Ex/INT/M/8-Stat/31/2018

BACHELOR OF SCIENCE EXAMINATION, 2018

(2nd Year, 1st Semester)

STATISTICS (Subsidiary)

Paper - 8-Stat

Full Marks : 50 Time : Two Hours

All questions carry equal marks.

Symbols and notations have their usual meanings.

Answer any *five* questions. 10×5=50

1. Explain how a control chart helps to control the quality of a manufactured product. Describe the basis of a control chart. Distinguish clearly between the charts for variables and charts for attributes. Is it possible to use the latter for former ? If so, when and how ? 10

2. Construct a control chart for mean and the range for the following data on the basis of fuses, samples of 5 being taken every hour (each set of 5 has been arranged in ascending order of magnitude). Comment on whether the production seems to be under control assuming that these

[*Turn over*]

are the first data (For $n = 5$, $A_2 = 0.58$, $D_3 = 0$, $D_4 = 2.11$).

42	42	19	36	42	51	60	18	15	69	64	61
65	45	24	54	51	74	60	20	30	109	90	78
75	68	80	69	57	75	72	27	39	113	93	94
78	72	81	77	59	78	95	42	62	118	109	109
87	90	81	84	78	132	138	60	84	153	112	136

10

3. (a) In a single sampling plan of attributes with lot size *N*, sample size *n* and allowable defectives *C*, how will you obtain the probability of acceptance of the lot if the lot fraction defective is *p* ? How will you modify the above expression using :

   (i) Binomial approximation,

   (ii) Poisson approximation.

   (b) Define and distinguish clearly between Producer's and Consumer's risk. 7+3

4. (a) Explain what is single sampling plan and double sampling plan. Discuss their relative merits and demerits.

[*Turn over*]

(b) Draw O.C. curve for the single sampling plan $N = 1000,\ n = 150$ and $C = 2$.

5. (a) Write short notes on :

(i) Standard scores,

(ii) σ-scores.

(b) A number of students were examined in a subject by three examiners E_1, E_2 and E_3 independently. The standards of marking of the examiners are reflected in the percentage frequency distribution of the scores given :

Marks	Percentage frequency distribution of		
	E_1	E_2	E_3
0-10	5	10	5
10-30	15	20	25
30-50	50	60	50
50-70	24	8	10
70-90	5	2	8
90-100	1	—	2

Determine the relative ranks of the three students A, B and C who have scored the following marks with the three examiners E_1, E_2 and E_3.

Student	Marks given by		
	E_1	E_2	E_3
A	25	62	73
B	48	51	35
C	78	25	50

6. (a) Explain the concept of reliability of a test and obtain the expressions for (i) coefficient of reliability and (ii) index of reliability.

(b) Explain the importance of validity in test standardization. What is its relationship with reliability ? Describe a method of obtaining the reliability coefficient and the validity coefficient.

7. (a) What is the price elasticity of demand for the demand curve

$$p = \frac{a}{b + cy}$$

where p is the price, y is the quantity demanded and a, b, c are constants ?

(b) Define price elasticity of demand and income elasticity of demand. Point out their uses in economic analysis.

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