[Total No. of CO's -05] **Seat No:** **[Total No. of Pages: 02]**

G. H. Raisoni College of Engineering and Management, Pune.

(An Autonomous Institution affiliated to Savitribai Phule Pune University, Pune)
F.Y B. Tech (All Branches) (Term II)
ESE Summer-2021(2020 Pattern)

Linear algebra and statistics (UBSL153)

[Time: 2 Hours] **[Max. Marks-50]**

COURSE OUTCOME:

CO1: Apply simple operations like adding, multiplying, inverting, transposing, etc. in matrices &vectors.
CO2: Apply the concepts of Linear Algebra in programming languages. Course Outcomes
CO3: Apply the concepts of least squares methods and basic problems in probability.
CO4: Apply the knowledge of Random variables.
CO5: Apply the knowledge of Probability distributions to solve engineering problems.
Instructions to the candidates:.

1) ***All questions compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

BL	*Sub Question*		*Marks*	*CO*
L1	*a)*	Define Bases and Dimension of a vector space	**[2]**	**CO1**
	b)	Define probability distribution of discrete and continuous random variable.	**[2]**	**CO4**
	c)	Define correlation and regression	**[2]**	**CO3**
L2	*a)*	Explain properties of Eigen values and Eigen vectors	**[3]**	**CO2**
	b)	A box contains 6 red, 4 white and 5 blue balls. 3 balls are drawn .Find the probability that they are drawn in the order red, white and blue if each ball is not replaced	**[3]**	**CO3**
	c)	Explain normal distribution	**[3]**	**CO5**
L3	*a)*	If 40% of bolts produced by a machine are defective, determine the probability that out of 5 bolts drawn, i) 2 are defective, ii) At least 3 are defective, iii) 1 is defective, iv) At most 2 are defective.	**[5]**	**CO5**
	b)	Random variable x has following distribution.	**[5]**	**CO4**

X	0	1	2	3	4	5	6	7
P(X)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

Evaluate i) K, ii) p(x< 3), iii) p(x> 4) , iv) p(x≥ 6), v) cumulative distribution function.

	c)	Find the matrix representing T: $R^3 \rightarrow R^4$ such that T(x ,y ,z) = (x + y + z, 2x+z,2y-z, 6y) relative to standard basis of R^3 and R^4.	**[5]**	**CO2**

OR

	d)	Evaluate Eigen values and all Eigen vectors for A == $\begin{bmatrix} 2 & -2 & 3 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$	**[5]**	**CO2**

L4 ***a)*** Test the linear dependency and find the relation if it exists for $X_1 = (1,1,1,3)$, $X_2 = (1,2,3,4)$ & $X_3 = (2,3,4,7)$. **[5]** **CO1**

OR

b) Determine which of these two subsets is a subspace of R^3 **[5]** **CO1**

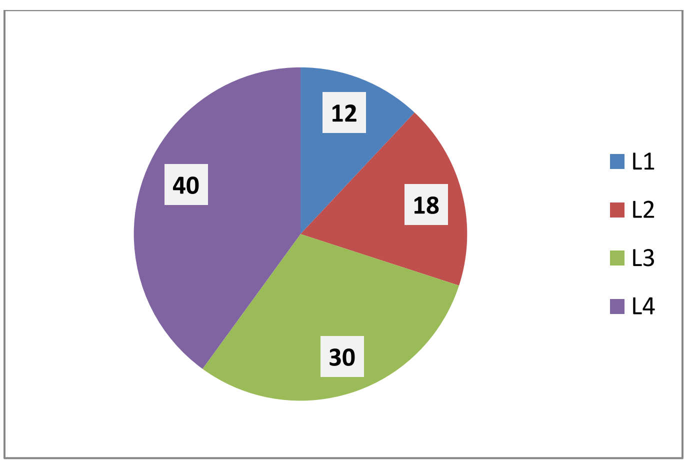
(a) $W = \{(x_1, x_2, 1) \mid \text{where } x_1 \,\&\, x_2 \text{ are real numbers.}\}$

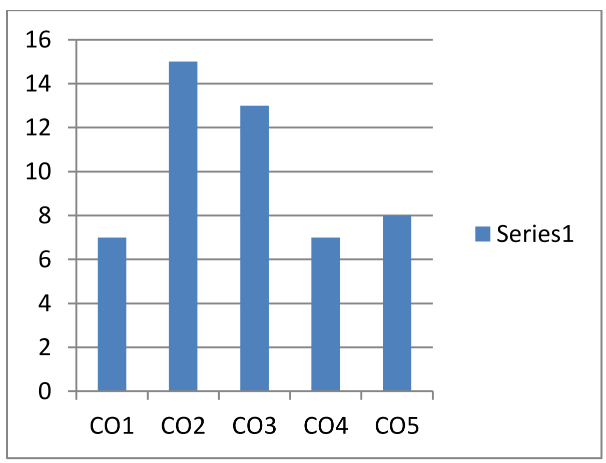
(b) $U = \{(x_1, x_3 + x_1, x_3) \mid \text{where } x_1 \,\&\, x_3 \text{ are real numbers.}\}$

c) Diagonalize the matrix $A = \begin{bmatrix} 4 & -3 & -3 \\ 3 & -2 & -3 \\ -1 & 1 & 2 \end{bmatrix}$ **[7]** **CO2**

d) Analyse the given data to best fit the curve $y = a + bx + cx^2$ **[8]** **CO3**

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3





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