

DF-101

December-2018

B.B.A., Sem.-III**CC-206 : Elementary Statistics**

Time : 2:30 Hours]

[Max. Marks : 70

1. (A) Do as directed :

- (1) Three families have respectively 3 boys and 2 girls; 2 boys and 3 girls; 2 boys and 2 girls. One child is selected from each family randomly. Find the probabilities that the selected group of 3 children will have (i) 2 boys and 1 girl (ii) all boys (iii) all girls. 7
- (2) The probability distribution of a random variable x is as follows : 7

x_i	0	1	2	3	4
Probability	$\frac{2}{20}$	$2p$	$\frac{6}{20}$	$2p$	$\frac{2}{20}$

From the above, find (i) the value of p (ii) $E(x+1)$ **OR**

- (1) Jilvi has three urns containing respectively 2 white and 2 black balls; 3 white and 4 black balls; 1 white and 3 black balls. One urn is selected at random and a ball is drawn from it. The ball is found to be white. Find the probabilities that this ball comes from (i) first urn (ii) third urn. 7
- (2) A coin is tossed until a head appears. What is the expected number of tosses ? 7

(B) Choose the correct option from the following : (Any four) 4

- (1) What is the probability of 53 Sundays in a leap year ? 4
- (a) $\frac{2}{7}$ (b) $\frac{1}{7}$ (c) 0 (d) None
- (2) In mathematical expectation, what is the maximum total of $\sum p(x_i)$?
- (a) 1 (b) 0 (c) Any (d) None
- (3) What is the probability of 5 Monday in February which is not a leap year ?
- (a) 1 (b) 0 (c) 0.5 (d) None
- (4) If one number is randomly selected between 1 to 20, what is the probability that the number is a multiple of 5 ?
- (a) $\frac{1}{2}$ (b) $\frac{1}{5}$ (c) $\frac{1}{6}$ (d) None
- (5) If $P(A) = 0.4$ and $P(B) = 0.3$, what is the value of $P(A \cap B)$ if A & B are independent events.
- (a) 1.2 (b) 0.012 (c) 0.12 (d) None
- (6) What is the other name of classical definition of probability ?
- (a) Axiomatic (b) Statistical (c) Mathematical (d) None

2. (A) Do as directed :

(1) The probability that a bomb dropped from a plane will hit a target is $\frac{3}{5}$.

Two bombs are enough to destroy a bridge. If 4 bombs are dropped on a bridge, find the probabilities that,

- (i) The bridge will be saved.
- (ii) The bridge will be partially destroyed.
- (iii) The bridge will be destroyed.

(2) A random variable x follows Poisson law such that $P(x = k) = P(x = k + 1)$. Find the mean and variance of Poisson distribution.

OR

(1) State the properties of Poisson distribution.

(2) Mr. Taksh has a bag which contain certain number of black and white balls. 10% of the total number of balls in the bag is of white colour. 5 balls are selected from the bag. Find mean of white balls in the bag. (Use hyper-geometric distribution)

(B) Choose the correct option from the following : (Any four)

(1) What are the parameters of Binomial distribution ?

- (a) n & p (b) n , p & q (c) p & q (d) None

(2) For Binomial distribution, which is true ?

- (a) Mean $>$ Variance (b) Mean $<$ Variance
(c) Mean = Variance (d) None

(3) For Poisson distribution, which is true ?

- (a) Mean $>$ Variance (b) Mean = Variance
(c) Mean $<$ Variance (d) None

(4) Poisson distribution was first given by which mathematician ?

- (a) Jack Poisson (b) Simeon De Poisson
(c) T. K. Poisson (d) None

(5) What are the parameters of the Hyper Geometric Distribution ?

- (a) m & n (b) n & r (c) m , n & r (d) None

(6) When $(m + n)$ is very large, Hyper Geometric Distribution tends to which distribution ?

- (a) Hyper Geometric (b) Poisson Distribution
(c) Binomial Distribution (d) None

3. (A) Do as directed :

(1) From the following, find the correlation co-efficient.

