

C 2237

(Pages : 3)

Name.....

Reg. No.....

FOURTH SEMESTER (CUCBCSS-UG) DEGREE EXAMINATION, APRIL 2021

Statistics

STS 4C 04—APPLIED STATISTICS

Time : Three Hours

Maximum : 80 Marks

Use of Calculator and Statistical table are permitted.

Part A

Answer all questions in one word.

Each question carries 1 mark.

1. The data collected from published reports is known as _____ data.
2. If all the units of a population are surveyed, it is called _____.
3. The number of all possible samples of size 2 from a population of 4 units is _____.
4. The ratio of between sample variance and within sample variance follows _____ distribution.
5. A time series is a set of values arranged in _____ order.
6. For additive model, the sum of the seasonal indices is _____.
7. Index numbers are expressed in _____.
8. If μ and σ are the process mean and standard deviation, then the control limits $\mu \pm \sigma$ are known as _____.
9. The probability of rejecting a lot having \bar{p} as the process average defectives is known as _____.
10. The points which lie outside the upper control line are called _____.

(10 × 1 = 10 marks)

Part B

Answer all questions in one sentence.

Each question carries 2 marks.

11. Define primary data.
12. Define population.
13. Give the basic assumptions in ANOVA technique.
14. Discuss the multiplicative model of a time series.
15. Give the names of different methods of measuring trend.

Turn over

16. Discuss time reversal test.
 17. What is the main purpose of statistical quality control ?

(7 × 2 = 14 marks)

Part C

*Answer any three questions.
 Each question carries 4 marks.*

18. Distinguish between census and sampling. What are the merits of sampling over census ?
 19. What are the advantages and disadvantages of the moving average method ?
 20. Discuss various problems involved in the construction of index numbers.
 21. Distinguish between Laspeyre's and Paasche's index numbers.
 22. How is the control limits set up for mean ?

(3 × 4 = 12 marks)

Part D

*Answer any four questions.
 Each question carries 6 marks.*

23. Explain the technique of analysis of variance for a one-way classification data.
 24. Explain the methods for collecting primary data.
 25. Calculate the Laspeyer's index number from the following data :

Commodity	Price		Quantity	
	Base year	Current year	Base year	Current year
A	0.80	0.70	10	11
B	0.85	0.90	8	9
C	1.30	0.80	5	5.5

26. Apply the method of semi-averages for determining the trend.

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Value	45	58	62	50	70	72	68	70	78	75

27. Discuss the method of least squares in fitting a straightline trend.
 28. What do you understand by control limits in statistical quality control ?

(4 × 6 = 24 marks)

Part E

*Answer any two questions.
 Each question carries 10 marks.*

29. Explain the problems in the construction of index numbers.
 30. Compute Fisher's ideal index from the following data and show that it satisfies the factor reversal test.

Commodity	Price		Quantity	
	Base year	Current year	Base year	Current year
A	5	8	10	1
B	6	24	18	3
C	8	11	8	1
D	3	12	6	4

31. How will you prepare the control charts for fraction defectives ?
 32. Following are the weekly sale records (in Rs.) of three salesmen A, B and C of a company during 13 sale-calls :

A	300	400	300	500	
B	600	300	300	400	
C	700	300	400	600	500

Test whether the sales of three salesmen are different.

(2 × 10 = 20 marks)

C 80936

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Name.....
Reg. No.....
Pareekal, Malappuram

FOURTH SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION, APRIL 2020

Statistics

STS 4C 04—APPLIED STATISTICS

Time : Three Hours

Maximum : 80 Marks

Use of Calculator and Statistical Tables are permitted.

Part A

Answer all questions in one word.

Each question carries 1 mark.

1. A study based on complete enumeration is known as _____.
2. The sampling error usually _____ with increase in sample size.
3. ANOVA technique was developed by _____.
4. Abbreviated form of analysis of variance is _____.
5. Quarterly fluctuations observed in a time series data are termed as _____ variation
6. A time series consists of data arranged in _____ order.
7. _____ is an ideal index number.
8. Index numbers are also known as _____.
9. To ensure that the proportion of defective items in the manufactured product is not beyond certain limits is called _____.
10. In control charts we establish _____ limits.

(10 × 1 = 10 marks)

Part B

Answer all questions in one sentence.

Each question carries 2 marks.

11. Define simple random sampling with and without replacement.
12. What is the difference between stratum and cluster.
13. Write down the model for two way ANOVA.
14. Briefly explain secular trend.
15. Define Laspeyr's price and quantity index numbers.

Turn over

16. Distinguish between assignable causes and chance causes of variation.
17. Define statistical quality control.

(7 × 2 = 14 marks)

Part C*Answer any three questions.**Each question carries 4 marks.*

18. Distinguish between linear and circular systematic sampling.
19. Write a short note on (i) seasonal variation and (ii) cyclical variation.
20. From the following data construct an index for 2017 taking 2016 as base using simple aggregative method :

Commodities	Prices in 2016 (Rs.)	Prices in 2017(Rs.)
A	50	70
B	40	60
C	80	90
D	110	120
E	20	20

21. Define ANOVA. What are the basic assumptions in ANOVA technique ?
22. What are the advantages of statistical quality control ?

