Class 12 2026

Full Syllabus Minus Calculus – Test 1

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Maximum Marks:60 Duration: 2 hours

Section A

Questions 1 to 12 carry 1 mark each

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

   (A) $\begin{bmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$ (B) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$ (C) $\begin{bmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ (D) $\begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

2. If vector $\vec{a} = 3\hat{\imath} + 2\hat{\jmath} - \hat{k}$ and vector $\vec{b} = \hat{\imath} - \hat{\jmath} + \hat{k}$ then which of the following is correct?

   (A) $\vec{a} \parallel \vec{b}$ (B) $\vec{a} \perp \vec{b}$ (C) $|\overrightarrow{b}| > |\vec{a}|$ (D) $|\overrightarrow{a}| = |\vec{b}|$

3. If A is a square matrix of order 2 such that $\det(A) = 4$, then $\det(4\ adj(A))$ is equal to

   (A) 16 (B) 64 (C) 256 (D) 512

4. If E and F are two independent events such that $P(E) = \frac{2}{3}$, $P(F) = \frac{3}{7}$, then $P(E|\bar{F})$ is equal to

   (A) $\frac{1}{6}$ (B) $\frac{1}{2}$ (C) $\frac{2}{3}$ (D) $\frac{7}{9}$

5. Let $A = \begin{bmatrix} 1 & -2 & -1 \\ 0 & 4 & -1 \\ -3 & 2 & 1 \end{bmatrix}$, $B = \begin{bmatrix} -2 \\ -5 \\ -7 \end{bmatrix}$, $C = [9 \quad 8 \quad 7]$, which one of the following is defined?

   (A) Only AB (B) Only AC (C) Only BA

   (D) All AB, AC and BA

6. If $\vec{a} + \vec{b} + \vec{c} = \vec{0}$, $|\overrightarrow{a}| = \sqrt{37}$, $|\overrightarrow{b}| = 3$ and $|\overrightarrow{c}| = 4$, then angle between $\vec{b}$ and $\vec{c}$ is

   (A) $\frac{\pi}{6}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{2}$

7. If $A = \begin{bmatrix} 7 & 0 & x \\ 0 & 7 & 0 \\ 0 & 0 & y \end{bmatrix}$ is a scalar matrix, then y^x is equal to

   (A) 0 (B) 1 (C) 7 (D) ± 7

Solution to the test

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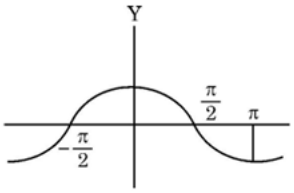
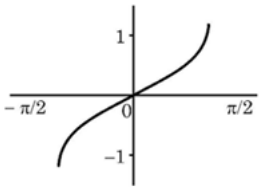
8. If A and B are invertible matrices, then which of the following is not correct?
   (A) $(A+B)^{-1} = B^{-1} + A^{-1}$ (B) $(AB)^{-1} = B^{-1}A^{-1}$
   (C) $adj(A) = |A|A^{-1}$ (D) $|A|^{-1} = |A^{-1}|$

9. The graph of a trigonometric function is as shown. Which of the following will represent graph of its inverse?



(A)


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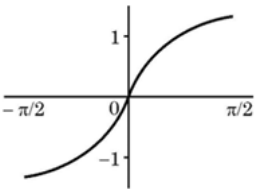

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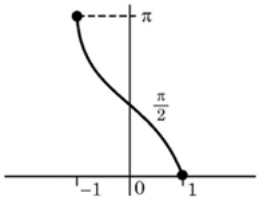
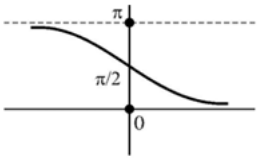


(D)


10. The projection vector of vector $\vec{a}$ on vector $\vec{b}$ is
    (A) $\left(\frac{\vec{a}.\vec{b}}{|\vec{b}|^2}\right)\vec{b}$ (B) $\frac{\vec{a}.\vec{b}}{|\vec{b}|}$ (C) $\frac{\vec{a}.\vec{b}}{|\vec{a}|}$ (D) $\left(\frac{\vec{a}.\vec{b}}{|\vec{a}|^2}\right)\vec{b}$

11. If a line makes angles of $\frac{3\pi}{4}$, $\frac{\pi}{3}$ and θ, with the positive directions of X, Y and Z axis respectively, then θ is
    (A) $\frac{-\pi}{3}$ *only* (B) $\frac{\pi}{3}$ *only* (C) $\frac{\pi}{6}$ (D) $\pm\frac{\pi}{3}$ *only*

12. Which of the following can be both a symmetric and skew-symmetric matrix?
    (A) Unit Matrix (B) Diagonal Matrix
    (C) Null Matrix (D) Row Matrix

Section B

Questions 13 to 16 carry 2 marks each

13. Evaluate $\tan^{-1}\left[2\sin\left(2\cos^{-1}\frac{\sqrt{3}}{2}\right)\right]$

14. The diagonals of a parallelogram are given by $\vec{a} = 2\hat{\imath} - \hat{\jmath} + \hat{k}$ and vector $\vec{b} = \hat{\imath} + 3\hat{\jmath} - \hat{k}$. Find the area of the parallelogram.
15. (A) Two friends while flying kites from different locations, find the strings of their kites crossing each other. The strings are represented by vectors $\vec{a} = 3\hat{\imath} + \hat{\jmath} + 2\hat{k}$ and vector $\vec{b} = 2\hat{\imath} - 2\hat{\jmath} + 4\hat{k}$. Determine the angle formed between the kite strings. Assume there is no slack in the strings.

