

No. of Printed Pages : 3

BCS-040

**BACHELOR OF COMPUTER APPLICATION
(BCA-REVISED)**

Term-End Examination

June, 2013

BCS-040 : STATISTICAL TECHNIQUES

Time : 2 hours

Maximum Marks : 50

- Note :**
- (i) *Attempt both sections A and Section B*
 - (ii) *Attempt any four questions from Section A*
 - (iii) *Attempt any three questions from Section B*
 - (iv) *Use of Non-scientific calculator is allowed*

SECTION-A

1. Define-the terms Random Experiment and Random Variable ? Briefly discuss the types of Random Variables, with suitable examples. 5
2. The Probability that atleast one of the two Independent events occur is 0.5. Probability that first event occurs but not the second is $(3/25)$. Also the probability that the second event occurs but not the first is $(8/25)$. Find the probability that none of the two event occurs. 5

3. Marks of six students are tabulated below :

5

Name :	Raj	Anil	Amit	Om	Rita	Renu
Marks :	54	50	52	48	50	52

From the population, tabulated above, you are suppose to choose a sample of size two.

- Determine, how many samples of size two are possible
- Construct sampling distribution of means by taking samples of size 2 and organize the data.

4. Expand the term ANOVA. Briefly discuss the utility of ANOVA, with suitable examples.

5

5. List the advantages and disadvantages of using a sampling approach instead of a census approach for studying the characteristics of data.

5

6. Given the following sample of 10 numbers

5

12 41 48 58 14 43 50 59 15 79

Compute Mean deviation and Standard deviation for the data given above.

SECTION - B

7. Explain *any two* of the following with the help of an example each : 5+5=10
- Goodness of fit test
 - Test of Independence
 - Criteria for a good estimator
8. Explain the term "Time Series". Briefly discuss 10
any two categories of time series analysis.
9. Explain *any two* of the following : 5+5=10
- Cluster sampling
 - Stratified sampling
 - Systematic sampling
10. A company wants to estimate, how its monthly costs are related to its monthly output rate. The data for a sample of nine months is tabulated below : 10

Out Put (Tons)	1	2	4	8	6	5	8	9	7
Cost (Lakhs)	2	3	4	7	6	5	8	8	6

Using the data given above, perform following tasks :

- Calculate the best linear regression line, where the monthly output is the dependent variable and monthly cost is the independent variable.
- Use the regression line to predict the company's monthly cost, if they decide to produce 4 tons per month.

No. of Printed Pages : 3

BCS-040

BACHELOR OF COMPUTER APPLICATION (BCA-REVISED)

Term-End Examination

December, 2013

BCS-040 : STATISTICAL TECHNIQUES

Time : 2 hours

Maximum Marks : 50

- Note :**
- (i) Attempt both section A and Section B.
 - (ii) Attempt **any four** questions from Section A.
 - (iii) Attempt **any three** questions from Section B.
 - (iv) Use of **Non-scientific** calculator is allowed.

SECTION-A

1. "Explain the term probability distribution". How Binomial distribution differs from poisson distribution ? 5
2. Suppose that A and B are two independent events, associated with a random experiment. If the probability that A or B occurs equals 0.6; while probability that A occurs equals 0.4. Determine the probability that B occurs. 5
3. Construct Model ANOVA table for one-way classification. 5
4. From a population of 200 observations, a sample of $n = 50$ is selected. Calculate the standard error; if the population standard deviation equals 22. 5

5. Compare and Contrast Random Sampling with Non Random Sampling. Briefly discuss the methods involved in selection of any simple random sample. 5
6. Calculate an estimate of median for the following data. 5

CLASS		FREQUENCY
0 - 24.9	-	6
25 - 49.9	-	11
50 - 74.9	-	14
75 - 99.9	-	16
100 - 124.9	-	13
125 - 149.9	-	10

SECTION - B

7. Explain *any two* of the following. 5+5=10
- t - distribution
 - F - distribution
 - CHI - SQUARE distribution
8. Using the Regression line $y = 90 + 50x$, fill up the values in the table below. 10

SAMPLE No. (i)	12	21	15	1	24
x_i	0.96	1.28	1.65	1.84	2.35
y_i	138	160	178	190	210
\hat{y}_i	138	-	-	-	-
\hat{e}_i	0	-	-	-	-

After filling the table, compute the parameters of Goodness to fit i.e R and R^2 . Based on the result of R and R^2 , interpret the correlation between variable x and y .

9. What is forecasting ? How forecasting is related to future planning, give suitable example in support of your answer ? Briefly discuss any forecasting model. 10
10. Differentiate between the following (*any two*) : $5+5=10$
- (a) Linear systematic sampling and circular systematic sampling.
 - (b) Z - Test and T - Test
 - (c) Correlation and Regression
-



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No. of Printed Pages : 3

BCS-040

**BACHELOR OF COMPUTER APPLICATION
(BCA-REVISED)**

Term-End Examination

June, 2014

BCS-040 : STATISTICAL TECHNIQUES

Time : 2 hours

Maximum Marks : 50

Note : (i) *Attempt both Sections i.e. Section A and Section B.*

(ii) *Attempt any four questions from Section A.*

(iii) *Attempt any three questions from Section B.*

(iv) *Use of Non-scientific calculator is allowed.*

SECTION - A

1. With the help of an suitable example, describe the term "Probability Distribution". How the Binomial Distribution differs from the Poissons Distribution ? 5
2. Suppose A and B are two independent events, associated with an random experiment. If the probability of occurrence of either A or B equals 0.6 ; while probability that only A occurs equals 0.4, then determine the probability of occurrence of event B. 5
3. A sample of size $n=50$, is drawn from the population of 200 observations. If standard deviation of the data is 22, then find the standard error ? 5

4. Construct Model ANOVA table for one-way classification. 5
5. Write short notes on (any two) : 5
- t - test for Mean
 - F - test for equality of two variances
 - Chi-square - test for independence of Attributes.

