MATHEMATICS CLASS TEST # 01

TIME: 1HR **MM: 120**

This paper contains 30 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct. **MARKING: (+4, –1, 0)**

SECTION –A

Q.1 If the lines $\frac{x-1}{-3} = \frac{y-2}{2k} = \frac{z-3}{2}$ and $\frac{x-1}{3k} = \frac{y-5}{1} = \frac{z-6}{-5}$ are perpendicular to each other then k = **[AIEEE 2002]**

(A) $\frac{5}{7}$ (B) $\frac{7}{5}$ (C) $\frac{-7}{10}$ (D) $\frac{-10}{7}$

Q.2 The angle between the lines, whose direction ratios are 1, 1, 2 and $\sqrt{3}-1, -\sqrt{3}-1, 4$, is- **[AIEEE 2002]**

(A) 45° (B) 30° (C) 60° (D) 90°

Q.3 The acute angle between the planes $2x - y + z = 6$ and $x + y + 2z = 3$ is- **[AIEEE 2002]**

(A) 30° (B) 45° (C) 60° (D) 75°

Q.4 The lines $\frac{x-2}{1} = \frac{y-3}{1} = \frac{z-4}{-k}$ and $\frac{x-1}{k} = \frac{y-4}{2} = \frac{z-5}{1}$ are coplanar if- **[AIEEE 2003]**

(A) k = 3 or – 3 (B) k = 0 or – 1

(C) k = 1 or – 1 (D) k = 0 or – 3

Q.5 A tetrahedron has vertices at O (0, 0, 0), A (1, 2, 1), B (2, 1, 3) and C (–1, 1, 2). Then the angle between the faces OAB and ABC will be- **[AIEEE 2003]**

(A) 90° (B) $\cos^{-1}\left(\frac{19}{35}\right)$

(C) $\cos^{-1}\left(\frac{17}{31}\right)$ (D) 30°

Q.6 Two systems of rectangular axes have the same origin. If a plane makes intercepts a, b, c and a′, b′, c′ on the two systems of axes respectively, then **[AIEEE-2003]**

(A) $a^2 + b^2 + c^2 = a'^2 + b'^2 + c'^2$

(B) $\frac{1}{a}+\frac{1}{b}+\frac{1}{c} = \frac{1}{a'}+\frac{1}{b'}+\frac{1}{c'}$

(C) $\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2} = \frac{1}{a'^2}+\frac{1}{b'^2}+\frac{1}{c'^2}$

(D) $\frac{1}{a^2-a'^2} + \frac{1}{b^2-b'^2} + \frac{1}{c^2-c'^2} = 0$

Q.7 A line makes the same angle θ, with each of the x and z axis. If the angle β, which it makes with y-axis, is such that $\sin^2\beta = 3\sin^2\theta$, then $\cos^2\theta$ equals- **[AIEEE 2004]**

(A) 2/3 (B) 1/5

(C) 3/5 (D) 2/5

Q.8 Distance between two parallel planes $2x + y + 2z = 8$ and $4x + 2y + 4z + 5 = 0$ is **[AIEEE 2004]**

(A) 3/2 (B) 5/2 (C) 7/2 (D) 9/2

Q.9 A line with direction cosines proportional to 2, 1, 2 meets each of the lines $x = y + a = z$ and $x + a = 2y = 2z$. The coordinates of each of the points of intersection are given by- **[AIEEE 2004]**

(A) (3a, 3a, 3a), (a, a, a)

(B) (3a, 2a, 3a), (a, a, a)

(C) (3a, 2a, 3a), (a, a, 2a)

(D) (2a, 3a, 3a), (2a, a, a)

Q.10 If the straight lines $x = 1 + s$, $y = -3 - \lambda s$, $z = 1 + \lambda s$ and $x = \frac{t}{2}$, $y = 1 + t$, $z = 2 - t$, with parameters s and t respectively are coplanar then λ equals- **[AIEEE 2004]**

(A) – 2 (B) – 1

(C) – 1/2 (D) 0

Q.11 If the angle θ between the line $\frac{x+1}{1} = \frac{y-1}{2} = \frac{z-2}{2}$ and the plane $2x - y + \sqrt{\lambda}\, z + 4 = 0$ is such that $\sin\theta = \frac{1}{3}$ the value of λ is – **[AIEEE-2005]**