OR

(B) If $\vec{a}$ and $\vec{b}$ are two non-collinear vectors, then find x, such that $\vec{\alpha} = (x-2)\vec{a} + \vec{b}$ and $\vec{\beta} = (3+2x)\vec{a} - 2\vec{b}$ are collinear.

Section C
Questions 17 to 20 carry 3 marks each

16. Solve the following linear programming problem graphically;
Maximize $Z = x + 2y$
Subject to constraints:
$x - y \geq 0$
$x + 2y \leq 6$
$x \geq 0, y \geq 0$
17. Find the distance between the lines given by $\vec{r} = (1-\lambda)\hat{\imath} + (\lambda - 2)\hat{\jmath} + (3 - 2\lambda)\hat{k}$ and $\vec{r} = (\mu + 1)\hat{\imath} + (2\mu - 1)\hat{\jmath} - (2\mu + 1)\hat{k}$.
18. (A) The probability distribution for the number of students being absent in a class on a Saturday is as follows:
Where X is the number of students absent.

X	0	2	4	5
P(X)	P	2p	3p	p

(i) Calculate p.
(ii) Calculate the mean of the number of absent students on Saturday

OR

(B) For the vacancy advertised in the newspaper, 3000 candidates submitted their applications. From the data it was revealed that two thirds of the total applicants were females and others were males. The selection for the job was done through a written test. The performance of the applicants indicates that the probility of a male getting a distinction in written test is 0.4 and that a female getting a distinction is 0.35. Find the probility that the candidate chosen at random will have a distinction in the written test.
19. Let R be a relation defined over $\boldsymbol{N}$, where $\boldsymbol{N}$ is set of natural numbers, defined as "$mRn\ if\ and\ only\ if\ m\ is\ a\ multiple\ of\ n, m, n \in \boldsymbol{N}$." Find whether R is reflexive, symmetric and transitive or not.

Section D

Questions 21 to 24 carry 5 marks each

20. (A) Find the image of the point A' of the point A(1, 6, 3) in the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$. Also, find the equation of the line joining A and A'.

OR

(B) Find a point P on the line $\frac{x+5}{1} = \frac{y+3}{4} = \frac{z-6}{-9}$ such that its distance from the point Q(2, 4, -1) is 7 units. Also, find the equation of the line joining P and Q.

21. (A) A school wants to allocate students into three clubs: Sports, Music and Drama, under following conditions:
    - The number of students in Sports club should be equal to the sum of the number of students in Music and Drama club.
    - The number of students in Music club should be 20 more than half the number of students in Sports club.
    - The total numbers of students to be allocated in all three clubs are 180.

Find the number of students allocated to different clubs, using matrix method.

OR

(B) Given $A = \begin{bmatrix} -4 & 4 & 4 \\ -7 & 1 & 3 \\ 5 & -3 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 & 1 \\ 1 & -2 & -2 \\ 2 & 1 & 3 \end{bmatrix}$, find AB. Hence solve the system of linear equations

$$x - y + z = 4$$
$$x - 2y - 2z = 9$$
$$2x + y + 3z = 1$$

22. If $A = R - \{3\}$ and $B = R - \{1\}$, Consider the function $f: A \to B$ defined by $f(x) = \frac{x-2}{x-3}$ for all $x \in A$. Then show that f is bijective and Find $f^{-1}(x)$.

23. Show that the points with position vectors $2\hat{\imath}, -\hat{\imath} - 4\hat{\jmath}$ and $-\hat{\imath} + 4\hat{\jmath}$ form an isosceles triangle also find the area of the triangle.

Section E

Questions 25 to 26 carry 4 marks each

24. A class-room teacher is keen to assess the learning of her students the concept of "relations" taught to them. She writes the following five relations each defined on the set $A = \{1, 2, 3\}$:

- $R_1 = \{(2,3),(3,2)\}$
- $R_2 = \{(1,2),(1,3),(3,2)\}$
- $R_3 = \{(1,2),(2,1),(1,1)\}$
- $R_4 = \{(1,1),(1,2),(3,3),(2,2)\}$
- $R_5 = \{(1,1),(1,2),(3,3),(2,2),(2,1),(2,3),(3,2)\}$

The students are asked to answer the following questions above relations:
(i) Identify the relation which is reflexive, transitive but not symmetric.
(ii) Identify the relation which is reflexive and symmetric but not transitive.
(iii) (a) Identify the relations which are symmetric but neither reflexive nor transitive.

OR

(iii) What pairs should be added to the relation R_2 to make it an equivalence relation?

25. A bank offers loan to its customers on different types of interest namely, fixed rate, floating rate and variable rate. From the past data with the bank, it is known that a customer avails loan on fixed rate, floating rate or variable rate with probabilities 10%, 20% and 70% respectively. A customer after availing loan can pay the loan or default on loan repayment. The bank data suggests that the probability that a person defaults on loan after availing it at fixed rate, floating rate and variable rate is 5%, 3% and 1% respectively.

    Based on the above information, answer the following:
    (i) What is the probability that a customer after availing the loan will default on the loan repayment?
    (ii) A customer after availing the loan, defaults on loan repayment. What is the probability that he availed the loan at a variable rate of interest?