(3 × 4 = 12 marks)

Part D*Answer any four questions:**Each question carries 6 marks.*

23. Explain stratified random sampling with suitable example.
24. Explain the method of moving averages for measuring trend. Also state the merits and demerits of this method.
25. Define Fisher's index number. Explain why it is known as an ideal index number.
26. Explain the construction of 'R chart'.
27. Explain the test procedure of one way ANOVA.
28. Distinguish between questionnaire method and schedules sent through enumerators.

(4 × 6 = 24 marks)

Part E*Answer any two questions.**Each question carries 10 marks.*

29. Draw a graph to represent the following data showing the number of students in a college :

Year	:	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
No. of students	:	705	685	703	687	705	689	715	685	725	730

Calculate the 5-yearly moving averages of the above data and plot them on the same chart.

30. Explain (i) Simple random sampling ; (ii) Stratified random sampling ; (iii) Systematic sampling ; and (iv) Cluster sampling.
31. Compute Laspeyre's price index and Paasche's price index from the following data :

Commodities	Base Year		Current Year	
	Quantity	Price	Quantity	Price
A	40	4	35	3
B	15	3	20	4
C	20	6	15	5
D	30	5	25	2

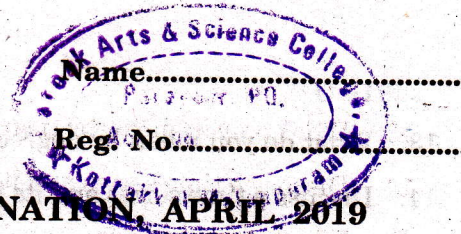
32. To assess the significance of possible variation in performance in a certain test between the grammar schools of a city, a common test was given to a number of students taken at random from the senior fifth class of each of the four schools concerned. The results are given below. Make an analysis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

(2 × 10 = 20 marks)

C 61252

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FOURTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2019

(CUCBCSS—UG)

Statistics

STS 4C 04—APPLIED STATISTICS

Time : Three Hours

Maximum : 80 Marks

Use of Calculator and Statistical Tables are permitted.

Part A

Answer all questions in one word.

Each question carries 1 mark.

1. If each and every unit of a population has equal chance of being included in the sample, it is known as _____.
2. A list or a map which serves as a guide to cover the population is known as _____.
3. The hypothesis which is to be tested for its possible rejection is _____.
4. The classical method used to separate the assignable causes and chance causes of variation is _____.
5. The sales of a departmental store on Dussera and Diwali are associated with which component of a time series ?
6. The component of a time series attached to long-term variations is termed as _____.
7. The trend of economic activity can be studied with the help of _____.
8. Fisher's ideal index number is the _____ of Laspeyre's and Paasche's index numbers.
9. A _____ is a statistical device principally used for the study and control of repetitive processes.
10. A finite number of units produced during a definite period of time is called a _____.

(10 × 1 = 10 marks)

Part B

Answer all questions in one sentence.

Each question carries 2 marks.

11. Define stratification. What are the points to be observed under stratification ?
12. Explain any method of selecting a simple random sample.

Turn over

13. What do you mean by degrees of freedom ?
14. Discuss a time series and its importance.
15. What is time reversal test ?
16. What are the limitations of statistical quality control ?
17. Distinguish between control chart for variables and attributes.

(7 × 2 = 14 marks)

Part C

*Answer any three questions.
Each question carries 4 marks.*

18. The figures given below show the export of sugar from India for the years 1970-71 to 1979-80. Fit a straight line trend using semi-average method.

Years	Export (Lakh Tonnes)
1970-1971	3.9
1971-1972	1.3
1972-1973	1.1
1973-1974	4.4
1974-1975	9.4
1975-1976	9.6
1976-1977	3.4
1977-1978	2.5
1978-1979	8.6
1979-1980	2.9

19. Distinguish between p chart and np chart.
20. What are the advantages of sampling over census method ?
21. Define Laspeyre's and Paasche's index numbers for price and quantity.
22. What are the uses of index numbers ?

(3 × 4 = 12 marks)

Part D

Answer any four questions.

Each question carries 6 marks.

23. Explain cluster sampling with an example.
24. Explain the test procedure of two-way ANOVA.
25. Explain factor reversal test. Check whether Laspeyre's and Paasche's indices satisfy factor reversal test.
26. What are the points to be observed while preparing a questionnaire ?
27. Explain the method of least squares for measuring trend. Also state the merits and demerits of this method.
28. State the criteria for detecting lack of control in mean and range charts.

(4 × 6 = 24 marks)

Part E

Answer any two questions.

Each question carries 10 marks.

29. Explain census method and sampling and discuss their merits and demerits.
30. Perform a two-way ANOVA on the data given below :

Sides of triangle	Measurements by pupils				
	A	B	C	D	E
a	5.44	5.41	5.43	5.42	5.43
b	5.43	5.41	5.42	5.43	5.44
c	5.45	5.42	5.43	5.43	5.44

Turn over

31. A dry-cells producing factory wanted to test the life of cells produced daily. The cells will be considered satisfactory if their life is 25 hours. For this a sample of 5 cells was drawn on 12 consecutive days. The results were as follows:

Days	Life of cells (in hours)				
	1	2	3	4	5
1	27.0	28.0	25.5	26.5	23.0
2	23.5	27.5	26.0	27.0	29.0
3	27.5	27.0	28.0	26.5	24.5
4	28.0	26.5	27.5	28.5	27.0
5	27.5	24.5	25.0	26.0	27.5
6	26.5	26.0	27.0	27.5	26.0
7	21.0	22.0	28.0	26.5	25.0
8	25.5	24.5	25.0	27.5	27.5
9	28.0	26.5	30.0	29.5	27.0
10	25.0	27.0	26.5	24.5	23.0
11	22.0	26.5	27.5	23.5	25.5
12	26.0	28.0	27.0	30.0	29.0

- (i) Calculate 3σ -limits of control chart for mean when the value of mean of the universe is 25 hours and standard deviation is 2 hours.
- (ii) Draw a range chart when standard values are not specified.

