

**D.K.M.COLLEGE FOR WOMEN (AUTONOMOUS)**  
**SEMESTER EXAMINATIONS**  
**NOVEMBER – 2017**  
**INDUSTRIAL APPLICATIONS OF MATHEMATICS**

**Time : 3 Hrs**

**SECTION-A (10 x 2 =20)**

Answer ALL the questions.

1. Define a feasible solution.
2. What do you mean by a general LPP?
3. Define artificial variable.
4. Define dual of LPP.
5. What do you understand by transportation problem?
6. What is the purpose of MODI method?
7. What is an Assignment problem?
8. What is the name of the method used in getting the optimum assignment?
9. What is meant by inventory?
10. Define shortage cost.

**SECTION-B (5 x 5 =25)**

Answer any FIVE of the following questions.

11. A firm produces three products. These products are processed on three machines. The time required to manufacture one unit of each of the three products and the cost of the machines are given in the table below.

Machine	Time per unit (minutes)			Machine cost (Rs.)
	Product 1	Product 2	Product 3	
$M_1$	2	3	2	
$M_2$	4	--	3	
$M_3$	2	5	---	

It is required to determine the daily number of units to be manufactured on each machine so that the profit per unit for product 1, 2 and 3 is Rs.4, Rs.3 and Rs.6 respectively. The maximum amounts produced are consumed on the market. Formulate the mathematical model.

14. Find the initial basic feasible solution, using North – West corner Rule.

		<i>Centres</i>				<i>Supply</i>		
		1	2	3	4			
<i>Plants</i>	1	⎧	1	2	3	4	6	
	2		2	3	11	7		1
	3		5	8	15	9		
<i>Requirement</i>			7	5	3	2		

15. Explain transportation algorithm.

16. Explain Hungarian assignment algorithm.

17. Solve the assignment problem

		<i>Machines</i>				
		$M_1$	$M_2$	$M_3$	$M_4$	
<i>Jobs</i>	$J_1$	⎧	5	7	11	6
	$J_2$		8	5	9	6
	$J_3$		4	7	10	7
	$J_4$		10	4	8	3

18. A manufacturer has to supply 12,000 units of a product per year to his customer and known and the shortage cost is assumed to be infinite. The inventory holding cost is Rs.10 per month and the setup cost per run is Rs.350. Determine

- (i) the optimum run size  $q_p$ .
- (ii) optimum scheduling period  $t_0$ .
- (iii) minimum total expected yearly cost.

**SECTION-C (3 x 10 =30)**

Answer any THREE questions.

19. (a) Solve by simplex method

20. (a) Solve the transportation problem, using Vogel's Approximation method

		<i>To</i>			
		A	B	C	<i>Supply</i>
<i>From</i>	<i>I</i>	50	30	220	1
	<i>II</i>	90	45	170	3
	<i>III</i>	250	200	50	4
<i>Requirement</i>	4	2	2		

(Or)

(b) Solve the Assignment problem

	<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>	<i>V</i>
1	10	5	9	18	11
2	13	9	6	12	14
3	3	2	4	4	5
4	18	9	12	17	15
5	11	6	14	19	10

21. (a) A company has a demand of 12,000 units/year for an item and it can produce 1,000 units per month. The cost of one setup is Rs.400 and the holding cost/ unit/month is Rs.2. Find the optimum lot size and the total cost per year, assuming the cost of production is Rs.10 per unit. Also find the maximum inventory. Manufacturing time and total time.

(Or)

(b) Solve the following assignment problem

	<i>Men</i>			
<i>Task</i>	<i>E</i>	<i>F</i>	<i>G</i>	<i>H</i>
<i>A</i>	18	26	17	11