Seat No. : 7098

DF-102

December-2022

B.B.A., Sem.-III

CC-206 : Elementary Statistics

Time : 2:30 Hours] **[Max. Marks : 70**

1. (A) There are two children in a family. If the first child is a girl then find the probability that both the children in the family are girls (Use Conditional Probability). 7

(B) Joyaan Limited runs a factory. In a factory, packets of produced blades are prepared having 50 blades in each packet. A quality engineer randomly selects a packet from these packets and examines all the blades of the selected packet. If 4 or more defective blades are observed in the selected packet then the packet is rejected. The probability distribution of the defective blades in the packet is given below : 7

X	0	1	2	3	4	5	6 or more
P(x)	9K	3K	3K	2K	2K	K-0.02	0.02

From the given probability distribution,

(i) Find constant K.

(ii) Find the probability that the randomly selected packet is accepted by the quality control engineer.

OR

(A) Johaana Limited produces a certain type of item in its two different factories T and V in the proportion 60% and 40% respectively. The proportions of defectives in the production of these factories are 2% and 3% respectively. One item is randomly selected after mixing the items produced in the two factories. Find the probability that this item is defective from factory T (Use Bayes Theorem). 7

(B) Write the properties of Expected Value with respect to Mathematical Expectation. 7

2. (A) In a binomial distribution, for $P(X = x) = p(x)$, $n = 8$ and $2p(4) = 5p(3)$. Find the probability of getting success in all the trials for this distribution. 7

(B) A random variable x follows Poisson Law such that $P(x = k) = P(x = k + 1)$. Find its mean and variance (Use Poisson Distribution). 7

OR

(A) Write the uses and Properties of Binomial Distribution and Poisson Distribution. 7

(B) Jannet has a bag. It contains number of black and white balls. 10% of the total number of balls in the bag are of white colour. 5 balls are selected from the bag. Find the mean of white balls in the bag (Use Hyper Geometric Distribution). 7

3. (A) Pravin Limited has obtained the data for two variables x and y.

$n = 30$, $\Sigma x = 120$, $\Sigma xy = 356$, $\Sigma x^2 = 600$, $\Sigma y = 90$, $\Sigma y^2 = 250$.

However, later on it was observed that two pairs were wrongly taken as (8, 10) and (12, 7) instead of (8, 12) and (10, 8). Find the correct value of the correlation co-efficient. 7

(B) Find the regression equation of Y on X and X on Y from the following information : 7

X	28	41	40	38	35	33	46	32	36	33
Y	30	34	31	34	30	26	28	31	26	31

OR

(A) Johaana Ltd. has collected the data. From the following data find the correlation co-efficient. 7

	25-30	30-35	35-40	40-45	45-50
0	–	3	5	7	8
1	–	–	9	4	1
2	3	5	10	3	–
3	4	9	6	–	–
4	12	7	3	1	–

(B) In a trivariate distribution, $\bar{x}_1 = 28.02$, $\bar{x}_2 = 4.91$, $\bar{x}_3 = 594$, $S_1 = 4.4$, $S_2 = 1.1$, $S_3 = 80$, $r_{12} = 0.8$, $r_{13} = -0.4$, $r_{23} = -0.56$. Estimate x_1, when $x_2 = 6$ and $x_3 = 650$. 7

4. (A) Joyaan & Manvit Ltd. gives the following information. Draw $\bar{X}$ and R chart and write the conclusion. (For n = 5, $A_2 = 0.577$, $D_3 = 0$, $D_4 = 2.115$) 7

Sample	$\bar{X}$	R
1	12.8	2.1
2	13.1	3.1
3	13.5	3.9
4	12.9	2.1
5	13.2	1.9
6	14.1	3.0
7	12.1	2.5
8	15.5	2.8
9	13.9	2.5
10	14.2	2.0

(B) Draw O. C. Curve for a single sampling plan (50, 10, 0). 7

OR

(A) Vani Limited producing piston rings, samples of 200 rings are taken daily. The record of defective rings is given below. Draw an appropriate chart and report on the state of control. 7

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Defective Rings	18	10	20	20	26	20	26	12	15	17	31	34	32	13	10

(B) Johaana & Viyaan collected the following data for a single sampling plan with lot size 2000 and sample size 100, the probabilities of acceptance P_a for different fraction defectives are given below. Draw ASN, ATI and AOQ curves. 7

p'	0	0.01	0.02	0.03	0.04	0.05	0.06
P_a	1.0	0.92	0.68	0.42	0.24	0.12	0.06

5. Give the following answer. (Attempt any 7 out of 12)

(1) Three coins are tossed simultaneously. What is the probability of getting two heads and one tail ?

(a) $\frac{3}{8}$ (b) $\frac{5}{8}$ (c) 0 (d) None

(2) For the discrete random variable, $E(X) = 5$ and $E(X^2) = 35$, what will be the variance of this distribution ?

(a) 10 (b) 30 (c) 49 (d) None

(3) From the following find the value of p.

X	0	1	2	3	4
Probability	$\frac{1}{10}$	p	$\frac{3}{10}$	p	$\frac{1}{10}$

(a) $\frac{1}{4}$ (b) $\frac{1}{5}$ (c) $\frac{3}{4}$ (d) None

(4) The mean and variance of a binomial distribution are 3.9 and 2.73 respectively. What will be the numbers of Bernoulli Trials ?

(a) 13 (b) 10 (c) Both (d) None

(5) The mean of a poisson distribution is 3. What will be the standard deviation ?

(a) 1.21 (b) 1.73 (c) Infinite (d) None

(6) Write two uses of Hyper Geometric Distribution.

(7) In usual notations, Which term is added in Σd^2 for each repeated observation in the rank correlation ?

(a) $\frac{m^3 - m}{6}$ (b) $\frac{m^3 - m}{12}$ (c) Both (d) None

(8) What is the value of b_{yx} if the regression line is $2x + 3y - 50 = 0$?

(a) $\frac{2}{3}$ (b) $-\frac{2}{3}$ (c) 0 (d) None

(9) If $r_{12} = 0.8, r_{13} = -0.4, r_{23} = -0.56$, What is the value of $r_{12.3}$?

(a) –0.99 (b) 0.76 (c) –0.07 (d) None

(10) If $\bar{C} = 2.25$ what is lower control limit of C – Chart ?

(a) 4 (b) 2.25 (c) 0 (d) None

(11) From a production process for 10 samples each of size 100 are taken and the average fraction defective is found to be 0.02. What will be the central line for np Chart ?

(a) –1 (b) +1 (c) 2 (d) None

(12) From the following which is /are correct ?

(I) $r21.3 = r12.3$

(II) $r31.2 = r13.2$

(III) $r32.1 = r23.1$

(a) Only I (b) Only II (c) All I, II & III (d) None