

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
RSc DEGREE EXAMINATION MAY 2017
(Fifth Semester)

Branch- STATISTICS

CORE ELECTIVE-I OPERATIONS RESEARCH-I

Time : Three Hours

Maximum : 75 Marks

SECTION-A (20 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (10 x 2 = 20)

- 1 Write any four types of models used in O.R.
- 2 Write the canonical form of LPP.
- 3 What is the purpose of using artificial variable?
- 4 Define slack and surplus variable.
- 5 Write any two important results in duality.
- 6 Define an integer programming problem.
- 7 What do you mean by unbalanced Transportation problem? How to convert % into balanced?
- 8 Write the mathematical formulation of a T.P.
- 9 Define an assignment problem.
- 10 Define Total Elapsed time and idle time on a machine in sequencing problem.

SECTION - B (25 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5 x 5 = 25)

- 11 a Write any five applications of O.R.
OR
b A firm manufactures two types of products 'A' and 'B' and sells them at a profit of Rs.20/- on type 'A' and Rs.30/- on type 'B'. Each product is processed on two machines r_1 and r_2 . Type 'A' requires r_1 minutes of processing time on r_1 and 20 minutes on r_2 . Type 'B' requires 15 minutes on r_1 and 10 minutes on r_2 . Machine r_1 is available for not more than 6 hours & 40 minutes and Machine B is available for 10 hours during any working day. Formulate the problem as L.P.P. so as to maximize the profit.
- 12 a Write the procedure of solving a LPP by Two-phase method.
OR
b Solve the following LPP by simplex method
Maximize $z = 3x_1 + x_2$
Subject to $-x_1 - 2x_2 < 5$
 $3x_1 + 5x_2 < 6$
and $x_1, x_2 > 0$.
- 13 a What are the guidelines to be adopted for constructing the dual problem?
, OR
b Write the procedure of dual simplex method.
- 14 a Explain row minima and column maxima method of obtaining initial basic feasible solution of a Transportation problem.

OR

- 14 b Find the initial basic feasible solution by NWC and Matrix Minima for the following T.P.

		To				Supply
		10	20	5	7	
From	S ₁	13	9	12	8	20
	S ₂	4	5	7	9	30
	S ₃	14	7	1	0	40
	S ₄	3	12	5	19	50
	Demand	60	60	20	10	

- 15 a What are the assumptions to be made while solving a sequencing problem?
OR'

- b Solve the following assignment problem :

J _i	n	U ₁	U ₂	U ₃
h ₁	0	10	20	30
h ₂	20	30	40	45
h ₃	20	40	25	50
h ₄	30	30	35	40

SECTION - C (30 Marks)

Answer any THREE Questions

ALL Questions Carry EQUAL Marks (3 x 10 = 30)

- 16 Solve the following LPP graphically

$$\text{Maximize } z = 3x_1 + 2x_2$$

$$\text{Subject to } -2x_1 + x_2 < 1$$

$$x_1 < 2$$

$$x_1 + x_2 < 3 \text{ and } x_1, x_2 > 0$$

- 17 Use Big- r method to solve

$$\text{Minimize } z = 30x_1 + 30x_2 + 10x_3$$

$$\text{Subject to } 2x_1 + x_2 + x_3 > 6$$

$$x_1 + x_2 + 2x_3 < 8$$

$$\text{and } x_1, x_2, x_3 > 0.$$

- 18 Use dual simplex method to solve the LPP

$$\text{Maximize } z = -3x_1 - 2x_2$$

$$\text{subject to } x_1 + x_2 > 1$$

$$x_1 + x_2 < 7$$

$$x_1 + 2x_2 > 10$$

$$x_2 < 3 \text{ and } x_1, x_2 > 0$$

- 19 Find the optimal solution for the following transportation problem.

		Destination				Supply
		D ₁	D ₂	D ₃	D ₄	
Source	S ₁	6	7	9	3	70
S ₂	11	5	2	8	55	
S ₃	10	12	4	7	70	
Demand		85	35	50	45	

- 20 Find the sequence that minimizes the total elapsed time required to complete the following jobs on machines r₁, r₂ and r₃ in the order r₁ - r₂ - r₃.

Test	A	B	C	D	E	F
r ₁	8	3	7	2	5	1
r ₂	3	4	5	2	1	6
r ₃	8	7	6	9	10	9

Find also the total elapsed time and idle time on r₁, r₂ & r₃.

Z-Z-Z *

END