(FOR THE CANDIDATES ADMITTED
DURING THE ACADEMIC YEAR 2023 ONLY)

23UBC4A1

REG.NO. :

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI
END-OF-SEMESTER EXAMINATIONS : MAY - 2025

B.C.A   **MAXIMUM MARKS: 75**
SEMESTER IV   **TIME : 3 HOURS**

PART - III
COMPUTER BASED OPTIMIZATION TECHNIQUES
SECTION – A   **(10 X 1 = 10 MARKS)**

ANSWER THE FOLLOWING QUESTIONS.
MULTIPLE CHOICE QUESTIONS.   **(K1)**

1. LPP involving two decision variables can be easily solved by_____.
   - (a) Simplex method   (b) Graphical method
   - (c) Graphical method   (d) Least cost method
2. An assignment problem can be solved using _____
   - (a)Complete Enumeration   (b) Transportation   (c) Hungarian method   (d) all of these
3. Inventories in general are build up to_____.
   - (a) satisfy demand during period of replacement   (b) Carry reserve needs to avoid shortages
   - (c) keep pace with changing market conditions   (d)   all of these

4. Sequencing problems involving processing of two jobs on n machines_____
   - (a) Can be solved graphically   (b) Cannot be solved graphically
   - (c) Have a condition that the processing of two jobs must be in the order
   - (d) Can be solved simplex method

5. Network problems have advantage in terms of project_____
   - (a) Scheduling   (b) planning   (c) controlling   (d) all of these

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES.   **(K2)**
6. Define slack variables.
7. What is called unbalanced transportation problem.
8. What is called inventory control?
9. Write the basic terms used in sequencing.
10. Write the features of network flow model.

SECTION – B   **(5 X 5 = 25 MARKS)**
ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K3)
11. a)   Explain Graphical solution method.
(OR)
   b) Reduce the following LPP to its standard form:
       Maximize z =$3x_1+4x_2+6x_3$ subject to the constraints:
       $2x_1+x_2+2x_3 \geq 6$; $3x_1+2x_2=8$, $7x_1-3x_2+5x_3 \geq 9$; $x_1,x_2 \geq 0$ and x_3 unrestricted in sign.

12. a)   Obtain an initial basic feasible solution to the following transportation problem using the North-west corner rule

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Requirements	200	225	275	250	

(OR)

b) Obtain an initial basic feasible solution to the following transportation problem using the Least-cost method.

	D	E	F	G	Capacity
A	1	2	3	4	6
B	4	3	2	0	8
C	0	2	2	1	10
Demand	4	6	8	6	

13.a) Neon lights in an industrial park are replaced at the rate of 100 units per day. The physical plant orders the neon lights periodically. It costs Rs 100 to initiate a purchase order. A neon light kept in storage is estimated to cost about Re 0.02 per day. The lead time between placing and receiving an order is 12 days. Determine the optimum inventory policy for ordering the neon lights.

(OR)

b) A contractor has to supply 10,000 bearing per day to an automobile manufacturer. He finds that, when he starts a production run, he can produce 25,000 bearing per day. The cost of holding a bearing in stock for one year is Rs 2 and the set-up cost of a production run is Rs 1,800, how frequently should production run be made?

14(a). Solve the following sequencing problem

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

(OR)

(b). Explain the basic terms in sequence problem.

15.(a) Explain network representation.

(OR)

(b) Explain the rules of network construction.

SECTION – C   (5 X 8 = 40 MARKS)
ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.
(K4 (Or) K5)

16. a) Use graphical method to solve

Maximize $z = 2x_1 + 3x_2$

Subject to the constraints: $x_1 + x_2 \le 30$; $x_1 - x_2 \ge 0$;

$0 \le x_1 \le 20$; $x_2 \ge 3$;

$0 \le x_2 \le 12$

where $x_1,\ x_2 \ge 0$

(OR)

b) Use simplex method to solve the following LPP

Maximize $z = 4x_1 = 10x_2$

Subject to

$2x_1 + x_2 \le 50$; $2x_1 + 5x_2 \le 100$; $2x_1 + 3x_2 \le 90$

Where $x_1, x_2 \ge 0$

17.a) Calculate the starting solution in the following transportation problem by Vogel's
       approximation method. Also obtain the optimum solution:

	D1	D2	D3	D4	Supply
S1	3	7	6	4	5
S2	2	4	3	2	2
S3	4	3	8	5	3
Demand	3	3	2	2	

(OR)

17b) A pharmaceutical company is producing a single product and is selling it through five
      Agencies located in different cities. All of a sudden, there is a demand for the product in
      another five cities not having any agency of the company. The company is faced with the
      problem of deciding on how to assign the existing agencies to dispatch the product to needy
      cities in such a way that the travelling distance is minimized. The distance between the
      surplus and deficit (in km) is given in the following table.

Surplus	Deficit cities				
cities	A	B	c	d	e
A	85	75	65	125	75
B	90	78	66	132	78
C	75	66	57	114	69
D	80	72	60	120	72
E	76	64	56	112	68

Determine the optimum assignment schedule.

18. a) A manufacturing company purchases 9,000 parts of a machine for its annual requirements
        ordering one month usage at a time. Each part costs Rs 20. The ordering cost per order is Rs
        15 and the carrying charges are 15% of the average inventory per year. You have been
        assigned to suggest a more economical purchasing policy for the company. What advice
        would you offer and how much would it save the company per year?

(OR)

b) Explain the types of inventory.

19.a) Determine the optimal sequence of jobs that minimizes the total elapsed time based on the
       following information processing time on machine is given in hours and passing is not
       allowed:

Job	A	B	C	D	E	F	G
Machine M1	3	8	7	4	9	8	7
Machine M2	4	3	2	5	1	4	3
Machine M3	6	7	5	11	5	6	12

(OR)

b) Solve the following sequencing problem.

Book	1	2	3	4	5	6
Machine A	30	120	50	20	90	100
Machine B	80	100	90	60	30	10

20.a) A project consists of a series of tasks labeled A,B,………,H, I with the following relationships (W<X, Y means X and Y cannot start until W is completed X, Y<W means W cannot start until both X and Y are completed) With this notation construct the network diagram having the following constraints :

A< D,E; B,D <F ; C<G ; B,G<H; F,G<I

Find also the minimum lines of completion of the project , When the time (in days) of completed of each task is as follows:

Task	A	B	C	D	E	F	G	H	I
Time	23	8	20	16	24	18	19	4	10

(OR)

20 b) A project consists of eight activities with the following relevant information:

Activity	Immediate predecessor	estimated duration (days)		
		Optimistic	Most likely	Pessimistic
A	---	1	1	7
B	---	1	4	7
C	---	2	2	8
D	A	1	1	1
E	B	2	5	14
F	C	2	5	8
G	D,E	3	6	15
H	F,G	1	2	3

(i) Draw the PERT network and find out the expected project completion time.

(ii) Draw duration will have 95% confidence for project completion?

(iii) If the average duration for activity F increase to 14 days, what will be its effect on the excepted project completion time which will have 95% confidence?

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ETHICAL PAPER