

(FOR THE CANDIDATES ADMITTED

SUBJECT CODE

25 UCT 2A1

DURING THE ACADEMIC YEAR 2025-26 ONLY)

REG.NO.

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI**END-OF-SEMESTER EXAMINATIONS : MAY– 2026****B.Sc. – COMPUTER TECHNOLOGY****MAXIMUM MARKS: 75****II SEMESTER****TIME : 3 HOURS****PART – III****MATHEMATICS -II : OPERATIONS RESEARCH****SECTION – A****(10 X 1 = 10 MARKS)****ANSWER THE FOLLOWING QUESTIONS.****(K1)**

- The Z_j row in a simplex table for maximization represents ____
 (a) Gross profit (b) Net profit (c) Profit per unit (d) Constraints
- The solution to a transportation problem with 'm' rows (supplies) & 'n' columns (destination) is basic feasible if number of positive allocations are ____
 (a) $m + n$ (b) $m * n$ (c) $m + n - 1$ (d) $m + n + 1$
- If small orders are placed frequently (rather than placing large orders infrequently), then the total inventory cost ____
 (a) increases (b) reduces (c) either increases or reduces (d) is minimized
- If there were n workers & n jobs there would be ____
 (a) n! solutions (b) (n-1)! solutions (c) $(n!)^n$ solutions (d) n solutions
- The longest possible time of completion of an activity in PERT is called ____ time.
 (a) expected (b) most likely (c) pessimistic (d) optimistic

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES (Qn. No. 6 - 10) (K2)

- Explain i) slack variable ii) surplus variable.
- What is meant by degeneracy in a transportation model?
- What is meant by EOL?
- List some of the basic terms used in sequencing.
- What are the two primary network scheduling techniques?

SECTION – B (5 X 5 = 25 MARKS)**ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K3)**

- A company manufactures two products A and B. These products are processed in the same machine. It takes 10 minutes to process one unit of product A and 2 minutes for each unit of product B and the machine operates for a maximum of 35 hours in a week. Product A requires 1 kg and B requires 0.5 kg of raw material per unit, the supply of which is 600 kg per week. Market constraint on product B is known to be minimum of 800 units every week. Product A costs Rs.5 per unit and sold at Rs.10, Product B costs Rs.6 per unit and can be sold in the market at a unit price of Rs.8. Formulate a LPP to determine the number of units of A and B per week to maximize the profit.

(OR)**(CONTD 2)**

- b) Solve the following LPP by graphical method Minimize $z = 5x_1 + 4x_2$ subject to constraints $4x_1 + x_2 \geq 40$; $2x_1 + 3x_2 \geq 90$ and $x_1, x_2 > 0$.

12. a) Attain the initial feasible solution using VAM method for the following Transportation.

Origin	Destination				Supply
	1	2	3	4	
1	20	22	17	4	120
2	24	37	9	7	70
3	32	37	20	15	50
Demand	60	40	30	110	240

(OR)

- b) Solve the following assignment problem.

Task	Men				
		A	B	C	D
1	7	5	8	4	
2	5	6	7	4	
3	8	7	9	8	

13. a) The demand for an item is 8000 units per annum and the unit cost is Re.1/-. Inventory carrying charges of 20% of average inventory cost and ordering cost is Rs. 12.50 per order. Calculate optimal order quantity, optimal order time, optimal inventory cost and number of orders.

(OR)

- b) A producer has to supply 12,000 units of a product per year to his customer. The demand is fixed and known and backlogs are not allowed. The inventory holding cost is Rs.0.20 per unit per month and the set-up cost per run is Rs. 350/- per run. Determine (a) the optimal lot size, (b) Optimum scheduling period, (c) Minimum total expected yearly cost.

14. a) There are seven jobs, each of which has to be processed on machine A and then on Machine B (order of machining is AB). Processing time is given in hours. Find the optimal sequence in which the jobs are to be processed so as to minimize the total time elapsed.

JOB:	1	2	3	4	5	6	7
MACHINE: A (TIME IN HOURS).	3	12	15	6	10	11	9
MACHINE: B (TIME IN HOURS).	8	10	10	6	12	1	3

(OR)

- b) Three jobs J_1, J_2, J_3 are to be assigned to three machines M_1, M_2, M_3 . The processing costs are given in the cost matrix form as shown below. Find the assignment which will minimize the overall processing cost.