SECTION - B

6. Using the regression line $\hat{Y} = 90 + 50 X$, fill up the values in the table below : 10

Sample No. (i)	12	21	15	1	24
x_i	0.96	1.28	1.65	1.84	2.35
y_i	138	160	178	190	210
\hat{y}_i	138	-	-	-	-
e_i	0	-	-	-	-

After filling the table, compute the parameters R and R^2 , finally interpret the correlation between X and Y.

7. What do you understand by the term forecasting ? 10
With the help of a suitable example discuss the relation between forecasting and future planning. Briefly discuss both forecasting model.
8. Differentiate between following (any two) : 10
- Linear and circular systematic sampling
 - Z-test and t-test
 - Correlation and Regression

9. (a) Compare and contrast Random Sampling with Non-Random Sampling. Briefly discuss the methods involved in the selection of any simple random sample. 5
- (b) Calculate an estimate of Median for following data. 5

Class	0-24.9	25-49.9	50-74.9	75-99.9	100-124.9	125-149.9
Frequency	6	11	14	16	13	10



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No. of Printed Pages : 4

BCS-040

**BACHELOR OF COMPUTER APPLICATIONS
(Revised)**

Term-End Examination

December, 2014

04914

BCS-040 : STATISTICAL TECHNIQUES

Time : 2 hours

Maximum Marks : 50

Note :

- (i) Attempt both Sections, A and B.
- (ii) Attempt any **four** questions from Section A
- (iii) Attempt any **three** questions from Section B.
- (iv) Use of non-scientific calculator is allowed.

SECTION A

1. Given the following sample of 20 numbers :

12 41 48 58 14 43 50 59 15 45 52 72 18 45 54 78
41 47 56 79

5

- (a) Compute mean, variance and standard deviation.
- (b) If the largest value in the above set of numbers is changed to 500, to what extent are the mean and variance affected by the change ? Justify your answer.

2. The probability that at least one of the two independent events occurs is 0.5. Probability that the first event occurs but not the second is $\frac{3}{25}$. Also the probability that the second event occurs but not the first is $\frac{8}{25}$. Find the probability that none of the two events occurs. 5
3. Calls at a telephone switchboard occur at an average rate of 6 calls per 10 minutes. Suppose the operator leaves for a 5-minute coffee break. What is the probability that exactly two calls occur while the operator is away? 5
4. A Statistics professor has given five tests. A student scored 70, 75, 65, 80 and 95 respectively in the five tests. The professor decides to determine his grade by randomly selecting a sample of 3 test scores. Construct the sampling distribution for this process. 5
-
5. Briefly discuss any **two** of the following : $2\frac{1}{2} + 2\frac{1}{2} = 5$
- (a) Goodness of fit test
 - (b) Test about the mean for paired values
 - (c) Regression

SECTION B

6. What do you understand by the term “Time Series”? Discuss all the categories in which Time Series is classified (in 100 words each). 10
7. Discuss the term Systematic Sampling. Differentiate between Linear and Circular systematic sampling. Give two advantages and limitations of Systematic Sampling. 10
8. A group of 1650 school children were classified according to their performance in school tests and family economic level. Test if there is any association between these two attributes (Given $\chi^2_{0.05}(9) = 16.918$). 10

Performance Economic Level	Very Good	Good	Average	Poor	Total
Very Rich	4	7	16	25	52
Rich	13	37	79	73	202
Average	105	372	298	175	950
Poor	35	213	75	123	446
Total	157	629	468	396	1650

9. A hosiery mill wants to estimate how its monthly costs are related to its monthly output rate. For that the firm collects a data regarding its costs and output for a sample of nine months as given below :

Output (Tons)	1	2	4	8	6	5	8	9	7
Production Cost (Thousands of dollars)	2	3	4	7	6	5	8	8	6

- (a) Calculate the best linear regression line.
- (b) Use this regression line to predict the firm's monthly costs if they decide to produce 4 tons per month.

10

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No. of Printed Pages : 5

BCS-040

**BACHELOR OF COMPUTER APPLICATIONS
(BCA) (Revised)**

05043

Term-End Examination

June, 2015

BCS-040 : STATISTICAL TECHNIQUES

Time : 2 hours

Maximum Marks : 50

Note :

- (i) Attempt both Sections, A and B.
- (ii) Attempt any **four** questions from Section A.
- (iii) Attempt any **three** questions from Section B.

SECTION A

1. In order to find the correlation coefficient between two variables X and Y from 20 pairs of observations, the following calculations were made :

$$\Sigma x = 15, \Sigma y = -6, \Sigma xy = 50$$

$$\Sigma x^2 = 61 \text{ and } \Sigma y^2 = 90.$$

Calculate the correlation coefficient and the slope of the regression line of Y on X.

5

2. Suppose 2% of the items made in a factory are defective. Find the probability that there are

- (i) 3 defectives in a sample of 100,
(ii) no defectives in a sample of 50.

5

3. Telephone Directories have telephone numbers which are the combinations of the ten digits 0 to 9. The observer notes the frequency of occurrence of these digits and wants to test whether the digits occur with same frequency or not ($\alpha = 0.05$). The data are given below :

5

Digits	Frequency
0	99
1	100
2	82
3	65
4	50
5	77
6	88
7	57
8	82
9	30

(Given that $\chi^2_9 (0.05) = 16.918$)

4. Fit a linear trend $y = a + b * \text{Demand}$, to the data collected in a unit manufacturing umbrellas, given in the following table :

5

Month	1	2	3	4	5	6
Demand	46	56	54	43	57	56

5. The mean weekly sales of soap bars in different departmental stores was 146.3 bars per store. After an advertisement campaign the mean weekly sales of 22 stores for a typical week increased to 153.7 and showed a standard deviation of 17.2. Was the advertisement campaign successful at 5% level of significance ? (Given $t_{21} (0.05) = 2.08$)

5

6. Write two merits and two demerits of Median.
An incomplete frequency distribution is given as follows :

C.I.	Frequency
10 – 20	12
20 – 30	30
30 – 40	?
40 – 50	65
50 – 60	?
60 – 70	25
70 – 80	18

Given that median value of 200 observations is 46, determine the missing frequencies using the median formula.

