

UNIT-II

Random Variables and Probability Distributions

S.NO	PART-A(SHORTANSWERQUESTIONS)	BT	CO	PO										
1	Define discrete and continuous random variable.	L1	CO2	PO1										
2	Write the formula for mean and variance of a discrete random variable.	L1	CO2	PO1										
3	Write the formula for mean and variance of a continuous random variable.	L1	CO2	PO1										
4	Write the formula of mean and variance of a Binomial distribution.	L2	CO2	PO1										
5	Define Poisson distribution.	L1	CO2	PO1										
6	If the probability of a defective bolt is 0.2 find the mean and variances of the number of successes.	L2	CO2	PO2										
7	If a random variable has a Poisson distribution such that $P(1) = P(2)$, find mean of the distribution.	L2	CO2	PO2										
8	In 256 set of 12 tosses of a coin, in how many cases one can expect 8 heads and 4 tails.	L2	CO2	PO2										
9	20% of item produced from a factory are defective. Find the probability that in a sample of 5 chosen at random $P(1 < x < 4)$.	L2	CO2	PO2										
10	Let the random variable X represent the number of defective parts for a machine when 3 parts are sampled from a production line and tested. The following is the probability distribution of X. <table border="1"> <tr> <td>x</td><td>0</td><td>1</td><td>2</td><td>3</td></tr> <tr> <td>F(x)</td><td>0.51</td><td>0.38</td><td>0.10</td><td>0.01</td></tr> </table> Calculate Mean.	x	0	1	2	3	F(x)	0.51	0.38	0.10	0.01	L2	CO2	PO2
x	0	1	2	3										
F(x)	0.51	0.38	0.10	0.01										

11		Seven coins are tossed and the number of heads are noted. The experiment is repeated 128 times and the following distribution is obtained. Fit a Binomial Distribution to the following data assuming the coin is unbiased <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></tr><tr><td>f</td><td>7</td><td>6</td><td>19</td><td>35</td><td>30</td><td>23</td><td>7</td><td>1</td></tr></table>	x	0	1	2	3	4	5	6	7	f	7	6	19	35	30	23	7	1	L3,L5	CO2	PO3
x	0	1	2	3	4	5	6	7															
f	7	6	19	35	30	23	7	1															
12		If the probability that an individual suffers a bad reaction from a certain injection is 0.001, determine the probability that out of 2000 individuals i. Exactly 3 ii. More than 2 individuals iii. None iv. More than one individual suffers bad reaction	L3	CO2	PO2																		
13	a)	A die is tossed until 6 appears. Find the probability that it must be cast more than 5 times.	L1	CO2	PO1																		
	b)	A lot containing 7 components is sampled by a quality inspector. The lot contains 4 good components and 3 defective components. A sample of 3 items is taken by the inspector. Find the expected values of the number of good components in the sample.	L3	CO2	PO2																		
14		Out of 800 families with 5 children each, how many would you expect to have a. 3boys b. 5girls c. At least one boy d. Mean e. Variance	L3,L4,L5	CO2	PO3																		
15		Derive Mean , variance of Poisson distribution	L1	CO2	PO1																		
16	a)	If a Poisson Distribution is such that $P(X=1) \cdot \frac{3}{2} = P(X=3)$,find (i) $P(X \geq 1)$ (ii) $p(x \leq 3)$ (iii) $P(2 \leq x \leq 5)$.	L3	CO2	PO2																		
	b)	Average number of accidents on any day on a national highway is 1.8. Determine the probability that the number of accidents are (i) at least one (ii) at most one.	L3	CO2	PO2																		

