

SCHOOL OF APPLIED SCIENCE & HUMANITIES
DEPARTMENT OF MATHEMATICS

Subject: Foundations of Engineering Mathematics
Sem. : Pre-Semester
Section: 31

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Assignment 3

30 Marks

1. Answer the following:

a. If $A - B = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$ and $A + B = \begin{bmatrix} 3 & 4 \\ 2 & 5 \end{bmatrix}$, then calculate AB.

b. If $A = \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 & -1 \end{bmatrix}$, then calculate AB.

c. If $\begin{bmatrix} x-2 & x+y \\ z-3 & 12 \end{bmatrix} = \begin{bmatrix} 0 & 3 \\ 4 & 12 \end{bmatrix}$, then calculate $x+2y+3z$.

d. For a given matrix A of order $m \times n$, write it as a sum of a symmetric and a skew-symmetric matrix.

e. For a square matrix of order 2, calculate the additive identity, additive inverse, multiplicative identity and multiplicative inverse.

f. If A is a 3×3 skew-symmetric matrix, then calculate $\det(A)$.

g. If A is a 3×3 matrix such that $A^2 - 5A + 6I = 0$, find A^{-1} .

2.

a. Three firms A, B and C supplied 40, 35 and 25 truckloads of stones and 10, 5, 8 truckloads of sand respectively to a contractor. If the costs of stone and sand are 1200/- and 500/- per truck load respectively, find the total amount paid by the contractor to each of these firms, by using matrix method.

b. There are two families A and B. There are 4 men, 6 women and 2 children in family A and 2 men, 2 women, and 4 children in family B. The recommended daily requirement for calories is: Man: 2400, Women: 1900, child: 1800 and for proteins is: Man: 55-gram, Woman: 45 gram and child: 33gram. Represent

the above information by matrices. Using matrix multiplication, calculate the total requirements of calories and proteins for each of the two families.

3. Evaluate $\lim_{x \rightarrow 0} (\sin 5x / \tan 3x)$.
4. Find the equation of the tangent and normal to the curve $y = x^3 - 3x + 2$ at $x = 1$.
5. If $y = x^x$, find dy/dx .
6. Verify Rolle's theorem for $f(x) = x^2 - 4x + 3$ in the interval $[1, 3]$.