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)

Q. No	Question (s)	Marks	BL	CO
	UNIT - I			
1	**a)** For the following the probability distribution x: -3, 6, 9 P(X=x): 1/6, ½, 1/3 Find E(X)	1M	L2	C221.1
1m 1c	**b)** A random sample with replacement of size 2 is taken from $S=\{1,2,3\}$. Let the random variable X denote the sum of the two numbers taken, write the probability distribution.	1M	L1	C221.1
	c) If the probability density of a random variable is given by $f(x)=\begin{cases}k(x^2-1), & -1\le x\le 3\\ 0, & otherwise\end{cases}$ find the value of k 3m 2c	1M	L1	C221.1
	d) Define mean and variance of continuous random variable 1m 1d	1M	L3	C221.1
	UNIT – II			
	e) Determine the probability of getting a sum of 9 exactly twice in 3 throws with a pair of dice.	1M	L2	C221.2
	f) Ten coins are thrown simultaneously. Find the probability of getting atleast seven heads.	1M	L1	C221.2
	g) Average number of accidents on any day on a national highway is 1.8. Determine the probability the number of accidents are atleast one.	1M	L2	C221.2
	h) If X is normal variate with mean 30 and standard deviation 5. Find the probabilities that $26 \le X \le 40$. 3m 2e	1M	L1	C221.2
	UNIT – III			

	i) Derive critical values of Z for both two tailed and single tailed tests at 1%, 2% and 5% level of significance. 1m 1e	**1M**	**L1**	**C221.3**
	j) Define one tailed and two tailed tests.	**1M**	**L2**	**C221.3**

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

PART – B (20M)

Q. No	Question (s)	Marks	BL	CO
	UNIT - I			
2	**a)** A sample of 4 items is selected at random from a box containing 12 items of which 5 are defected. Find the expected number E of defective items. pg 18	**4M**	**L3**	**C221.1**
	b) Find the mean and variance of the uniform probability distribution given by $f(x)=\frac{1}{n}$ for x=1,2,…n. pg 19	**4M**	**L2**	**C221.1**
	OR			
3	**a)** If X is a continuous random variable and Y = aX +b. Prove that E(Y) = a E(X)+b and $V(Y)=a^2V(X)$ where V stands for variance and a, b are constants.	**4M**	**L5**	**C221.1**
	b) For the continuous probability function f(x) = kx^2e^{-x} when $x \geq 0$, find mean and variance.	**4M**	**L3**	**C221.1**
	UNIT – II			
4	**a)** 20% of items produced from a factory are defective. Find the probability that in a sample of 5 chosen at random (i) none is defective (ii) one is defective (iii) p(1<x<4) 3m 2d	**4M**	**L5**	**C221.2**
	b) Seven coins are tossed and the number of heads are noted. The experiment is repeated 128 times and the following distribution is obtained. 10m 4c X: 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Total F: 7 | 6 | 19 | 35 | 30 | 23 | 7 | 1 | 128 Fit a binomial distribution assuming the coin is unbiased.	**4M**	**L4**	**C221.2**
	OR			
5	**a)** In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and variance of distribution	**4M**	**L3**	**C221.2**
	b) Derive mean and variance of poisson distribution. 5m 3b	**4M**	**L4**	**C221.2**
	UNIT – III			
6	An ambulance service claims that it takes on the average less than 10 minutes to reach its destination in emergency calls. a sample of 36 calls has a mean of 11 minutes and the variance of 16 minutes. test the significance at 5% level of significance.	**4M**	**L3**	**C221.3**
	OR			

7	In a sample of 1000 people in Karnataka 540 are rice eaters and the rest are wheat are equally popular in this state at 1% level of significance? 5m 3e	**4M**	**L3**	**C221.3**

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