32. Compute Laspeyre's, Paasche's and Fisher's price index from the following data :

Commodities	Base Year		Current Year	
	Price	Quantity	Price	Quantity
A	10	12	12	15
B	7	15	5	20
C	5	24	9	20
D	16	5	14	5

(2 × 10 = 20 marks)

19/7/18

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Name.....

Reg. No.....

FOURTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2018

(CUCBCSS—UG)

Complementary Course

STS 4C 04—APPLIED STATISTICS



Time : Three Hours

Maximum : 80 Marks

Use of statistical table and calculator are permitted.

Part A

Answer all questions in one word.

Each question carries 1 mark.

1. Stratified random sampling is appropriate when the groups of items in a population are _____.
2. Probability of including a specified unit in a sample of size 100 selected out of 800 units is _____.
3. The consistent increase in production of wheat constitutes _____ component of a time series.
4. If the origin in a trend equation $Y = A + BX$ is shifted backward by two years, the variable X in the trend equation will be replaced by _____.
5. Name the average which is most suitable for the construction of index numbers.
6. The weights used in Paasche's index formula are _____.
7. _____ distribution is commonly used to construct c-chart in a manufacturing process.
8. The main tool of process control is the technique of _____.
9. In a production process, variation due to _____ is beyond the control.
10. In an ANOVA table, if total sum of squares is 258 with degrees of freedom 19 and sum of square between sample is 50 with degrees of freedom 3, the mean error sum of squares is _____.

(10 × 1 = 10 marks)

Part B

Answer all questions in one sentence.

Each question carries 2 marks.

11. Point out the utility of time series.
12. What are irregular variations in a time series?
13. What is a control chart?

Turn over

14. Define sampling unit and sampling frame.
15. What do you understand by random sampling ?
16. Define Fishers index number.
17. Distinguish between defective and defect in a manufacturing process.

(7 × 2 = 14 marks)

Part C

*Answer any three questions.
Each question carries 4 marks.*

18. Define seasonal variation in a time series. Give examples.
19. Distinguish between control chart for variables and control chart for attributes.
20. Define : (i) time reversal test and (ii) factor reversal test.
21. Explain systematic sampling.
22. Mention any four situations where sampling is inevitable.

(3 × 4 = 12 marks)

Part D

*Answer any four questions.
Each question carries 6 marks.*

23. What do you understand by ANOVA ? Stating the basic assumptions, how will you test the equality of means of several normal populations ?
24. Explain the moving average method of obtaining trend in a time series. Mention its merits and demerits.
25. Define Laspeyre's and Paasche's index numbers. What are the types of bias appears in Laspeyre's and Paashe's formulae ?
26. Distinguish between SRSWOR and SRSWR. Explain the lottery method of random sample selection.
27. Explain sampling error and non sampling errors. How these errors can be controlled in a survey ?
28. A plant produces rolls of paper. The number of defects per unit observed by the inspection of 10 rolls are as follows: 3, 4, 5, 6, 3, 3, 5, 3, 6, 2. Draw suitable control chart and comment on the state of control of the process.

(4 × 6 = 24 marks)

Part E

Answer any two questions.

Each question carries 10 marks.

29. Explain the construction of control charts for mean and range in a manufacturing process.
30. A tea company appoints four salesmen A, B, C and D and observes their sales in three seasons-summer, winter and monsoon. The figures (in lakhs) are given in the following table :

Season	Salesmen			
	A	B	C	D
Summer	36	36	21	35
Winter	28	29	31	32
Monsoon	26	28	29	29

Perform a two way ANOVA on the data given above.

31. Compute Fishers ideal index number from the following data :

Commodity	Base period		Current period	
	Price	Expenditure	Price	Expenditure
A	2	40	5	75
B	4	16	8	40
C	1	10	2	24
D	5	25	10	60

32. Calculate the seasonal index from the following data using the simple average method :

Year	1 st Quarter	2 nd Quarter	3 rd Quarter	4 th Quarter
1999	72	68	80	70
2000	76	70	82	74
2001	74	66	84	80
2002	76	74	84	78
2003	78	74	86	82

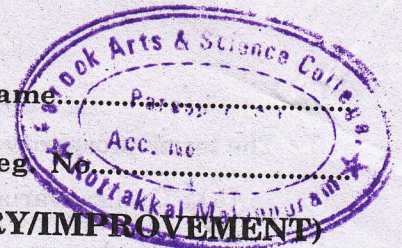
(2 × 10 = 20 marks)

C 5175

(Pages : 4)

Name

Reg No



**FOURTH SEMESTER B.Sc. DEGREE (SUPPLEMENTARY/IMPROVEMENT)
EXAMINATION, MAY 2016**

(UG—CCSS)

Complementary Course

ST 4C 04—APPLIED STATISTICS

Time : Three Hours

Maximum : 30 Weightage

Part A

Answer all questions.

Each question carries a weightage $\frac{1}{4}$.

