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Time: 2 Hour Total Marks: 80

Class : XII

Subject : Mathematics

MCQ SINGLE CORRECT

1. If f (x) = |x-a| $\phi(x)$ where $\phi(x)$ is continuous function, then

   (a) $f'(a^+) = \phi(a)$

   (b) $f'(a^-) = \phi(a)$

   (c) $f'(a^+) = f'(a^-)$

   (d) none of these

2. Area of the region bounded by the curve $y^2 = 4x$, y axis and the line y = 3 is :

   (a) 2

   (b) $\frac{9}{4}$

   (c) $\frac{9}{3}$

   (d) $\frac{9}{2}$

3. If A and B are square matrices of order 2, then det (A + B) = 0 is possible only when

   (a) det (A) = 0 or det (B) = 0

   (b) det (A) + det (B) = 0

   (c) det (A) = 0 and det (B) = 0

   (d) A + B = 0

4. Let a, b, c be positive real numbers. The following system of equations in x, y and z $\frac{x^2}{a^2}+\frac{y^2}{b^2}-\frac{z^2}{c^2}=1, \frac{x^2}{a^2}-\frac{y^2}{b^2}+\frac{z^2}{c^2}=1, -\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$ has

   (a) no solution

   (b) unique solution

   (c) infinitely many solutions

   (d) finitely many solutions

All The Best!!!

5. The system of equation x + y + z = 2, 3x - y + 2z = 6 and 3x + y + z = - 18 has

(a) no solution

(b) an infinite number of solutions

(c) zero solution as the only solution

(d) a unique solution

TRUE/FALSE

6. If A, B and C are three independent events such that P(A) = P(B) = P(C) = p, then P (At least two of A, B, C occur) = $3p^2 - 2p^3$

(a) True

(b) False

7. If A and B′are independent events, then P(A' ∪ B) = 1 – P (A) P(B')

(a) True

(b) False

8. Two independent events are always mutually exclusive.

(a) True

(b) False

9. If A and B are independent events, then A and B are also independent.

(a) True

(b) False

10. Let P(A) > 0 and P(B) > 0. Then A and B can be both mutually exclusive and independent.

(a) True

(b) False

FILL IN THE BLANKS

11. In a LPP the linear inequalities or restrictions on the variables are called _____
12. If X follows binomial distribution with parameters n = 5, p and P (X = 2) = 9, P (X = 3), then p = _____
13. A corner point of a feasible region is a point in the region which is the ____ of two boundary lines.

14. If A and B are two events such that
P (A | B) = p, P (A) = p, P (B) = $\frac{1}{3}$ and $P(A \cup B)=\frac{5}{9}$, then p = _____

15. A plane passes through the points (2, 0, 0) (0, 3, 0) and (0, 0, 4). The equation of plane is _____

VERY SHORT DESC

16. 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)}.
Write the ordered pairs to be added to R to make it the smallest equivalence relation.
17. Let R be the equivalence relation in the set Z of integers given by R = {(a, b) : 2 divides a – b}.
Write the equivalence class [0].
18. Let the function f : R → R be defined by f (x) = 4x – 1, ∀ x ∈ R. Then, show that f is one-one.
19. If f = {(5, 2), (6, 3)} and g = {(2, 5), (3, 6)}, write the range of f and g.
20. Let f : R → R be the function defined by f (x) = 4x - 3 ∀ x ∈ R. Then write f^{-1}.

SHORT DESC - 25 WORDS

21. Evaluate the definite integrals
$\int_{\pi/6}^{\pi/4} \operatorname{cosec}\, x\, dx$

22. Evaluate the definite integrals
$\int_{0}^{\pi/4} (2\sec^2 x + x^3 + 2)\, dx$

23. Evaluate the definite integrals
$\int_{0}^{1} \frac{2x+3}{5x^2+1} dx$

24. Evaluate the definite integrals
$\int_{0}^{\pi} \left(\sin^2 \frac{x}{2} - \cos^2 \frac{x}{2} \right) dx$

25. Evaluate the definite integrals
$\int_{0}^{1} \left(x e^x + \sin \frac{\pi x}{4} \right) dx$

MED DESC - 50 WORDS

26. Find the equation of the plane with intercept 3 on the y-axis and parallel to ZOX plane.
27. Integrate the function :
$\frac{x+2}{\sqrt{4x-x^2}}$

28. Show that each of the given three vectors is a unit vector:
$\frac{1}{7}(2\hat{i}+3\hat{j}+6\hat{k})$, $\frac{1}{7}(3\hat{i}-6\hat{j}+2\hat{k})$, $\frac{1}{7}(6\hat{i}+2\hat{j}-3\hat{k})$
Also show that they are mutually perpendicular to each other.

29. Using differentiate, find the approximate value of the following upto 3 places of decimal.
$y = x^{\frac{1}{10}}$

30. Find the shortest distance between the lines whose vector equations are
$\vec{r} = (1-t)\hat{i} + (t-2)\hat{j} + (3-2t)\hat{k}$ and $\vec{r} = (5+1)\hat{i} + (25-1)\hat{j} - (25+1)\hat{k}$

LONG DESC - 100 WORDS

31. Find the vector and Cartesian equations of the plane passing through the points (2,5, - 3), (- 2, -3,5) and (5, 3, -3). Also, find the point of intersection of this plane with the line passing through points (3, 1, 5) and (–1, –3, –1).

32. Find the equation of the plane passing through the intersection of the planes $\vec{r}\cdot(\hat{i}+\hat{j}+\hat{k})=1$ and $\vec{r}\cdot(2\hat{i}+3\hat{j}-\hat{k})+4=0$ and parallel to x-axis. Hence, find the distance of the plane from x-axis.

33. If $A=\begin{bmatrix}1 & 1 & 1\\ 0 & 1 & 3\\ 1 & -2 & 1\end{bmatrix}$, find A^{-1}

Hence, solve the system of equations:

x + y + z = 6

y + 3z = 11 and x – 2y + z = 0

34. Find the inverse of the following matrix, using elementary transformations:

$A=\begin{bmatrix}2 & 3 & 1\\ 2 & 4 & 1\\ 3 & 7 & 2\end{bmatrix}$

35. Evaluate $\int_1^4 (1+x+e^{2x})\,dx$ as limit of sums.