(A) $\frac{5}{3}$ (B) $\frac{-3}{5}$

(C) $\frac{3}{4}$ (D) $\frac{-4}{3}$

Q.12 The angle between the lines 2x = 3y = – z and 6x = – y = – 4z is- **[AIEEE-2005]**

(A) 0º (B) 90º (C) 45º (D) 30º

Q.13 The distance between the line $\vec{r} = 2\hat{i} - 2\hat{j} + 3\hat{k} + \lambda(\hat{i} - \hat{j} + 4\hat{k})$ and the plane $\vec{r}.(\hat{i} + 5\hat{j} + \hat{k}) = 5$ is **[AIEEE-2005]**

(A) $\frac{10}{9}$ (B) $\frac{10}{3\sqrt{3}}$ (C) $\frac{3}{10}$ (D) $\frac{10}{3}$

Q.14 The two lines x = ay + b, z = cy + d; and x = a′y + b′, z = c′y + d′are perpendicular to each other if – **[AIEEE-2006/AIEEE -2003]**

(A) aa′ + cc′ = 1 (B) $\frac{a}{a'} + \frac{c}{c'} = -1$

(C) $\frac{a}{a'} + \frac{c}{c'} = 1$ (D) aa′+ cc′= – 1

Q.15 The image of the point (–1, 3, 4) in the plane x – 2y = 0 is – **[AIEEE 2006]**

(A) (15, 11, 4) (B) $\left(-\frac{17}{3}, -\frac{19}{3}, 1\right)$

(C) (8, 4, 4) (D) None of these

Q.16 Let L be the line of intersection of the planes 2x + 3y + z = 1 and x + 3y + 2z = 2. If L makes an angle α with the positive x-axis, then cos α equals- **[AIEEE 2007]**

(A) $1/\sqrt{3}$ (B) 1/2

(C) 1 (D) $1/\sqrt{2}$

Q.17 If a line makes an angle of π/4 with the positive directions of each of x-axis and y-axis, then the angle that the line makes with the positive direction of the z-axis is- **[AIEEE-2007]**

(A) π/6 (B) π/3

(C) π/4 (D) π/2

Q.18 If the straight lines $\frac{x-1}{k} = \frac{y-2}{2} = \frac{z-3}{3}$ and $\frac{x-2}{3} = \frac{y-3}{k} = \frac{z-1}{2}$ intersect at a point, then the integer k is equal to- **[AIEEE-2008]**

(A) 5 (B) 2

(C) –2 (D) –5

Q.19 The line passing through the points (5, 1, a) and (3, b, 1) crosses the yz-plane at the point $\left(0, \frac{17}{2}, \frac{-13}{2}\right)$. Then **[AIEEE-2008]**

(A) a = 4, b = 6 (B) a = 6, b = 4

(C) a = 8, b = 2 (D) a = 2, b = 8

Q.20 Let the line $\frac{x-2}{3} = \frac{y-1}{-5} = \frac{z+2}{2}$ lie in the plane x + 3y – αz + β = 0, then (α, β) equals : **[AIEEE-2009]**

(A) (–6, 7) (B) (5, –15)

(C) (–5, 5) (D) (6, –17)

Q.21 The projections of a vector on the three coordinate axis are 6, –3, 2 respectively. The direction cosines of the vector are : **[AIEEE-2009]**

(A) $\frac{6}{5}, \frac{-3}{5}, \frac{2}{5}$ (B) $\frac{6}{7}, \frac{-3}{7}, \frac{2}{7}$

(C) $\frac{-6}{7}, \frac{-3}{7}, \frac{2}{7}$ (D) 6, –3, 2

Q.22 A line AB in three dimensional space makes angles 45° and 120° with the positive x – axis and the positive y – axis respectively. If AB makes an acute angle θ with the positive z – axis, then θ equals - **[AIEEE-2010]**

(A) 30° (B) 45°

() 60° (D) 75°

Q.23 **Statement – 1 :** The point A(3, 1, 6) is the mirror image of the point B(1, 3, 4) in the plane x – y + z = 5.

