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Even Semester Examination-2023 (Backlog)

Paper Name: Mathematics-II

Paper Code: BTCSE-202

Time: 3 Hours

NOTE: Programmable calculator is not allowed.

Maximum Marks: 75

PART -A

(All questions are compulsory)

(7 X 5 = 35)

S. No	Questions	Marks	Course Learning Outcomes	Blooms Taxonomy Level												
Q.1	If A and B are two events such that $P(A) = 1/3$ and $P(B) = 3/4$ and $P(A \cup B) = 11/12$, find $P(A/B)$ and $P(B/A)$.	5	CLO1	L3												
Q.2	A normal population has a mean of 0.1 and standard deviation of 2.1. Find the probability that mean of a sample of size 900 will be negative.	5	CLO4	L4												
Q.3	Two airplanes bomb a target in succession. The probability of each correctly scoring a hit is 0.3 and 0.2 respectively. The will bomb only if the first misses the target. Find the probability that (i) target is hit (ii) both fail to score hit.	5	CLO1	L3												
Q.4	Construct the distribution function and compute $P(X > \frac{1}{2})$, where $f(x) = \begin{cases} ke^{-x} & \text{if } 1 > x > 0 \\ 0 & \text{otherwise} \end{cases}$ is a probability density function for some constant k.	5	CLO2	L6												
Q.5	Out of 800 families with 5 children each how many would you expect to have (i) 3 boy (ii) at least one boy.	5	CLO1	L3												
Q.6	For the following data: <table border="1"> <tr> <td>Marks</td> <td>6</td> <td>9</td> <td>12</td> <td>15</td> <td>18</td> </tr> <tr> <td>No. of students</td> <td>7</td> <td>12</td> <td>19</td> <td>10</td> <td>2</td> </tr> </table> Find (i) mean (ii) variance.	Marks	6	9	12	15	18	No. of students	7	12	19	10	2	5	CLO5	L4
Marks	6	9	12	15	18											
No. of students	7	12	19	10	2											
Q.7	In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal, find how many students score between 12 and 15. Given that $P(-\infty < x < -0.8) = 0.2119$ and $P(-\infty < x < -0.4) = 0.6554$	5	CLO2	L3												

PART – B

(Attempt any Four Questions out of Six)

(4 X 10 = 40)

S. No	Questions	Marks	Course Learning Outcomes	Blooms Taxonomy Level																		
Q.1	For the following data: <table><tr><td>Marks</td><td>0-10</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td></tr><tr><td>No. of students</td><td>3</td><td>5</td><td>7</td><td>9</td><td>11</td></tr></table> Find (i) first four moments (ii) kurtosis (iii) skewness (iv) and standard deviation.	Marks	0-10	10-20	20-30	30-40	40-50	No. of students	3	5	7	9	11	10	CLO4	L3						
Marks	0-10	10-20	20-30	30-40	40-50																	
No. of students	3	5	7	9	11																	
Q.2	Let X and Y be random variables having joint density function $f(x,y) = \begin{cases} x+y, & 0 \leq x \leq 1, 0 \leq y \leq 1 \\ 0 & \text{otherwise} \end{cases}$ Find (a) $Var(X)$ (b) $Var(Y)$ (c) σ_X (d) σ_Y (e) σ_{XY}.	10	CLO3	L3																		
Q.3	The mean life time of a sample of 100 fluorescent light bulbs produced by a company is computed to be 1570 hours with a standard deviation of 120 hours. If μ is the mean life time of all the bulbs produced by the company, test the hypothesis $\mu = 1600$ hours against the alternative hypothesis $\mu \neq 1600$ hours, using the level of significance of (a) 0.05 and (b) 0.01.	10	CLO5	L2																		
Q.4	Fit a second degree curve (say, parabola) $Y = p + qX + rX^2$ for the following data: <table><tr><td>X</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>Y</td><td>2</td><td>4</td><td>6</td><td>8</td><td>10</td></tr></table>	X	0	1	2	3	4	Y	2	4	6	8	10	10	CLO4	L5						
X	0	1	2	3	4																	
Y	2	4	6	8	10																	
Q.5	A random variable X has the following distribution <table><tr><td>x</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>$f(x)$</td><td>c</td><td>$2c$</td><td>$3c$</td><td>$4c$</td><td>$5c$</td><td>$6c$</td><td>$7c$</td><td>$8c$</td></tr></table> Determine (i) c (ii) the probability distribution function (iii) variance (iv) $P(2 \leq x \leq 5)$.	x	1	2	3	4	5	6	7	8	$f(x)$	c	$2c$	$3c$	$4c$	$5c$	$6c$	$7c$	$8c$	10	CLO1	L4
x	1	2	3	4	5	6	7	8														
$f(x)$	c	$2c$	$3c$	$4c$	$5c$	$6c$	$7c$	$8c$														
Q.6 (a)	A manufacturer claims that only 4% of his products are defective. A random sample of 500 were taken among which 100 were defective. Test the hypothesis at 5% level.	6	CLO4	L3																		
(b)	If X is a Poisson variate such that $P(X = 1) = P(X = 2)$, find (i) mean (ii) $P(X = 4)$.	4	CLO1	L3																		

BL – Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3- Applying, 4- Analyzing, 5- Evaluating, 6- Creating)
CO-Course Outcomes

*****End of Paper*****