

S.D.E.
M.B.A. Sem-III (2013 Course) : WINTER - 2018
SUBJECT: OPERATIONS RESEARCH

Day: Monday
Date: 10/12/2018

W-2018-4561

Time: 10.00 AM TO 1.00 PM
Max. Marks: 70

N.B.:

- 1) Attempt any **FOUR** questions from Section –I and any **TWO** questions from Section –II.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SEPARATE answer book.**
- 4) Use of non programmable **CALCULATOR** is allowed.
- 5) **Graph papers** and **statistical tables** will be provided if necessary.

SECTION-I

Q.1 Define Transportation problem. Explain for a transportation problem the Vogel's approximation method. (10)

Q.2 A dentist schedules all her patients for 30 minutes appointments. Some of the patients take more or less than 30 minute depending on the types of dental work to be done. The following summary shows the various categories of work, their probabilities and the time needed to complete the work. (10)

Category	Time required (minutes)	Probability of category
Filling	45	0.40
Crown	60	0.15
Cleaning	15	0.15
Extraction	45	0.10
Checkup	15	0.20

Simulate the dentist's clinic for four hours and determine the average waiting time for the patients as well as the idleness of the dentist. Assume that all the patients show up at the clinic at exactly their scheduled arrival times, starting at 8 A.M. Use the following random numbers for handling the above problem 40, 82, 11, 34, 25, 66, 17, 66, 90 and 79.

Q.3 Find the initial solutions for the following problem using North-West Corner Rule and check whether it is optimal? The supply, demand and the transportation cost per unit is given as follows: (10)

	W1	W2	W3	W4	Supply
P1	190	300	500	100	70
P2	700	300	400	600	90
P3	400	100	400	200	180
Demand	50	80	70	140	340

P. T. O.

- Q.4** Find the optimal allocation of Jobs and Machines and the total cost of (10) assignment.

		Machine				
		A	B	C	D	E
Jobs	1	11	17	8	16	20
	2	12	18	12	6	15
	3	13	16	15	12	16
	4	21	24	17	28	26
	5	14	10	12	11	15

- Q.5** Write short notes on any **TWO** of the following: (10)

- Applications of Operations Research
- Business Applications and Limitations of Simulation
- Components of Linear Programming Problem
- Critical Path Method

SECTION-II

- Q.6** Two products A and B are to be manufactured. One unit of product A requires (15) 2.4 minutes of punch press time and 5 minutes of assembly time. The profit for product A is Rs. 60 per unit. One unit of product B requires 3 minutes of punch press time and 2.5 minutes of welding time. The profit for product B is Rs. 70 per unit. The capacity of the punch press department available for these products is 1,200 minutes / week. The welding department has capacity of 600 minutes/ week and assembly department has 1,500 minutes/ week.
- Formulate the problem as linear programming problem.
 - Determine graphically, the quantities of product A and B to be produced so that total profit is maximized.

- Q.7** A project consists of the following jobs given as follows: (15)

Job	(1-2)	(1-3)	(2-4)	(3-4)	(3-5)	(4-8)	(5-6)	(6-7)	(6-8)	(7-8)
Duration (days)	4	1	3	2	6	12	4	8	2	4

- Draw the project network diagram.
- Find the critical path and project duration

- Q.8** Factories A, B and C supply to warehouses. P, Q, R and S. The monthly (15) production capacity (tons) of each factory and monthly requirements (tons) for each warehouse and the transportation costs in Rs/ton are given in the following table:

		Factories			Production capacity (tons)
		A	B	C	
Warehouse	P	4	3	7	60
	Q	5	8	4	50
	R	2	4	7	140
	S	5	8	4	50
Requirement (tons)		120	80	200	

Starting with Vogel's method, find the most economical transportation plan.

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