

Code No. 5028 / E

## **FACULTIES OF ARTS AND SCIENCE**

B.A. / B.Sc. III - Year Examination, March / April 2015

Subject : STATISTICS (Theory)

Paper - IV

Quality Control, Reliability and Operations Research (Elective-I)

Time: 3 hours

Max. Marks: 100

Note : Answer all questions. Answer questions I to IV by choosing any two from each and any three from question V. All questions carry equal marks. Scientific calculators are allowed.

- I \_1 Explain the following terms.
  - i) Control charts for variables
- ii) Control charts for attributes
- 2 Explain the difference between specification limits, tolerance limits and control
- 3 Each of 10 lots of rubber belts contain 2000 rubber belts. Number of defective rubber belts in those lots are 412, 421, 326, 335, 298, 315, 292, 301, 325 and 299. Draw control chart for fraction defective and give your conclusions.
- Describe how you construct a  $\overline{X}$  chart and R-chart? Explain their uses.
- II /5 Explain the procedure of double sampling plan. Obtain ASN and OC
  - 6 What is single sampling plan? Discuss the relative merits and demerits of
  - Define reliability. Explain the importance of hazard function in the computation of failure density.
  - Define system reliability. Explain how to compute the system reliability for K
- Define terms i) Linear programming problem iii) Basic feasible solution ii) Feasible solution iv) Optimum basic feasible solution
  - .10 Solve the following LPP graphically

Minimize  $Z = -6x_1 - 4x_2$ Subject to  $2x_1 + 3x_2 \ge 30$  $3x_1 + 2x_2 \le 24$  $x_1 + x_2 \ge 3$ and  $x_1$  ,  $x_2 \ge 0$ 



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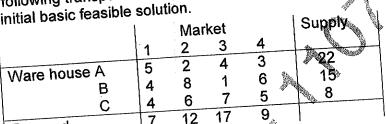
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- 11 What are surplus and slack variables? Explain Big-M method to solve an LPP.
- 12 Apply principle of duality to solve the LPP and also read the primal solution

Minimize 
$$Z = 12x_1 + 20x_2$$
  
Subject to  $6x_1 + 8x_2 \ge 100$   
 $7x_1 + 12x_2 \ge 120$   
and  $x_1, x_2 \ge 0$ 

IV 13 Solve the following transportation problem for optimality. Use VAM for obtaining initial basic feasible solution.



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14 Solve the following assignment problem by Hungarian method for optimality

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Tasks	Α	1	A STATE OF THE STA	3	1	5	
	В	2	. <del>.4</del>	3	4	6	
	C	5	ზ 1	4	2	2	
	D	8	5	6	5	4	
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- 15 What is degeneracy in transportation problem? How it is resolved?
- 16 Find the sequence that minimizes the total elapsed time in performing following six jobs on three machines in the order  $M_1$ ,  $M_2$ ,  $M_3$ . Also find the idle time for these machines.

Job	:	1	2	3	4	5	6
Machine M <sub>1</sub>	:	8	3	7	2	5	1
Machine M <sub>2</sub>	:	3	4	5	2	1	6
Machine M <sub>3</sub>	:	8	7	6	9	10	9

- ∨ Answer any three of the following:
  - 17 Process control, product control
  - 18 A situation where 100% inspection is needed
  - 19 Two-phase method
  - 20 p-chart and np-chart
  - 21 Importance of SQC in industry

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