

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Degree Examination, November 2020

**BST1C05 – Descriptive Statistics**

(2020 Admission onwards)

Time: 2 hours

Max. Marks : 60

**SECTION-A****Each question carries 2 Marks.****Maximum Marks that can be scored in this section is 20.**

1. Distinguish between census and sampling.
2. What do you mean by systematic sampling?
3. Explain the method of construction of simple bar diagram.
4. What is a questionnaire?
5. Show that sum of the deviations of the observations taken about the A.M is zero.
6. Calculate the G.M of the observations 15, 18 and 20.
7. Mean of 100 observations is 50 and S.D is 10. What will be the new mean and S.D if 5 is subtracted from each observation and then it is divided by 4?
8. Distinguish between absolute and relative measures of dispersion. Give one example for each.
9. Calculate the average speed of a car running at the rate of 15 kmph during the first 30kms, 20 kmph during the second 30 kms and at 25 kmph during the third 30kms
10. Discuss the merits and demerits of standard deviation.
11. Find the C.V of a frequency distribution given that its mean is 120, mode is 123 and Karl Pearson's Coefficient of skewness is -0.3.
12. What do you understand by kurtosis of a distribution?

**SECTION-B****Each question carries 5 Marks.****Maximum Marks that can be scored in this section is 30.**

13. Discuss the advantages of sampling over census method.
14. Briefly explain the general guidelines to be followed while preparing a questionnaire.
15. Calculate Q.D for the following data.

Class	0-9	10-19	20-29	30-39	40-49	50-59	60-69
Frequency	4	12	17	28	15	9	5

16. Draw the two ogives for the following data and hence obtain the median.

Class	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59
Frequency	5	10	15	30	5	5

17. Calculate M.D about mean for the following data

Class	0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	10 - 12
Frequency	5	16	13	7	5	4

18. Show that S.D is the minimum value of root mean square deviation.

19. The mean weight of 150 students in a certain class is 60 kg. The mean weight of boys in the class is 70kg. and that of girls is 55kg. Find the number of boys and girls in the class.

### SECTION-C

(Answer any one Question and carries 10 marks)

20. Calculate coefficient of variation for the following data:

Marks less than: 10 20 30 40 50 60 70 80 90 100

No. of students 5 13 25 48 65 80 92 97 99 100

Which player is more consistent?

21 .Calculate a suitable measure of skewness for the following data and comment on it.

Class	5 - 15	15 - 25	25 - 35	35 - 45	45 - 55	55 - 65	65 - 75
frequency	7	12	25	34	22	12	8

(1 x 10 = 10 Marks)

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE  
First Semester B.Sc Statistics Degree Examination, November 2020  
**BST1B01 – Official Statistics & Probability**

(2020 Admission onwards)

Time: 2 ½ hours

Max. Marks : 80

**Part A**

**Each question carries 2 marks**

1. Define Geometric mean for raw data and grouped data.
2. What are the desirable properties of a good average?
3. Define Skewness. Explain it graphically.
4. What do you mean by probability mass function?
5. Differentiate between partial and multiple correlation.
6. Define Sample space and event. Give example.
7. What is the Harmonic mean of  $1, 1/2, 1/3, \dots, 1/n$ .
8. State Bayes theorem.
9. Define Quartile deviation.
10. Write the classical definition of probability.
11. Calculate the Standard deviation of 100,200,300,400,500.
12. Explain scatter diagram.
13. Define correlation and regression.
14. A single card is chosen at random from a standard deck of 52 playing cards. What is the probability of choosing a king or a heart?
15. The mean mark of 100 students in a class is 39. The mean mark of the boys is 35, while that of girls is 45. Find the number of boys and that of girls in the class.

**(Maximum Mark=25)**

**Part B**

**Each question carries 5 marks**

16. The mean deviation is minimum when measured from median. Prove or disprove
17. The following is the probability mass function of a r.v. X: Find  $\alpha$  and  $\beta$  if

$$P(X^2=4x-3)=1/2$$

X=x	0	1	3	7	13
P(X=x)	1/8	$\alpha$	1/16	1/4	$\beta$

18. What are regression lines. Why there are two regression lines?
19. Derive Spearman's formula for rank correlations coefficient.
20. Calculate coefficient of correlation for the following data: X: 6,10,14,17,19,5,2.
21. Define distribution function. What are the properties of it?
22. Define Range. What are the merits, demerits and uses of range?
23. Calculate the median for the following data:
- |            |     |      |       |       |       |       |
|------------|-----|------|-------|-------|-------|-------|
| Classes:   | 0-6 | 7-13 | 14-20 | 21-27 | 28-34 | 35-41 |
| Frequency: | 08  | 17   | 28    | 15    | 09    | 03    |

**(Maximum mark=35)**

**Part C**

**Each question carries 10 marks. (Answer any Two Questions)**

24. (a) Explain the method of least squares  
 (b) Fit a straight line  $y= ax+b$  to the following data:
- |    |    |    |    |    |    |
|----|----|----|----|----|----|
| x: | 1  | 2  | 3  | 4  | 5  |
| y: | 14 | 13 | 04 | 06 | 02 |
- Estimate the value of y when  $x=3.5$
25. The amount of bread (in hundreds of pounds) X that a certain bakery is able to sell in a day is found to be a numerical valued random phenomenon with a probability density function  $f(x)$  is given by
- $$f(x) = ax, 0 \leq x < 5$$
- $$= a(10-x), 5 \leq x < 10$$
- $$= 0 \text{ elsewhere.}$$
- Determine
- (i) What is the probability that sales tomorrow exceed 500 pounds?
- (ii) Less than 500 pounds
- (iii) Between 250 and 750 pounds.
26. Write about the functions and activities of (i) NSSO (ii) CSO (iii) MoSPI
27. Define coefficient of variation and give its uses. Calculate coefficient of variation for the data given below.

