

FE (APPLIED MATHEMATICS -I)**Internal Assessment Test-I****Date: 07/09 /2015****Time: 1.30-2.30 pm****Max marks: 20**

Note the following instructions.

1. All questions are compulsory.
2. Write everything in ink (no pencil) only.

Q.1 Attempt any five

a. Express $\frac{1+i}{1-i}$ in exponential form [2m]

b. Find all the values of $(-1)^{\frac{1}{3}}$ [2m]

c. Is the following matrix orthogonal? $A = \begin{bmatrix} 2 & 2 & 1 \\ -2 & 1 & 2 \\ 1 & -2 & 2 \end{bmatrix}$ [2m]

d. State the necessary and sufficient condition for a square matrix to be symmetric and skew-Hermitian. [2m]

e. Check if the system is consistent. [2m]

$$x_1 + 2x_2 + 3x_3 = 1$$

$$x_2 + 2x_3 = 1$$

$$2x_1 + 4x_2 + 6x_3 = 5$$

f. State the conditions for the system $\mathbf{AX}=\mathbf{0}$ to have [2m]
i) trivial solution ii) non-trivial solution

Q.2 Attempt any one

a. Express $\tan 5\theta$ in terms of powers of $\tan \theta$. [5m]

b. Fit a curve $y = ax + bx^2$ for the data using method of least squares. [5m]

x	1	2	3	4	5	6
y	2.51	5.82	9.93	14.84	20.55	27.06

Q.3 Attempt any one

a. Find non-singular matrices P and Q such that $A = \begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$ [5m]

is reduced to normal form. Also find its rank.

b. Investigate for what values of λ and μ the equations $x + y + z = 6$, [5m]
 $x + 2y + 3z = 10$, $x + 2y + \lambda z = \mu$ have i) no solution ,
ii) a unique solution, iii) infinite number of solutions.

ALL THE BEST