PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION MAY 2019
(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   State any two applications of OR.
2   Define objective function.
3   Define basic variables.
4   What is degeneracy?
5   What do you understand by duality in linear programming?
6   Define integer programming.
7   What is balanced transportation problem?
8   Give the meaning of an optimum solution.
9   Give a mathematical formulation of the assignment problem.
10   What is 'no passing rule' in a sequencing algorithm?

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

11 a   What are the steps involved in operations research?

OR

  b   Solve graphically :
Max $z = 45x_1 + 80x_2$
Subject to the constraints :
$$5x_1 + 20x_2 \leq 400$$
$$10x_1 + 15x_2 \leq 450$$
and $x_1, x_2 \geq 0$

12 a   Write a note on (i) slack variables (ii) surplus variables.

OR

  b   Explain the simplex procedure to solve a linear programming problem.

13 a   Obtain the dual problem of the following LPP :
Max $z = 2x_1 + 5x_2 + 6x_3$
Subject to the constraints
$$5x_1 + 6x_2 - x_3 \leq 3$$
$$-2x_1 + x_2 + 4x_3 \leq 4$$
$$x_1 - 5x_2 + 3x_3 \leq 1$$
$$-3x_1 - 3x_2 + 7x_3 \leq 6$$
and $x_1, x_2, x_3 \geq 0$

OR

  b   Explain the Gomory's cutting plane all – Integer algorithm of an IPP.

Cont...

14 a Enumerate the steps involved in solving a transportation problem using least cost method :

OR

b Find the initial basic feasible solution by the least cost method :

				Supply
48	60	56	58	140
45	55	53	60	260
50	65	60	62	360
52	64	55	61	220
Demand 200	320	250	210	

15 a Solve the following minimal assignment problem by Hungarian method :

Machines

		1	2	3	4
	A	9	26	17	11
	B	13	28	4	26
Jobs	C	38	19	18	15
	D	19	26	24	10

OR

b Explain the principal assumptions made while dealing with sequencing problem.

SECTION - C (30 Marks)
Answer any THREE Questions
ALL Questions Carry EQUAL Marks (3 x 10 = 30)

16 Define OR. Discuss its limitations.

17 Use simplex method to solve :
Max $z = x_1 + x_2 + 3x_3$
Subject to the constraints
$$3x_1 + 2x_2 + x_3 \leq 3$$
$$2x_1 + x_2 + 2x_3 \leq 2$$
and $x_1, x_2, x_3 \geq 0$

18 Find the optimum integer solution to the following all IPP.
Max $z = x_1 + 2x_2$
Subject to the constraints
$$x_1 + x_2 \leq 7$$
$$2x_1 \leq 11$$
$$2x_2 \leq 7$$
$x_1, x_2 \geq 0$ and are integers.

19 Explain clearly the various steps involved in getting an optimum solution to a transportation problem.

20 In a factory, there are six jobs to perform, each of which should to through two machines A and B, in the order A, B. The processing timings (in hours) for the jobs are given here. You are required to determine the sequence for performing the jobs that would minimize the total elapsed time T. What is the value of T?

Job :	J_1	J_2	J_3	J_4	J_5	J_6
Machine A :	1	3	8	5	6	3
Machine B :	5	6	3	2	2	10