

(FOR THE CANDIDATES ADMITTED

23UCS3A1

DURING THE ACADEMIC YEAR 2023 ONLY)

REG.NO. :

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : NOVEMBER 2024

BSC COMPUER SCIENCE(AIDED& SF)

MAXIMUM MARKS: 75

SEMESTER: III

TIME : 3 HOURS

PART-III

23UCS3A1 GE-III:ALLIED :COMPUTER BASED OPTIMIZATION TECHNIQUES

SECTION – A

(10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

(K1)

1. A feasible solution to a L.P.P., which is also basic solution to the problem is called a -----.
 - (a) Degenerate solution.
 - (b) Non degenerate solution.
 - (c) Basic feasible solution.
 - (d) Feasible solution.
2. The method used for solving an assignment problem is called-----.
 - (a) Reduced matrix method
 - (b) MODI method
 - (c) Hungarian Method
 - (d) Stepping stone method.
3. The longest duration in any project network is called the -----.
 - (a) Total float
 - (b) Free float
 - (c) PERT
 - (d) CPM
4. The quantity is called the present worth factor of one rupee spent in n years' time
 - (a) $(1+r)^{-n}$
 - (b) $(1+r)^n$
 - (c) $-(1+r)^{-n}$
 - (d) $(1-r)^{-n}$
5. on a machine is the time that the machine remains idle during the total elapsed time.
 - (a) Passing rule
 - (b) Idle time
 - (c) No Passing rule
 - (d) Total elapsed time

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES

(K2)

6. List any two applications of Operations Research.
7. Define unbalanced Transportation Problem.
8. Write the expansion of PERT.
9. Define Saddle Point.
10. Define Economic lot size formula.

SECTION – B

(5 X 5 = 25 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K3)

- 11 a) Solve by graphical method:

$$\text{Max } z = 3x_1 + 4x_2$$

Subject to the constraints:

$$4x_1 + 2x_2 \leq 10$$

$$2x_1 + 5x_2 \leq 180$$

$$x_1, x_2 \geq 0.$$

(OR)

- b) A company sells to different products A and B making a profit Rs.40 and Rs.30 per unit on them, respectively. They are produced in a common production process and are sold in two different markets. The production process has a total capacity of 30,000 man-hours. It takes three hours to produce a unit of A and one hour to produce a unit of B. The market has been surveyed and company officials feel that the maximum number of units of A that can be sold is 8,000 units and that of B is 12,000 units. Subject to these limitations, products can be sold in any combination. Formulate this problem as an LP model to maximize profit.

- 12 a) Obtain an initial basic feasible solution to the following Transportation problem using 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
Requirement	200	225	275	250	

(OR)

- b) Determine the Optimal Assignment Schedule.

		Job				
		I	II	III	IV	V
	A	8	4	2	6	1
	B	0	9	5	5	4
Machine	C	3	8	9	2	6
	D	4	3	1	0	3
	E	9	5	8	9	5

(cont...3)

- 13 a) Describe the rules for Network construction.

(OR)

- b) Draw the network for the given data:

Jobs	1-2	1-3	2-4	3-4	3-5	4-5	4-6	5-6
Duration	6	5	10	3	4	6	2	9

- 14 a) The cost of a machine is Rs.12, 200 and its scrap value is Rs.200. The maintenance costs found from experience are as follows: When should the machine be replaced?

Year	1	2	3	4	5	6	7	8
Running cost(Rs)	200	500	800	1200	1800	2500	3200	4000

(OR)

- b) Determine the range of value of p and q that will make the payoff element a_{22} a

saddle point for the game whose payoff matrix (a_{ij}) is given below $\begin{bmatrix} 2 & 4 & 5 \\ 10 & 7 & q \\ 4 & p & 8 \end{bmatrix}$.

- 15 a) There are six jobs, each of which is to be processed through two machines M1, M2 in the order M1, M2. Processing hours as follows:

Job	1	2	3	4	5	6
M1	1	3	8	5	6	3
M2	5	6	3	2	2	10

Determine the Optimum sequences for six jobs.

(OR)

- b) An Oil Engine manufacturer purchases Lubricants at the rate of Rs.42 per piece from a vendor. The requirement of these lubricants is 1,800 per year. What should be the order quantity per order, if the cost per placement of an order is Rs.16 and inventory carrying charge per rupee per year is only 20 paise.

SECTION – C

(5 X 8 = 40 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.(K4 (Or) K5)

- 16 a) Solve by graphical method:

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

Subject to the constraints:

$$-2x_1 + x_2 \leq 1$$

$$x_1 \leq 2$$

$$x_1 + x_2 \leq 3$$

$$x_1, x_2 \geq 0.$$

- b) Use Simplex method to solve the LPP

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

Subject to the constraints:

$$2x_1 + x_2 \leq 50$$

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

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

$$x_1, x_2 \geq 0.$$

- 17 a) Solve the Transportation problem.

	D	E	F	G	Available
A	11	20	7	8	80
B	21	16	20	12	40
C	8	12	18	9	70
Requirement	30	25	35	40	

(OR)

- b) Determine the Optimal Assignment schedule.

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

- 18 a) Draw the Network and determine the Critical Path for the given data:

Jobs	1-2	2-3	3-4	3-7	4-5	4-7	5-6	6-7
Duration	3	4	4	4	2	2	3	2

(OR)

- b) The following table tests the jobs of a network with three Time Estimates.

Activity / Duration	Optimistic	Most likely	Pessimistic
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

- Draw the Project Network.
- Find the expected duration and variance of each activity.
- Calculate early and late occurrence times for each event. What is the expected project length?
- Calculate the Variance and Standard Deviation of project length.

(Cont...5)

- 19 a) The initial cost of a machine is Rs.15, 000 and maintenance or running costs(in Rs.) for different years are given below:

Year	1	2	3	4	5	6	7
Running cost(Rs)	2, 500	3,000	4,000	5,000	6,500	8,000	10, 000

What is the Replacement Policy to be adopted if the capital is worth 10 % and there is no salvage value?.

(OR)

- b) Determine the Optimum strategies and value of the game:

$$P1 \begin{matrix} & P2 \\ \begin{bmatrix} 5 & 1 \\ 3 & 4 \end{bmatrix} \end{matrix}$$

- 20 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 is not allowed.

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

(OR)

- b) A contractor has to supply 10, 000 bearings per day to an automobile manufacturer. He finds that, when he starts a production run, he can produce 25,000 bearings per day. The cost of holding a bearing in a stock for one year is 2 paise and the setup cost of a production run is Rs.18. How frequently should production run be made?
