INDIAN MARITIME UNIVERSITY

(A Central University, Govt of India)

B.SC (NAUTICAL SCIENCE)

END SEMESTER EXAMINATIONS- JUNE/JULY 2019

SEMESTER IV

APPLIED MATHEMATICS-VI

(UG21T2403)

Date: 29.06.2019 **Max Marks: 70**

Time: 3 Hours **Pass Marks: 35**

Note: Answer any Seven questions out of Nine Questions.
All questions carry equal marks.

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1 a) Test for consistency and solve:

$5x + 3y + 7z = 4, 3x + 26y + 2z = 9, 7x + 2y + 10z = 5$ (5 Marks)

b) Verify that the following matrix is orthogonal: $\begin{bmatrix} -2/3 & 1/3 & 2/3 \\ 2/3 & 2/3 & 1/3 \\ 1/3 & -2/3 & 2/3 \end{bmatrix}$ (5 Marks)

2 a) Find the eigen values and eigen vectors of the matrix: $\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$ (5 Marks)

b) Show that the following matrix is unitary: $\begin{bmatrix} \frac{1}{2}(1+i) & \frac{1}{2}(-1+i) \\ \frac{1}{2}(1+i) & \frac{1}{2}(1-i) \end{bmatrix}$ (5 Marks)

3 Find the matrix P which transforms the matrix: $A = \begin{bmatrix} -1 & 2 & -2 \\ 1 & 2 & 1 \\ -1 & -1 & 0 \end{bmatrix}$

to the diagonal form (10 Marks)

4 a) Verify Cayley Hamilton theorem and hence find the inverse

of $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ (5 Marks)

b) Find non-singular matrices P and Q such that PAQ is in the normal form for the

matrix,

$$A = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 3 \\ 0 & -1 & -1 \end{bmatrix}$$ (5 Marks)

5 a) Show that $A = \begin{bmatrix} 2 & 3+4i \\ 3-4i & -5 \end{bmatrix}$ is a Hermitian matrix. (5 marks)

b) Solve $\frac{\partial^3 z}{\partial x^2\, \partial y} + 18xy^2 + \sin(2x - y) = 0$ (5 Marks)

6 a) Solve $(x^2 - y^2 - z^2)p + 2xyq = 2xz$ (5 Marks)

b) Solve $p(1 + q) = qz$ (5 Marks)

7 a) Solve $q^2 = z^2p^2(1 - p)$ (5 Marks)

b) Solve $2\frac{\partial^2 z}{\partial x^2} + 5\frac{\partial^2 z}{\partial x \partial y} + 2\frac{\partial^2 z}{\partial y^2} = 0$ (5 Marks)

8 a) Solve the equation $\left(D^2 + 4DD' - 5D'^2\right)z = \sin(2x + 3y)$ (5 Marks)

b) Form a partial differential equaton by eliminating the arbitrary function from : $2z = \frac{x^2}{a^2} + \frac{y^2}{b^2}$ (5 Marks)

9 Solve the equation $y^2r - 2ys + t = p + 6y$ (10 Marks)