

**Sri Sivasubramaniya Nadar College of Engineering, Kalavakkam – 603 110**  
(An Autonomous Institution, Affiliated to Anna University, Chennai)

**Department of Mathematics**  
**Continuous Assessment Test – I**  
**Question Paper**

Degree & Branch	B.E. CSE, ECE, BME / B.Tech I.T				Semester	IV
Subject Code & Name	UMA1477 – Probability Theory & Stochastic Processes UMA1478 – Probability & Statistics				Regulation: 2018	
Academic Year	2021-2022	Batch	2020-2024	Date	25.03.2022	FN
Time: 90 Minutes	Answer All Questions				Maximum: 50 Marks	

**Part – A (6×2 = 12 Marks)**

K1	1. State Bayes' theorem	CO1	1.1.1
K2	2. A continuous random variable $X$ has the pdf given by $f(x) = ce^{- x }, -\infty < x < \infty$ . Find the value of $c$	CO1	2.1.3
K2	3. If the mgf of a random variable $X$ is of the form $(0.8e^t + 0.2)^8$ , Find $E(X)$	CO1	2.1.3
K2	4. Let $X$ be a random variable with $E(X) = 1$ and $E(X(X-1)) = 4$ , find $\text{var}\left(\frac{X}{2}\right)$ .	CO1	2.1.3
K2	5. If the cumulative distribution function of a random variable $X$ is $F(x) = \begin{cases} 1 - \frac{4}{x^2}, & x > 2 \\ 0 & x \leq 2 \end{cases}$ , find $P(4 < X < 5)$ .	CO1	2.1.3
K1	6. Find the mgf of the random variable whose moments are $\mu'_r = (r+1)!2^r$	CO1	2.1.3

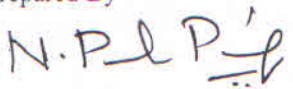


**Part – B (3×6 = 18 Marks)**

K3	<p>7. A random variable <math>X</math> has the following probability mass function.</p> <table><tr><td><math>X=x</math></td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr><tr><td><math>p(x)</math></td><td><math>a</math></td><td><math>3a</math></td><td><math>5a</math></td><td><math>7a</math></td><td><math>9a</math></td><td><math>11a</math></td><td><math>13a</math></td><td><math>15a</math></td><td><math>17a</math></td></tr></table> <p>i. Determine the value of <math>a</math>. ii. Find <math>P(X &lt; 3), P(X \geq 3), P(0 &lt; X &lt; 5)</math> iii. Find the distribution function of <math>X</math>.</p>	$X=x$	0	1	2	3	4	5	6	7	8	$p(x)$	$a$	$3a$	$5a$	$7a$	$9a$	$11a$	$13a$	$15a$	$17a$	CO1	2.1.3
$X=x$	0	1	2	3	4	5	6	7	8														
$p(x)$	$a$	$3a$	$5a$	$7a$	$9a$	$11a$	$13a$	$15a$	$17a$														
K3	<p>8. Prove that the sum of two independent Poisson variates is Poisson but the difference is not.</p>	CO1	1.1.1																				
K3	<p>9. State and Prove memory less property for Geometric distribution</p>	CO1	1.1.1																				

**Part – C (2×10 = 20 Marks)**

K3	10. There are 3 true coins and 1 false coin with head on both sides. A coin is chosen at random and tossed 4 times. If head occurs all the 4 times, what is the probability that the false coin has been chosen and used?	CO1	2.1.3								
(Or)											
K3	11. If the density function of a continuous random variable $X$ is given by $f(x) = \begin{cases} ax & 0 \leq x < 1 \\ a & 1 \leq x < 2 \\ 3a - ax & 2 \leq x < 3 \\ 0 & \text{otherwise} \end{cases}$ (a) Find the value of $a$ ; (b) Find the cumulative distribution function of $X$ .	CO1	2.1.3								
K3	12. Find the moment generating function, mean and variance of a Binomial Distribution	CO1	1.1.1								
(Or)											
K3	13. In a distribution exactly normal, 7% of the items are under 35 and 89% are under 63. Find the mean and S.D of the distribution. <table border="1"><thead><tr><th colspan="2">From the normal table:</th></tr></thead><tbody><tr><td>Area = 0.19, <math>Z = 0.5</math></td><td>Area = 0.41, <math>Z = 1.35</math></td></tr><tr><td>Area = 0.29, <math>Z = 0.81</math></td><td>Area = 0.42, <math>Z = 1.4</math></td></tr><tr><td>Area = 0.39, <math>Z = 1.23</math></td><td>Area = 0.43, <math>Z = 1.48</math></td></tr></tbody></table>	From the normal table:		Area = 0.19, $Z = 0.5$	Area = 0.41, $Z = 1.35$	Area = 0.29, $Z = 0.81$	Area = 0.42, $Z = 1.4$	Area = 0.39, $Z = 1.23$	Area = 0.43, $Z = 1.48$	CO1	2.1.3
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CO1: Identify standard distributions and apply them.

Prepared By 	Reviewed By 	Approved By 
Course Coordinator	PAC Team	HOD