5

SECTION B

7. A chemical firm wants to determine how four catalysts differ in yield. The firm runs the experiment in three of its plants, types A, B, C. In each plant, the yield is measured with each catalyst. The yield (in quintals) are as follows :

Plant	Catalyst			
	1	2	3	4
A	2	1	2	4
B	3	2	1	3
C	1	3	3	1

Perform an ANOVA and comment whether the yield due to a particular catalyst is significant or not at 5% level of significance. Given $F_{3,6} = 4.76$. 10

8. Find and plot the regression line of y on x on scatter diagram for the data given below : 10

Speed km/hr	30	40	50	60
Stopping distance in feet	160	240	330	435

9. In an air pollution study, a random sample of 200 households was selected from each of 2 communities. The respondent in each house was asked whether or not anyone in the house was bothered by air pollution. The responses are tabulated below (Given $\chi_1^2 (0.05) = 3.841$) :

Community	Yes	No	Total
I	43	157	200
II	81	119	200
Total	124	276	400

Can the researchers conclude that the 2 communities are bothered differently by air pollution ? ($\alpha = 0.05$)

10

10. The Police plans to enforce speed limits by using radar traps at 4 different locations within the city limits. The radar traps at each of the locations L_1 , L_2 , L_3 and L_4 are operated 40%, 30%, 20%, and 30% of the time. If a person who is speeding on his way to work has probabilities of 0.2, 0.1, 0.5 and 0.2 respectively, of passing through these locations, what is the probability that he will receive a speeding ticket ? Find also the probability that he will receive a speeding ticket at locations L_1 , L_2 , L_3 and L_4 .

10

03912

No. of Printed Pages : 5

BCS-040

**BACHELOR OF COMPUTER APPLICATIONS
(BCA) (Revised)**

Term-End Examination

December, 2015

BCS-040 : STATISTICAL TECHNIQUES

Time : 2 hours

Maximum Marks : 50

Note :

- (i) Attempt both Section A and Section B.
- (ii) Attempt any **four** questions from Section A.
- (iii) Attempt any **three** questions from Section B.

SECTION A

1. Write any two merits and demerits of Arithmetic Mean. Given below is the data about the number of seeds in a pod of a certain plant. Find the variance :

5

No. of Seeds	1	2	3	4	5	6
Frequency	8	14	7	12	3	1

2. Division A and B in a school have 20 students each. One student is to be selected from each division. What is the probability that Rahul in division A will be selected, if 2 students are selected out of 40 students ?

5

3. A die is rolled 1200 times with the following results :

No. that comes up :	1	2	3	4	5	6
Frequency :	195	289	202	242	163	109

Test, if the die is unbiased at 5% level of significance. (Given that $\chi^2_{0.05}(5) = 11.07$)

5

4. Define simple random sampling. Describe the limitations of simple random sampling. Differentiate SRSWR and SRSWOR methods of simple random sampling.

1+2+2

5. Cancer is present in 22% of a population and is not present in the remaining 78%. An imperfect clinical test successfully detects the disease and with probability 0.70. Thus, if a person has the disease in the serious form, the probability is 0.70 that the test will be positive and it is 0.30 if the test is negative. Moreover among the unaffected persons, the probability that the test will be positive is 0.05. A person selected at random from the population is given the test and the result is positive. What is the probability that this person has the cancer ?

5

6. The probability that Meena is on time to catch the bus to her office is 0.8. Find the probability that she is late

- (a) exactly twice in a 6-day week, and
- (b) at least once in a 6-day week.

5



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SECTION B

7. In a partially destroyed laboratory, record of an analysis of correlation of data, only the following results are legible :

Variance of $x = 9$. Regression equations

- (i) $8x - 10y + 66 = 0$
 (ii) $40x - 18y - 214 = 0$

What were :

- (a) the means of x and y ,
 (b) the coefficient of correlation between x and y ,
 (c) the standard deviation of y ? 10

8. The following table shows the sample values of 3 independent normal random variables, X_1 , X_2 and X_3 . Assuming that they have equal variances, test the hypothesis that they have the same mean by using ANOVA (Given $F_{(2,9)}(0.05) = 4.26$) : 10

X_1	:	13	11	16	22
X_2	:	16	08	21	11
X_3	:	15	12	25	10

9. The following table gives, for a sample of married women, the level of education and marriage adjustment score :

		Marriage Adjustment Score		
		Low	High	Very High
Level of Education	Middle School	25	05	10
	High School	50	30	40
	College	120	60	60

Can you conclude from the above, the higher the level of education, the greater is the degree of adjustment in marriage ?

Given $\chi^2(4, 0.05) = 9.488$. 10

10. A population of size 500 is divided into 4 strata. The following table gives the data on size and standard deviation of each stratum :

		Strata			
		I	II	III	IV
Size		100	150	150	100
Standard Deviation		05	08	07	10

A stratified random sample of size 100 is to be drawn from the population. Determine the size of samples from each of these strata for :

- (a) Proportional Allocation,
 (b) Neyman's optimum allocation. 10

No. of Printed Pages : 4

BCS-040

**BACHELOR OF COMPUTER APPLICATIONS
(BCA) (Revised)**

Term-End Examination

00556

June, 2016

BCS-040 : STATISTICAL TECHNIQUES

Time : 2 hours

Maximum Marks : 50

Note :

- (i) Attempt both Sections, i.e., Section A and Section B.
- (ii) Attempt any **four** questions from Section A.
- (iii) Attempt any **three** questions from Section B.
- (iv) Non-scientific calculator is allowed.