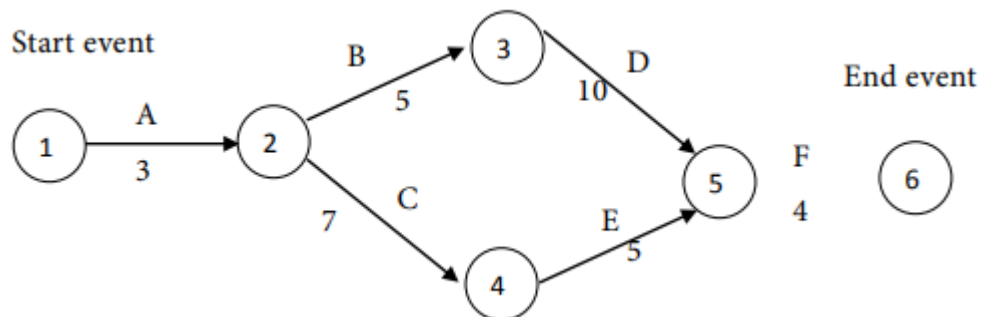
	M_1	M_2	M_3
J_1	19	28	31
J_2	11	17	16
J_3	12	15	13

15. a) Develop a network diagram for the project specified below:

Activity	Immediate Predecessor Activity
A	-
B	A
C, D	B
E	C
F	D
G	E, F

(OR)

- b) Determine the critical path, the critical activities and the project completion time using CPM network method.



SECTION – C (5 X 8 = 40 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

(K4 (Or) K5)

16. a) Use Simplex method to solve $\text{Min } Z = x_2 - 3x_3 + 2x_5$ subject to $3x_2 - x_3 + 2x_5 \leq 7$, $-2x_2 + 4x_3 \leq 12$, $-4x_2 + 3x_3 + 8x_5 \leq 10$, $x_2, x_3, x_5 \geq 0$.

(OR)

- b) Solve $\text{Max } Z = 22x_1 + 30x_2 + 25x_3$ subject to $2x_1 + 2x_2 \leq 100$, $2x_1 + x_2 + x_3 \leq 100$, $x_1 + 2x_2 + 2x_3 \leq 100$, $x_1, x_2, x_3 \geq 0$.

17. a) Obtain optimal solution using MODI method

Plant	Distribution Centre				Supply
	D1	D2	D3	D4	
S1	19	30	50	12	7
S2	70	30	40	60	10
S3	40	10	60	20	18
Requirement	5	8	7	15	

(OR)

- b) Given the matrix of set-up costs, show how to sequence the production so as to minimize the set-up cost per cycle.

α	4	7	3	4
4	α	6	3	4
7	6	α	7	5
3	3	7	α	7
4	4	5	7	α

(CONTD 4)

18. a) A shopkeeper has a uniform demand of an item at the rate of 50 units per month. He buys from supplier at the cost of Rs. 6/- per item and the cost of ordering is Rs. 10/- each time. If the stock holding costs are 20% per year of stock value, how frequently should he replenish his stocks? What is the optimal cost of inventory and what is the total cost?

(OR)

- b) A company uses annually 24,000 units of raw material, which costs Rs. 1.25 per units. Placing each order cost Rs. 22.50, and the carrying cost is 5.4% of the average inventory. Find the economic lot size and the total inventory cost including material cost.
19. a) A ready-made dress company is manufacturing its 7 products through two stages i.e. cutting and Sewing. The time taken by the products in the cutting and sewing process in hours is given below:

Products:	1	2	3	4	5	6	7
Cutting:	5	7	3	4	6	7	12
Sewing:	2	6	7	5	9	5	8

Find the optimal sequence that minimizes the total elapsed time.

(OR)

- b) A book binder has one printing press, one binding machine and manuscripts of 7 different books. The time required for performing printing and binding operations for different books is shown below. Decide the optimum sequence of processing of books in order to minimize the total time required to bring out all the books.

Book	1	2	3	4	5	6	7
Printing time (hours)	20	90	80	20	120	15	65
Binding time (hours)	25	60	75	30	90	35	50

20. a) Distinguish between CPM and PERT analysis.

(OR)

- b) Determine the early start and late start in respect of all node points and identify critical path for the following network.

