AU–140

B.Sc. Part–III (Semester–V) Examination

5S : STATISTICS

Time : Three Hours]   [Maximum Marks : 80

Note :— All questions are compulsory.

1. (A) Fill in the blanks :

(i) In SRSWOR, sample mean is an unbiased estimate of _____ mean.

(ii) _____ sampling is used if the complete and up-to-date list of sampling units is available.

(iii) SQC stands for _____.

(iv) An indifference curve that lies to the right of another yields more _____.   2

(B) Choose the correct alternative (MCQ) :

(i) If the discrepancy between the observed and expected value of statistic is greater than _____ times the S.E. then hypothesis is rejected at 5% level of significance.

(a) 0.5   (b) 1.96

(c) 0.96   (d) 0.99

(ii) OC curve is a graphic representation of the relationship between the probability of acceptance and _____.

(a) Fraction defective in the lot

(b) Average Outgoing Quality (AOQ)

(c) Average Total Inspection (ASN)

(d) Lot Tolerance Proportion Defectives (LTPD)

(iii) $\bar{X}$ and R chart are used to find out _____.

(a) Cost control   (b) Process control

(c) Production control   (d) Material control

(iv) _____ sampling is the scientific method of selecting samples according to same laws of chance.

(a) Random   (b) Quota

(c) Subjective   (d) Convenience   2

(C) Answer the following in **one** sentence :

    (i)   Who first apply control chart to investigate quality of manufactured product ?

    (ii)   Who first extensively studied distribution of income among citizens ?

    (iii) Which control charts are used for attributes ?

    (iv) Define sampling frame.   4

2. (A) Explain the concept of statistical quality control   4

    (B) Obtain 3σ limits for R chart   4

    (C) Explain process control and product control.   4

OR

3. (P) Explain construction of X chart   4

    (Q) State the applications of C-chart   4

    (R) Explain the causes of variation in SQC.   4

4. (A) Explain single and double sampling inspection plans in quality control.   6

    (B) Explain the following terms :

      (i)   ASN   (ii) AOQL   (iii) AQL.   6

OR

5. (P) Describe single sampling plan and obtain OC for this plan.   6

    (Q) Explain ASN and ATI.   6

6. (A) Explain partial elasticities of demand with example.   4

    (B) Explain the theory of consumer behaviour.   4

    (C) Explain indifference curve.   4

OR

7. (P) Describe cardinal and ordinal approach to utility.   4

    (Q) Explain cross elasticities of demand.   4

    (R) State Pareto's law of income distribution.   4

8. (A) Define standard error and state its importance in sampling.   4

    (B) Define :

      (i)   SRSWR   (ii) SRSWOR.   4

    (C) Obtain variance of unbiased estimate population mean under SRSWOR.   4

OR

9. (P) State the uses and limitations of sampling procedure. 4

(Q) Prove that in SRSWOR the probability of selecting a specified unit of the population at any given draw is equal to the probability of its being selected at the first draw. 4

(R) Explain the concept of census survey and sample survey. 4

10. (A) Explain the concept of stratified random sampling and obtain variance of unbiased estimate of population mean. 6

(B) Define :

(i) Strata

(ii) Stratifying factor

(iii) Optimum allocation. 6

OR

11. (P) Explain stratification and obtain the estimate of population mean under stratified random sampling. 6

(Q) Compare Neyman's allocation of stratified random sampling over SRSWOR and interpret the result. 6

12. (A) Explain the procedure of drawing a sample in systematic sampling. 4

(B) Define cluster sampling and obtain its sample mean. 4

(C) State merits and demerits of systematic sampling. 4

OR

13. (P) Explain cluster sampling along with example. 4

(Q) Prove in case of systematic sampling :

$$V\left(\overline{Y}_{sys}\right) = \frac{N-1}{N} s^2 - \frac{(n-1)}{n} s^2_{wsys}$$

Where $s^2_{wsys} = \frac{1}{k(n-1)} \Sigma\Sigma(y_{ij} - \overline{y}_i)^2$ is the mean square with the same systematic sample. 4

(R) State the advantages and disadvantages of cluster sampling. 4