class	0-10	10-20	20-30	30-40	40-50
f	8	15	28	16	2

**(2x10=20 Marks)**

## FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Mathematics Degree Examination, November 2020

**BST1C01 – Introductory Statistics**

(2020 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. What are the four divisions of NSSO?
2. Define qualitative and quantitative data
3. What are the properties of a good average?
4. Define Coefficient of variation. How can it be used for comparing consistency of two series?
5. Distinguish between leptokurtic and platykurtic curves
6. Write a short note on Histogram.
7. What is the Empirical relation between mean, median and mode?
8. What is a scatter diagram?
9. What is the principle of least squares?
10. What is Fisher's index number?
11. Explain the terms 'base year' and 'current year' of an index number.
12. Define purchasing power of money.

**Part B****Each question carries 5 Marks.****Maximum Marks that can be scored in this Part is 30**

13. Write a short note on Indian Statistical system
14. Draw histogram for the following data and find mode from histogram

Class	:	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	:	6	10	15	20	12	7

15. The mean and S.D. of 20 items is found to be 10 and 2 respectively. At the time of checking, it was found that a value 12 is incorrectly entered as 8. Calculate the mean and S.D. if the wrong item is replaced by 12.

16. Fit a straight line of the form  $y=ax+b$ . Also estimate the value of  $y$  when  $x=10$

$x$	:	1	2	3	4	5	6	7
$y$	:	7	13	19	25	32	40	50

17. Given two regression lines  $4y=9x+15$  and  $6y=25x-y$ . Identify the regression lines and obtain the coefficient of correlation between  $x$  and  $y$ .

18. Explain the procedure for fitting curve of the form  $y = ae^{bx}$ .

19. Construct Paasche's index number for the following data.

Commodity	1994		1995	
	Price ( $p_0$ )	Quantity ( $q_0$ )	Price ( $p_1$ )	Quantity ( $q_1$ )
A	2	8	4	6
B	5	10	6	5
C	4	14	5	10
D	2	19	2	13

### Part C

Answer any one question and carries 10 Marks.

20.

- Show that mean deviation is a minimum when calculated from the median.
- Explain merits and demerits of various measures of central tendency

21. Construct Laspayer's , Paasche's and Fisher's index numbers for the following data.

Article	Quantity in 2007	Quantity in 2010	Price in 2007	Price in 2010
A	8	8	13	16
B	9	10	16	20
C	12	14	21	25
D	7	8	17	23
E	9	9	25	25
F	10	10	26	29

## FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Statistics Degree Examination, November 2020

## BAS1C01 – Financial Mathematics

(2020 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. Calculate  $\bar{a}_{8|}$  at  $i=9\%$  p.a effective
2. Define effective rate of interest
3. Explain index linked security
4. Calculate  $s_{60|}$  at  $i=4.25\%$  pa effective.
5. Differentiate between compound and simple rate of interest
6. Calculate the present value of Rs.10,000 due at time 3 years, using a nominal discount rate of  $8\%$  pa convertible quarterly
7. Calculate the present value of an annuity that pays Rs. 50 pa annually in arrears forever using an annual effective rate of interest of  $9\%$ .
8. What is net present value
9. Express  $i$  in terms of  $d$
10. What is equation of value? give formula
11. Define mortgage
12. Calculate  $Ia_{12|}$  at  $i=7.5\%$  pa effective.

**Maximum Marks=20****Part B****Each question carries 5 Marks.****Maximum Marks that can be scored in this Part is 30**

13. Derive an expression for the Accumulated value of a level immediate annuity payable in advance
14. Given an investment of €1,000, calculate the accumulation after 5 years using:
  - (a) Simple discount of  $8\%$  pa
  - (b) Compound discount of  $8\%$  pa
  - (c) Compound interest of  $8\%$  pa.

15. A loan of £120,000 is repayable by equal quarterly payments for 20 years. The effective rate of interest is 6% *pa*. Calculate the interest portion of the first payment and the equal quarterly payments
16. Suppose the nominal interest rate *pa* payable quarterly is 8%. Find the equivalent nominal interest rate *pa* payable every six months
17. Derive an expression for  $(I\ddot{a})_{n|}$
18. The force of interest is:

$$\delta(t) = 0.01t + 0.04, 0 \leq t \leq 5.$$

Find the present value at time 0 of the payment stream  $0.5t + 2$ , which is received between 0 & 5.

19. An annuity is payable annually in advance for a term of 20 years. The payment is £500 in year 1, £550 in year 2, and so on, increasing by £50 each year. Calculate the present value of this annuity, assuming that the effective rate of interest is 5% *pa* for the first twelve years and 7% *pa* thereafter.

**Maximum Marks=30**

### PART-C

**Answer any 1 Question. Each question carries ten marks.**

20. An actuarial student takes out a mortgage for £250,000 with a term of 25 years. The mortgage is repayable by level instalments made monthly in arrears. Interest is charged at a rate of 6% *pa* effective.
  - a. Calculate the monthly repayment. **(2 Marks)**
  - b. Calculate the capital repaid in the fourth year. **(4 Marks)**
  - c. Calculate the interest element of the 49th repayment. **(4 Marks)**
21. The force of interest at time  $t$  is given by:

$$\delta(t) = 0.08 - 0.001t \text{ when } 0 \leq t < 3$$

$$\delta(t) = 0.025t - 0.04 \text{ when } 3 \leq t < 5$$

$$\delta(t) = 0.03 \text{ when } 5 \leq t$$

Calculate the present value at time 2 of a payment of Rs.1,000 at time 10

**(1 x 10=10 Marks)**