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Avinashilingam Institute for Home Science and Higher Education for Women
 (Deemed to be University Estd. u/s 3 of UGC Act 1956, Category 'A' by MHRD)
 Re-accredited with 'A++' Grade by NAAC. Recognised by UGC Under Section 12B
 Coimbatore - 641 043, Tamil Nadu, India

Continuous Internal Assessment Test - I February 2025
SEMESTER IV

Class: II UG (Repeaters)
Major: Computer Applications

Time: 2 hours
Max. Marks: 60

18BCAI04/21BCAI04 DSE – IV Optimization Techniques

Course Outcomes:

1. Formulate a real-world problem as a mathematical programming model with application software.
2. Solve the linear problems and analyze the simplex and dual simplex principles.
3. Apply optimality and allocation methods for resources
4. Demonstrate network scheduling concepts and apply critical path analysis and time estimates for real time project completion.
5. Apply sequencing algorithm for job scheduling.

Part A
Choose the correct answer

6x1=6

1. In graphical representation the bounded region is known as _____ region. CO1K2
 a. solution b. basic solution c. feasible solution d. optimal
2. The pivot or leading element in a simplex table should be made to _____. CO1K3
 a. 0 b. 1 c. -1 d. 1.5
3. The dummy source or destination in a transportation problem is added to
 a. satisfy rim condition b. prevent solution from becoming degenerate
 c. ensure that total cost does not exceed a limit d. all of the above CO2K1
4. The simple and efficient method to find initial basic feasible solution is CO2K2
 a. North-West corner method b. Least cost method
 c. Vogel's Approximation Method d. Row Minima Method
5. In an assignment problem involving four workers and three jobs, total number of assignments possible are _____. CO3K2
 a. 4 b. 3 c. 12 d. 7
6. The minimum number of lines covering all zeros in a reduced cost matrix of order n can be _____. CO3K1
 a. at the most n b. at the least n c. n-1 d. n+1

Part B
Answer ALL Questions

3 x 6=18

Answer should not exceed 400 words or two pages

- 7.a. Using Graphical solution find the maximum value of $z = 5x_1 + 3x_2$, subject to the constraints $3x_1 + 5x_2 \leq 15$, $5x_1 + 2x_2 \leq 10$ where $x_1, x_2 \geq 0$ CO1K2
 (Or)
- 7.b. Write the Simplex Algorithm. CO1K3
8. a. Determine an initial basic feasible solution to the following transportation problem using North-West Corner method. CO2K3

	D1	D2	D3	D4	Availability
O1	5	3	6	2	19
O2	4	7	9	1	37
O3	3	4	7	5	34
Demand	16	18	31	25	

(Or)

8. b. Write the steps involved in solution of a transportation problem - MODI Method. CO2K2
- 9.a. A department head has four tasks to be performed and three subordinates, the subordinates differ in efficiency. The estimates of the time, each subordinate would take to perform, is given below in the matrix. How should he allocate the tasks one to each man, so as to minimize total man-hours? CO3K2

Tasks	Men		
	1	2	3
I	9	26	15
II	13	27	6
III	35	20	15
IV	18	30	20

(Or)

9.b. Write the algorithm of Hungarian assignment problem.

CO3K3

Part C

3 x 12 = 36

Answer ALL Questions

Answer should not exceed 800 words or four pages

10. a. Use graphical method to solve the following LPP Max $z=4x_1+3x_2$ subject to the constraints $2x_1+x_2 \leq 1000$, $x_1+x_2 \leq 800$, $x_1 \leq 400$, $x_2 \leq 700$ where $x_1 \geq 0$ and $x_2 \geq 0$

CO1K3

(or)

10. b. Use simplex method to solve the following LPP

Maximize $z=4x_1+10x_2$ subject to the constraints

$2x_1+x_2 \leq 50$, $2x_1+5x_2 \leq 100$, $2x_1+3x_2 \leq 90$, where $x_1 \geq 0$ and $x_2 \geq 0$

CO1K3

11. a. Given $x_{13}=50$, $x_{14}=20$, $x_{21}=55$, $x_{31}=30$, $x_{32}=35$, $x_{34}=25$. Is it an optimal solution to the transportation problem.

CO2K2

	D1	D2	D3	D4	Supply
S1	6	1	9	3	70
S2	11	5	2	8	55
S3	10	12	4	7	90
Demand	85	35	50	45	

(or)

11. b. Write algorithm for the following transportation problems: i) North West Corner Method
ii) Least Cost Method iii) Vogel's Approximation method.

CO2K1

12.a. A departmental head has five subordinates and five tasks to be performed. The subordinates differ in efficiency, and the tasks differ in their intrinsic difficulty. His estimate of the time each man would take to perform each task is given in the matrix below. How should the tasks be allocated, one to a man, so as to minimize total man-hours?

CO3K2

Tasks	Men				
	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

(or)

12. b. Find the optimum assignment and the maximum sales for the following manufacturing company.

CO3K3

SALES	ZONES			
	A	B	C	D
P	140	112	98	154
Q	90	72	63	99
R	110	88	77	121
S	80	64	56	88

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