Where $p_x$ and $p_y$ are the fixed price and $\mu$ the individual's fixed income.

Deduce that the elasticity of demand for either goods with respect to income or price is equal to unity in absolute value.

4+6

Ex/M/8-Stat/30/19(Old)

## INTER B.SC. EXAMINATION, 2019

( 2nd Year, 1st Semester, Old Syllabus )

### STATISTICS (SUBSIDIARY)

### PAPER - 8 STAT

Time : Two hours Full Marks : 50

All questions carry equal marks.

Symbols and notations have their usual meanings.

Answer ***any five*** questions

1. a) What is Control Chart ? Explain clearly the basis and working of control charts for mean and range. State the basis and assumption on which $\overline{X}$ and R charts are developed.

   b) Explain in detail the $\overline{X}$ and R charts. What purpose do they surve ? What are their advantages over the p chart ?

   6+4

2. The following are the mean and ranges of 20 samples of size 5 each. The data pertain to the overall length of a fragmentation bomb base manufactured during the war by the American Store camp.

| Group No. | Mean | Range | Group No. | Mean | Range |
|---|---|---|---|---|---|
| 1 | 0·8372 | 0·010 | 11 | 0·8380 | 0·006 |
| 2 | 0·8324 | 0·009 | 12 | 0·8322 | 0·002 |
| 3 | 0·8318 | 0·008 | 13 | 0·8356 | 0·.013 |

| Group No. | Mean | Range | Group No. | Mean | Range |
|---|---|---|---|---|---|
| 4 | 0·8344 | 0·004 | 14 | 0·8322 | 0·005 |
| 5 | 0·8346 | 0·005 | 15 | 0·8404 | 0·008 |
| 6 | 0·8332 | 0·011 | 16 | 0·8372 | 0·011 |
| 7 | 0·8340 | 0·009 | 17 | 0·8282 | 0·006 |
| 8 | 0·8344 | 0·003 | 18 | 0·8346 | 0·006 |
| 9 | 0·8308 | 0·002 | 19 | 0·8360 | 0·004 |
| 10 | 0·8350 | 0·006 | 20 | 0·8374 | 0·006 |

From this data, obtain the control limits for $\overline{X}$ and R charts to control the length of bomb bases produced in the future, (For $n = 5$, $A_2 = 0{\cdot}58$, $D_3 = 0$ and $D_4 = 2{\cdot}12$) 10

3. a) What do you understand by acceptance sampling procedure ? State its uses giving illustrations.

   b) Describe single sampling plan. Obtain O.C. and A.O.Q. curve for this plan. Distinguish clearly between producer's and consumer's risk. 5+5

4. Explain single and double sampling inspection plans in quality control and discuss thier relative merits and demerits. 10

5. a) Why is it condidered desirable to convert gross scores to some standard socres ? Define 'standardised scores' and 'normalized socres' and describe how they are derived ?



   b) A fist is administered on 400 pupils. It gave mean 60 and s.d. 12. Complete the following table of equivalent raw scores.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Raw scores (x) | 84 | 78 | 72 | 66 | 60 | 54 | 48 | 42 | 36 |
| $\sigma$-Score (z) | - | - | 1 | - | 0 | - | - | - | - |
| Standard socre ( x′ ) | - | - | - | - | - | 45 | - | - | - |

5+3+2

   c) Convert the 10 scores 1, 2, 3,....,10 into standard scores with mean 50 and s.d.10.

6. a) Explain briefly the concepts of reliability and validity of socres in educational and psychological experiments.

   b) Explain the importance of reliability and validity in test standardisation. What is their relationship to each other ? Describe the different methods of obtaining the reliability coefficient and the validity coefficient. 5+5

7. a) Explain the terms 'demand elasticity' and 'income elasticity'. What is the advantage of using elasticities instead of ordinary derivatives ?

   b) If $u = cx^{\alpha}y^{\beta}$ in an individual's utility function of two goods, show that his demand for the goods is

$$x = \frac{\alpha}{\alpha+\beta}\cdot\frac{\mu}{p_x},\quad y = \frac{\beta}{\alpha+\beta}\cdot\frac{\mu}{p_y}$$ 4+6