



**SAL Institute of Technology and Engineering Research**

**Department of Computer Applications (306)**

**Bachelor Of Computer applications (BCA)**

**SUBJECT: - Mathematical Foundation for AI**

**SEM: - 3**

**Practice Sheet-1**

**CHAPTER No.-2 Probability & Statistics**

<b>1</b>	An unbiased coin is tossed 3 times. What is the probability of obtaining two heads (exactly)?
<b>2</b>	A bag contains 5 white and 10 black balls. Three balls are taken out at random. Find the probability that all three balls drawn are black.
<b>3</b>	Two cards are drawn from a pack of cards. Find the probability that they will be both red or both pictures.
<b>4</b>	Three boxes contain 10%, 20% and 30% of defective finger joints. A finger joint is selected at random which is defective. Determine the probability that it comes from (a) First box (b) Second box (c) Third box.
<b>5</b>	If A and B are two events such that $P(A) = 0.3, P(B) = 0.4, P(A \cap B) = 0.2$ . Find (i) $P(A \cup B)$ , (ii) $P((A/\bar{B}))$ and (iii) $P(\bar{A}/B)$
<b>6</b>	Define Mutually exclusive events and independent events. If A and B are Independent events, where $P(A) = 1/4, P(B) = 2/3$ . Find $P(A \cup B)$ .
<b>7</b>	From a city population, the probability of selecting (a) a male or a smoker is $\frac{7}{10}$ , (b) a male smoker is $\frac{2}{5}$ , and (c) a male, if smoker is already selected is $\frac{2}{3}$ , Find the probability of selecting (i) a non-smoker, (ii) a male, and (iii) a smoker, if a male is first selected.

8	State Bayes' theorem. A microchip company has two machines that produce the chips. Machine I produces 65% of the chips, but 5% of its chips are defective. Machine II produces 35% of the chips and 15% of its chips are defective. A chip is selected at random and found to be defective. What is the probability that it came from Machine I?																		
9	An urn contains 10 white and 3 black balls, while another urn contains 3 white and 5 black balls. Two balls are drawn from the first urn and put into the second urn and then a ball is drawn from the latter. What is the probability that it is a white ball?																		
10	For the following probability distribution. <table><tr><td>x</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>F(x)</td><td>0.1</td><td>0.1</td><td>0.2</td><td>0.3</td><td>0.3</td></tr></table> <p>(i) Find the mean and variance</p> <p>(ii) Find the distribution function</p>	x	1	2	3	4	5	F(x)	0.1	0.1	0.2	0.3	0.3						
x	1	2	3	4	5														
F(x)	0.1	0.1	0.2	0.3	0.3														
11	A machine produces on average of 500 items during the first week of the month And on average of 400 items during the last week of the month. The probability for these being 0.68 and 0.32. Determine the expected value of the production.																		
12	The monthly demand for allwyn watches is known to have the following probability 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>0.08</td><td>0.12</td><td>0.19</td><td>0.24</td><td>0.16</td><td>0.10</td><td>0.07</td><td>0.04</td></tr></table> Find the expected demand for watches. Also, compute the variance.	X	1	2	3	4	5	6	7	8	F(x)	0.08	0.12	0.19	0.24	0.16	0.10	0.07	0.04
X	1	2	3	4	5	6	7	8											
F(x)	0.08	0.12	0.19	0.24	0.16	0.10	0.07	0.04											
13	The mean and variance of a binomial variate are 8 and 6. Find $p(X \geq 2)$ .																		
14	The mean and variance of a binomial distribution are 4 and $4/3$ respectively. Find $P(X \geq 1)$ .																		
15	If the mean of a Poisson variable is 1.8, find (i) $P(X > 1)$ , (ii) $P(X = 5)$ , and (iii) $P(0 < X < 5)$ .																		
16	If a random variable has a Poisson distribution such that $P(X = 1) = P(X = 2)$ , find (i) the mean of the distribution, (ii) $P(X = 4)$ , (iii) $P(X \geq 1)$ , and (iv) $P(1 < X < 4)$																		
17	If the variance of a Poisson variable is 3, find the probability that (i) $0 < X < 3$ , and (ii) $1 \leq X \leq 4$ .																		