1. For a symmetric distribution, co-efficient of skewness is :
(a) Zero. (b) One.
(c) Three. (d) Positive.
2. The degree of concentration of values of a data around mode is measured using :
(a) Skewness. (b) Kurtosis.
(c) Coefficient of variation. (d) Regression.
3. Coefficient of correlation is independent of :
(a) Change of origin. (b) Change of scale.
(c) Both (a) and (b). (d) Neither (a) nor (b).
4. When $\rho = \pm 1$, the two regression lines are :
(a) Perpendicular to each other. (b) Coincident.
(c) Parallel to each other. (d) None of the above.
5. If $b_{xy} = -1.6$ and $b_{yx} = -0.4$, the correlation coefficient between them is :
(a) -0.64 . (b) 0.64 .
(c) 0.8 . (d) -0.8 .
6. In time series the variations that occur regularly in every year are termed as :
(a) Trend. (b) Seasonal variations.
(c) cyclical variations. (d) Random variations.
7. Moving average method of fitting trend in a time series removes the effect of :
(a) Long term movement. (b) Short term variations.
(c) Cyclical variations. (d) None of the above.

Turn over

8. The terms prosperity and recession are attached to which of the component of Time Series.
- (a) Cyclical variations. (b) Seasonal variations.
(c) Random variations. (d) Long term variations.
9. If the products show a marked deviation from the given specifications, it may be due to :
- (a) Random causes. (b) Non-traceable causes.
(c) Assignable causes. (d) Non-assignable causes.
10. Control chart for fraction defectives are known as :
- (a) \bar{X} -chart. (b) R-chart.
(c) c-chart. (d) p-chart.
11. In ANOVA the ratio of two component variations is distributed as :
- (a) x^2 -variate. (b) F-variate.
(c) t-variate. (d) Normal variate.
12. The error degree of freedom in a two way ANOVA with k rows and n columns is :
- (a) $(k - 1)(n - 1)$. (b) $nk - 1$.
(c) $nk - 2$. (d) $n - k - 1$.

(12 × ¼ = 3 weightage)

Part B

Answer all questions.

Each questions carries a weightage 1.

13. Define Quartile co-efficient of skewness.
14. What is the formula to compute partial correlation coefficient $r_{12.3}$.
15. Define multiple correlation and regression.
16. For a bivariate data SD (x) = 8, SD (y) = 10 and $r_{xy} = 0.6$. Find the regression coefficients.
17. What are additive and multiplicative models in time series.
18. What is meant by cyclical variations.
19. What are the uses of control charts.
20. With usual notations, write the control limits for mean.
21. What are the assumptions in ANOVA.

(9 × 1 = 9 weightage)

Part C

Answer any five questions.
Each question carries a weightage 2.

22. Distinguish between skewness and kurtosis.
23. Find the rank correlation coefficient of the following data :
- | | | | | | | | | | |
|-----|---|----|----|----|----|----|----|----|----|
| x | : | 15 | 28 | 24 | 21 | 20 | 18 | 29 | 30 |
| y | : | 47 | 65 | 54 | 48 | 54 | 70 | 68 | 72 |
24. 10 observations on a bivariate data yielded the following
 $\Sigma x = 130$ $\Sigma y = 220$ $\Sigma x^2 = 2288$ $\Sigma y^2 = 5506$ $\Sigma xy = 3467$. Obtain the line of regression of y on x and estimate y when $x = 16$.
25. Explain scatter diagram.
26. Compute trend by taking 3 yearly moving averages of the following data :
- | | | | | | | | | | | |
|--------|---|------|------|------|------|------|------|------|------|------|
| year | : | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
| values | : | 121 | 125 | 127 | 113 | 115 | 121 | 127 | 135 | 142 |
27. Distinguish between process control and product control.
28. Explain ANOVA for a one way classification.

(5 × 2 = 10 weightage)

Part D

Answer any two questions.
Each question carries a weightage 4.

29. (a) Explain the least square method of measuring trend.
(b) Fit a trend line by the method of least squares to the following data :
- | | | | | | | | | | |
|-------|---|------|------|------|------|------|------|------|------|
| year | : | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
| Sales | : | 67 | 53 | 43 | 61 | 56 | 79 | 58 | 61 |
- Also estimate the trend values.
30. 16 boxes of switches each containing 20 switches were randomly selected and inspected for the number of defects. The number of defects in boxes are found to be :
12, 15, 9, 14, 18, 26, 8, 6, 11, 12, 16, 13, 19, 18, 14, 21.
Calculate 3 σ limits for c-chart. Draw control chart and comment.

Turn over

31. The following data gives the yield per acre of four different crops treated with three different types of fertilizers.

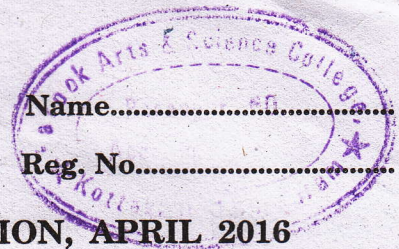
		Crop			
		I	II	III	IV
Fertilizer	A	4.5	6.4	7.2	6.7
	B	8.8	7.8	9.6	7.0
	C	5.9	6.8	5.7	5.2

Perform a two way Analysis of variance and test the hypotheses concerning type of fertilizers and variety of crops.

(2 × 4 = 8 weightage)

C 3994

(Pages : 3)



FOURTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2016

(CUCBCSS-UG)

Complementary Course

STS 4C 04—APPLIED STATISTICS

Time : Three Hours

Maximum : 80 Marks

Use of Calculator and Statistical table are permitted.