SECTION A

1. The mean and standard deviation of 20 items is found to be 10 and 2, respectively. At the time of checking it was found that one noted item with value 8 was incorrect. Calculate the mean and standard deviation, if the wrong item is deleted. 5
2. Let x_1 and x_2 be two independent random variables with variances $\text{Var}(x_1) = k$, $\text{Var}(x_2) = 2$. If the variance of $y = 3x_2 - x_1$ is 25, then find k . 5

3. (a) State and prove the Addition theorem of probability. 2
- (b) Suppose that A and B are two independent events, associated with a random experiment. The probability of occurrence of event A or B is 0.8, while the probability of occurrence of event A is 0.5. Determine the occurrence of probability of event B. 3
4. (a) What do you understand by a random variable ? Define the types of random variables. 2
- (b) A bag contains 10 white and 3 black balls. Balls are drawn one by one without replacement till all the black balls are drawn. Find the probability that all black balls are drawn by the 6th draw. 3
5. A survey of 64 medical labs revealed that the mean price charged for a certain test was ₹ 120, with a standard deviation of ₹ 60. Test whether the data indicates that the mean price of this test is more than ₹ 100 at 5% level of significance. 5

SECTION B

6. Describe the following tests in detail : 10
- (a) Paired t-test
 - (b) Chi-Square test for independence of Attributes
7. Differentiate between any *two* of the following : 10
- (a) Simple Random Sampling With Replacement and Simple Random Sampling Without Replacement
 - (b) Probability (Random) Sampling and Non-Random Sampling
 - (c) One-Sample Test and Two-Sample Test
8. The following table shows the sample values of 3 independent normal random variables. Test whether they have the same mean [use ANOVA].
Given $F_{0.05}(2, 9) = 4.26$. 10

X_1	:	13	11	16	22
-------	---	----	----	----	----

X_2	:	16	08	21	11
-------	---	----	----	----	----

X_3	:	15	12	25	10
-------	---	----	----	----	----

9. (a) Discuss the following : 4
- (i) Control chart for variables
 - (ii) Control chart for attributes
- (b) Describe control chart for \bar{X} and R in detail. Also suggest when R-chart and S-chart can be used. 5+1
-



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BCS-040

**BACHELOR OF COMPUTER APPLICATIONS
(BCA) (Revised)**

Term-End Examination

December, 2016

02505

BCS-040 : STATISTICAL TECHNIQUES

Time : 2 hours

Maximum Marks : 50

Note :

- (i) Attempt both sections, i.e., Section A and Section B.
- (ii) Attempt any **four** questions from Section A.
- (iii) Attempt any **three** questions from Section B.
- (iv) Non-scientific calculator is allowed.

SECTION A

1. Calculate the mean and standard deviation for the following data :

5

<i>Marks</i>	<i>Number of Students</i>
0 – 10	7
10 – 20	8
20 – 30	10
30 – 40	36
40 – 50	12
50 – 60	17
60 – 70	10

2. Find the correlation coefficient between two variables X and Y and the slope of regression line Y on X i.e., b_{YX} . The observations on 20 pairs are as follows :

5

$$\sum_{i=1}^{20} x_i = 15, \quad \sum_{i=1}^{20} y_i = -6, \quad \sum_{i=1}^{20} x_i y_i = 50,$$

$$\sum_{i=1}^{20} x_i^2 = 61, \quad \sum_{i=1}^{20} y_i^2 = 90.$$

3. Box X contains 5 red and 4 blue balls, Box Y contains 2 red and 5 blue balls. A ball is drawn at random from each box. Find the probability of drawing one red and one blue ball.

5

4. Suppose 2% of the items made in a factory are defective. Find the probability that there are

- (a) 3 defective items in a sample of 100, and
(b) no defective item in a sample of 50.

5

5. Define time series and describe its components briefly, with examples.

5

SECTION B

6. Describe the following tests (in detail) : 10

- (a) Chi-square test for Goodness of fit
- (b) F-test for Equality of two variances

7. Differentiate between any *two* of the following : 10

- (a) Neyman Allocation and Optimum Allocation
- (b) Correlation and Regression
- (c) Random Sampling and Non-Random Sampling

8. The sales figures of a company are given below. Compute the moving averages for the length of 4 and 2 separately. 10

Day	Sales
1	230
2	200
3	250
4	300
5	200
6	225
7	400
8	450
9	415
10	420
11	500
12	300
13	400
14	300
15	315

9. A dice is rolled 1200 times with the following results :

<i>Number on dice</i>	<i>Frequency</i>
1	195
2	289
3	202
4	242
5	163
6	109

Test if the dice is unbiased at 5% level of significance.

10

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BCS-040**BACHELOR OF COMPUTER APPLICATIONS
(BCA) (Revised)****06542****Term-End Examination****June, 2017****BCS-040 : STATISTICAL TECHNIQUES***Time : 2 hours**Maximum Marks : 50***Note :**

- (i) Attempt both sections, i.e., Section A and Section B.
- (ii) Attempt any **four** questions from Section A.
- (iii) Attempt any **three** questions from Section B.
- (iv) Use of non-scientific calculator is allowed.

SECTION A

1. Data of rainfall were collected to study the rainfall patterns in 50 different areas of a state and are given in the following table :

166	154	168	217	199	168	205	201	173
192	157	224	160	209	203	182	182	151
191	188	226	176	228	182	228	186	229
219	220	189	188	179	199	150	190	215
207	211	228	204	195	221	206	215	218
168	183	213	180	208				

Construct the continuous frequency distribution by considering intervals 150 – 160, 160 – 170, 170 – 180, etc. Also draw a Histogram.

5

2. The chances of catching cold by workers working in an ice factory during winter are 25%. What is the probability that out of 5 workers, 4 or more will catch cold ?

5

3. A quality controller selected 50 laptops from the production line, each day over a period of 10 days to monitor the manufacturing process. Fifty laptops were inspected for defectives and the number of defective laptops found each day was recorded and given in the following table :

Day	1	2	3	4	5	6	7	8	9	10
No. of defective laptops	3	4	4	10	4	2	4	5	4	6

Construct a suitable control chart and interpret the results.

5

4. (a) Differentiate between estimator and estimate with examples.

2

- (b) A manager of a bulb manufacturing company tests a random sample of 100 bulbs and determined the average life to be 300 hours and standard deviation 50 hours. Obtain 99% confidence interval for the average life of the bulbs. (Given that $Z_{0.005} = 2.58$)

3

5. (a) Distinguish between random sampling and non-random sampling. 2

(b) The monthly income (in thousands) of five workers in a small company is as follows :

25, 20, 30, 15, 10

How many samples of size 2 are possible, if we select the samples without replacement ?

