq 0$ and if f(x) is continuous at x = 0 then f(0) is

(a) 0 (b) 1 (c) 2 (d) Not defined

12. Differential co–efficient of $\operatorname{cosec}\left(\cot^{-1} x\right)$ is

(a) $\frac{x}{\sqrt{1+x^2}}$ (b) $\frac{x}{1+x^2}$ (c) $\frac{x}{2\sqrt{1+x^2}}$ (d) None of these

13. If $x^y = y^x$; then $\frac{dy}{dx}$ is

(a) $\frac{y(x\log y + y)}{x(y\log x + x)}$ (b) $\frac{y(x\log y - y)}{x(y\log x - x)}$ (c) $\frac{y}{x}$ (d) $\frac{-y}{x}$

14. If $f(x) = |x^2 - x|$ then $f'\left(\frac{1}{3}\right)$ is

(a) 0 (b) $\left(\frac{1}{3}\right)$ (c) $-\frac{1}{3}$ (d) Does not exists

15. If $y = a\sin\theta + b\cos\theta$; $x = b\sin\theta - a\cos\theta$ then $\frac{dy}{dx}$ is

(a) $\frac{x}{y}$ (b) $\frac{-x}{y}$ (c) $\frac{y}{x}$ (d) $\frac{-y}{x}$

16. If $y = \log\left[\tan\left(\frac{\pi}{4} + \frac{x}{2}\right)\right]$ then $\frac{dy}{dx}$ is

(a) sec x (b) cosec x (c) tan x (d) cot x

17. If $x^y = e^{x-y}$; then $\frac{dy}{dx}$ is

(a) $\frac{\log x}{1+\log x}$ (b) $\frac{-\log x}{(1+\log x)^2}$ (c) $\frac{\log x}{(1+\log x)^2}$ (d) None

18. angle of intersection between the curves $y = x^2 + x - 1$ and $y = \frac{1}{6}(7 - x^2)$ at (1, 1) is

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{2}$ (d) $\tan^{-1}\left(\frac{3}{4}\right)$

19. $f(x) = e^x \sin x$ is decreasing in the interval

(a) $\left(0, \frac{3\pi}{4}\right)$ (b) $\left(\frac{3\pi}{4}, \frac{7\pi}{4}\right)$ (c) $(0, \pi)$ (d) $\left(\frac{3\pi}{2}, 2\pi\right)$

20. Point on the curve $y = x^2 - x + 1$ where the tangent is parallel to line joining (2, –1) and (3, 2):

(a) (2, 3) (b) (3, 2) (c) (–2, 7) (d) None

Section – B

21. If objective function $z = ax + y$ is minimum at (4, 1) and minimum value is 13; then value of a is

(a) 3 (b) 1

(c) 2 (d) incomplete information's

22. In an L.P.P; if the objective function z = x – y and the corner points of its feasible region are (6, 0), (0, 1), (6, 6) and (0, 15). then the minimum value f z occurs at

(a) (6, 0) (b) (0, 1) (c) (6, 6) (d) (0, 15)

23. If objective function z = px + qy is maximum at (4, –2) and maximum value is 10 such that p = 3q then the value of p and q are respectively

(a) 3, 1 (b) 1, 3 (c) 2, 3 (d) None of these

24. Value of $\begin{bmatrix}1 & 2\end{bmatrix}\begin{bmatrix}2\\-1\end{bmatrix}+\begin{bmatrix}1 & -1 & 0\end{bmatrix}\begin{bmatrix}1\\5\\6\end{bmatrix} =$

(a) $[-4]$ (b) $[4]$ (c) $[6]$ (d) None of these

25. If $\begin{bmatrix}x+y & 4\\-5 & 3y\end{bmatrix}=\begin{bmatrix}3 & 4\\-5 & 6\end{bmatrix}$ then value of x is

(a) 1 (b) 2 (c) –1 (d) 3

26. A, B and C are square matrices of order 3 × 3 and if AB = 2C; |A| = 4, |C|=3 then |B| is

(a) $\frac{3}{2}$ (b) 3 (c) 6 (d) None of these

27. If ABC = D; then B is equal to

(a) $DA^{-1}C^{-1}$ (b) $A^{-1}DC^{-1}$ (c) $C^{-1}DA^{-1}$ (d) None of these

28. If system of equations $2x - y = 4$ and $\lambda x + 3y = 1$ has unique solution, then λ cannot be equal to

(a) 6 (b) 3 (c) –6 (d) 0

29. For what value of x; the matrix $\begin{bmatrix}x-1 & 7\\1 & x+5\end{bmatrix}$ is singular

(a) 2 only (b) –6 only (c) 2 or –6 (d) No value of x

30. If $A=\begin{bmatrix}1 & 1\\0 & 1\end{bmatrix}$ then A^{2021} is

(a) $\begin{bmatrix}2021 & 2021\\0 & 2021\end{bmatrix}$ (b) $\begin{bmatrix}2021 & 1\\0 & 2021\end{bmatrix}$

