Name : _____ Date : _____

Time : Start [ ] End [ ] Marks : 100

DPP JEE Main

Class XII | M | 080

MATHEMATICS

Chapter 21 : Three Dimensional Geometry

Topics :

- Different Forms of Equation of a Plane, Angle between a Line and a Plane, Angle between Two Planes, Line of Intersection of Two Planes

Instructions :

➲ DPP contains 25 topicwise questions. ➲ Each DPP contains Multiple Choice Questions (MCQs) and Numerical Value Type Questions. ➲ Each question carries 4 marks. ➲ Mark the correct answer for MCQs and answers to be filled in as a numerical value for Numerical Value Type Questions in the OMR Sheet given at the end of the DPP. ➲ For every incorrect answer deduct 1 mark.

1. Find the acute angle between the planes
$\vec{r}\cdot(\hat{i}-2\hat{j}+3\hat{k})=-4$ and $\vec{r}\cdot(2\hat{i}+\hat{j}-3\hat{k})=-7$

(a) $\cos^{-1}(9/14)$ (b) $\sin^{-1}(9/14)$
(c) $\cos^{-1}(14/9)$ (d) $\sin^{-1}(14/9)$

2. Find the angle between the line $\vec{r}=(2\hat{i}-2\hat{j}+3\hat{k})+\lambda(\hat{i}-\hat{j}+4\hat{k})$ and to the plane $\vec{r}\cdot(\hat{i}+5\hat{j}+\hat{k})=5$.

(a) $\sin^{-1}\left(\frac{2}{\sqrt{255}}\right)$ (b) $\sin^{-1}\left(\frac{5}{\sqrt{420}}\right)$
(c) $\sin^{-1}\left(\frac{5}{\sqrt{459}}\right)$ (d) $\sin^{-1}\left(\frac{5}{\sqrt{659}}\right)$

3. Find the equation of the plane passing through the point $2\hat{i}-\hat{k}$ and parallel to the lines
$\frac{x}{-3}=\frac{y-2}{4}=z+1$ and $x-4=\frac{1-y}{2}=2z$

(a) $\vec{r}\cdot(8\hat{i}-5\hat{j}-4\hat{k})-12=0$
(b) $\vec{r}\cdot(8\hat{i}+5\hat{j}+4\hat{k})+12=0$
(c) $\vec{r}\cdot(8\hat{i}+5\hat{j}+4\hat{k})-12=0$
(d) $\vec{r}\cdot(5\hat{i}+8\hat{j}+4\hat{k})+12=0$

4. 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 cosec θ = 6, the value of λ is

(a) $-\frac{3}{5}$ (b) $\frac{1}{3}$ (c) $\frac{-4}{3}$ (d) $\frac{3}{4}$

5. Find the equation of plane passing through (4, 3, –1) and perpendicular to the planes $x+2y+3z-7=0$ and $2x-3y+4z=0$.

(a) $17x+y-z=81$ (b) $17x+2y-7z=81$
(c) $2x-y+z=61$ (d) $2x+2y+7z=67$

6. Find the equation of the plane passing through the points (–1, 1, 1) and (1, –1, 1) and perpendicular to the plane $x+2y+2z=5$.

(a) $2x+3y+z=2$ (b) $3x-2y-z=6$
(c) $2x+2y-3z+3=0$ (d) $2x+y-2z+3=0$

7. Find the vector equation of the line passing through (1, 2, 3) and perpendicular to the plane $\vec{r}\cdot(\hat{i}+2\hat{j}-5\hat{k})+9=0$.