Part A

Answer all questions in one word.

Each question carries 1 mark.

1. A study based on complete enumeration is called _____.
2. If 50 units are selected in a sample from 600 population units, then sampling fraction is _____.
3. The erratic variation in a time series is known as _____.
4. If the slope of trend line is positive, it shows _____ trend.
5. The control chart which is used to control number of defects per unit in a production process is _____.
6. Statistical Quality Control takes care of variation due to _____ causes.
7. Abbreviated form of analysis of variance is _____.
8. Factor reversal test in index numbers was invented by _____.
9. If the old series is connected with the new series of index numbers, it's known as _____.
10. Analysis of variance technique is used to test the equality of _____.

(10 × 1 = 10 marks)

Part B

Answer all questions in one sentence.

Each question carries 2 marks.

11. What do you mean by multiplicative model of a time series ?
12. Name the various components of a time series.
13. Define Statistical Quality Control
14. What are three sigma control limits ?
15. Define simple random sampling.
16. What is consumer price index number ?
17. State the basic assumptions in analysis of variance technique.

(7 × 2 = 14 marks)

Turn over

Part C

*Answer any three questions.
Each question carries 4 marks.*

18. Distinguish between seasonal variation and cyclical variation in a time series.
19. What are the uses of index numbers ?
20. Distinguish between process control and product control.
21. Explain stratified random sampling.
22. Describe sampling and non-sampling errors.

(3 × 4 = 12 marks)

Part D

*Answer any four questions.
Each question carries 6 marks.*

23. Describe the technique of analysis of variance for a two way classification data.
24. Explain the method of least squares method of obtaining linear trend in a time series.
25. What are time reversal and factor reversal tests ? Show that Fisher's index number satisfies these tests.
26. Explain the advantages and disadvantages of sampling over census.
27. How will you conduct a sample survey ? What special points should be kept in mind in the selection of sample and collection of data ?
28. Explain the construction of p chart.

(4 × 6 = 24 marks)

Part E

*Answer any two questions.
Each question carries 10 marks.*

29. Draw control charts for mean and range using the following data (subgroup of size 5 being taken). Determine whether the process is under control.

Sample No :	1	2	3	4	5	6	7	8	9	10
Mean :	20	34	45	39	26	29	13	34	37	23
Range :	23	39	15	5	20	17	21	11	40	10

(For $n = 5$, $A_2 = 0.577$, $D_4 = 2.115$, $D_3 = 0$).

30. Compute (i) Laspeyre's price index and (ii) Paasche's price index from the following data :

Items	Base Year		Current Year	
	Price	Quantity	Price	Quantity
A ...	10	40	12	45
B ...	11	50	11	52
C ...	14	30	17	30
D ...	8	28	10	29
E ...	12	15	13	20

31. Estimate the trend values from the following data by using four yearly moving averages :

Year	:	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Production	:	464	515	518	467	502	540	557	571	586	612
(in '000 tonnes)											

32. Kerala Traders Co-operative Limited wishes to test whether the three salesmen A, B, and C tend to make sales of the same size or whether they differ in their selling ability as measured by the average size of their sales. During the last week there have been 14 sale calls- A made for 5 calls, B made 4 calls and C made 5 calls. Following are the weekly sales record of three salesmen :

Salesman A (in thousand rupees)	Salesman B (in thousand rupees)	Salesman C (in thousand rupees)
300	600	700
400	300	400
300	300	400
500	400	600
0	—	500

Perform the analysis of variance and draw your conclusion.

(2 × 10 = 20 marks)

C 81859

(Pages : 4)

Name.....

Reg. No.....

FOURTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL/MAY 2015

(U.G.—CCSS)

Complementary Course—Statistics

ST 4C 04—APPLIED STATISTICS

Time : Three Hours

Maximum : 30 Weightage

Part A

Answer all questions.

Weightage 1 for a bunch of 4.

1. For a positively skewed frequency curve, the inequality that holds is :
 - (a) $Q_1 + Q_3 > 2Q_2$.
 - (b) $Q_1 + Q_3 > 2Q_3$.
 - (c) $Q_1 + Q_3 > Q_2$.
 - (d) $Q_3 - Q_1 > Q_2$.
2. The value of coefficient of kurtosis β_2 can be :
 - (a) Less than.
 - (b) Greater than 3.
 - (c) Equal to 3.
 - (d) All the above.
3. If all the plotted points in a scatter diagram lie on a single line, then correlation is :
 - (a) Perfect Positive.
 - (b) Perfect Negative.
 - (c) Both (a) and (b).
 - (d) None of the above.
4. If $\rho = 1$, the angle between the two lines of regression is :
 - (a) Zero degree.
 - (b) Ninety degree.
 - (c) Sixty degree.
 - (d) Thirty degree.
5. In the usual notation $R_{1.23}^2$ can be expressed as :
 - (a) $1 - (1 - r_{12}^2)(1 - r_{1.32}^2)$.
 - (b) $1 - (1 - r_{12}^2)(1 - r_{1.32})$.
 - (c) $(1 - r_{12}^2)(1 - r_{1.32}^2)$.
 - (d) $(1 - r_{12})(1 - r_{1.32})$.

Turn over

6. The hypothesis for a specific known value of the correlation coefficient ρ can be tested by :

- (a) t test.
- (b) z test.
- (c) χ^2 test.
- (d) F-test.

