Vivekananda College of Engineering & Technology, Puttur

[A Unit of Vivekananda Vidyavardhaka Sangha Puttur ®]

Affiliated to VTU, Belagavi & Approved by AICTE New Delhi

CRM08	Rev 1.10	BS	31-07-2021

CONTINUOUS INTERNAL EVALUATION- 3

Dept: BS(MAT)	Sem / Div: IV/ A & B	Sub: Engineering Statistics & Linear Algebra	S Code: 18EC44
Date: 5/08/2021	Time: 3.00-4:30PM	Max Marks: 50	Elective: N
Note: Answer any 2 full questions, choosing one full question from each part.			

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Q N		Questions	Marks	RBT	COs
		PART A			
1	a	Define Central Limit Theorem and show that the sum of the two independent Gaussian random variables is also Gaussian. What is averaging or law of large numbers.	8	L2	CO2
	b	X is a random variable uniformly distributed between 0 and 3. Y is a random variable, independent of X, uniformly distributed between +2 and −2. W = X + Y. What is the PDF for W?	8	L2	CO2
	c	A random process is defined by $X(t)=A\cos(w_c t+\phi+\theta)$ where A,w,ϕ are constants and θ is a random variable uniformly distributed between $\pm\pi$. Is X(t) wide sense stationary? If not why not? If so then what are the mean and autocorrelation function for the random process.	9	L2	CO3
		OR			
2	a	The random variable Z is uniformly distributed between 0 and 1. The random variable Y is obtained from Z as follows: Y = 3.5Z + 5.25 One hundred independent realizations of Y are averaged: $V=\frac{1}{100}\sum_{i=1}^{100} Y_i$ (i) Estimate the probability $P(V\leq 7.1)$ (ii) If 1000 independent calculations of V are performed, approximately how many of these calculated values for V would be less than7.1?	8	L2	CO2
	b	Briefly explain the following random variables (RV). (i) Chi-Square RV (ii) Student's t RV (iii) Cauchy RV (iv) Rayleigh RV	8	L3	CO2
	c	A random process is descibed by $X(t)=A\sin(w_c t+\theta)$ where A,w_c are constants and θ is a random variable uniformly distributed between $\pm\pi$. Is X(t) wide sense stationary? If not why not? If so then what are the mean and autocorrelation function for the random process.	9	L2	CO3
		PART B			
3	a	Find the range space, Kernel and nullity of the following linear transformation. Also verify the rank nullity theorem $T:V_2(R)\rightarrow V_2(R)$ defined by $T(x_1,x_2)=(x_1+x_2,x_1)$.	8	L3	CO4
	b	Apply Gram- Schmidt process to $a=\begin{bmatrix}1\\0\\1\end{bmatrix};b=\begin{bmatrix}1\\0\\0\end{bmatrix};c=\begin{bmatrix}2\\1\\0\end{bmatrix}$ and find Orthonoraml basis also write the result in the form A=QR.	8	L3	CO4
	c	Factor the matrix A into $A=S\wedge S^{-1}$ using Diagonalization	9	L3	CO4

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HOD: Prof. M Ramananda Kamath

CONTINUOUS INTERNAL EVALUATION- 3

		and hence find $A^{3.}$ where $A=\begin{bmatrix}1 & 2\\0 & 3\end{bmatrix}$			
		OR			
4	a	Define Orthonormal set of vectors. Solve Ax=b by least squares and find $p=A\hat{x}$ if $A=\begin{bmatrix}1 & 0\\0 & 1\\1 & 1\end{bmatrix};b=\begin{bmatrix}1\\1\\0\end{bmatrix}$.	8	L3	CO4
	b	Derive cosine of the angle between any two non zero vectors also the projection on a line. Project b=(1,-1,2) on the line through a=(1,3,2).	8	L3	CO4
	c	Factor the matrix **A** using singular value decomposition $A=\begin{bmatrix}1 & 1 & 0\\0 & 1 & 1\end{bmatrix}$	9	L3	CO4

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