B. Sc. (Sem. VI) (CBCS) Examination

March / April - 2017

Statistics : S-602

(Statistical Quality Control & Operation Research) (New Course)

Faculty Code : 003
Subject Code : 001663

Time : $2\frac{1}{2}$ Hours]   [Total Marks : **70**

Instructions : (1) Right hand side figures show that mark of that question.

(2) Student can use their own calculator (scientific).

(3) Statistical table and graph provided on request.

1   Answer the following questions :   **20**

(1)   Statistical quality control takes care of the variation due to _____ causes.

(2) R - chart uncover assignable causes _____ samples.

(3)   The variance of the fraction defective is obtained by the variance of _____ distribution.

(4)   Producer's risk is referred as _____ error.

(5)   Number of defects follows _____ distribution.

(6)   Average percentage of defectives remaining in an outgoing lot is known as _____.

(7)   The per cent defectives in a lot below which only the lot is acceptable is known as _____.

(8)   The inspection of 50 aircrafts revealed that there are 700 missing rivets in all. The appropriate control chart in this situation which can be prepared is _____.

(9)   A list shows the number of non-conforming items in each of the 20 samples, each sample consisting of 50 items. The appropriate statistical control chart in this situation is _____.

(10) A factory produces 300 articles per day. After inspecting 3000 articles on 30 consecutive days, 270 articles were non-conforming to the specification. The upper control limit for p - chart is _____.

(11) The constrains may be in the form of _____.

(12) Linear programming is a technique which attempts to determine how best to allocate resources in order achieve some _____ function.

(13) The probability of accepting a lot with fraction defectives p_t is known as _____.

(14) A _____ variable represents amounts by which solution values exceed a resource.

(15) Whether the variability in the manufactured items is within tolerance limits or not can be ascertained through _____ .

(16) The simplex method examines the extreme points in a systematic manner, repeating the same set of steps of the algorithm until an _____ solution is reached.

(17) If there were n workers and n jobs there would be solution.

(18) The solution to a transportation problem with m - rows (supplies) and n - columns (destination) is feasible if number of positive allocation are _____.

(19) The control charts help to achieve _____.

(20) A basic feasible solution is said to be _____ if the values of all basic variables are nonzero and positive.

2 (a) Answer the following questions : (any **three**)   6
   (1) Write the assumptions of LPP.
   (2) Explain LP problem.
   (3) Define optimum solution.
   (4) Compare R chart versus σ chart.
   (5) Explain charts for attributes.
   (6) Explain Acceptance sampling plan.

   (b) Answer the following questions : (any **three**)   9
   (1) Find the probability of accepting a lot if the fraction defective of lot is 0.02 using single sampling plan (100,20,1) by using Hyper Geometric Distribution.
   (2) Explain mathematical form of LP problem.
   (3) Write a Short Note : Ideal OC curve.
   (4) Why $\bar{X}$ and R charts drawn simultaneously?
   (5) Explain Single sampling plan.
   (6) Explain assignment problem with an example.

(c) Answer the following questions : (any **two**)   **10**

(1) Obtain a solution of following transportation problem by least cost method :

Supply/Dest	D1	D2	D3	D4	Supply
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
Demand	5	8	7	14	

(2) Write the difference between variable charts and attribute charts.

(3) Write a short note on Theory of Runs.

(4) Write all the applications of Linear Programming Problem.

(5) Obtain solution of the following LP problem by Simplex method :

Maximize : $Z = 3x_1 + 5x_2 + 4x_3$

Subject to constraints :

$2x_1 + 3x_2 \leq 8$; $2x_2 + 5x_3 \leq 10$; $3x_1 + 2x_2 + 4x_3 \leq 15$ and

$x_1, x_2, x_3 \geq 0$.

3 (a) Answer the following questions : (any **three**)   **6**

(1) Define feasible solution.

(2) Explain use of C chart.

(3) What is the difference between p and np chart.

(4) Explain characteristic of Operating Characteristic (OC) curve.

(5) Write the limitation of linear programming problem.

(6) Explain optimum feasible solution.

(b) Answer the following questions : (any **three**) 9

    (1) Using graphical method to solve the following LP problem :

        Maximize : $Z = 2x_1 + x_2$

        Subject to constraints :

        $x_1 + 2x_2 \le 10;\ \ x_1 + x_2 \le 6;\ \ x_1 - x_2 \le 2;\ \ x_1 - 2x_2 \le 1;\ \ x_1, x_2 \ge 0$

    (2) Discuss double sampling plan.

    (3) Explain Average Total Inspection (ATI).

    (4) Explain Transportation problem with an example.

    (5) Write the uses of Statistical Quality Control.

    (6) If in single sampling plan (1000,100,1) and also AQL = 0.01 and LTPD = 0.07 then obtain producer's and consumer's risk. [$e^{-1} = 0.37\ \ e^{-7} = 0.001$].

(c) Answer the following questions : (any **two**) 10

    (1) Obtain a solution of following transportation problem by Vogel's method :

Supply/Dest	D1	D2	D3	D4	Supply
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
Demand	5	8	7	14	

    (2) Solve the assignment problem that the objective is to Optimum the total cost :

Machine	Operators			
	1	2	3	4
I	10	5	13	15
II	3	9	18	3
III	10	7	3	2
IV	5	11	9	7

    (3) Explain Average Sample Number.

    (4) Derive OC function for Single Sampling Plan.

    (5) Discuss different assignable cause of variations.