Write all of them. 3

6. A computer chip manufacturer claims that at most 2% of the chips it produces are defective.

To check the claim of the manufacturer, a researcher selects a sample of 250 of these chips.

If there are eight defective chips among these 250, test the null hypothesis that more than 2%

of the chips are defective at 5% level of significance. Does this disprove the

manufacturer's claim. (Given that $Z_{0.05} = 1.645$) 5

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SECTION B

7. (a) What is time series ? Explain briefly the components of the time series with examples.

4

- (b) In a company, cases of CPU are manufactured and the production for ten years is given below :

Year	Production (in 1000 tonnes)
2001	26
2002	27
2003	28
2004	30
2005	29
2006	27
2007	30
2008	31
2009	32
2010	31

Determine the (i) 3-yearly, and (ii) 4-yearly centred moving averages.

6

8. A researcher wants to compare the waiting time of three hospitals (A, B and C). The time measured from the instant the patient arrives in the emergency room until the patient is attended to by a doctor is recorded in the following table :

Waiting time (in minutes)

Hospital A	Hospital B	Hospital C
8	2	10
4	4	2
3	3	9
6	5	5
	3	7
	6	

(Given that $F_{0.05, 2, 12} = 3.89$)

Is there enough evidence that the average waiting times for a patient to meet a doctor in these hospitals are equal at 5% level of significance ?

10

9. A company manufactures pipes of small diameter. Four observations of diameters of the pipes were taken periodically. The following table gives the values of four observations, taken 10 times during a working day :

Sample No.	Observations			
	I	II	III	IV
1	4.1	4.3	4.2	4.2
2	4.3	4.1	4.3	4.5
3	4.2	4.3	4.4	4.3
4	4.1	4.2	4.4	4.1
5	4.3	4.1	4.2	4.2
6	4	4.2	4.1	4.1
7	4	4.5	4.2	4.1
8	4.2	4.3	4.1	4.2
9	4.4	4.2	4.1	4.5
10	4.4	4.2	4.3	4.3

Calculate the control limits for mean and range.

(Given that $A_2 = 0.729$, $D_3 = 0$, $D_4 = 2.282$)

10

10. The table given below shows the relation between the performances of students in Statistics and Computer Sciences. Test the hypothesis that the performance in Statistics is independent of the performance in Computer Sciences using 5% level of significance. (Given that $\chi^2_{0.05, 4} = 9.49$) 10

	Computer Sciences			
		High Grade	Medium Grade	Low Grade
Statistics	High Grade	36	72	42
	Medium Grade	34	122	44
	Low Grade	50	56	44

No. of Printed Pages : 6

BCS-040

**BACHELOR OF COMPUTER APPLICATIONS
(BCA) (Revised)**

05250

Term-End Examination

December, 2017

BCS-040 : STATISTICAL TECHNIQUES

Time : 2 hours

Maximum Marks : 50

Note :

- (i) Attempt both sections, i.e., Section A and Section B.
- (ii) Attempt any **four** questions from Section A.
- (iii) Attempt any **three** questions from Section B.
- (iv) Use of non-scientific calculator is allowed.

SECTION A

1. A research was conducted to improve the safety plans in a factory. In this study, the accidental data of the factory for the last 50 weeks were compiled. These data are grouped into the frequency distribution as shown below :

Number of Accidents	Number of Weeks
0 – 5	8
5 – 10	22
10 – 15	10
15 – 20	8
20 – 25	2

Draw a histogram and calculate the average number of accidents per week.

5

2. A cricket ball manufacturing company wants to check the variation in the weight of the balls. For this, 25 samples each of size 4, are selected and the weight of each ball is measured (in grams). The sum of the sample averages and the sum of

sample ranges were found to be $\sum_{i=1}^{25} \bar{x}_i = 4010$

grams and $\sum_{i=1}^{25} R_i = 72$ grams, respectively.

Compute the control limits for the \bar{X} and R-charts. It is given that $A_2 = 0.729$, $D_3 = 0$ and $D_4 = 2.282$.

5

3. An insurance company insured 1000 scooter drivers, 3000 car drivers and 6000 truck drivers. The probabilities that the scooter, car and truck drivers meet with an accident are 0.2, 0.04 and 0.25, respectively. One of the insured persons meets with an accident. What is the probability that he is a car driver ?

5

4. A researcher would like to test whether there is any significant difference between the proportion of safety consciousness of men and women while driving a car. In a sample of 300 men, 130 said that they used seat belts. In a sample of 300 women, 90 said that they used seat belts. Test the claim that there is no significant difference between the proportion of safety consciousness of men and women while driving a car at 5% level of significance. (Given that $Z_{0.025} = 1.96$)

5

5. A company manufactures two types of bulbs, (A and B). The manager of the company tests a random sample of 50 bulbs of type A and 60 bulbs of type B and obtains the following information :

	Mean Life (in hours)	Standard Deviation (in hours)
Type A	1300	50
Type B	1200	60

Obtain 99% confidence interval for the difference of the average life of the two types of bulbs. (Given that $Z_{0.005} = 2.58$)

5

6. (a) Differentiate between parametric and non-parametric tests.

(b) A washing machine company chooses a random sample of 10 motors received from one of the suppliers. It determines the length of life of each of the motors. The results (in thousands of hours) are as follows :

4.5, 5.0, 4.2, 4.8, 4.2, 5.1, 4.0, 4.2, 4.2, 4.5

Compute a point estimate of the mean length of life of the motors received from the supplier.

2+3

SECTION B

7. A steel rod is subjected to stress. The tensile strength of the rod at different values of the stress are recorded. Find a relation between the tensile strength and the stress. The data is given below :

Stress (kg) :	10	9	7	8	11
Tensile strength : (m/kg)	6	3	2	4	5

Also predict the tensile strength at a stress of 5 kg.