(c) $\begin{bmatrix}1 & 2021\\0 & 1\end{bmatrix}$ (d) None

31. If $f(x)=\begin{bmatrix}\cos x & -\sin x\\ \sin x & \cos x\end{bmatrix}$ then f(x). f(y) is

(a) f(xy) (b) f(x + y) (c) f(x) + f(y) (d) $\frac{f(x)}{f(y)}$

32. If $y=\tan^{-1}\left(\frac{2\sqrt{x}}{1-x}\right)$ then $\frac{dy}{dx}$ is

(a) $\frac{2}{1+x}$ (b) $\frac{2}{\sqrt{x}(1+x)}$

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

33. Simplified value of $\cot^{-1}\sqrt{\frac{1+\cos x}{1-\cos x}}$ where $x\in(\pi,2\pi)$

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

34. Principal value of $\cos^{-1}\left[\sin\left(\frac{127\pi}{4}\right)\right]$ is

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

35. A relation R in the set of natural number in given by $R=\{(a,b):a\le b^2\}$ is

(a) reflexive (b) symmetric

(c) transitive (d) none

36. If $A=\{1,2\}$ and $B=\{a,b,c\}$. Then number of onto functions from A to B is

(a) 3 (b) 0 (c) 9 (d) 8

37. Number of point on the curve $y=x^3-11x+5$ at what the tangent is $y=x-11$ is/are:

(a) Infinite (b) Only one point

(c) Exactly two point (d) No point

38. If $x-y+1=0$ is tangent to the curve $y=x^2-x+a$ then value of a is:

(a) 1 (b) 2 (c) –1 (d) –2

39. If $f(x)=\frac{x^2}{2}+ax+1$ is increasing in the interval [2, 4] then the least value of a is

(a) 2 (b) –2 (c) 4 (d) –4

40. Solution of x of normal to the curve defined parametrically as $y=\sec\theta; x=\tan\theta$ at $\theta=\frac{\pi}{4}$ is

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

Section – C

41. The point which does not lie in the half–plane $2x+3y-12\le 0$ is

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

42. The common region determined by all the linear constraints of a LPP is called ……. region

(a) Feasible (b) Triangular (c) Quadrilateral (d) None

43. Value of $\begin{vmatrix} \sin\frac{\pi}{18} & \sin\frac{4\pi}{9} \\ -\cos\frac{\pi}{18} & \cos\frac{4\pi}{9} \end{vmatrix}$ is:

(a) 0 (b) 1 (c) $\sin\frac{7\pi}{8}$ (d) $\cos\frac{7\pi}{18}$

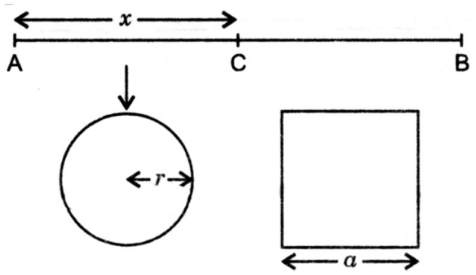
44. If A and B are square matrices such that ABA' is skew–symmetric then:

(a) B is symmetric (b) B is skew–symmetric

(c) B can be any matrix (d) B is null matrix

Case Study

A wire 50 meter long is out into two pieces. One of pieces is to be made into a circle and other into a square.



Length of the piece which is made into a circle is x metres.

The radius of the circle is 'r' metre and side of square is 'a' metre.

Based on the information given above, answer the following questions:

45. Absolute maximum value of $f(x)=x^2-2x+4$ in $[-3,2]$

(a) 19 (b) 4 (c) 3 (d) None

46. Relation between r and x is:

(a) $\pi r = x$ (b) $\pi r^2 = x$

(c) $2\pi r = x$ (d) None of these

47. Value of side of square 'a' in terms of x is:

(a) $a = 50 - x$ (b) $a = \frac{50-x}{4}$

(c) $a = \frac{50-x}{2}$ (d) None of these

48. Sum of areas of circle and square S(x) expressed as a function of x is:

(a) $S(x)=\frac{x^2}{4\pi}+\frac{(50-x)^2}{16}$ (b) $S(x)=\frac{x^2}{4\pi}+\frac{(50-x)^2}{4}$

(c) $S(x)=\frac{x^2}{4\pi}-\frac{(50-x)^2}{4}$ (d) None of these

49. Value of x for which S(x) is maximum, is: $\left(\text{Use } \pi=\frac{22}{7}\right)$

(a) x = 11 (b) x = 22 (c) x = 25 (d) x = 20

50. Length of the piece which is made into a square is:

(a) 39 m (b) 32 m (c) 28 m (d) None of these