(a) $\vec{r}=(\hat{i}+2\hat{j}+3\hat{k})+\lambda(\hat{i}+2\hat{j}-5\hat{k})$
(b) $\vec{r}=(\hat{i}-2\hat{j}-9\hat{k})+\lambda(\hat{i}+2\hat{j}-5\hat{k})$
(c) $\vec{r}=(\hat{i}+4\hat{j}+3\hat{k})+\lambda(\hat{i}+2\hat{j}-5\hat{k})$
(d) None of these

8. Find the angle between the line $\frac{x-1}{2}=\frac{y-2}{-3}=\frac{z+1}{1}$ and the plane $2x+y-z=4$.

(a) 90° (b) 0 (c) 60° (d) 30°

9. Find the equation of the plane passing through the points (2, 1, 0), (5, 0, 1) and (4, 1, 1).

(a) $x+y+2z=3$ (b) $x+y-2z=3$
(c) $x-y+2z=3$ (d) None of these

10. The equation of the plane perpendicular to the *yz*-plane and passing through the points (1, –2, 4) and (3, –4, 5) is

(a) $y+2z=5$ (b) $2y+z=5$ (c) $y+2z=6$ (d) $2y+z=6$

11. Find the angle between the planes $3x+y-2z+3=0$ and $\vec{r}\cdot(6\hat{i}+3\hat{j}+2\hat{k})=5$.

(a) $\cos^{-1}\left(\frac{17}{\sqrt{13}}\right)$ (b) $\cos^{-1}\left(\frac{17\sqrt{14}}{98}\right)$
(c) $\cos^{-1}\left(\frac{17}{\sqrt{14}}\right)$ (d) $\cos^{-1}\left(\frac{17\sqrt{13}}{91}\right)$

12. The equation of the plane through intersection of planes $x + 2y + 3z = 4$ and $2x + y - z = -5$ and perpendicular to the plane $5x + 3y + 6z + 8 = 0$ is
(a) $7x - 2y + 3z + 81 = 0$
(b) $23x + 14y - 9z + 48 = 0$
(c) $51x + 15y - 50z + 173 = 0$
(d) None of these

13. Find the vector equation of the plane passing through the intersection of the planes $\vec{r}\cdot(2\hat{i} - 7\hat{j} + 4\hat{k}) = 3$ and $\vec{r}\cdot(3\hat{i} - 5\hat{j} + 4\hat{k}) + 11 = 0$ and passing through the point (1, 0, 2).
(a) $\vec{r}\cdot(15\hat{i} + 47\hat{j} + 28\hat{k}) = 7$ (b) $\vec{r}\cdot(23\hat{i} - 119\hat{j} + 60\hat{k}) = 143$
(c) $\vec{r}\cdot(15\hat{i} - 47\hat{j} + 28\hat{k}) = 0$ (d) $\vec{r}\cdot(52\hat{i} - 149\hat{j} + 92\hat{k}) = 0$

14. Find the vector equation in scalar product form of the plane that contains the lines
$\vec{r} = (\hat{i} + \hat{j}) + s(\hat{i} - 2\hat{j} + \hat{k})$ and $\vec{r} = (\hat{i} + \hat{j}) + t(-\hat{i} + 3\hat{j} - 2\hat{k})$
(a) $\vec{r}\cdot(\hat{i} + \hat{j} + \hat{k}) = 0$ (b) $\vec{r}\cdot(\hat{i} + \hat{j} + \hat{k}) = 2$
(c) $\vec{r}\cdot(\hat{i} - \hat{j} - \hat{k}) = 1$ (d) $\vec{r}\cdot(\hat{i} - \hat{j} - \hat{k}) = -1$

15. The equation of the plane containing the line $2x - 5y + z = 3$; $x + y + 4z = 5$, and parallel to the plane $x + 3y + 6z = 1$ is
(a) $x + 3y + 6z = 7$ (b) $2x + 6y + 12z = -13$
(c) $2x + 6y + 12z = 13$ (d) $x + 3y + 6z = 9$

16. Equation of the line passing through (1, 1, 1) and parallel to the plane $2x + 3y + z + 5 = 0$, is
(a) $\frac{x-1}{1} = \frac{y-1}{2} = \frac{z-1}{1}$ (b) $\frac{x-1}{-1} = \frac{y-1}{1} = \frac{z-1}{-1}$
(c) $\frac{x-1}{3} = \frac{y-1}{2} = \frac{z-1}{1}$ (d) $\frac{x-1}{2} = \frac{y-1}{3} = \frac{z-1}{1}$

