Vivekananda College of Engineering & Technology, Puttur
[A Unit of Vivekananda Vidyavardhaka Sangha Puttur ®]
Affiliated to VTU, Belagavi & Approved by AICTE New Delhi

CRM08	Rev 1.11	BS	20.06.22

CONTINUOUS INTERNAL EVALUATION - 1

Dept:BS (MAT)	Sem / Div: IV A	Sub: Engineering statistics & Linear algebra	S Code: 18EC44
Date: 05-06-2022	Time: 3:00-4:30pm	Max Marks: 50	Elective: N

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

<table>
<tr><th>QN</th><th></th><th>Questions</th><th>Marks</th><th>RBT</th><th>CO's</th></tr>
<tr><td colspan="6">PART A</td></tr>
<tr><td>1</td><td>a</td><td>The random variable X has the following distribution as show in the table. Determine (a) k (b) mean (c) V(X)
<table>
<tr><td>x</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>P(x)</td><td>0.1</td><td>k</td><td>0.2</td><td>2k</td><td>0.3</td><td>k</td></tr>
</table></td><td>8</td><td>L1</td><td>CO1</td></tr>
<tr><td></td><td>b</td><td>The following is the PDF for the random variable U $f_U(u)=\{c\exp(-u/2) \, for \, 0\le u<1\}$ and is 0 otherwise
Find the value that c must have and evaluate $F_U(0.5)$</td><td>8</td><td>L2</td><td>CO1</td></tr>
<tr><td></td><td>c</td><td>Define Binomial distribution. Obtain the characteristic function of a binomial random variable and using the characteristic function derive its mean and variance</td><td>9</td><td>L3</td><td>CO1</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>2</td><td>a</td><td>Given the data in the following table
<table>
<tr><td>k</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>x</td><td>2.1</td><td>3.2</td><td>4.8</td><td>5.4</td><td>6.9</td></tr>
<tr><td>P(x)</td><td>0.21</td><td>0.18</td><td>0.2</td><td>0.22</td><td>0.19</td></tr>
</table>
a) Plot the p.d.f and c.d.f of the discrete random variable X b) Write the expressions for $f_X(X)$ and $F_X(x)$</td><td>8</td><td>L1</td><td>CO1</td></tr>
</table>

using unit delta function and unit step function

b The probability distribution of discrete random variable (DRV) is as shown below — 8 L1 CO1

k	-0.25	0	1	2	3.75
P(x=k)	0.2	c	0.4	0.1	2c

Find (i) the value of c (ii) $P(X \leq 0)$ (iii) $P(X > 1 / X \geq 0$

c Define Uniform distribution. Obtain the characteristic function of a uniform random variable and hence obtain its mean and variance using the characteristic function. — 9 L3 CO1

PART B

3 a Define vector space. Write the vector v=(1,3,9) as a linear combination of the vectors u_1=(2,1,3), u_2=(1,-1,1), u_3=(3,1,5). — 8 L1 CO4

b Find the dimension and basis for four fundamental subspace for $A=\begin{bmatrix}1 & 2 & 0 & 1\\ 0 & 1 & 1 & 0\\ 1 & 2 & 0 & 1\end{bmatrix}$ — 8 L1 CO4

c Define linear transformation of vector space. Also determine whether the given transformation is linear or not $T:R^2 \to R^3, T(x,y)=(x-y,x+y,2x)$. — 9 L3 CO4

OR

4 a Define Rank-nullity theorem. Also find the range space, kernel and nullity of the following linear transformation. Also verify the rank nullity theorem $T:V_2(R) \to V_2(R), T(x_1,x_2)=(x_1+x_2,x_1)$. — 8 L3 CO4

b Determine whether or not each of the following vectors form a basis, v_1=(1,2,3), v_2=(3,1,7) and v_3=(2,5,8). — 8 L2 CO4

c Explain four fundamental sub-spaces. Find basis for column space and null-space of the following matrices — 9 L2 CO4

ii. $A=\begin{bmatrix}1 & -1\\ 0 & 0\end{bmatrix}$ ii. $B=\begin{bmatrix}0 & 0 & 3\\ 1 & 2 & 3\end{bmatrix}$.

Prepared by: Prof. Nayana P

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