* P G - 0 0 3 - 0 0 1 6 6 3 - 5 0 - 4 *

PG-003-001663 Seat No. _____

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

July - 2018

Statistics : Paper - 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) Q. No. 1 carries 20 marks.
(2) Q. No. 2 and Q. No. 3 each carries 25 marks.
(3) Right side figures indicate marks of that question.
(4) Statistical table and graph provided on request.
(5) Students can use their own scientific calculator.

1 Fill the blanks : **20**

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

(2) In control charts we establish _____ limits.

(3) *R–chart* uncover assignable causes _____ samples.

(4) In case of large samples, _____ charts should preferable be used.

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

(6) Sampling inspection reduces the risk of the _____.

(7) Consumer's risk is akin (referred) _____ error.

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

(9) The inspection of 25 aircrafts revealed that there are 350 missing rivets in all. The appropriate control chart in this situation which can be prepared 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) Model in which at least one decision variable is random is known as _____ model.

(12) Every linear programming problem includes _____ which relates variable in the problem to the goal of the firm and _____ which represent the limit on resource available to the firm.

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

(14) In Big–M method, _____ basic feasible solution is obtained by assigning _____ value to the original value.

(15) _____ occurs when there is no finite solution in the LP problem.

(16) For a maximization problem, the objective function coefficient for an artificial variable is _____.

(17) In the optimal simple table, $c_j - z_j = 0$ value indicates _____.

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

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

(20) The assignment problem requires that only _____ be assigned to _____.

2 (A) Give the answer : (Any **Three**) **6**

(1) Define acceptance sampling

(2) Compare R chart versus σ chart

(3) Write the limitation of linear programming problem

(4) Define feasible solution

(5) Write the dual of the following LP problem

Maximize : $Z : x_1 - x_2 + 3x_3$

Subject to constraints :

(i) $x_1 + x_2 + x_3 \leq 10$;

(ii) $2x_1 - x_3 \leq 2$;

(iii) $2x_1 - 2x_2 - 3x_3 \leq 6$;

$x_1, x_2, x_3 \geq 0$

(6) Obtain control limits of *p–chart* from the following information.

$m = 15, n = 200, \sum p = 0.84$

(B) Give the answer : (Any **Three**) **9**

(1) Determine $U-chart$ limits.

(2) Discuss Single sampling plan

(3) Explain general mathematical form of transportation problem.

(4) Explain assignment problem with example

(5) For a single sampling plan (100,10,1) find the values of AOQ and ATI when the proportion defective is 4%. Using Hyper Geometric distribution.

(6) Obtain a solution of following transportation problem by North-West Corner method

	D_1	D_2	D_3	D_4	Supply
O_1	2	3	5	1	7
O_2	7	3	4	6	9
O_3	4	1	7	2	18
Requirement	5	8	7	14	34

(C) Give the answer : (Any **Two**) **10**

(1) Write the difference between variable charts and attribute charts

(2) Short Note : Theory of Runs

(3) Explain Average Total Inspection

(4) Write the applications of Linear Programming

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

Maximize : $Z : 4x_1 + 3x_2$

Subject to constraints :

(i) $2x_1 + x_2 \leq 30$;

(ii) $x_1 + 2x_2 \leq 24$;

$x_1, x_2 \geq 0$

3 (A) Give the answer : (Any **Three**) **6**

(1) Difference between p chart and np chart

(2) Define charts for attributes

(3) Explain producer's risk

(4) Define Linear programming

(5) Define optimum feasible solution

(6) Define basic solution

(B) Give the answer : (Any **Three**) **9**

(1) Explain double sampling plan with example.

(2) Explain Ideal Operating Characteristic Curve (OC)

(3) Explain transportation problem with example.

(4) Explain mathematical form of LP problem.

(5) If in single sampling plan (4000,100,2) and also $AQL = 0.015$ and $LTPD = 0.07$ then obtain producer's and consumer's risk.

$\left[e^{-1.5} = 0.2231, e^{-7} = 0.0009\right]$.

(6) Solve the assignment problem that the objective is to minimize the total cost

Persons	Work			
	A	B	C	D
I	12	15	18	8
II	13	10	9	14
III	10	12	15	13
IV	7	11	9	14

(C) Give the answer : (Any **Two**) **10**

(1) Discuss different assignable cause of variations

(2) Derivation OC function for single sampling plan

(3) Explain Average Sample Number

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

Minimize : $Z : 3x_1 + 8x_2$

Subject to constraints :

$x_1 + x_2 = 200$;

$x_1 \leq 80$;

$x_2 \geq 60$;

$x_1, x_2 \geq 0$

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

	D_1	D_2	D_3	D_4	Supply
O_1	1	2	1	4	30
O_2	3	3	2	1	50
O_3	4	2	5	9	20
Requirement	20	40	30	10	100