7. Trend in a time series means :

- (a) Long term regular movement.
- (b) Short term regular movement.
- (c) Both (a) and (b).
- (d) Neither (a) nor (b).

8. For the given five values 15, 24, 18, 33, 42. The three yearly moving averages are :

- (a) 19, 22, 33.
- (b) 19, 25, 31.
- (c) 19, 30, 31.
- (d) None of the above.

9. Control charts consist of :

- (a) Three control lines.
- (b) Upper and lower control lines.
- (c) The level of the process.
- (d) All the above.

10. The control limit for 'C'-chart for equal size samples are given as :

- (a) $UCL = \bar{C} + 3\sqrt{\bar{C}}$, $CL = \bar{C}$ and $LCL = \bar{C} - 3\sqrt{\bar{C}}$.
- (b) $UCL = \bar{C} + \sqrt{2\bar{C}}$, $CL = 2\bar{C}$ and $LCL = \bar{C} - \sqrt{2\bar{C}}$.
- (c) $UCL = \bar{C} + 2\sqrt{\bar{C}}$, $CL = \bar{C}$ and $LCL = \bar{C} - 2\sqrt{\bar{C}}$.
- (d) $UCL = \bar{C} + 2\sqrt{\bar{C}}$, $CL = C$ and $LCL = \bar{C} - 2\sqrt{\bar{C}}$.

11. The underlying assumption in the analysis of variance technique is :

- (a) The observations are correlated random variables.
- (b) The observations are un-correlated random variables.
- (c) The observations are independent random variables.
- (d) None of the above.

12. The statistic used to testing the hypothesis in the case of one-way classification is :

- (a) F-statistic. (b) χ^2 -statistics.
(c) *t*-statistic. (d) None of the above.

(12 × ¼ = 3 weightage)

Part B

*Answer all questions.
Weightage 1 each.*

13. What is meant by kurtosis ?
14. What is principles of least squares ?
15. What are the limits with in which the correlation coefficient can vary ?
16. Define partial correlation coefficient.
17. What are the demerits of ratio-to moving average method ?
18. Give the merits of the simple average method.
19. Write the control limits of *d*-chart.
20. What is meant by quality of a product ?
21. Write the observational equation in the case of one-way classification.

(9 × 1 = 9 weightage)

Part C

*Answer any five questions.
Weightage 2 each.*

22. Obtain the different method of measuring skewness.
23. Obtain the procedure for fitting the curve of the form $y = ax + b$.
24. Derive the formula for Spearman's rank correlation coefficient.
25. Explain cyclic variation.
26. How will you prepare the control charts for fraction defectives ?
27. Give five situations in which C-charts can be used.
28. Discuss the analysis of one-way classification.

(5 × 2 = 10 weightage)

Turn over

Part D

Answer any two questions.
Weightage 4 each.

29. Show that $r = \frac{\sigma_x^2 + \sigma_y^2 - \sigma_{x-y}^2}{2\sigma_x \sigma_y}$ where σ_x^2 , σ_y^2 and σ_{x-y}^2 are the variances of x , y and $x - y$

respectively.

30. Explain the various methods for obtaining trend in time series.

31. Prove that $r_{1.23} = \frac{r_{12} - r_{13}r_{23}}{\sqrt{(1 - r_{13}^2)(1 - r_{23}^2)}}$.

(2 × 4 = 8 weightage)

C 62083

(Pages : 3)

Name.....

Reg. No.....

FOURTH SEMESTER B.Sc. DEGREE EXAMINATION, MAY 2014

(UG—CCSS)

Complementary Course—Statistics

ST 4C 04—APPLIED STATISTICS

Time : Three Hours

Maximum : 30 Weightage

I. Answer all questions :

- 1 If the coefficient of kurtosis γ_2 of a distribution is zero, the frequency curve is :
(a) Leptokurtic (b) Platykurtic.
(c) Mesokurtic (d) Any of these.
- 2 For a symmetrical distribution the coefficient of skewness :
(a) $\beta_1 = 1$. (b) $\beta_1 = 3$.
(c) $\beta_1 = 0$. (d) $\beta_1 = -1$.
- 3 Given $r_{12} = 0.6$ $r_{13} = 0.5$ and $r_{23} = 0.8$ the value of $r_{12.3}$ is :
(a) 0.4. (b) 0.72.
(c) 0.38. (d) 0.47.
- 4 If the correlation coefficient $\rho = 0$ the angle between two regression lines is :
(a) 0° . (b) 90° .
(c) 60° . (d) 30° .
- 5 The geometric mean of two regression coefficient is equal to :
(a) r . (b) r^2 .
(c) 1. (d) None of the above.
- 6 The range of simple correlation coefficient is :
(a) 0 to ∞ . (b) $-\infty$ to ∞ .
(c) 0 to 1. (d) -1 to 1.
- 7 The component of time series which are attached to short term fluctuations :
(a) Seasonal variation. (b) Cyclic variation.
(c) Irregular variation. (d) All the above.

Turn over

8 Simple average method is used to calculate :

- (a) Trend values. (b) Cyclic variation.
(c) Seasonal indices. (d) None.

9 The main tools of statistical quality control are :

- (a) Shewhart charts. (b) Acceptance sampling plan.
(c) Both (a) and (b). (d) None of the above.

10 Chance variation in respect of quality control of a product is :

- (a) Tolerable. (b) Not effecting the quality of a product.
(c) Uncontrollable. (d) All the above.