10

8. A computer engineer identifies four ways that a certain job can be done. To determine how long it takes operators to do the job when each of these methods is used, the engineer asks four operators to do the job using the method A, another four operators to do the job using method B, and so on. Each operator's time (in seconds) is shown below :

A	B	C	D
19	18	21	22
17	16	20	23
22	15	19	21
20	14	19	20

Construct the relevant analysis of variance table and test the hypothesis that the average time of all operators are equal at 1% level of significance. (Given that $F_{0.01, (3, 12)} = 5.95$)

10

9. The following contingency table presents the analysis of 300 persons according to hair colour and eye colour :

Hair Colour	Eye Colour			
		Blue	Grey	Brown
	Fair	30	10	40
	Brown	40	20	40
	Black	50	30	40

Test the hypothesis that there is an association between hair colour and eye colour at 5% level of significance. (Given that $\chi^2_{0.05, 4} = 9.49$)

10

10. (a) Distinguish between random sampling and non-random sampling.
- (b) Suppose an analyst studies three villages having populations $N_1 = 50000$, $N_2 = 30000$ and $N_3 = 40000$, respectively. A stratified random sample is to be taken with a total sample size of $n = 500$. Determine the sample size to be selected from each village individually using the method of (i) proportional, and (ii) optimal allocation.

From the previous survey, it is known that the standard deviations are $S_1 = 30$, $S_2 = 15$ and $S_3 = 20$.

2+8

No. of Printed Pages : 5

BCS-040

**BACHELOR OF COMPUTER APPLICATIONS
(BCA) (Revised)**

Term-End Examination

June, 2018

BCS-040 : STATISTICAL TECHNIQUES

Time : 2 hours

Maximum Marks : 50

Note :

- (i) Attempt both Section A and Section B.
- (ii) Attempt any **four** questions from Section A.
- (iii) Attempt any **three** questions from Section B.

SECTION A

1. Draw a histogram and a frequency polygon for the following data. Also find its mean. Further comment on the shape of the distribution.

<i>Time (in minutes)</i>	<i>No. of Machines</i>
20 – 25	03
25 – 30	07
30 – 35	11
35 – 40	08
40 – 45	05
45 – 50	02

2. A sample of size 3 is to be selected from a population of 10 households. List all possible samples by (a) Linear systematic; (b) Circular systematic sampling. 5

3. A bag contains 10 white and 3 black balls. Balls are drawn one by one without replacement till all the black balls are drawn. Find the probability that this procedure comes to an end at the 6th draw. 5

4. From a list of 500 names and addresses, 100 names were selected without replacement and 25 wrong addresses were found. Identify the population and estimate the total number of addresses required to be corrected in the list. Also estimate the standard error. 5

5. In order to find the correlation coefficient between two variables X and Y from 20 pairs of observations, the following calculations were made :

$$\sum X = 15, \sum Y = -6, \sum XY = 50, \sum X^2 = 61 \\ \text{and } \sum Y^2 = 90.$$

Calculate the correlation coefficient and the slope of the regression line of Y on X. 5

6. A random sample of size 10 from a normal population gives the values 64, 72, 65, 70, 68, 71, 65, 62, 66, 67. If it is known that the standard error of the sample mean is $\sqrt{0.64}$, find 95% confidence limits for the population mean. Also find the population variance. 5

SECTION B

7. (a) The police plans to enforce speed limits by using radar traps at 4 different locations within the city limits. The radar traps at each of the locations L_1 , L_2 , L_3 and L_4 are operated 40%, 30%, 20% and 10% of the time respectively. If a person who is speeding on his way to work has probabilities 0.2, 0.1, 0.5 and 0.2 respectively, of passing through these locations, what is the probability that he will receive a speeding ticket? Also find the probability that he will receive a speeding ticket at location L_1 .

5

- (b) Explain the exponential smoothing method. Use the same to forecast the following data. Also estimate the error. [Take $W = 0.1$]

Table : Number of new colleges opened in the country.

5

Year	Colleges
2001	5
2002	3
2003	3
2004	4
2005	3
2006	6
2007	4

8. The result of a survey regarding radio listeners' preference for all different types of music are given in the following table with listeners classified by age group :

Types of Music Preferred	Age Group		
	19 – 25	26 – 35	Above 35
National Music	60	60	30
Foreign Music	190	264	96
Indifferent	50	76	74

Test at 5% level of significance whether the type of music is dependent on the age group. Given that

$$\chi^2_{4,5\%} = 9.488.$$

10

9. A company wants to test whether its 3 salesmen A, B and C have the same selling ability. Their records of sales (in ₹ '000) during various weeks of the last month are given below :

Salesman	A	B	C
I st week	16	22	25
II nd week	20	20	24
III rd week	18	15	16
IV th week	25	26	20

Prepare a one-way ANOVA table and test the hypothesis that all the salesmen perform equally over the week. Given $F_{5\%}(2, 9) = 4.26$.

10

10. Write short notes on any **four** of the following :

$$4 \times 2 \frac{1}{2} = 10$$

- (a) Cluster Sampling
- (b) Stratified Sampling
- (c) Control Charts
- (d) Goodness of Fit
- (e) Moving Average



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No. of Printed Pages : 4

BCS-040

**BACHELOR OF COMPUTER APPLICATIONS
(BCA) (Revised)**

Term-End Examination

December, 2018

02663

BCS-040 : STATISTICAL TECHNIQUES

Time : 2 hours

Maximum Marks : 50

Note :

- (i) Attempt both Section A and Section B.
- (ii) Attempt any **four** questions from Section A.
- (iii) Attempt any **three** questions from Section B.

