

Semester: III of Bsc

Course name & code: STATISTICAL METHODS [SEC 01]

Total marks: 60

Date: 28/11/2022 Duration: 2 hours

Total No of pages: 2

Instructions: 1. All questions are compulsory.

2. Figures to the right indicate maximum marks to the questions.

3. Use of non-programmable calculators is allowed.

Q.1. Answer the following: (2×5 = 10 marks)

- a. Define Statistics. State any two limitations of statistics?
- b. Compute the coefficient of rank correlation between marks in mathematics (X) and marks in statistics (Y) for the data given below.

Marks in Mathematics	88	56	50	45	62	60
Marks in Statistics	92	76	75	63	50	65

- c. A random variable X has the following probability distribution.

Value of X :	-2	-1	0	1	2	3
Probability :	0.1	k	0.2	2k	0.3	k

Find the value of k and hence use it to find the expected value of X.

- d. A bag contains 7 white and 9 black balls. Two balls are drawn at random. What is the probability that one of them is white and the other is black?
- e. Given the equation of the regression lines for certain bivariate data as  $2x - y - 15 = 0$  and  $3x - 4y + 25 = 0$ , find the mean value of x and y.

Q.2. Answer the following: (2×5 = 10 marks)

- a. Explain the terms with respect to testing of hypothesis:  
(i) Level of Significance                      (ii) Critical Values
- b. A random sample of 1000 units from a large consignment showed that 200 were damaged. Find 95% confidence limits for the proportion of damaged units in the consignment
- c. Explain Type I and Type II errors with reference to testing of hypothesis.
- d. State the condition under which Poisson distribution is used. If a random variable X follows Poisson distribution such that  $P(X = 1) = P(X = 2)$ .
- e. What are non-parametric test. State the assumption associated with non-parametric tests

Q.3. A Answer **any one** of the following: (5 marks)

- a. You are supplied with the following data  
 $4X - 5Y + 33 = 0$ ,  $20X - 9Y - 107 = 0$ , variance of X = 9  
Calculate (i) Coefficient of correlation between X and Y.  
(ii) Standard deviation of Y

OR

- b. The odds that A speaks the truth are 3:2, and odds that B speaks the truth is 5:3. In what percent of the cases are they likely to contradict each other on an identical point

Q.3. B. Answer the following (5 marks)

The following data relates to the marks obtained by 10 students of a class in Statistics and Costing. Obtain the rank correlation coefficient.

Marks in Statistics	30	38	28	27	28	23	30	33	28	35
Marks in Costing	29	27	22	29	20	29	18	21	27	22



- Q.4. A Answer **any one** of the following: (5 marks)
- a. A box contains 3 red and 7 white balls. One ball is drawn at random and in its place a ball of the other colour is put in the box. Now one ball is drawn at random from the box. Find the probability that it is red.

OR

- b. The mean weight of 500 male students at a certain college is 65.5 and standard deviation is 10 kg. Assuming that the weights are normally distributed. find how many students weigh:
- (i) more than 75.5 kg (ii) between 55.5 and 75.5 kg.  
(Given :  $P(0 < z < 1) = 0.3413$ ,  $P(0 < z < 2) = 0.4772$ )

- Q.4. B. Answer the following (5 marks)
- If the chance that the vessel arrives safely at a port is 0.9, find the chance that out of 5 vessels expected at least 4 will arrive safely.

- Q.5. A Answer **any one** of the following: (5 marks)
- a. It is claimed that 80% of the students make use of the computer provided to them through cyberage scheme of the government. A random sample of 100 students gives that only 70 of them use their computer. Can we reject the claim at 1% level of significance?

OR

- b. The means of two random samples of size 9 and 7 are 196.42 and 198.82 respectively. The sum of the squares of deviations from mean are 26.94 and 18.73 respectively. Can the sample be considered to have been drawn from the same normal population?  
(given tabulated  $t_{0.05}$  for 14 d.f. for two tailed test is 2.15)

- Q.5. B. Answer the following (5 marks)
- Ten cartons are taken at random from an automatic filling machine. The mean net weight of the ten cartons is 11.8 oz. and the standard deviation is 0.15 oz. Does the sample mean differ significantly from the intended weight of 12 oz.? Given that for  $\nu = 9$ ,  $t_{0.05} = 2.26$

- Q.6. A Answer **any one** of the following: (5 marks)
- a. The mean weekly sales of chocolate bar in candy stores was 146.3 bar per store. After an advertising campaign the mean weekly sales in 22 stores for a typical week increased to 153.7 and showed a standard deviation of 17.2. Was the advertising campaign successful?  
(given tabulated  $t_{0.05}$  for 21 d.f. for one tailed test is 1.721.)

OR

- b. A D.T.P. operator claims that she can type a regular text at an average speed of 100 words per minute. To check her claim random 36 trials were done, her average speed was 95 words per minute with a standard deviation of 10 words. Test the claim at 1% level of significance.

- Q.6. B. Answer the following (5 marks)
- The number of aircraft accidents that occurred during various days of the week are given. Find whether the accidents are uniformly distributed over the week.  
No. of Accidents: 14 16 8 20 11 9 14  
(Given  $\chi^2_{6}(0.05)=12.59$ )

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