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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 yeid 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 $S_3 = 20$

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