SECTION A

1. The mean and standard deviation of 20 items is found to be 10 and 2, respectively. At the time of checking it was found that one item with value 8 was incorrect. Calculate the mean and standard deviation if the wrong item is omitted. 5
2. A population consists of the numbers 2, 5, 7, 8 and 10. Write all possible simple random samples of size 3 (without replacement). Verify that the sample mean is an unbiased estimator of the population mean. 5

3. A random sample of 10 males from a normal population showed a mean height of 66 inches and the sum of squares from this mean is equal to 90 sq inches. Is it reasonable to believe that the average height is greater than 64 inches ? Justify your answer at 5% level of significance (Use $t_{0.05}(9) = 2.26$). 5

4. Write short notes on any *two* of the following : $2 \times 2 \frac{1}{2} = 5$

- (a) Simple Random Sampling
- (b) Systematic Sampling
- (c) Stratified Sampling

5. A random sample of size 64 has been drawn from a population with standard deviation 20. The mean of the sample is 80.

- (a) Calculate 95% confidence limits for the population mean.
- (b) How does the width of the confidence interval change if the sample size is 256 instead ? 5

6. Box A contains 5 red and 4 blue balls, Box B contains 2 red and 5 blue balls. A ball is drawn at random from each box. Find the probability that one is red and the other is blue. 5

SECTION B

7. The following table gives data for a sample of married women, the level of education and marriage adjustment score :

	Marriage Adjustment Score		
Level of Education	Low	High	Very High
Middle School	25	5	10
High School	50	30	40
College	120	60	60

Can you conclude from the above, the higher the level of education, the greater is the adjustment in marriage ? Justify. Given that $\chi^2_{0.05}(4) = 9.488$. 10

8. Refill of cartons with apple juice is taking place in a plant. Data for 14 days was collected and 100 cartons were checked every day for proper filling. Data is as given below :

S. No.	X
1	8
2	2
3	4
4	1
5	3
6	3
7	2
8	4
9	9
10	7
11	5
12	8
13	5
14	9

Compute the UCL, LCL and CL using an appropriate control chart. Also draw the chart. 10

9. Plot the following data about demand for an item. Find the centred moving averages by taking $n = 3$. Use these to forecast the next two months' demand.

10

Month	Demand
1	46
2	56
3	54
4	43
5	57
6	56
7	67
8	62
9	50
10	56
11	47
12	56

10. The following table gives the yield of a hybrid variety of wheat in quintals per acre from 17 trial plots of land treated with four types of fertilizers :

Treatment with fertilizers

A	B	C	D
24	31	39	38
39	25	41	32
35	26	33	35
	21	40	34
		45	26

Use ANOVA to test whether the effect of fertilizers differs in terms of average yields.

Given that $F_{0.05}(3, 13) = 3.41$.

10

No. of Printed Pages : 5

BCS-040

BACHELOR OF COMPUTER APPLICATIONS

(BCA) (Revised)

Term-End Examination, 2019

BCS-040 : STATISTICAL TECHNIQUES

Time : Two Hours]

[Maximum Marks : 50

Note : Attempt both sections, i.e., Section A and Section B.
Attempt **any four** questions from **Section-A**. Attempt
any three questions from **Sections-B**. Non-scientific
calculator is allowed.

SECTION - A

1. The following table represent daily wages (in rupees) of the workers in a certain commercial organisation : [5]

Daily Wages	200-300	300-400	400-500	500-600
Number of Workers	05	10	03	02

Calculate mean and standard deviation of the above data.

2. A person is known to hit a target in 4 out of 5 shots whereas another person is known to hit in 2 out of 3 shots. Find the probability that the target being hit, when they both try. [5]

3. An oil exploration firm plans to drill four holes. It is assumed that the probability of oil yield from each hole is $1/5$. Since the holes are in quite different locations, the outcome of drilling one holes is statistically independent of that of drilling any other holes. What is the probability that two or more holes produce oil. [5]

4. A population of five households having monthly income (in thousand rupees) as following :

Household	1	2	3	4	5
Income	14	10	12	20	18

Write all possible samples without replacement of size 2 and show that sample mean gives an unbiased estimate of population mean.

5. Explain **any two** of the following : [5]
 - (a) z-test for mean
 - (b) Paired t-test

- (c) Simple random sampling

SECTION - B

6. An investigator is interested to know the level of knowledge about the history of India, among three different schools in a city. A test is given to four students of 8th class of each school. Their scores out of 10 are given below :

School I	School II	School III
8	6	6
6	4	5
7	6	5
5	5	6

Test the equality of the average scores of the three schools at 5% level of significance. [10]

(Given $F_{(2,9)} 5\% = 4.26$)

7. A Manager of a car company wants to estimate the relationship between age of cars and annual maintenance cost. The following data from six cars of same model are obtained as :

Age of Car (in years)	Annual Maintenance Cost (In hundred rupees)
1	10
2	15
3	18
4	20
5	25
6	35

- (a) Construct a scatter diagram for the data given above.
- (b) Fit a best linear regression line, by considering annual maintenance cost as the dependent variable and the age of the car as the independent variable.
- (c) Use this regression line to predict the annual maintenance cost for the car of age 8 years.

[2+7+1]

8. The following contingency table presents the analysis of 300 persons according to hair colour and eye colour :

Hair Colour	Eye Colour			Total
	Blue	Grey	Brown	
Fair	30	10	40	80
Brown	40	20	40	100
Black	50	30	40	120
Total	120	60	120	300

Test the hypothesis that there is an association between hair colour and eye colour at 1% level of significance

(Given $\chi^2_{(4), 1\%} = 13.28$, $\chi^2_{(6), 1\%} = 16.81$) [10]

9.

(a) Define stratified random sampling.

(b) Suppose the population of three towns is $N_1 = 50000$, $N_2 = 30000$, and $N_3 = 40000$, respectively. A stratified random sample is to be drawn with a total sample size of $n = 500$.

Determine the sample size for each town individually using the method of :

(i) proportional allocation

(ii) Optimal allocation.

It is known from a previous survey that $S_1 = 30$, $S_2 = 15$ and $S_3 = 20$

-----X-----

Number of Printed Pages : 4

BCS-040

BACHELOR OF COMPUTER APPLICATIONS

(BCA) (Revised)

Term-End Examination, 2019

BCS-040 : STATISTICAL TECHNIQUES

Time : 2 Hours

Maximum Marks : 50

Note : Attempt both sections, i.e. Section A and Section B. Attempt **any four** questions from Section A. Attempt **any three** questions from Section B. Non-scientific calculator is allowed.