17. Find the equation of the plane which contains the two parallel lines:
$\frac{x-4}{1} = \frac{y-3}{-4} = \frac{z-2}{5}$ and $\frac{x-3}{1} = \frac{y+2}{-4} = \frac{z}{5}$
(a) $11x + y - 3z + 35 = 0$ (b) $11x - y - 3z - 35 = 0$
(c) $11x - y + 3z + 35 = 0$ (d) $11x + y + 3z - 35 = 0$

18. If the straight lines $\frac{x-1}{2} = \frac{y+1}{k} = \frac{z}{2}$ and $\frac{x+1}{5} = \frac{y+1}{2} = \frac{z}{k}$ are coplanar, then the planes containing these two lines are
(a) $y \pm 2z = -1$ (b) $y \pm z = -1$
(c) $y \pm 2z = 1$ (d) $y \pm z = 1$

Numerical Value Type

19. Let the plane $ax + by + cz + d = 0$ bisect the line joining the points (4, –3, 1) and (2, 3, –5) at the right angles. If a, b, c, d are integers, then the minimum value of $(a^2 + b^2 + c^2 + d^2)$ is _____.

20. If the equation of a plane P, passing through the intersection of the planes, $x + 4y - z + 7 = 0$ and $3x + y + 5z = 8$ is $ax + by + 6z = 15$ for some $a, b \in R$, then $|a| + |b|$ is _____.

21. If the angle between the plane $x - 3y + 2z = 1$ and the line $\frac{x-1}{2} = \frac{y-1}{1} = \frac{z-1}{-3}$ is θ, then find the value of $\cos^2\theta$.

22. If the plane $ax - by + cz = 0$ contains the line $\frac{x-a}{a} = \frac{y-2d}{b} = \frac{z-c}{c}$, then the value of $\frac{b}{d}$ is

23. If the position vector of the point of intersection of the line $\vec{r} = (\hat{i} + 2\hat{j} + 3\hat{k}) + \lambda(2\hat{i} + \hat{j} + 2\hat{k})$ and the plane $\vec{r}\cdot(2\hat{i} - 6\hat{j} + 3\hat{k}) + 5 = 0$ is $a\hat{i} + b\hat{j} + c\hat{k}$, then $(50a + 60b + 75c)^2$ is equal to _____.

24. The angle between the planes $x + y = 0$ and $y - z = 1$ is $\frac{\pi}{k}$, where k is _____.

25. Let the equation of the plane containing line $x - y - z - 4 = 0 = x + y + 2z - 4 = 0$ and parallel to the line of intersection of the planes $2x + 3y + z = 1$ and $x + 3y + 2z = 2$ be $x + Ay + Bz + C = 0$. Then find the value of $|A + B + C - 4|$.

OMR SHEET

Use HB pencil only and darken each circle completely.
Mark only one choice for each question as indicated.

Correct marking ● ⓑ ⓒ ⓓ
Wrong marking ⊗ ⓑ ◑ ⊙

1. ⓐⓑⓒⓓ	4. ⓐⓑⓒⓓ	7. ⓐⓑⓒⓓ	10. ⓐⓑⓒⓓ	13. ⓐⓑⓒⓓ	16. ⓐⓑⓒⓓ	19. _____	22. _____	25. _____
2. ⓐⓑⓒⓓ	5. ⓐⓑⓒⓓ	8. ⓐⓑⓒⓓ	11. ⓐⓑⓒⓓ	14. ⓐⓑⓒⓓ	17. ⓐⓑⓒⓓ	20. _____	23. _____	
3. ⓐⓑⓒⓓ	6. ⓐⓑⓒⓓ	9. ⓐⓑⓒⓓ	12. ⓐⓑⓒⓓ	15. ⓐⓑⓒⓓ	18. ⓐⓑⓒⓓ	21. _____	24. _____	

RESULT M | 080 - MATHEMATICS

Total Questions	25	Total Marks	100
Attempted		Correct	
Incorrect		Net Score	

Net Score = (Correct × 4) – (Incorrect × 1) = ...
Percentage Score = ...

Check your learning! If your score is

> 90%	EXCELLENT WORK !
90-75%	GOOD WORK !
74-60%	SATISFACTORY !
< 60%	NOT SATISFACTORY!