

**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.*
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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 $D_4 = 2.282$.

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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 ?

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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 $Z_{0.025} = 1.96$)

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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 $Z_{0.005} = 2.58$)

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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 :

		Eye Colour		
		Blue	Grey	Brown
Hair Colour	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 $\chi_{0.05, 4}^2 = 9.49$)

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