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**DHANALAKSHMI SRINIVASAN COLLEGE
OF ARTS & SCIENCE FOR WOMEN
(AUTONOMOUS)**



(For Candidates admitted from 2020-2021 onwards)

UG DEGREE EXAMINATIONS APRIL – 2021

B.SC - CHEMISTRY

ANALYTICAL GEOMETRY (3D) AND TRIGONOMETRY

Time: 3 Hrs

Max.Marks: 75

PART - A

CHOOSE THE CORRECT ANSWER.

(10*1=10)

- The distance between the points $P(x_1, y_1, z_1)$ from origin is
 - $\sqrt{((x_1)^2 - (y_1)^2 - (z_1)^2)}$
 - $\sqrt{((x_1)^2 + (y_1)^2 + z_1^2)}$
 - $(x_1 + y_1 + z)$
 - none
- The direction cosines of the line joining point $P(x, y, z)$ and $O(0, 0, 0)$ where OP is r
 - $\frac{r}{x}, \frac{r}{y}, \frac{r}{z}$
 - $\frac{-r}{x}, \frac{-r}{y}, \frac{-r}{z}$
 - $\frac{x}{r}, \frac{y}{r}, \frac{z}{r}$
 - $\frac{-x}{r}, \frac{-y}{r}, \frac{-z}{r}$
- Find the plane passing through $(3, 4, 5)$ and parallel to the plane $2x + 3y - z = 0$
 - $2x + 3y - z - 13 = 0$
 - $2x - 3y + z - 13 = 0$
 - $-2x - 3y - z - 13 = 0$
 - none
- Find the perpendicular from the origin to the planes $ax + by + cz + d = 0$
 - $\pm \frac{\sqrt{(a^2 + b^2 + c^2)}}{d}$
 - $\pm \frac{\sqrt{(a^2 - b^2 - c^2)}}{d}$
 - $\pm \frac{d}{\sqrt{(a^2 + b^2 + c^2)}}$
 - $\pm \frac{d}{\sqrt{(a^2 - b^2 - c^2)}}$
- Find the symmetric form of the straight line
 - $\frac{x+x_1}{l} = \frac{y+y_1}{m} = \frac{z+z_1}{n}$
 - $\frac{x-x_1}{l} = \frac{y-y_1}{m} = \frac{z-z_1}{n}$
 - $\frac{l}{x+x_1} = \frac{m}{y+y_1} = \frac{n}{z+z_1}$
 - $\frac{l}{x-x_1} = \frac{m}{y-y_1} = \frac{n}{z-z_1}$
- The line $\frac{x-x_1}{l} = \frac{y-y_1}{m} = \frac{z-z_1}{n}$ parallel to the plane $ax + by + cz + d = 0$ if
 - $ax_1 + by_1 + cz_1 = 0$
 - $l + my_1 + nz_1 = 0$
 - $al + bm + cn = 0$
 - none
- $x^n - \frac{1}{x^n}$ where $x = \cos\theta + i\sin\theta$ and n being positive integer.
 - $2i\sin n\theta$
 - $2i\sin\theta$
 - $2i\cos n\theta$
 - $2\cos\theta$
- $\lim_{x \rightarrow 0} \frac{x - \sin x}{x^3} =$
 - $\frac{1}{3}$
 - $\frac{1}{2}$
 - $\frac{1}{6}$
 - none

9. $\cos ix =$

a) $i \cosh x$

b) $\cosh x$

c) $-\cosh x$

d) $-i \cosh x$

10. Imaginary part of $\tan(x+iy)$ is

a) $\frac{\sinh 2y}{\cos 2x + \cosh 2y}$

b) $\frac{-\sinh 2y}{\cos 2x + \cosh 2y}$

c) $\frac{\sinh 2y}{\cos 2x - \cosh 2y}$

d) $\frac{-\sinh 2y}{\cosh 2y - \cos 2x}$

PART - B

ANSWER ALL THE QUESTIONS

(5X7=35)

11. a) Show that the points (2,3,5), (-1,5,-1) and (4,-3,2) form an isosceles right angled triangle.

(OR)

b) Find the direction cosines of the line joining the points (3,-5,4), and (1,-8,-2), direction ratios

12. a) Find the distance from the origin to the planes $6x-3y+2z-14=0$

(OR)

b) find the distance between the planes $x+2y-z+3=0$ and $2x-5y+3z+1=0$.

13. a) Find the symmetrical form of the equation of the line given by $x+5y-z=7$; $2x-5y+3z+1=0$

(OR)

b) find the equation of the plane which contains the two parallel lines $\frac{x-1}{1} = \frac{y-2}{2} = \frac{z-3}{3}$;

$$\frac{x-3}{1} = \frac{y+2}{2} = \frac{z+4}{3}$$

14. a) Prove that $\frac{\sin 7\theta}{\sin \theta} = 7 - 56\sin^2\theta + 112\sin^4\theta - 64\sin^6\theta$

(OR)

b) Prove that $\cos^5\theta = \frac{1}{16}(\cos 5\theta + 5\cos 3\theta + 10\cos\theta)$

15. a) Prove that $\sinh(x \pm y) = \sinh x \cosh y \pm \cosh x \sinh y$.

(OR)

b) Prove that $\sinh^{-1} x = \log_e(x + \sqrt{x^2 + 1})$

PART - C

ANSWER ANY THREE QUESTIONS.

(3X10=30)

16. Show that the straight lines whose direction cosines are $al+bm+cn=0$ and $fmn+gnl+hlm=0$ are perpendicular if $\frac{f}{a} + \frac{g}{b} + \frac{h}{c} = 0$ and parallel if $\sqrt{af} + \sqrt{bg} + \sqrt{ch} = 0$

17. Show that the origin lies in the acute angle between the planes $x+2y+2z=0$; $4x-3y+12z+13=0$;

Find the planes bisecting the angle between them and point out which bisect the obtuse angle.

18. Find the image of the point (2,3,4), under the reflection of the plane $x-2y+5z=6$.

19. Prove that $\cos^5\theta \sin^4\theta = \frac{1}{2^8}(\cos 9\theta + \cos 7\theta - 4\cos 5\theta - 4\cos 3\theta + 6\cos\theta)$

20. If $\sin(\theta + i\phi) = \cos\alpha + i\sin\alpha$ then show that $\cos^2\theta = \pm \sin\alpha$