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(Pages : 2)

Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Statistics Degree Examination, November 2023

BST1B01 – Official Statistics & Probability

(2022 Admission onwards)

Time : 2 ½ hours

Max. Marks : 80

PART A
All questions can be attended
(Each question carries 2 marks)

1. What are the four divisions of NSSO?
2. Distinguish between class limits and class boundaries.
3. What is census method?
4. What is frequency distribution?
5. Write a short note on ogive.
6. Find the arithmetic mean of first n natural numbers?
7. What is an inter quartile range?
8. The SD of the numbers 1, 3, 5, 7, 9 is 3.17. Evaluate the SD of 27, 29, 31, 33 and 35.
9. Define Kurtosis.
10. Write down the normal equations to fit a parabola.
11. What is meant by perfect correlation?
12. Find the Karl Pearson correlation coefficient if $\sum XY = 203$, $\sum X^2 = 400$, $\sum Y^2 = 190$, where X and Y are the deviation from the actual mean.
13. State classical definition of probability.
14. Prove that the probability of a sure event is one.
15. If P(A|B) = 1/2 and P(B|A) = 2/5, then find P(A)/ P(B).

Ceiling – 25 marks

PART B
All questions can be attended
(Each question carries 5 marks)

16. Write a short note on Ministry of Statistics and Programme Implementation (MoSPI).
17. Distinguish between questionnaire and schedules
18. Two batsmen A and B have the following scores in a series of matches. Compare A and B for average and variability of scores.

A	74	101	4	82	36	71	14	0	77
B	62	5	81	97	22	11	16	1	88

19. First four moments about the value 5 of a distribution are 2, 20, 40 and 560. Calculate the mean, variance, third and fourth central moments.

20. Explain the principle of least squares for curve fitting. Illustrate its use in fitting a curve of the form $y = ae^{bx}$; where a and b are constants.

21. The equations of two regression lines obtained in a correlation analysis are as follows: $3x + 12y = 19$ and $3y + 9x = 46$. Obtain the mean values of x and y and the value of correlation coefficient.

22. State and prove addition theorem on probability for two events.

23. A box contains 6 red, 4 white and 5 black balls. A person draws 4 balls from the box at random. Find the probability that among the balls drawn there is at least one ball of each colour.

Ceiling – 35 marks

PART C

Each question carries 10 marks (Answer any TWO questions)

24. Draw the ogive and the histogram for the following distribution showing the wage of 43 workers in a factory. And hence obtain the median.

Wages (in Rs.)	2000-3000	3000-4000	4000-5000	5000-6000	6000-7000
No. of workers	3	5	20	10	5

25. Find the mean, median, mode, GM and HM for the following data and verify the empirical relation.

Class	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	5	12	18	24	17	15	9

26. Calculate the rank correlation coefficient between sports and music using the scores of 10 students.

Student	1	2	3	4	5	6	7	8	9	10
Music	50	70	50	60	80	50	90	50	60	60
Sports	25	60	45	50	45	20	55	30	45	30

27. Two groups are competing for the position of the Board of Directors of a corporation. The probabilities that the first and second groups will win are 0.6 and 0.4 respectively. If the first group wins, the probability of introducing a new product is 0.8. The corresponding probability if the second group wins is 0.3. What is the probability that the new product will be introduced?

(Pages : 2)

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FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Mathematics Degree Examination, November 2023

BST1C01 – Introductory Statistics

(2022 Admission onwards)

Time : 2 hours

Max. Marks : 60

Part A

Each question carries 2 Marks.

Maximum Marks that can be scored in this Part is 20

1. Write any four limitations of statistics.
2. What are the four divisions of NSSO?
3. Define Median and Mode.
4. Distinguish between discrete and continuous variable.
5. State any two properties of arithmetic mean.
6. Write any two merits and demerits of quartile deviation,
7. Define primary data with example.
8. What are the different types of correlation?
9. Write down any two uses and limitations of index number.
10. Calculate the coefficient of correlation between x and y where the regression coefficients are -0.4 and -0.9.
11. Write any two mathematical models of time series.
12. Define Kurtosis.

Part B

Each question carries 5 Marks.

