

CRM08	Rev 1.10	BS	23-06-2021
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CONTINUOUS INTERNAL EVALUATION- 1

Dept: BS(MAT)	Sem / Div: IV/ A & B	Sub: Engineering Statistics & Linear Algebra	S Code: 18EC44
Date: 25/06/2021	Time: 3.00-4:30PM	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	A bivariate PDF for the discrete random variable X and Y is $0.2\delta(x)\delta(y)+0.3\delta(x-1)\delta(y)+0.2\delta(x)\delta(y-1)+c\delta(x-1)\delta(y-1)$ (i)What is the value of c (ii)What are the PDF's of X and Y (iii)What are the marginal CDF's of X and Y (iv)Are X and Y independent.	8	L2	CO2
b	(i)It is given that the random variable X is Gaussian with mean of 0 and a variance of 1. The random variable Y is obtained from X with relation $Y=5X-6$, Find the PDF for Y. (ii)A dimension and its tolerance are specified to be $y=0.75\pm 0.002$ in Y where Y is a Gaussian random variable with the mean of 0.751 and standard deviation of 0.0013. Estimate the % of realization of Y that will be within the tolerance range.	8	L2	CO1
c	Define an exponential random variable. Obtain the characteristic function of an exponential random variable and using the characteristic function derive its mean and variance.	9	L2	CO1
OR				
2 a	The joint PDF of $f_{XY}(x,y)=c$ a constant when $0<x<2$ and $0<y<3$ and is 0 otherwise. (i)What is the value of c (ii)What are the PDF's for X and Y (iii)What are $F_{XY}(x,\infty)$ and $F_{XY}(\infty,y)$ (iv)Are X and Y independent.	8	L2	CO2
b	(i)Suppose the joint p.m.f of a bivariate random variable (X, Y) is given by $P_{XY}(x,y)=\begin{cases} \frac{1}{3} & \text{for } (0,1), (1,0), (2,1) \\ 0 & \text{otherwise} \end{cases}$ Find (a) Are X and Y uncorrelated (b)Are X and Y independent. (ii) X and Y are bivariate random variables which are correlated and ρ_{XY} is the correlation coefficient, then prove that $ \rho_{XY} \leq 1$	8	L2	CO2
c	Define rectangular distribution. The random variable X is uniformly distributed between 0 and 5. The event B is $B=\{x>3.7\}$ what are	9	L2	CO1

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	$f_{x/B}(x), \mu_{x/B}(x), \sigma_{x/B}^2(x)$			
PART B				
3	a	i. Show that W is a subspace of $V(\mathbb{R})$ where $W = \{f : f(9) = 0\}$ ii. Show that W is a subspace of $M_2(F)$, where W be the collection of all elements from the space $M_2(F)$ of the form $\begin{bmatrix} a & b \\ -b & a \end{bmatrix}$.	8	L1 CO4
	b	Find a condition on a,b,c so that $w=(a,b,c)$ is a linear combination of $u=(1,-3,2)$ and $v=(2,-1,1)$ in \mathbb{R}^3 so that $w \in \text{span}(u,v)$	8	L1 CO4
	c	Define Linear dependence and linear independence of the set of vectors. Also determine whether the given set of vectors $V_1=(1,3,5), V_2=(2,5,9), V_3=(-3,9,3)$ are linearly independent or linearly dependent.	9	L1 CO4
OR				
4	a	Show that the following vectors form a basis $x_1=(2,2,1), x_2=(1,3,7), x_3=(1,2,2)$ in \mathbb{R}^3 .	8	L1 CO4
	b	Check whether the given set of vectors $f(x)=1+x+x^2, g(x)=1-x, h(x)=1-x^3$ are linearly independent in the Vector space of polynomials.	8	L1 CO4
	c	Explain four fundamental sub-spaces with example.	9	L1 CO4