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	EC	26/08/22

CONTINUOUS INTERNAL EVALUATION- 3

Dept: EC	Sem / Div: IV	Sub: Engineering Statistics & Linear Algebra	S Code: 18EC44
Date: 01/09/2022	Time: 03:00-04:30PM	Max Marks: 50	Elective: N

Note: Answer any 2 full questions, choosing one full question from each part.

Q N		Questions	Marks	RBT	COs
		PART A			
1	a	Define the autocorrelation function (ACF) of a random process and discuss its properties.	7	L2	CO3
	b	Suppose that the PSD input to a linear system is $S_X(\omega)=K$. The cross-correlation of the input X(t) with the output Y(t) of the linear system is found to be, $R_{XY}(\tau) = K\begin{cases} e^{-\tau}+3e^{-2\tau}; & \tau \geq 0 \\ 0; & \tau < 0 \end{cases}$ What is the power filter function $\lvert H(j\omega)\rvert^2$?	9	L3	CO3
	c	$X(t)$ and Y(t) are X(t) and Y(t) independent, jointly wide-sense stationary random processes given by, $X(t)=A\cos(\omega_1 t+\theta_1)$ and $Y(t)=B\cos(\omega_2 t+\theta_2)$. If $W(t)=X(t)Y(t)$ then find the ACF $R_W(\tau)$.	9	L3	CO3
		OR			
2	a	With the help of an example, define Random Process and discuss the terms Strict-Sense Stationary (SSS) and Wide-Sense Stationary (WSS) associated with a random process.	8	L2	CO3
	b	A random process is described by $X(t)=A\cos(\omega_c t+\theta)+B$ Where A, B, ω_c are constants and where θ is a random variable uniformly distributed between $\pm\pi$. Is $X(t)$ wide-sense stationary? If not, then why not? If so, then what are the mean and the autocorrelation function for the random process?	9	L3	CO3
	c	Explain Power spectral density and Wiener-Khinchin relation.	8	L2	CO3
		PART B			
3	a	Find the Eigenvalues and Eigenvectors of $A=\begin{bmatrix} 4 & -5 \\ 2 & -3 \end{bmatrix}$.	8	L3	CO4
	b	Test to see if A^TA is positive definite $A=\begin{bmatrix} 1 & 1 \\ 1 & 2 \\ 2 & 1 \end{bmatrix}$.	8	L3	CO4
	c	Factor the matrix A into $A=S\Lambda S^{-1}$ using Diagonalization and hence find A^3 where $A=\begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$	9	L3	CO4
		OR			

Prepared by: Naveena C　　　　HOD

CONTINUOUS INTERNAL EVALUATION- 3

4	a	Use row operations to verify that for the matrix $A=\begin{bmatrix}1 & a & a^2\\ 1 & b & b^2\\ 1 & c & c^2\end{bmatrix}$ det A= (b-a)(c-a)(c-b).	8	L1	CO4
	b	Find the Eigenvalues and Eigenvectors of $A=\begin{bmatrix}0 & 2\\ 2 & 3\end{bmatrix}$	8	L3	CO4
	c	Factor the matrix **A** using singular value decomposition $A=\begin{bmatrix}2 & -1\\ 2 & 2\end{bmatrix}$	9	L3	CO4

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