SUB.CODE: 18UPH3A5

REG.NO:

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)**

1. Find the coefficient of x^4 in $(1+2x+3x^2+\ldots\ldots\infty)^{3/2}$

   a) 10 b) 13 c) 15 d) 16

2. Find the coefficient of x^n in the expansion of $(x+1)\, e^{x/2}$ is

   a) $\frac{(2n+1)}{2}$ b) $\frac{2n+1}{2^n n!}$ c) 0 d) n!

3. If A is a square matrix then A-A′ is

   a) diagonal matrix b) skew-symmetric matrix

   c) symmetric d) none of the above

4. The transpose of an orthogonal matrix is

   a) diagonal b)orthogonal c) symmetric d) scalar

5. 5. 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?

   a) 11/70 b)70/11 c) 1 d) 5

6. Any two lines which do not lie on the same plane and also not parallel are called

   a) plane b) skew lines c) coplanar d) collinear

7. A circle whose equation of the center of the curve $x^2+y^2+4x+6y-23=0$ has its center at

   a) (2,3) b)(3,2) c) (3,4) d) (-2,-3)

8. 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

   a) 1 b) 2 c) 3 d) 4

9. If $\theta+\frac{\theta^3}{3}+\frac{2\theta^5}{5}+\ldots\ldots$expressed in

   a) $\sin\theta$ b) $\cos\theta$ c) $\tan\theta$ d) $\cot\theta$

10. Find approximately the value of θ in radians if $\frac{\sin\theta}{\theta} = \frac{863}{864}$

    a) 1/12 b) 1/13 c) 1 d) 2/3

PART - B

ANSWER ALL THE QUESTIONS: **(5*7=35)**

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

(OR)

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

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 $2^5\cos^6\theta=\cos6\theta+6\cos4\theta+15\cos2\theta+10$.

(OR)

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

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.