

(FOR THE CANDIDATES ADMITTED
DURING THE ACADEMIC YEAR 2022 ONLY)

22UBC4A4

REG.NO. :

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI	
END-OF-SEMESTER EXAMINATIONS : MAY-2024	
COURSE NAME: B.C.A	MAXIMUM MARKS: 50
SEMESTER: IV	TIME : 3 HOURS

PART - III

MATHEMATICS-III COMPUTER BASED OPTIMIZATION TECHNIQUES

SECTION – A

(10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS.

(K1)

- What is the objective function in linear programming problems?
 - A constraint for available resource
 - An objective for research and development of a company
 - A linear function in an optimization problem
 - A set of non-negativity conditions
- In a transportation problem with m-sources and n-destinations is feasible, if the number of allocations are _____.
 - $m \times n$
 - $m+n+1$
 - $m+n$
 - $m+n-1$
- Which of the following is not an inventory?
 - Finished products
 - Raw material
 - Machines
 - Consumable tool
- In sequencing problems with n jobs and 2 machines, how many possible sequences are there?
 - $n!$
 - 2^n
 - $2!$
 - n^2
- How is the total project duration calculated in network scheduling?
 - Sum of activity durations
 - Average activity duration
 - Product of activity durations
 - Maximum activity duration

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES.

(K2)

- Define Convex Set.
- What do you mean by feasible solution?
- Define EOQ.
- Define total elapsed time.
- Abbreviate PERT.

SECTION – B

(5 X 3 = 15 MARKS)

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

(K3)

- a) Solve the following LPP by graphically

Minimize $z = -x_1 + 2x_2$

Subject to constraints $-x_1 + 3x_2 \leq 10$

$x_1 + x_2 \leq 6$

$x_1 - x_2 \leq 2$ and $x_1 \geq 0, x_2 \geq 0$

(OR)

- b) Examine the canonical form of Linear Programming Problem.

(CONTD.....2)

- 12.a) Obtain an initial basic feasible solution for the transportation problem by Least Cost Method.

	D ₁	D ₂	D ₃	D ₄	Available
O ₁	1	2	3	4	6
O ₂	4	3	2	0	8
O ₃	0	2	21	1	10
Demand	4	6	8	6	

(OR)

- b) Find the optimum assignment schedule.

	A	B	C
I	9	26	15
II	13	27	6
III	35	20	15
IV	18	30	20

13. a) List any Five Reasons for Carrying Inventories.

(OR)

- b) An oil engine manufacturer purchases lubricant cans at the rate of Rs. 42 per piece from a vendor. The requirement of these lubricant cans is 1800 per year. If the cost per placement of an order is Rs. 16 and inventory carrying charges per rupee per year is 20 paise, what should be the order quantity per order?
- 14.a) A book binder has one printing press, one binding machine, and the manuscripts of a number of different books. The time required to perform the printing and binding operations for each book. Determine the order in which books should be processed, in order to minimize the total time required to turn out all the books.

Book	1	2	3	4	5	6
Printing time (Hrs.)	30	120	50	20	90	100
Binding time (Hrs.)	80	100	90	60	30	10

(OR)

- b) Describe the optimal Sequence algorithm for n jobs through k machines.
15. a) List the Rules for network construction.

(OR)

- b) Find the critical path and duration of the project time.

Activity	1-2	1-3	1-4	3-4	3-5	5-7	5-6
Time	4	7	6	5	7	6	5

SECTION – C**(5 X 5 = 25 MARKS)****ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.****(K4 (Or) K5)**

16. a) Use simplex method to solve the following LPP

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

$$\text{Subject to constraints } 2x_1 + x_2 \leq 50,$$

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

$$2x_1 + 3x_2 \leq 90 \text{ and } x_1, x_2 \geq 0$$

(OR)

(CONTD....3)

- b) Solve the following LPP by BIG – M method

$$\text{Maximize } z = 6x_1 + 4x_2$$

$$\text{Subject to constraints } 2x_1 + 3x_2 \leq 30$$

$$3x_1 + 2x_2 \leq 24$$

$$x_1 + x_2 \geq 3 \text{ and } x_1, x_2 \geq 0$$

- 17.a) Use Vogel's Approximation Method to obtain an initial basic feasible solution of the transportation Problem.

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

(OR)

- b) Minimize the optimum assignment schedule

	E	F	G	H
A	18	26	17	11
B	13	28	14	26
C	38	19	18	15
D	19	26	24	10

18. a) Identify the types of inventories briefly.

(OR)

- b) A manufacturing company purchases 9000 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 asked 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?
- 19.a) Determine the optimal sequence of jobs that minimizes the total elapsed time based on the following information processing time on machines is given in hours and passing in not allowed

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

(OR)

- b) Use graphical method to minimize the time added to process the following jobs on the machines, find the job which should be done first. Also calculate the total time elapsed to complete both the jobs:

Job 1	Sequence	A	B	C	D	E
	Time	3	4	2	6	2
Job 2	Sequence	A	B	C	D	E
	Time	5	4	3	2	6

(CONTD....4)

(4)

22UBC4A4

20.a) Find Critical Path, Duration and Floats of the following

Task	1-2	1-3	1-4	2-5	3-4	3-7	4-5	4-6	5-6	5-7	6-7
Time(Days)	20	23	8	19	16	24	0	18	0	4	10

(OR)

b) Draw the project network and find expected duration, variance

Activity	1-2	1-3	1-4	2-5	3-5	4-6	5-6	
Time	t_0	1	1	2	1	2	2	3
	t_m	1	4	2	1	5	5	6
	t_p	7	7	8	1	14	8	15
