

U.G. 5th Semester Examination - 2020**STATISTICS****[HONOURS]****Discipline Specific Elective (DSE)****Course Code : STAH-DSE-1****(Statistical Quality Control)**

Full Marks : 50(40+10)

Time : $2\frac{1}{2}$ Hours*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.*

1. Answer any **five** questions: $2 \times 5 = 10$
- a) What is acceptance rectification type sampling plan?
 - b) Distinguish between process control and product control.
 - c) Define OC curve of a sampling plan.
 - d) What is control chart for fraction defectives?
 - e) What are rational subgroups?
 - f) Distinguish between assignable and non-assignable causes of variation.
 - g) Distinguish between tolerance limits and specification limits.

- h) What is average total inspection?

2. Answer any **two** questions: $5 \times 2 = 10$
- a) What do you mean by Type I and Type II errors in context of using control chart technique? Explain average run length (ARL) in context of using control chart technique.
 - b) While preparing the control chart for process mean, how one can estimate the process standard deviation if it is unknown? State whether the estimate is valid when the underlying distribution is not normal.
 - c) Describe how 3σ limits and probability limits are used in setting limits on control chart.
 - d) Explain LTPD and AOQL plans with reference to a single sampling acceptance rectification plan by attribute.
3. Answer any **two** questions: $10 \times 2 = 20$
- a) i) The upper specification limit of the diameter of a fibre tube is given to the manufacturer. Explain how one can accept or reject a lot of such tube. Indicate any assumptions that you make.
ii) For the plan in (i) obtain a suitable expression

[Turn over]

for the OC function when the process standard deviation is known. 4+6

- b) Derive the control limits for a manufacturing process where each item is observed for the number of defects it contains. How do you take care of the situation when the subgroup sizes are not equal? 5+5
- c) i) Discuss the advantages and disadvantages of sampling over 100% inspection.
- ii) Derive the control limits for fraction defectives when sample size varies. 5+5
- d) Describe double sampling inspection plans. Give an outline of methods for determining the constants involved in double sampling plan. 4+6

[Internal Assessment: 10]