Marks	Age of Candidate				
	18	19	20	21	22
200 - 250	6	6	4	2	-
250 - 300	-	4	8	4	4
300 - 350	6	10	10	4	-
350 - 400	-	2	4	6	6
400 - 450	-	-	4	8	2

- (2) The regression equations of two variables are as under :

$$5y = 9x - 22$$

$$20x = 9y + 350$$

Find means of x and y and also find the value of correlation co-efficient.

OR

- (1) Find the rank correlation from the following data :

X	66	40	35	75	65	80	35	20	85	65	55	33
Y	30	55	68	28	76	25	80	85	20	35	45	65

- (2) Obtain the equation of both the regression line of V on T and T on V from the data given below and estimate T when $V = 50$.

T	0	20	40	60	80
V	54	65	75	85	96

- (B) Choose the correct option from the following : (Any three)

- (1) Which correlation co-efficient can be used to measure the extent of linear relationship between two variables ?

(a) Karl Pearson (b) Spearman (c) Both (d) None

- (2) When we eliminate the linear effect of other variables from these variables, this study is known as which type of study ?

(a) Partial Correlation (b) Multiple Correlation

(c) Both (d) None

- (3) From the following which is correct for $b_{13.2}$?

(a) $\frac{r_{13} - r_{12}r_{32}}{1 - r_{32}^2} \cdot \frac{S_1}{S_2}$

(b) $\frac{r_{13} - r_{12}r_{32}}{1 - r_{32}^2} \cdot \frac{S_1}{S_3}$

(c) $\frac{r_{13} - r_{12}r_{32}}{1 - r_{32}^2} \cdot \frac{S_2}{S_3}$

(d) None

- (4) From the following which is correct for $r_{12.3}$?

(a) $\frac{r_{13} - r_{13}r_{23}}{\sqrt{(1 - r_{23}^2)(1 - r_{13}^2)}}$

(b) $\frac{r_{12} - r_{13}r_{23}}{\sqrt{(1 - r_{13}^2)(1 - r_{23}^2)}}$

(c) $\frac{r_{12} - r_{13}r_{23}}{\sqrt{(1 - r_{13}^2)(1 - r_{23}^2)}}$

(d) None

- (5) From the following, which is true ?

(a) $r_{12.3} = r_{21.3}$

(b) $r_{13.2} = r_{31.2}$

(c) $r_{23.1} = r_{32.1}$

(d) All are correct

4. (A) Do as directed.

- (1) Draw \bar{X} and R chart from the following data :

Sample No.	1	2	3	4	5	6	7	8	9	10
\bar{X}	128	131	135	129	132	141	121	155	139	142
R	21	31	39	21	19	30	25	28	25	20

$$(A_2 = 0.577, D_3 = 0, D_4 = 2.115)$$

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

OR

- (1) From the following, draw an appropriate chart.

Sample No.	No. of Defects
1	6
2	7
3	15
4	10
5	26
6	15
7	12
8	10
9	5
10	6
11	19
12	25
13	20
14	2
15	8

- (2) For a single sampling plan (1000, 100, 3) the different values of p_a for the values of p' are given below. Draw ASN, ATI and AOQ curves.

p_a	0	0.01	0.02	0.03	0.04	0.05	0.06
p'	1	0.981	0.8569	0.6474	0.4334	0.2670	0.15

- (B) Choose the correct option from the following : (Any three)

- (1) C - chart is based on which distribution ?
- (a) Poisson (b) Binomial
(c) Hyper Geometric (d) None
- (2) The probability that a point will fall outside the control limits in \bar{X} - chart is _____ when only chance causes are present in the process.
- (a) 0.0027 (b) 0.9473 (c) 0.6745 (d) None
- (3) For control chart $UCL \bar{X} = 325$ and $LCL \bar{X} = 275$, then central line = _____.
- (a) 600 (b) 300 (c) 325 (d) 275
- (4) If $p_a = 0.92$, what is Producers risk ?
- (a) 0.92 (b) 0.08 (c) 1 (d) None
- (5) For Acceptance Sampling, AQL stands for,
- (a) Accepted Quality Level (b) Acceptable Quality Level
(c) Both (d) None