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BCS-040

BACHELOR OF COMPUTER APPLICATIONS (BCA) (REVISED)

Term-End Examination

June, 2023

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. Write the median formula, and use it to complete the frequency distribution given below : 5

Class Interval (C.I.)	Frequency
10—20	12
20—30	30
30—40	?
40—50	65
50—60	?
60—70	25
70—80	18

Given, the median value of 200 observations is 46.

2. Fit a linear trend $y = a + bx$, to the data collected from a unit that manufactures shoes : 5

Month (x)	Demand (y)
1	46
2	56
3	54
4	43
5	57
6	56

3. If 2% of the items manufactured in a factory are defective, then find the probability that : 5

   (i) There are 3 defectives in a sample of 100

   (ii) There is no defective in a sample of 50.

4. Calculate the correlation coefficient from the following data (determined from the 20 pairs of observations of two variables X and Y) : 5

   $\Sigma x = 15$, $\Sigma y = -6$, $\Sigma xy = 50$, $\Sigma x^2 = 61$, $\Sigma y^2 = 90$

5. The mean weekly sales of mobile phones in different mobile stores was 146.3 mobile phones per store. After an advertisement campaign the mean weekly sales of 22 stores, increased to 153.7 (for a typical week), and showed a standard deviation of 17.2. Verify the success of advertisement campaign, at 5% level of significance. (Given : $t_{21(0.05)} = 2.08$). 5

6. The mobile phone numbers are combinations of ten digits, 0 to 9. An observer analysed the mobile numbers in the contact list of his/her mobile phone and prepared a frequency distribution table of the digits (0 to 9), as given ahead : 5

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

From the observed data (given above), she/he wants to test whether the digits occur with same frequency or not. (Given : $\alpha = 0.05$), $\chi^2_{9(0.05)} = 16.918$).

Section—B

7. A survey study includes three villages V_1, V_2 and V_3 having 50000, 30000 and 40000 as respective populations. 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 allocation and (ii) optimal allocation.

From the previous survey, it is known that the standard deviations are $S_1 = 30$, $S_2 = 15$ and $S_3 = 20$. 10

8. The data of 300 persons, according to hair colour and eye colour is shown below : 10

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

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

9. An engineer identifies four ways that a job can be done. To determine how long it takes for an operator to do a job, when each of these ways (or methods) are used, the engineer asks 4 operators to do a job using method A another 4 operators to do the same job using method B

and so on. Data, related to the performance of each operator (in seconds) is shown below : 10

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. Write short notes on any *two* of the following : 5×2=10

(a) Control charts

(b) Stratified sampling

(c) Forecasting models