PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION DECEMBER 2019
(Fifth Semester)

Branch- STATISTICS

CORE ELECTIVE -1: OPERATIONS RESEARCH -1

Time : Three Hours   Maximum : 75 Marks

SECTION-A (20 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks   (1 0 x 2 = 20)

1   What is the scope of O.R?
2   State the mathematical formulation of LPP.
3   Define Stack Variables.
4   Define initial basic feasible solution of LPP.
5   What do you mean by duality in LPP?
6   State any two important results in duality.
7   Define feasible solution in transportation problem.
8   State the degeneracy in transportation problem.
9   Define unbalanced assignment problem with an example.
10   Define total elapsed time and idle time on machine with an example.

SECTION - B (25 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 5 = 25)

11 a Discuss the characteristic of a good linear programming model.
<div align="center">OR</div>
   b Old hens can be bought at Rs.2 each and young ones at Rs.5 each. The old hens lay 3 eggs per week and the young ones lay 5 eggs per week, each egg being worth 30 paise. A hen cost Rs.l per week to feed. A person has only Rs.80 to spend for hens. How many of each kind should he buy to give a profit of more than Rs.6 per week, assuming that he cannot house more than 20 hens. Formulate this as LPP.

12 a   Explain the canonical and standard forms of LPP with suitable illustrations.
<div align="center">OR</div>
   b Solve the following LPP by simplex method.
   Maximize $z=4x_1+10x_2$
   subject to the constraints

   $2x_1+x_2<50$
   $2x_1+5x_2<100$
   $2x_1+3x_2<90$

   and $x_1,x_2>0$

13 a Write down the dual of the following LPP.
   Maximize $z=4x_1+3x_2$
   subject to the constraints

   $-x_1x_2<-3$
   $-x_1+x_2>-2$
   $x_1,x_2>0$

<div align="center">OR</div>
   b Write the mathematical model of the dual simplex method.

Find the initial basic feasible solution for the following transporation problem by VAM.

Distribution Centres

	Di	D_2	D_3	D_4	Availability
Si	11	13	17	14	250
S_2	16	18	14	10	300
S_3	21	24	13	10	400
Requirements	200	225	275	250	

OR

Write the methods of finding initial basic feasible solution in transportation problem and explain the procedure of any one method.

Solve the following Assignment Problem.

Job

	1	2	3	4	5
A	"8	4	2	6	f
	0	9	5	5	4
Person ^	3	8	9	2	6
D	4	.3	1	0	3
E	9	5	8	9	5

OR

Explain the Johnson's procedure of solving a sequencing problem of 'n' jobs on '3' machines.

SECTION - C (30 MarksI
Answer any **THREE** Questions
ALL Questions Carry **EQUAL** Marks ($3 \times 10 = 30$)

Solve the LPP graphically

Maximize $z = 5x_1 + 3x_2$

subject to

$4x_1 + 5x_2 < 1000$

$5x_1 + 2x_2 < 1000$

$3x_1 + 8x_2 < 1200$

and $x_1, x_2 > 0$

Use Big-M method to solve

Maximize $z = 4x_1 + 3x_2$

subject to

$2x_1 + x_2 > 10$

$-3x_1 + 2x_2 < 6$

$x_1 + x_2 > 6$

and $x_1, x_2 > 0$

Use dual Simplex method to solve the LPP.

Maximize **$z = -3x_1 - 2x_2$**

subject to

$x_1 + x_2 > 1$

$x_1 + x_2 < 7$

$x_1 + 2x_2 > 10$

$x_2 < 3$

and $x_1, x_2 > 0$

Describe the procedure of MODI 'method in transportation problem.

Find the sequence that minimizes the total elapsed time required to complete the following jobs on machines M_1, M_2 and M_3 in the order M_1, M_2, M_3.

Task	A	B	c	D	E	F	G	H	I
1U,	9	S	4	O	6	8	7	S	A