·Sub. Code : | 0 | 4 | 8 | 4 |

Exam. Code : | 1 | 0 | 3 |

B.A. /B.Sc (General) 3rd Year

1046

STATISTICS

Paper : 302 : Statistical Quality Control and

Computational Techniques

Time Allowed : Three Hours]   **[Maximum Marks : 65**

Note :– (i)   Attempt **five** questions in all, including the **first** Compulsory
questions from each section.

(ii)   Use of simple non-programmable calculators is allowed.

(iii)   Statistical tables and log tables will be provided on demand.

(iv)   Various symbols used have their usual meaning.

(Compulsory Question)

1.   (a)   Define Producer's risk and explain its significance.

(b)   What determines the width of the control limits in a process
control ?

(c)   Distinguish between defect and defective.

(d)   What are the benefit and limitations of the graphical methods
of solving the linear programming problems ?

(e)   Explain briefly the Gauss-Siedel method of obtaining the
iterative solution of linear equations.   3,2,3,3,2

SECTION–I

2. (a) Explain the term Statistical Quality Control. What is meant by process control in industrial statistics ? Also briefly about quality assurance.

   (b) Explain the construction and uses of c-chart and p-chart, clearly mentioning that under what circumstances c-chart is used instead of p-chart. 6,7

3. (a) Distinguish between single and double sampling plans.

   (b) Discuss the basis principles underlying the control charts. Explain how control charts are determined for :

   (i) Mean chart and

   (ii) Range chart. 7,6

4. (a) Explain the causes of variations in quality characteristics of a product.

   (b) Discuss about ASN and OC curves functions in the context of double sampling plan. 4,9

5. Write in detail about the following :

   (a) *np* charts and its uses

   (b) AOQL and LTPD 6,7

SECTION–II

6. Obtain dual and solve the linear programming problem using simplex method :

   Minimize $Z = x_1 + x_2$

   Subject to

   $$0.12x_1 + 0.04x_2 \geq 600$$
   $$0.10x_1 + 0.40x_2 \geq 1000$$
   $$x_1, x_2 \geq 0$$

   13

7. (a) Define the terms :

   (i) Feasible solution

   (ii) Basic feasible solution in the context of transportation problem and explain about a balanced transportation problem.

   (b) Explain the Vogel's approximation method of solving a transportation problem. How is it an improvement over the North West Corner method ?

   4,9

8. (a) What do you understand by interpolation ? What are the underlying assumptions for the validity of the various methods used for interpolation ?

   (b) The mode of a certain frequency curve $y = f(x)$ is attained at $f(9.1)$ and the value of the frequency function $f(x)$ for $x = 8.9, 9.0$ and 9.3 are respectively equal to 0.30, $0.35, 0.25$. Using Lagrange's interpolation procedure, calculate the approximate value of $f(x)$ at the mode.

   8,5

9. (a) Using Simpson's one-third rule to estimate approximately the area of the cross-section of river 80 feet wide, the depth d (in feet) at a distance x from one bank being given by the following table :

x	0	10	20	30	40	50	60	70	80
d	0	4	7	9	12	15	14	8	3

(b) Find the value of f(8) and f(15) from the following table using Newton's divided differences procedure:

x	4	5	7	10	11	13
f(x)	48	100	294	900	1210	2028

7,6