



# VIT

Vellore Institute of Technology  
(Deemed to be University under section 3 of UGC Act, 1956)

## SCHOOL OF ADVANCED SCIENCES

Fall Semester 2023-2024

Continuous Assessment Test – I

Programme Name & Branch : MCA – MASTER OF COMPUTER APPLICATIONS

Slot : D2+TD2

Course Name & code : PROBABILITY AND STATISTICS & PMAT501L

Class Number (s) : VL2023240106407 / 6408 / 6409

Faculty Name (s) : Dr. S. Kaspar / Dr. Rajesh Moharana / Dr.P. Ragukumar

Exam Duration: 90 Min.

Maximum Marks: 50

General instruction(s): Answer ALL Questions

Q.No.	Question	Max Marks												
1.	<p>(i) A sub-committee of 6 members is to be formed out of a group consisting of 7 men and 4 women. Calculate the probability that the sub-committee will consist of (a) exactly 2 women, (b) at least 2 women. <b>(5 Marks)</b></p> <p>(ii) For two events A and B, <math>P(A) = 0.5</math>, <math>P(B) = 0.6</math> and <math>P(A \cap B) = 0.8</math>. Find the conditional probabilities <math>P(A B)</math> and <math>P(B A)</math>. <b>(5 Marks)</b></p>	5+5												
2.	Data on readership of a magazine indicates that the proportion of male readers above 30 years old is 0.30 and the proportion of male readers under 30 years is 0.20. If the proportion of readers under 30 is 0.80, what is the probability that a randomly selected male subscriber is under 30?	10												
3.	<p>The probability function of a random variable X is given by:</p> <table border="1" style="margin: 10px auto;"> <tr> <td>X</td><td>-2</td><td>0</td><td>1</td><td>3</td><td>10</td></tr> <tr> <td>P(X)</td><td><math>\frac{1}{5}</math></td><td><math>\frac{1}{4}</math></td><td><math>\frac{1}{20}</math></td><td><math>\frac{3}{8}</math></td><td><math>\frac{1}{8}</math></td></tr> </table> <p>Evaluate (i) <math>P(X \leq 0)</math> (ii) <math>P(X &lt; 0)</math> (iii) <math>P( X  \leq 2)</math> (iv) <math>P(0 \leq X \leq 10)</math></p>	X	-2	0	1	3	10	P(X)	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{20}$	$\frac{3}{8}$	$\frac{1}{8}$	10
X	-2	0	1	3	10									
P(X)	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{20}$	$\frac{3}{8}$	$\frac{1}{8}$									
4.	<p>The joint density function of a bivariate distribution is given as</p> $f(x, y) = \begin{cases} \frac{1}{3}(x + y) & 0 \leq x \leq 2, \quad 0 \leq y \leq 1 \\ 0 & \text{otherwise} \end{cases}$ <p>Determine the marginal distributions and show that X and Y are not independent.</p>	10												
5.	<p>A continuous random variable X has the following PDF:</p> $f(x) = \begin{cases} 3x^2 & 0 < x < 1 \\ 0 & \text{otherwise} \end{cases}$ <p>Evaluate the following probabilities:</p> <p>(i) <math>P\left(X \leq \frac{1}{3}\right)</math> (ii) <math>P\left(\frac{1}{3} \leq X \leq \frac{1}{2}\right)</math> (iii) <math>P\left(X \leq \frac{1}{2} \mid \frac{1}{3} \leq X \leq \frac{2}{3}\right)</math></p>	10												