11 The trial control limits for R-chart with usual constant factors are :

- (a) $UCL = D_4 R$, $CL = R$, $LCL = D_3 R$.
(b) $UCL = D_4 \bar{R}$, $CL = \bar{R}$, $LCL = D_3 \bar{R}$.
(c) $UCL = D_4 \bar{R}$, $CL = \bar{R}$, $LCL = D_4 \bar{R}$.
(d) All the above.

12 Analysis of variance was introduced by :

- (a) M.G. Kendall. (b) Karl Pearson.
(c) C Spearman. (d) R.A. Fisher.

(12 × ¼ = 3 weightage)

II. Answer all questions :

- 13 Define skewness of a distribution.
14 What is meant by Tied Ranks ?
15 What is meant by Kurtosis ?
16 What do you mean by cyclic variation ?
17 Define multiple correlation coefficient.
18 Define ANOVA.
19 What is meant by Quality Control ?

20 Define Rank Correlation.

21 Define C chart.

(9 × 1 = 9 weightage)

III. Answer any *five* questions :—

22 Explain np chart.

23 What are the limitations of Statistical Quality Control ?

24 Explain three sigma limits.

25 Distinguish between partial and multiple correlation coefficient.

26 What are the advantages of moving average method.

27 What is time series ? Describe the deferent components of time series.

28 State the basic assumptions of Analysis of variance.

(5 × 2 = 10 weightage)

IV. Answer any *two* questions :

29 Obtain the regression lines and correlation coefficient for the following data :

X	...	68	64	75	50	64	80	75	40	55	64
Y	...	62	58	68	45	81	60	68	48	50	70

30 (a) Explain the theoretical basis of \bar{x} and R chart.

(b) Prepare \bar{x} chart using the following results :

Sample No.	...	1	2	3	4	5
Average	...	2.6	2.7	2.7	2.4	2.8
Range	...	0.2	0.2	0.3	0.4	0.3

31 Explain the method of least squares. Fit a parabolic curve to the data. Estimate the percentage increase for the year 1980 :

Year	...	1975	1976	1977	1978	1979
Production	...	11.5	16.8	21.4	25.7	31.6

(2 × 4 = 8 weightage)

C 41469

(Pages : 4)

Name.....

Reg. No.....

FOURTH SEMESTER B.Sc. DEGREE EXAMINATION, MARCH 2013

(CCSS)

Statistics

APPLIED STATISTICS

Time : Three Hours

Maximum : 30 Weightage

Part A

Answer all questions.

1. For a positive skewed frequency curve, the inequality that holds is :
 - (a) $Q_1 + Q_3 > 2Q_2$.
 - (b) $Q_1 + Q_2 > 2Q_3$.
 - (c) $Q_1 + Q_3 > Q_2$.
 - (d) $Q_3 - Q_1 > Q_2$.
2. If $R_{1,23}$ is the multiple correlation coefficient then :
 - (a) $-1 \leq R_{1,23} \leq 1$.
 - (b) $0 \leq R_{1,23} \leq 1$.
 - (c) $0 < R_{1,23} < 1$.
 - (d) $0 < R_{1,23} \leq 1$.
3. The lines of regression intersect at the point :
 - (a) (\bar{x}, \bar{y}) .
 - (b) (x, y) .
 - (c) $(0, 0)$.
 - (d) $(1, 1)$.
4. The two regression coefficients b_{XY} and b_{YX} are of :
 - (a) Same sign.
 - (b) Opposite sign.
 - (c) Any one of these two.
 - (d) Nothing can be said.
5. Number of components of a time series are :
 - (a) Two.
 - (b) Four.
 - (c) Three.
 - (d) Cannot be stated.
6. The best method for finding seasonal variation is :
 - (a) Simple average method.
 - (b) Ratio to moving average method.
 - (c) Ratio to trend method.
 - (d) None of these.

Turn over

7. Control chart consists of :
- (a) Three control limits. (b) Upper and lower control limits.
(c) The level of the process. (d) All the above.
8. The relation between expected value of R and S.D. σ with usual constant factors is :
- (a) $E(R) = d_1\sigma$. (b) $E(R) = d_2\sigma$.
(c) $E(R) = D_1\sigma$. (d) $E(R) = D_2\sigma$.
9. The faults due to assignable causes :
- (a) Can be removed. (b) Cannot be removed.
(c) Can sometimes be removed. (d) All the above.
10. \bar{X} chart indicates :
- (a) Consistency of the process. (b) Variability.
(c) Proportion of defectives. (d) Centering of the process.
11. The basic purpose of the Analysis of variance is to test the :
- (a) Homogeneity of experimental plots.
(b) Homogeneity of variances.
(c) Homogeneity of several means.
(d) None of these.
12. Analysis of variance was introduced by :
- (a) Karl Pearson. (b) G.E.P. Box.
(c) E.S. Pearson. (d) R.A. Fisher.

(12 × ¼ = 3 weightage)

Part B

Answer all questions.

13. State the positions of mean, mode and median in positively skewed and negatively skewed distributions.
14. If S.D. = 4, $\mu_4 = 64$ find a measure of Kurtosis.
15. What is a scatter diagram ?
16. What do you mean by regression ?

17. What is meant by perfect correlation ?
18. What are the merits of semi-Average method ?
19. Define Assignable causes.
20. Give control limits of C-chart.
21. Give the simple definition of Analysis of variance.

(9 × 1 = 9 weightage)

Part C

Answer any five questions.

