

ASSIGNMENT-II

Department of Physics

3rd Semester HC (CBCS)

Paper code: PHY-HC-3016, Mathematical Physics-II

Total Marks: 20

Answer any five from the followings:

5×4=20

1. Show that
$$\begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix} = \begin{bmatrix} 1 & -\tan \frac{\theta}{2} \\ \tan \frac{\theta}{2} & 1 \end{bmatrix} \begin{bmatrix} 1 & \tan \frac{\theta}{2} \\ -\tan \frac{\theta}{2} & 1 \end{bmatrix}^{-1}$$

2. Verify whether the matrix $A = \frac{1}{3} \begin{bmatrix} 2 & 2 & 1 \\ 2 & -1 & 2 \\ -1 & 2 & 2 \end{bmatrix}$ is an orthogonal.

3. The matrix A is defined as $A = \begin{bmatrix} 1 & 2 & -3 \\ 0 & 3 & 2 \\ 0 & 0 & -2 \end{bmatrix}$, find the eigenvalues of $3A^3 + 5A^2 - 6A + 2I$.

4. If $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$, find A^{-1} .

5. Find the eigenvalues and corresponding eigenvectors of the matrix $B = \begin{bmatrix} -2 & 5 & 4 \\ 5 & 7 & 5 \\ 4 & 5 & -2 \end{bmatrix}$.

6. For the matrix $A = \begin{bmatrix} 4 & 1 & 0 \\ 1 & 4 & 1 \\ 0 & 1 & 4 \end{bmatrix}$, determine a matrix P such that $P^{-1}AP$ is diagonal matrix.

7. Find the rank of the matrix $P = \begin{bmatrix} 1 & 2 & 1 \\ -1 & 0 & 2 \\ 2 & 1 & -3 \end{bmatrix}$.

Nota Bene:

- Write your answers in A4 paper sheet mentioning clearly **your name, GU roll number, registration number, paper code etc.** at the front page of your answer sheet.
- You have to make a single PDF file of your answer sheets.
- You need to submit your respective PDF at the online portal of our college website or at the mail id: ngcphysicsdept@gmail.com.
- The submission due date is on or before 10th August, 2021.