Faculty: SIT

Semester: SUM'19

Course Title: Mathematics-II

Course Teachers: *ALL*

Time: 2 Hours

Department: CSE

Exam: Term-Final

Code: MAT-121

Sections: *ALL*

Total Marks: 40

Answer **any 5** questions.

Question no. 1

(a). Express M = $\begin{bmatrix} -5 & 4 & 8 & 7 \\ 0 & 3 & 0 & 4 \\ 2 & 1 & 3 & 1 \\ 4 & 0 & -4 & 9 \end{bmatrix}$ as the sum of a symmetric & a skew-symmetric matrix.　　5

(b). Give an example of a 6×6 skew-symmetric matrix.　　2

(c). $I_5 + I_6 = ?$　　1

Question no. 2

$$M = \begin{pmatrix} 5 & 0 & 0 \\ 111 & -14 & 0 \\ 802 & 9 & 17 \end{pmatrix}.$$

(a). Find eigenvalues of M.　　4

(b). Find an spectrum of M^5.　　1.5

(c). Find an spectrum of M^{-1}.　　1.5

(d). Find an spectrum of M^T.　　1

Question no. 3

(a) Find M^{-1} if $M = \begin{pmatrix} -2 & 0 & -2 \\ -4 & -2 & 0 \\ 3 & 1 & -1 \end{pmatrix}$.　　6

(b). Give an example of a 6×6 orthogonal matrix.　　2

Question no. 4

$$M = \begin{pmatrix} 9 & -2 & -5 & 2 & 4 \\ 5 & 3 & -9 & -1 & -2 \\ 4 & -5 & 4 & 3 & 6 \end{pmatrix}$$

(a). Find the rank of M ;　　4

(b). Find the RREF of M ;　　3
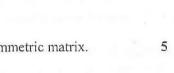
(c). Find the NF of M.　　1

Question no. 5

Solve:　　$9p - 2q - 5r + 2s = 4$

$5p + 3q - 9r - s = -2$

$4p - 5q + 4r + 3s = 6$

Find the general solution. Find 2 particular solutions.　　6 + 2

Question no. 6

Suppose S(a,b) = (4a-2b, ▓▓▓ 4b, -b) , T(p,q,r) = (-q+2r, 3p-4r, r, p-q-r), U(x,y,z) = (x+y, y-z, 271).

(a). Which of the above transformations are linear ?   5

(b). Find   T∘S   &   T∘S (2,-1)   2 +1

Question no. 7

(a). T means a 120^0 clockwise rotation. Find T(2,-4).   2

(b). If w = (15,-10,-60) is sheared along Y-axis by factor ⅕ , then find $T(w)$.   2

(c). S is a reflection about the YZ-plane. Find S(-1, -2, -3).   2

(d). If T means 9 times dilation of a vector, find T(-1/3 , 5/3).   2

Question no. 8 (answer any **8**)   1×8

(a). How many eigenvalues do belong to a 3×5 matrix ?

(b). How many eigenvalues do belong to a 36×36 matrix ?

(c). S : $\mathbb{R}^6 \longrightarrow \mathbb{R}^7$ is a linear transformation. Find S(0,0,0,0,0,0).

(d). Find T(-117,15, 6), if T is an orthogonal projection on the ZX-plane.

(e). Which matrices do have inverses ?

(f). $\Gamma\left(\frac{1}{2}\right)$ = ?

(g). B(1,1) = ?

(h). Define the rank of a matix.

(i). Evaluate : 275 tr(I_8) – tr (345 I_5) + 2003 tr (B), where B is any skew-symmeric matrix.

(j). Write 1 difference between a matrix & a determinant .

(k). Give an example of a 8×8 scalar matrix.

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