

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION MAY 2023
(First Semester)

Branch – STATISTICS

OPERATIONS RESEARCH

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (5 x 1 = 5)

1. Post-optimal analysis is a technique to :
 - (i) determine how optimum solution to LPP change in response problem inputs
 - (ii) allocate resources optimally
 - (iii) minimise cost of operations
 - (iv) spell out the relation between dual and its primal
2. The cost associated with the setting up of machinery before the production is
 - (i) Holding cost
 - (ii) Setup cost
 - (iii) Shortage cost
 - (iv) Lead time
3. The Probability that there are more than n customers in the system
 - (i) ρ^n
 - (ii) ρ^{2n}
 - (iii) ρ^{n+1}
 - (iv) ρ^{-n}
4. A minimal spanning tree allowed,
 - (i) all the nodes with cycles allowed
 - (ii) determining the least cost path between two cities
 - (iii) finding the shortest route communication network
 - (iv) determining a least cost flow pattern from refineries to various outlets.
5. In a non-linear programming problem
 - (i) the objective function is non-linear
 - (ii) one or more of the constraints have non-linear relationship
 - (iii) both (i) and (ii)
 - (iv) none of the above

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5 x 3 = 15)

6.(a) Write a short note on post-optimal analysis.

(OR)

(b) Explain duality in linear programming.

7.(a)) What are the objectives of scientific inventory control?

(OR)

(b) Explain the concept of EOQ.

8.(a) Explain the Traffic intensity

(OR)

(b) Write the characteristics of queueing system.

9.(a) Describe the rules of network construction.

(OR)

(b) Draw a network diagram for the following data:

Activity	:	A	B	C	D	E	F	G	H	I	J
Preceding activities:		None	A	A	B	A	B,E	C	D,F	G	H,I

Cont...

- 10.(a) Determine x_1 , x_2 , and x_3 so as to
 Minimize $Z = -x_1^2 - x_2^2 - 2x_3^2 + 4x_1 + 6x_2$
 subject to the constraints
 $x_1 + x_2 \leq 2$, $2x_1 + 3x_2 \leq 12$, $x_1, x_2, x_3 \geq 0$.

(OR)

- (b) Explain the formation of linear goal programming

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

- 11.(a) Use dual simplex method to solve the following LPP Minimize
 $z = 3x_1 + x_2$ subject to the constraints $x_1 + x_2 \geq 1$, $2x_1 + 3x_2 \geq 2$, $x_1, x_2 \geq 0$.

(OR)

- (b) Explain the structural changes.

- 12.(a) A manufacturer has to supply his customer with 600 units of his product per year. Shortages are not allowed and the storage cost amounts to Rs. 0.60 per unit per year. The setup cost per run is Rs. 80. Find its optimum run size and the minimum average yearly cost.

(OR)

- (b) Explain different types of inventories.

- 13.(a) Describe the queueing Model M/M/s.

(OR)

- (b) Explain the term (i) Busy period (ii) Waiting time.

- 14.(a) The following table gives the activities in a construction project and time duration:

Activity	1-2	1-3	2-3	2-4	3-4	4-5
Preceding Activity	-	-	1-2	1-2	1-3, 2-3	2-4, 3-4
Normal Time (Days)	20	25	10	12	5	10

- (i) Draw the activity network of the project, (ii) Find the total float and free float for each activity.

(OR)

- b Differentiate between PERT and CPM.

- 15.(a) Obtain the set of necessary and sufficient conditions for the following NLPP

$$\text{Minimize } Z = 2x_1^2 - 24x_1 + 2x_2^2 - 8x_2 + 2x_3^2 - 12x_3 + 200$$

subject to the constraints $x_1 + x_2 + x_3 = 11$, $x_1, x_2, x_3 \geq 0$.

(OR)

- (b) Explain the Kuhn – Tucker method.

Z-Z-Z

END