Statement – 2 : The plane x – y + z = 5 bisects the line segment joining A(3, 1, 6) and B(1, 3, 4).

[AIEEE-2010]

(A) Statement -1 is true, Statement -2 is true; Statement -2 is a correct explanation for Statement -1

(B) Statement -1 is true, Statement -2 is true; Statement -2 is ***not*** a correct explanation for Statement -1.

(C) Statement -1 is true, Statement -2 is false.

(D) Statement -1 is false, Statement -2 is ture.

Q.24 **Statement – 1 :**

The point A(1, 0, 7) is the mirror image of the point B (1, 6, 3) in the line :

$\frac{x}{1}=\frac{y-1}{2}=\frac{z-2}{3}$.

Statement – 2 :

The line : $\frac{x}{1}=\frac{y-1}{2}=\frac{z-2}{3}$ bisects the line segment joining A(1, 0, 7) and B(1, 6, 3).

[AIEEE-2011]

(A) Statement -1 is true, Statement -2 is true; Statement -2 is a correct explanation for Statement -1

(B) Statement -1 is true, Statement -2 is true; Statement -2 is ***not*** a correct explanation for Statement -1.

(C) Statement -1 is true, Statement -2 is false.

(D) Statement -1 is false, Statement -2 is true.

Q.25 If the angle between the line $x=\frac{y-1}{2}=\frac{z-3}{\lambda}$ and the plane x + 2y + 3z = 4 is $\cos^{-1}\left(\sqrt{\frac{5}{14}}\right)$, then λ equals - **[AIEEE-2011]**

(A) 2/3 (B) 3/2

(C) 2/5 (D) 5/2

SECTION-B

Q.1 If line $\frac{x-4}{1}=\frac{y-2}{1}=\frac{z-k}{2}$ lies in the plane 2x – 4y + z = 7 then the value of k = ? **[IIT Scr.2003]**

(A) k = –1 (B) k = 7

(C) k = –7 (D) no value of k

Q.2 Two lines $\frac{x-1}{2}=\frac{y+1}{3}=\frac{z-1}{4}$ and $\frac{x-3}{1}=\frac{y-k}{2}=\frac{z}{1}$ intersect at a point then k is- **[IIT Scr.2004]**

(A) 3/2 (B) 9/2

(C) 2/9 (D) 2

Q.3 A plane at a unit distance from origins cuts at three axes at P, Q, R points. Δ PQR has centroid at (x, y, z) point & satisfy to $\frac{1}{x^2}+\frac{1}{y^2}+\frac{1}{z^2}=k$, then k = **[IIT Scr.2005]**

(A) 9 (B) 1

(C) 3 (D) 4

Q.4 A plane passes through (1, –2, 1) and is perpendicular to two planes 2x – 2y + z = 0 and x – y + 2z = 4. The distance of the plane from point (1, 2, 2) is- **[IIT-2006]**

(A) $2\sqrt{2}$ (B) 0

(C) 1 (D) $\sqrt{2}$

Q.5 A line perpendicular to x + 2y + 2z = 0 and passes through (0, 1, 0) then the perpendicular distance of this line from the origin is- **[IIT-2007]**

(A) $\frac{\sqrt{5}}{3}$ (B) $\frac{\sqrt{3}}{2}$

(C) $\frac{-\sqrt{3}}{2}$ (D) None of these

Q.6 Consider the planes $3x - 6y - 2z = 15$
and $2x + y - 2z = 5$

STATEMENT–1 : The parametric equations of the line of intersection of the given planes are $x = 3 + 14t$, $y = 1 + 2t$, $z = 15t$.

because

STATEMENT–2 : The vector $14\hat{i} + 2\hat{j} + 15\hat{k}$ is parallel to the line of intersection of given planes.

[IIT-2007]

(A) Statement–1 is True, Statement–2 is True; Statement–2 is a correct explanation for Statement–1.

(B) Statement–1 is True, Statement–2 is True; Statement–2 is NOT a correct explanation for Statement–1

(C) Statement–1 is True, Statement–2 is False

(D) Statement–1 is False, Statement–2 is True