

(6 pages)

S.No. 5276

RACSY 75 E

(For candidates admitted from 2008 to 2015 batch)

B.Sc. DEGREE EXAMINATION, APRIL 2022.

Part III — Allied

OPERATIONS RESEARCH

Time : Three hours

Maximum : 75 marks

PART A — ($10 \times 2 = 20$)

Answer ALL questions.

1. Define the Basic feasible solution
2. What do you mean by the two-phase method for solving a given L.P.P?
3. State the general rules for forming a dual L.P.P from its primal.
4. What is the meaning of transportation problem?
5. What are the economic parameters of inventory?
6. What do you mean by total relevant cost?

7. Where is critical path in PERT network?
8. What are the types of replacement?
9. In what kind of situations is Queueing analysis most appropriate?
10. What are the limitations of Queueing Theory?

PART B — ($5 \times 5 = 25$)

Answer ALL questions, choosing either (a) or (b).

11. (a) Solve the following L.P.P by the graphical method.

$$\text{Max } Z = 3x_1 + 2x_2$$

$$\text{subject to } -2x_1 + x_2 \leq 1$$

$$x_1 \leq 2$$

$$x_1 + x_2 \leq 3$$

$$\text{and } x_1, x_2 \geq 0$$

Or

- (b) Explain Canonical and standard form of a L.P.P.

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12. (a) Solve the minimum transportation cost using the NWCR.

Origin	D1	D2	D3	D4	Supply
F1	19	30	50	10	7
F2	70	30	40	60	9
F3	40	8	70	20	18
Demand	5	8	7	14	34

Or

(b) Describe the Vogel's Approximation method.

13. (a) In an inventory Model, suppose that shortages are not allowed and the production rate is infinite and $R = 600$ units per year, $I = 0.20$, $C_3 = \text{Rs.}80.00$, $C = \text{Rs.}3.00$ and lead time is 1 year (i) Find the optimal order quantity (ii) Re-order point.

Or

(b) Find the optimum order quantity for a quantity for which the price breaks are as follows:

Quantity	Unit cost
	Rs.
$0 \leq Q_1 < 500$	10
$500 \leq Q_2$	9.25

The monthly demand for the product is 200 units, the cost of shortage is 2% of the unit cost and the cost of ordering is Rs.350.

14. (a) Distinguish between individual and group replacement policies.

Or

(b) Construct a network for each of the projects whose activities and their precedence relationships are given below.

Activities	A	B	C	D	E	F	G	H	I
Immediate Predecessor	-	A	A	-	D	B, C, E	F	D	G, H

15. (a) In a railway marshalling yard, goods trains arrive at a rate of 30 trains per day. Assume that the inter arrival — time follows an exponential distribution and the service time distribution is also exponential with an average of 36 minutes, calculate

- (i) The probability that the yard is empty
- (ii) Average Queue length assuming that the line capacity of the yard is 9 trains.

Or

(b) Show that if an arrival follows Poisson distribution, then the time between successive arrivals follow Exponential distribution.

PART C — ($3 \times 10 = 30$)

Answer any THREE questions.

16. Use simplex method to solve the following L.P.P

$$\text{Maximize } z = 4x_1 + 10x_2$$

Subject to the constraints:

$$2x_1 + x_2 \leq 50,$$

$$2x_1 + 5x_2 \leq 100,$$

$$2x_1 + 3x_2 \leq 90;$$

$$x_1 \geq \text{ and } \geq 0$$

17. Find the dual of the following LPP

$$\max z = 3x_1 - x_2 + x_3$$

$$\text{subject to } 4x_1 - x_2 + 0x_3$$

$$-8x_1 - x_2 - 3x_3 \leq -12$$

$$5x_1 + 0x_2 - 6x_3 \leq 13$$

$$x_1, x_2, x_3 \geq 0$$

18. Explain the inventory models under uncertainty.

19. Compute the earliest start, earliest finish latest start and latest finish of each activity of the project given below:

Activity	1-2	1-3	2-4	2-5	3-4	4-5
Duration (in days)	8	4	10	2	5	3

20. In a super market, the average arrival rate of customer is 10 in every 30 minutes following Poisson process. The average time taken by the cashier to list and calculate the customer's purchases are 2.5 minutes, following exponential distribution. What is the probability that the Queue length exceeds 6? What is the expected time spent by a customer in the system?