SR 22

St. Peter's Engineering College (Autonomous) Dullapally (P), Medchal, Hyderabad – 500100. I - Mid Term Examination – September 2024						Dept.	:	CSM/CSC /CSG
						Academic Year 2024-25		
Subject Code	:	AS22-00BS09	Subject	:	PROBABILITY AND STATISTICS			
Class/Section	:	B. Tech	Year	:	II	Semester	:	II
Duration	:	120 Min	Max. Marks	:	30	Date:	:	02.09.2024

BLOOMS LEVEL					
Remember	L1	Understand	L2	Apply	L3
Analyze	L4	Evaluate	L5	Create	L6

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PART – A (10x1M = 10M)

Note: Answer all Questions. Each Question carries equal marks.

Q. No	Question (s)	Marks	BL	CO
	UNIT - I			
1	**a)** Define mean and variance of continuous random variable 1m 1d	1M	L1	C221.1
1m 1e	**b)** If a random variable has the probability density f(x) as $f(x) = \begin{cases} 2e^{-2x}, & x > 0 \\ 0, & x \leq 0 \end{cases}$. Find the probability between 1 and 3	1M	L1	C221.1
	c) Let X denotes the number of heads in a single toss of 4 fair coins. Determine P(1<X<3)	1M	L2	C221.1
	d) Prove that If X is a discrete random variable and K is a constant, then E (X + K) = E (X) + K. 3m 2a	1M	L1	C221.1
	UNIT – II			
	e) 20% of items produced from a factory are defective. Find the probability that in a sample of 5 chosen at random such that none is defective. 3m 2d	1M	L2	C221.2
	f) The mean and variance of a binomial distribution are 4 and 4/3 respectively. Find $P(X \geq 1)$. 1m 1e	1M	L2	C221.2
	g) Derive mean of Binomial distribution.	1M	L2	C221.2
	h) Write the applications of Normal Distribution 1m 1d	1M	L2	C221.2
	UNIT – III			
	i) Define Type-I and Type-II errors. 1m 1c	1M	L1	C221.3
	j) Define Alternative Hypothesis. 1m 1a	1M	L1	C221.3

PART – B (20M)

<table>
<tr><th>Q. No</th><th>Question (s)</th><th>Marks</th><th>BL</th><th>CO</th></tr>
<tr><td colspan="5">UNIT - I</td></tr>
<tr><td>2</td><td>a) Find the mean and variance of the uniform probability distribution given by for f(x) = 1/n , x=1,2,…n. 19</td><td>4M</td><td>L3</td><td>C221.1</td></tr>
<tr><td></td><td>b) A random variable X has the following probability distribution
<table><tr><td>X</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>P(x)</td><td>a</td><td>3a</td><td>5a</td><td>7a</td><td>9a</td><td>11a</td><td>13a</td><td>15a</td><td>17a</td></tr></table>i) Determine the value of a. (ii) Find P(X<3). pg 13</td><td>4M</td><td>L5</td><td>C221.1</td></tr>
<tr><td colspan="5">OR</td></tr>
<tr><td>3</td><td>a) For a continuous probability density function is given by $f(x) = c\,e^{-|x|}, -\infty < x < \infty$. Find the value of c and hence mean and variance pg 11</td><td>8M</td><td>L3</td><td>C221.1</td></tr>
<tr><td colspan="5">UNIT – II</td></tr>
<tr><td>4</td><td>a) Derive the Mean of the Normal distribution. 3m 2c</td><td>4M</td><td>L3</td><td>C221.2</td></tr>
<tr><td></td><td>b) Fit a Poisson distribution to the following data:
<table><tr><td>X</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>Total</td></tr><tr><td>F</td><td>142</td><td>156</td><td>69</td><td>27</td><td>5</td><td>1</td><td>400</td></tr></table></td><td>4M</td><td>L4</td><td>C221.2</td></tr>
<tr><td colspan="5">OR</td></tr>
<tr><td>5</td><td>a) Out of 800 families with 5 children each, how many would you expect to have a)3 boys b)5 girls c) either 2 or 3 boys? Assume equal probabilities for boys &girls. 1m 4a</td><td>4M</td><td>L2</td><td>C221.2</td></tr>
<tr><td></td><td>b) Find the mean and variance of the distribution. In a Normal distribution, 7% of the items are under 35 and 89% are over 63. 5m 3e</td><td>4M</td><td>L2</td><td>C221.2</td></tr>
<tr><td colspan="5">UNIT – III</td></tr>
<tr><td>6</td><td>In big city 325 mean out of 600 men were found to be smokers. Does this information support the conclusion that the majority of men in this city are smokers? pg 4</td><td>4M</td><td>L4</td><td>C221.3</td></tr>
<tr><td colspan="5">OR</td></tr>
<tr><td>7</td><td>A die is tossed 960 times and it falls with 5 upwards 184 times. Is the die unbiased at a level of significance of 0.01.</td><td>4M</td><td>L5</td><td>C221.3</td></tr>
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