[Total No. of Questions : 3]

SEAT No. :

[Total No. of Pages : 2]

F.Y.B.Sc.
COMPUTER SCIENCE
Mathematics
MTC-121 : Linear Algebra
(2019 Pattern) (Semester -II)(Paper-I)

[Time : 2 Hours] *[Max. Marks : 35]*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *Figures to the right indicates full marks.*
3) *Use of single memory, non-programmable scientific calculator is allowed.*

Q1) Attempt any five of the following. **[10]**

a) Define subspace of a vector space. Give one example of subspace of a Vector space R^2.

b) Write the standard basis for $P_1(\mathbb{R})$. Also write it's dimension

c) Is the transformation $T : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ defined by $T(x,y) = (x^2, y)$ is linear? Justify.

d) Define the following terms:

i) Affine set

ii) Convex combination of Vectors

e) Is $Q(\overline{x}) = 3x_1^2+2x_2^2+x_3^2+4x_1x_2+4x_2x_3$ positive definite?

f) Find eigen values of $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

g) Let $V = IR^3$ and $W = \{(x,y,z) \in V : x^2 - y^2 = 0\}$ determine whether W is a subspace of V.

P.T.O

Q2) Attempt any three of the following. **[15]**

a) If W_1 and W_2 be two subspaces of V. $W_1 \cup W_2$ is a subspace V iff either $W_1 \subseteq W_2$ or $W_2 \subseteq W_1$

b) Find rank of following matrix A and hence write it's nullity.

$$A=\begin{bmatrix} 2 & 1 & 3 \\ 1 & 2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

c) Find all eigen values & eigen vectors of the following matrix.

$$A=\begin{bmatrix} 3 & -2 & 0 \\ -2 & 3 & 0 \\ 0 & 0 & 5 \end{bmatrix}$$

d) Find quadratic form of $A=\begin{bmatrix} 3 & -2 \\ -2 & 7 \end{bmatrix}$

e) Check whether S is a basis for P_2 where $S=\{p_1,p_2,p_3\}$

$P_1=1-3x+2x^2$

$P_2=1+x+4x^2$

$P_3=1-7x$

Q3) Attempt any one of the following. **[10]**

a) Find matrix P, that diagonalize $A=\begin{bmatrix} 1 & 4 \\ 1 & -2 \end{bmatrix}$ and determine $P^{-1}AP$.

b) i) Express w=(9,2,7) as a linear combination of given vectors in set s if possible; S={u,v} in R^3.where u=(1,2,-1),v=(6,4,2).

ii) Let T: $R^3 \rightarrow R^3$ is defined by T(x,y,z) = (x+y+z ,2x-3y+4z) then show that T is Linear Transformation.

OOO