Code No.: 7522   Sub. Code: ZKCM 12

M.Com. (CBCS) DEGREE EXAMINATION, APRIL 2023.

First Semester

Commerce – Core

STATISTICS

(For those who joined in July 2021 onwards)

Time : Three hours   Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer:

1. $q = ?$

    (a) $n - p$ (b) $p - 1$

    (c) $1 - p$ (d) np

2. Under Poisson distribution $(np)(a)\bar{X} = ?$

   (a) np

   (b) $n - p$

   (c) nq

   (d) $\sum X / n$

3. $N(Po) = $ under $(Ne - m)$ Poisson distribution.

   (a) Nm^{-c}

   (b) Ne^{-m}

   (c) Ne^{-p}

   (d) Ne^{-q}

4. Hypothesis means _____.

   (a) Assumption

   (b) Estimation

   (c) Standard error

   (d) observation

5. Type I error _____.

   (a) Hypothesis false

   (b) Hypothesis true, test accepts it

   (c) Hypothesis is true

   (d) Hypothesis true test reject it

6. The chi-square test symbol is _____.

   (a) d^2

   (b) χ^2

   (c) (p)

   (d) $(x)^2$

7. The formula for Chi-square test $=$

   (a) $\sum (O - E)^2 / E$

   (b) $\sum (O - E)^2$

   (c) $\sum (O - E) / E$

   (d) $\sum (O - E) / E^2$

8. Assumptions in analysis of variance are _____.

   (a) Normality

   (b) Homogeneity

   (c) Independence of error

   (d) All of the above

9. The relationship between mean sum of square between samples and mean sum of square within sample is called as _____.

   (a) Variance ratio of T

   (b) Variance ratio of Z

   (c) Variance ratio of F

   (d) ANOVA

10. The R chart is used to show the _____.

   (a) Variability of the quality

   (b) Variability of the quantity

   (c) Both

   (d) None of the above

PART B — (5 × 5 = 25 marks)

Answer ALL the questions, choosing either (a) or (b).

11. (a) The mean of the Poisson distribution is 2.25. Find the other constants of the distribution.

   Or

   (b) If on an average 8 ships out of 10 arrive safety at a port, find the mean and standard deviation of the number of ships arriving safely out of a total of 1600 ships.

12. (a) A coin was tossed 400 times and the head turned up 216 times. Test the hypothesis that the coin is unbiased.

   Or

   (b) In a sample of 500 people from a village in Rajasthan, 280 are found to be rice eaters and the rest wheat eaters. Can we assume that both the food articles are equally popular?

13. (a) Explain the Non-Parametric test.

   Or

   (b) In an anti a material campaign in a certain area, quinine was administered to 812 persons out of a total population of 3,248. The number of fever cases is shown below:

Treatment	Fever	No fever	Total
Quinine	20	792	812
No quinine	220	2,216	2,436
Total	240	3,008	3,248

   Discuss the usefulness of quinine in checking malaria.

14. (a) What do you meant by statistical theory?

   Or

   (b) Advantages of decision theory approach.

15. (a) Explain the X–Bar chart.

   Or

   (b) Write the uses of C-chart.

Answer ALL questions, choosing either (a) or (b).

16. (a) The following data show the number of seeds germinating out of 10 on damp filter for 80 set of seeds. Fit a binomial distribution to this data.

X:	0	1	2	3	4	5	6	7	8	9	10
Y:	6	20	28	12	8	6	0	0	0	0	0

Or

(b) Write the properties of a Poisson distribution.

17. (a) The following mistakes per page were observed in book:

No. of mistakes per page	0	1	2	3	4
No. of times the mistake occurred	211	90	19	5	0

Fit a passion distribution to fit data.

Or

(b) To assess the significance of possible variation in performance in a certain test between the grammar schools of a city, a common test was given to a number of students taken at random from the senior fifth class of each of the four schools concerned. The results are given below. Make an analysis of variance of data.

Schools

A	B	C	D
8	12	18	13
10	11	12	9
12	9	16	12
8	14	6	16
7	4	8	15

18. (a) Use the sign test to see if there is a difference between the number of days until collection of an account receivable before and after a new collection policy. Use the 0.05 significance level.

Before 30 28 34 35 40 42 33 38 34 45 28 27 25 41 36

After 32 29 33 32 37 43 40 41 37 44 27 33 30 38 36

Or

(b) Explain the limitation of Non–Parametric test.

19. (a) A baker produces a certain type of special pastry at a total average cost of Rs. 3 and sells it at a price of Rs. 5. This pastry is produced over the weekend and is sold during the following week: such pastries being produced but not sold during a week's time are totally spoiled and have to be thrown away. According to past experience the weekly demand for these pastries is never less than 78 or greater than 80. You are required to formulate action space, payoff table and loss table.

Or

(b) A proprietor of a food-stall has introduced a new item of food delicacy which he calls WHIM. He has calculated that the cost of manufacture is Re. 1 per piece and that because of its novelty and quality it would be sold for Rs. 3 per piece. It is however, perishable and any goods unsold at the end of the day are a dead loss. He expects the demand to be variable and has drawn up the following probability distribution expressing his estimates:

No. of pieces demanded	10	11	12	13	14	15
Probability	07	10	23	38	12	10

(i) Find an expression for his net profit or loss if he manufactures m pieces and only n are demanded. Consider separately the two cases $n > m$, $n < m$.

(ii) Assume that he manufactures 12 pieces. Using the results in (i) above find his net profit or loss for each level of demand.

(iii) Using the probability distribution, calculate his expected net profit or loss if he manufactures 12 pieces.

(iv) Calculate similarly the expected profit or loss for each of the other levels of manufacture ($10 < m < 15$).

(v) How many pieces should be manufactured so that his net expected profit is maximum?

20. (a) Assume that 20 ½ litre milk bottles are selected at random from a process. The number of air bubbles (defects) observed from the bottles is given in the table. [c = No. of air bubbles (defects) in each bottle]

Bottle Number (sample order)	Defects c	Bottle number (sample order)	Defects c
1	4	11	3
2	5	12	5
3	7	13	4
4	3	14	3

Bottle Number (sample order)	Defects c	Bottle number (sample order)	Defects c
5	3	15	4
6	5	16	5
7	6	17	3
8	2	18	7
9	4	19	6
10	8	20	13
		Total number of defects	100

Draw a control chart for the above data.

Or

(b) Describe advantages and limitation of statistical Quality control.