Maximum Marks that can be scored in this Part is 30

13. What are the responsibilities of CSO?
14. Distinguish between
    (1) Nominal data and ordinal data.
    (2)population and sample.
15. What are ogives? How we can construct less than ogive and more than ogive?
16. If about origin the first three moments are 3, 24, 76. respectively Calculate the first three raw moments about 5?
17. Fit an exponential trend to the following time series data.

X:	1	2	3	4	5
Y:	5.9	11.8	24.	47	95

18. Explain the four components of time series.
19. For the observation $(x_1, y_1), (x_2, y_2), \ldots\ldots (x_n, y_n)$ Derive the regression lines x on y and y on x.

Part C

Answer any one question and carries 10 Marks.

20. Calculate Karl Pearson correlation coefficient for the following data.

X:	22	26	29	30	31	33	34	35
Y:	19	21	22	29	27	24	27	31

21. Show that Fisher's index number satisfies both time reversal test and factor reversal test for the following data.

Commodities	Base year		Current year	
	Price	Quantity	Price	Quantity
A	6	50	10	56
B	2	100	2	120
C	4	60	6	60
D	10	30	12	24
E	8	40	12	36

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53

(Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Statistics Degree Examination, November 2023

BAS1C01 – Financial Mathematics

(2022 Admission onwards)

Time : 2 hours Max. Marks : 60

PART- A (Short Answer)

Each question carries Two marks. Maximum 20 Marks

1. Distinguish between Simple and Compound rate of discount
2. What is Equation of value
3. Calculate D, given that P=115, R =125,i =7. % and n= 8
4. State the linear interpolation formula
5. Calculate the present value of payments of £2,000 at times 0,1, 2,.... using i = 7.6% pa effective.
6. Calculate $\ddot{a}_5$ at 6% pa effective
7. Define Interest
8. What is a Repayment loan
9. Outline the similarities and differences between an Annuity certain and a Contingent annuity
10. Calculate $S_5^{(4)}$ at 15 % pa effective
11. A payment of $800 is due in 5 years' time. Calculate the present value of this payment using a force of interest of 9% pa.
12. What is Perpetuity

PART- B (Paragraph)

Each question carries Five marks. Maximum 30 Marks

13. Derive an expression for the present value at time 0 of an immediate level annuity of Rs.1 payable in Arrear
14. A company expects to receive a continuous cashflow for the next five years, where the rate of payment is 100×0.8^t at time t years. Calculate the present value of this cashflow assuming a constant force of interest of 8% pa throughout the period
15. A customer borrows £4,000 under a consumer credit loan. Repayments are calculated based on an APR of 15.4%, and are paid monthly in arrears for 5 years. Calculate the amount of each monthly repayment.

16. The force of interest $\delta(t)$ at time t is given by:

0.08 for $0 \leq t < 5$

$0.13 - 0.01t$ for $t \leq 5$

Determine expressions for the accumulation factor from time 0 to time t

17. Given i=15% pa effective, find the values of δ, $i^{(2)}$, $i^{(12)}$, v, d

18. The force of interest, $\delta(t)$, is given by:

$$\delta(t)=0.03-0.005t+0.001t^2$$

Calculate the accumulated value at time $t = 7$ of an investment of £250 at time t= 0

19. For each of the following calculate the equivalent effective annual rate of interest:

a) An effective rate of interest of 12.7% paid every 2 years

b) An effective rate of discount of 5.75% pa

c) A force of interest of ½% per month

PART- C (Essay)

Each question carries Ten marks, Maximum 10 Marks

20. The force of interest is given by

$$\delta(t) = 0.09 + 0.0006\,t^2 \qquad 0 \leq t < 9$$

$$0.1836 - 0.005t \qquad 9 \leq t < 15$$

where t is measured in years.

a) Find an expression for the accumulation factor from time 0 to t

b) Calculate the accumulated amount at the end of 12th year of Rs.5000 invested at time 0.

21. A loan of £50,000 is repaid over a period of 5 years by a series of level monthly instalments. Interest is charged on the loan at the rate of interest of 8% pa effective.

(i) Calculate the monthly repayment.

(ii) Calculate the amount of interest paid in the first year.

(iii) Determine the split of the 45th instalment between capital and interest