22. In a distribution, the difference between two quartiles is 15, their sum is 35. Q_2 is 20. Find the coefficient of skewness.
23. Compute the correlation coefficient between the price and demand :

Price (in Rs.)	:	80	75	60	90	70
Demand (kgs)	:	12	15	13	9	14
24. Distinguish between partial and multiple correlation.
25. What do you mean by components of a time series.
26. Discuss the theoretical basis of np -chart.
27. State the objectives of \bar{X} and R charts.
28. Define the terms :
 - (a) Secular trend.
 - (b) Seasonal variations.
 - (c) Cyclical variations.

(5 × 2 = 10 weightage)

Part D

Answer any two questions.

29. (a) Distinguish between Correlation and Regression.
- (b) Find the coefficient of correlation from the following :

x :	12	20	15	22	18	24	20	12	15	22
y :	30	35	28	36	29	39	30	25	30	38

Turn over

30. (a) The data below give the average quarterly prices of a commodity for four years :

Year	1 st Quarter	2 nd Quarter	3 rd Quarter	4 th Quarter
1980	40.3	44.8	46.0	48.0
1981	50.1	53.1	55.3	59.5
1982	47.2	50.1	52.1	55.2
1983	55.4	59.0	61.6	65.3

- (b) What are the merits and demerits of Ratio to Trend method ?
31. (a) Explain the construction of a control chart for \bar{X} when the standards for μ and σ are specified as μ' and σ' respectively.
- (b) Prepare an \bar{X} and R chart using the following results obtained from sample of size 5 each.

Sample Number	:	1	2	3	4	5
Average	:	2.5	2.6	2.7	2.7	2.4
Range	:	0.2	0.2	0.3	0.4	0.3

$$[A_2 = 0.58, D_4 = 2.11]$$

(2 × 4 = 8 weightage)

C 23325

(Pages : 3)

Name.....

Reg. No.....

FOURTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2017

(CUCBCSS—UG)

Complementary Course

STS 4C 04—APPLIED STATISTICS

Time : Three Hours

Maximum : 80 Marks

Use of Statistical table and calculator are permitted.

Part A

Answer all questions in one word.

Each question carries 1 mark

1. When the population consists of units arranged in a sequence, one would prefer _____ sampling.
2. Errors committed in presentation of data are categorized are _____.
3. The oscillatory movements in a time series is known as _____.
4. Simple average method is used to calculate _____ in a time series.
5. The control chart which is commonly used to control the dispersion of measurable quality characteristics is _____.
6. The technique of control chart was originated by _____.
7. _____ index formula is known as the ideal index number.
8. Historically the first index was constructed in the year _____.
9. The technique of Analysis of variance was developed by _____.
10. If all the units selected in the sample are not covered, its the problem of _____.

(10 × 1 = 10 marks)

Part B

Answer all questions in one sentence.

Each question carries 2 marks

11. Define time series. Give an example.
12. What is meant by analysis of time series ?
13. Define rational subgroups.
14. When will you say that a production process in statistical control ?

Turn over

15. Mention any *two* advantages of stratified random sampling.
16. Define quantity index number.
17. State the basic assumptions in analysis of variance technique.

(7 × 2 = 14 marks)

Part C*Answer any three questions.**Each question carries 4 marks.*

18. Distinguish between SRSWR and SRSWOR. Which method is more efficient ?
19. Explain seasonal variation in a time series.
20. Distinguish between chance and assignable causes in a production process.
21. Describe cluster sampling.
22. Explain the tests to be satisfied by a good index number.

(3 × 4 = 12 marks)

Part D*Answer any 4 questions.**Each question carries 6 marks.*

23. Explain the construction of *p*-chart
24. What is ANOVA ? What is the significance of its study? Distinguish between one way and two way ANOVA.
25. Explain the ratio to moving average method of estimating seasonal variation in a time series.
26. Describe briefly the principal steps in a sample survey.
27. Explain the advantages and disadvantages of sampling over census.
28. The following data provides the values of sample mean and range for the samples of size 5:

Sample No.	:	1	2	3	4	5	6	7	8	9	10
Mean	:	11.2	11.8	10.8	11.6	11	9.6	10.4	9.6	10.6	10
Range	:	7	4	8	5	7	4	8	4	7	9

Calculate the central line control limits for mean chart and range chart.

(For $n = 5$, $A_2 = 0.577$, $D_4 = 2.115$, $D_3 = 0$).

(4 × 6 = 24 marks)

Part E

*Answer any two questions.
Each question carries 10 marks.*

29. (a) What do you understand by Statistical Quality Control ? Explain briefly its needs and uses in industry.
(b) Describe the basic principles underlying the control charts.
30. Compute : (a) Laspeyre's price index ; and (b) Fisher's price index from the following data :

Items	Base year		Current year	
	Price	Quantity	Price	Quantity
A	4	8	9	10
B	3	7	5	8
C	4	6	8	5
D	2	5	4	7

31. (a) Explain : (i) Irregular variation ; and (ii) Cyclical variations in a time series.
(b) Describe the method of least squares for fitting straight line trend in a time series.
32. To study the performance of three detergents and three different water temperatures the following whiteness readings were obtained.

Water Temperature		Detergent A	Detergent B	Detergent C
Cold water	...	57	55	67
Warm water	...	49	52	68
Hot water	...	54	46	58

Perform a two way analysis of variance and draw your conclusion.

(2 × 10 = 20 marks)