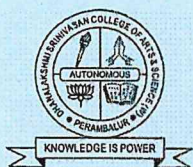


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**DHANALAKSHMI SRINIVASAN COLLEGE
OF ARTS & SCIENCE FOR WOMEN
(AUTONOMOUS)**



(For Candidates admitted from 2019-2020 onwards)

**UG DEGREE EXAMINATIONS APRIL – 2021
B.SC – PHYSICS**

ALGEBRA, ANALYTICAL GEOMETRY(3D) AND TRIGONOMETRY

Time: 3 Hrs

Max.Marks: 75

PART- A

CHOOSE THE CORRECT ANSWER

(10*1=10)

- Find the coefficient of x^4 in $(1+2x+3x^2+\dots+\infty)^{3/2}$
 - 10
 - 13
 - 15
 - 16
- Find the coefficient of x^n in the expansion of $(x+1) e^{x/2}$ is
 - $\frac{(2n+1)}{2}$
 - $\frac{2n+1}{2^n n!}$
 - 0
 - $n!$
- If A is a square matrix then $A-A'$ is
 - diagonal matrix
 - skew-symmetric matrix
 - symmetric
 - none of the above
- The transpose of an orthogonal matrix is
 - diagonal
 - orthogonal
 - symmetric
 - scalar
- For which value p of a lines $\frac{7-7x}{3p} = \frac{y-5}{1} = \frac{6-z}{5}$ and $\frac{1-x}{3} = \frac{7y-14}{5p} = \frac{z-3}{2}$ are perpendicular?
 - 11/70
 - 70/11
 - 1
 - 5
- Any two lines which do not lie on the same plane and also not parallel are called
 - plane
 - skew lines
 - coplanar
 - collinear
- A circle whose equation of the center of the curve $x^2+y^2+4x+6y-23=0$ has its center at
 - (2,3)
 - (3,2)
 - (3,4)
 - (-2,-3)
- The radius of a circle in which the sphere $x^2+y^2+z^2+2x-2y-4z=19$ is cut by the Plane $x+2y+2z+7=0$ is
 - 1
 - 2
 - 3
 - 4
- If $\theta + \frac{\theta^3}{3} + \frac{2\theta^5}{5} + \dots$ expressed in
 - $\sin \theta$
 - $\cos \theta$
 - $\tan \theta$
 - $\cot \theta$
- Find approximately the value of θ in radians if $\frac{\sin \theta}{\theta} = \frac{863}{864}$
 - 1/12
 - 1/13
 - 1
 - 2/3

PART - B

ANSWER ALL THE QUESTIONS:

(5*7=35)

11. a) Sum the series $1 + \frac{3}{4} + \frac{3.5}{4.8} + \frac{3.5.7}{4.8.12} + \dots \dots \dots \infty$

(OR)

b) Show that $\log\sqrt{12} = 1 + \left(\frac{1}{2} + \frac{1}{3}\right)\frac{1}{4} + \left(\frac{1}{4} + \frac{1}{5}\right)\frac{1}{4^2} + \left(\frac{1}{6} + \frac{1}{7}\right)\frac{1}{4^3} + \dots \dots \dots$

12. a) Find the rank of the matrix $\begin{pmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \\ 2 & 3 & 1 \end{pmatrix}$

(OR)

b) Verify Cayley Hamilton theorem for the matrix $\begin{pmatrix} 1 & 2 & 3 \\ 0 & -1 & 2 \\ 1 & 0 & 2 \end{pmatrix}$

13. a) Show that the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and $\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-4}{5}$ are coplanar.

(OR)

b) Find the angle between the line $\frac{x+1}{2} = \frac{y}{3} = \frac{z-3}{6}$ and the plane $3x+y+z=7$.

14. a) Find the equation of the sphere whose diameter is the join of $(2,-3,1)$ and $(1,-2,-1)$.

(OR)

b) Find the equation of a sphere which passes through the point $(1,-2,3)$ and the circle $z=0, x^2+y^2+z^2-9=0$

15. a) prove that $2^5 \cos^6\theta = \cos 6\theta + 6 \cos 4\theta + 15 \cos 2\theta + 10$.

(OR)

b) $\frac{\sin\theta}{\theta} = \frac{2165}{2166}$ prove that $\theta = 3^\circ$.

PART - C

ANSWER ANY THREE QUESTIONS:

(3*10=30)

16. Prove that $\sum_0^\infty \frac{5n+1}{(2n+1)!} = \frac{e}{2} + \frac{2}{e}$.

17. Find the Eigen values and Eigen vectors of $\begin{pmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{pmatrix}$

18. Find the shortest distance between the lines $\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1}$ & $\frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}$. Also find the equation of the line of the shortest distance.

19. Find the equation of the sphere passing through the points $(2,0,1), (1,5,-1), (0,-2,3), (4,-1,2)$.

20. Express $\cos^5\theta \sin^4\theta$ in terms of multiples angles.