(7 pages)   Reg. No. : ....

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B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023.

Second/Fourth Semester

Mathematics — Allied

STATISTICS — II

(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. Geometric Mean of Paasche and Laspeyre Index Numbers is _____.

   (a) Bowley Index Number

   (b) Fisher Index Number

   (c) Marshal Edgeworth Index Number

   (d) Kelly Index Number

2. Aggregate expenditure method of cost of living index is nothing but the following _____.

   (a) Marshall Edgeworth Index

   (b) Laspeyere's Index

   (c) Fisher's Index

   (d) Bowley's Index

3. Type II error is otherwise known as _____.

   (a) Rejection error   (b) Acceptance error

   (c) Probable error   (d) Standard error

4. Sample is a part of _____.

   (a) Sampling   (b) Population

   (c) Probability   (d) None of these

5. Test for equality of means based on two small samples is based on _____.

   (a) Normal distribution

   (b) χ^2 distribution

   (c) F-distribution

   (d) t-distribution

6. In which one of the following sampling design proportional allocation is used?

   (a) SRS

   (b) Stratified random sample

   (c) Systematic sample

   (d) None

7. The error degrees of freedom for two-way classified data is _____.

   (a) $pq(n-1)$ (b) $np(q-1)$

   (c) $nq(p-1)$ (d) $(p-1)(q-1)$

8. The basic principles of design of experiment are _____.

   (a) Local control   (b) Randomization

   (c) Replication   (d) All of these

9. Which of the following is suitable for P-chart?

   (a) Number of defective pieces

   (b) Measurable values

   (c) Number of defects in a unit

   (d) None of the above

10. In SQC, the important tools is _____.

    (a) Control charts   (b) Sampling plans

    (c) Both (a) and (b)   (d) None of these

PART B — (5 × 5 = 25 marks)

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

11. (a) Define Time Reversal Test and Factor Reversal Test.

    Or

    (b) From the following data, construct the index number taking 1987 as base.

Years	1987	1988	1989	1990	1991	1992
Price of rice per kg	5.00	6.00	6.50	7.00	7.50	8.00

12. (a) Explain (i) Critical Region (ii) Level of Significance.

    Or

    (b) A coin is tossed 144 times and a person gets 80 heads. Can we say that the coin is unbiased one?

13. (a) Explain any two test of significance based on t-distribution.

    Or

    (b) Explain the test of independence of two attributes in a $m \times n$ contingency table.

14. (a) Define one-way classification and two-way classification.

Or

(b) Explain RBD.

15. (a) Define control chart.

Or

(b) Point out Seven Quality Control Tools.

PART C — (5 × 8 = 40 marks)

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

16. (a) Calculate (i) Laspeyere's (ii) Paasches (iii) Fisher's Index numbers of the following data given below. Hence or otherwise find Edgeworth and Bowley's Index Numbers.

Commodities	Base Year 1990		Current Year 1992	
	Price	Quantity	Price	Quantity
A	2	10	3	12
B	5	16	6.5	11
C	3.5	18	4	16
D	7	21	9	25
E	3	11	3.5	20

Or

(b) Prove that Fishers Index Number is an ideal index number.

17. (a) Two populations have their means equal but the standard deviation σ of one is twice the other. (i) Show that in the sample of size 2,000 from each drawn under simple sampling conditions the difference of means will in all probability not exceed 0.15 σ. where σ is the smaller SD. (ii) Find the probability that the difference will exceed half this amount.

Or

(b) A Machine put out 16 imperfect articles in a sample of 500 articles. After the machine is overhauled it puts out 3 defective articles in a sample of 100. Has the machine improved?

18. (a) Two random samples gave the following results.

Sample	Size	Sample Mean	Sum of squares of deviations from the mean
I	10	15	90
II	12	14	108

Test whether the sample could have come from the same normal population.

Or

(b) A group of 10 rats fed on a diet A and another group of 8 rats fed on a different diet B recorded the following increases in weights in gms.

| Diet A | 5 | 6 | 8 | 1 | 12 | 4 | 3 | 9 | 6 | 10 |
| Diet B | 2 | 3 | 6 | 8 | 1 | 10 | 2 | 8 | — | — |

Test whether diet A is superior to diet B.

19. (a) Explain the analysis of Latin Square Design (LSD).

Or

(b) Analyse the one-way ANOVA for the following.

Batches	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8
A	1600	1610	1650	1680	1700	1720	1800	—
B	1580	1640	1640	1700	1750	—	—	—
C	1460	1550	1600	1620	1640	1660	1740	1820
D	1510	1520	1530	1570	1600	1680	—	—

20. (a) What are the ways Sampling Inspection can be carried out? Explain.

Or

(b) Describe the construction of P-chart for fixed and variable sample sizes!

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