SECTION-A

1. The marks obtained by 25 BCA students in statistical techniques paper out of 50 are given below :

48	10	18	02	27
23	17	23	34	35
35	37	42	37	22
42	24	26	40	08
25	13	20	23	35



(a) Present the above data in the form of continuous frequency distribution by taking the first class interval as (0-10). [2]

(b) Prepare histogram of the obtained distribution. [3]

2. The following table gives daily wages (in rupees) of workers in a certain commercial organization :

Daily Wages	200-300	300-400	400-500	500-600	600-700
No. of Workers	10	12	20	5	3

Calculate median wages of the workers. [5]

3. A problem of statistics is given to three students A, B and C whose chances of solving it are 0.3, 0.5 and 0.6 respectively. What is the probability that the problem will be solved ? [5]

4. The probability distribution of a discrete random variable X is as follows : [2+3]

X	0	1	2	3	4	5
p(x)	0	C	C	2C	3C	C

Find :

(a) The constant C

(b) $P[X \leq 3]$

5. A filling machine is set to pour 952 ml (milliliter) of oil into bottles. The filled amount is normally distributed with mean of 952 ml and standard deviation of 4 ml. Find the probability that a bottle contains oil between 952 and 956 ml. (Given $P[0 \leq z \leq 1] = 0.3413$) [5]

SECTION-B

6. Explain **any two** of the following : [5+5]

- (a) Criteria for a good estimator
- (b) Stratified random sampling
- (c) Systematic random sampling

7. Three salesmen were posted in different areas of a company. The number of units sold by them are given below :

A	B	C
10	12	5
7	8	10
9	5	6
10	7	5

On the basis of the above information, can it be concluded that there is a significant difference in the performance of the salesmen at 5% level of significance ? (Given $F_{(2,9), 5\%} = 4.26$). [10]

8. 1000 students at college level were graded according to their IQ level and economic condition of their parents.

The obtained data are as follows : [10]

Economic Condition	IQ Level	
	High	Low
Poor	240	160
Rich	460	140

Test that IQ level of the students is independent to the economic condition of their parents at 1% level of significance.

(Given $\chi^2_{(4),1\%} = 13.28$, $\chi^2_{(1),1\%} = 6.63$)

9. The Pulse rate of 6 people were recorded before and after taking a new drug. The obtained pulse rates are given below : [10]

Before	68	71	84	93	67	74
After	71	70	81	97	73	80

Can you say there is a significant increase in the pulse rate at 5% level of significance after consuming the new drug ? (Given $t_{(5), 5\%} = 2.015$, $t_{(6), 5\%} = 1.943$)

----- X -----

No. of Printed Pages : 4

BCS-040

**BACHELOR OF COMPUTER APPLICATION
(BCA) (Revised)**

Term-End Examination

BCS-040 : STATISTICAL TECHNIQUES

Time : 2 Hours]

[Maximum Marks : 50

Note: Attempt both Sections i.e. Section-A and Section-B.

Attempt any four questions from Section-A. Attempt any three questions from Section-B. Use of non-scientific calculator is allowed.

Section-A

1. Given the following sample of 20 numbers: 5
12, 41, 48, 58, 14, 43, 50, 59, 15, 45, 52, 72, 18,
45, 54, 78, 41, 47, 56, 79

- (i) Compute mean, variance and standard deviation.
- (ii) If the largest value in the sample of 20 number given above, is changed to 500, then to what extent the mean and variance will change? Justify your answer.



2. A dice is rolled 1200 times with the following results: 5

No. that comes up	1	2	3	4	5	6
Frequency	195	289	202	242	163	109

Test the hypothesis, if the dice is unbiased at 5% level of significance (Given that $\chi^2_{0.05}(5) = 11.07$)

3. Calls at a telephone switchboard occur at an average rate of 6 calls per 10 minutes. Suppose the operator leaves for a 5 minutes coffee break. What is the probability that exactly two calls occur while the operator is away? 5

4. Fit a linear trend $y = a + b * (\text{Demand})$, to the data collected from an umbrella manufacturing unit: 5

Month	1	2	3	4	5	6
Demand	46	56	54	43	57	56

5. Construct ANOVA table for one-way classification. 5
6. Briefly discuss, any two of the following: 5
- (i) Goodness of fit test
 - (ii) Binomial distribution
 - (iii) t-test for mean

Section-B

7. In a partially destroyed laboratory, legible record for correlation analysis of data is preserved as follows:

(a) Variance of $x = 9$

(b) Regression equations:

(i) $8x - 10y + 66 = 0$

(ii) $40x - 18y - 214 = 0$

Analyse the preserved records and determine:

- (i) The mean of x and y .
 (ii) The coefficient of correlation between x and y .
 (iii) The standard deviation of y .

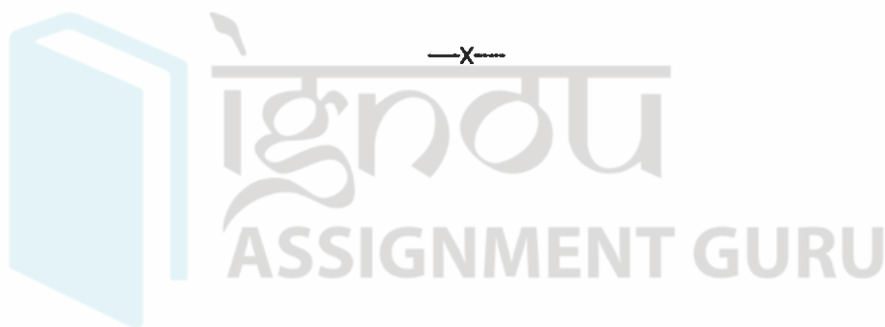
10

8. The following table shows the sample values of 3 independent normal random variables i.e. X_1 , X_2 and X_3 . Assuming that they have equal variance, test the hypothesis that they have the same mean,

by using ANOVA (Given $F_{(2, 9)}^{(0.05)} = 4.26$) 10

X_1 :	13	11	16	22
X_2 :	16	8	21	11
X_3 :	15	12	25	10

9. What do you understand by the term "Time Series"?
Discuss all the categories in which Time Series is classified. 10
10. Discuss the term "Systematic Sampling".
Differentiate between Linear and Circular systematic sampling. Give two advantages and limitations of systematic sampling. 10



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