Total	No	of pr	inted na	iges = 4				
			(NR)					
		2	didate	ech. 5 th Ser	EE	1 d-Te	RINA CHOWDHURY CENTRAL LIBRATE SIPS) APPLE Hallo maprice of water of the site	VARY -
					RATION I			
				(New Regu	ılati	ion)	
Full l	Mar	ks-7	0				Time - Tl	ree hours
1.	Ans	wer tl		wer question			ks):	$0 \times 1 = 10$
	(i)			s research, t			are prepared for situat	- 70
		(a)		natical mode			are properted for situati	10110.
		(b)		l models dia		3		
		(c)	200	nmatic mode				
		(d)	none of	these				
	(ii) Which of the following is not the phase of OR methodology?							
		(a)	Formul	ating a prob	lem	(b)	Constructing a model	
		(c)	Establi	shing contro	ls	(d)	Controlling the environme	ent
	(iii)	OR I	as char	acteristics th	nat it is do	ne by	y a team of	
		(a)	Scientis	sts		(b)	Mathematicians	

(d)

All of the above

[Turn over

Academics

(b) Mathematical analysis

Diversified Techniques

Both (a) and (b)

(iv) A solution can be extracted from a model either by

Conducting experiments on it

(c)

(a)

(c)

(d)

(v)	Which technique is used in finding a solution for optimizing a given objective, such as profit maximization or cost reduction under certain constraints?								
	(a)	Quailing Theory	(b)	Waiting Line					
	(c)	Both (a) and (b)	(d)	Linear Programming					
(vi)		The Operations research technique which helps in minimizing total waiting and service costs is							
	(a)	Queuing Theory	(b)	Decision Theory					
	(c)	Both (a) and (b)	(d)	None of the above					
(vii)	Optimal solution of an assignment problem can be obtained only if								
	(a)	Each row and column has only one zero element							
	(b)	Each row and column has at least one zero element							
	(c)	The data is arrangement in a square matrix							
	(d)	None of the above							
(viii)		h the transportation technic fashion one chooses. The on		initial solution can be generated in iction is that					
	(a)	the edge constraints for supply and demand are satisfied.							
	(b)	the solution is not degenerate. BINA CHOWDHURY CENTRAL LIBRARY							
	(c)	the solution must be optimal.							
	(d)	one must use the northwest-corner method.							
(ix)	Whi	Which of the following is NOT needed to use the transportation model?							
	(a)	the cost of shipping one unit from each origin to each destination							
	(b)	the destination points and the demand per period at each							
	(c)	the origin points and the capacity or supply per period at each							
	(d)	degeneracy							
(x)	One disadvantage of using North-West Corner Rule to find initial solution to the transportation problem is that								
	(a)	a) it is complicated to use							
	(b)	it does not take into account cost of transportation							
	(c)	it leads to degenerate initial solution							
	(d)	all of the above							

Maximize
$$Z = 3x + 2y$$

Subject to constraints

$$-2x + 3y \le 9$$
$$3x - 2y \le -20$$

$$x, y \ge 0$$
.

3. A company plans to assign 5 salesman to five different districts in which it operates. Estimates of sales revenue in thousand of rupee for each given salesman in different districts are given in the following table. What should be the placement of the salesman if the objective is to maximize the expected sales revenue?
(15)

			Dis	trict		
		D1	D2	D3	D4	D5
	S1	40	46	48	36	48
01	S2	48	32	36	29	44
Supply	S3	49	35	41	38	45
	S4	30	46	49	44	44
	S5	37	41	48	43	47

4. Solve the following LPP by using its Dual.

Subject to

$$2x_1 + 2x_2 - x_3 \ge 2$$

$$3x_1 - 4x_2 \le 3$$

 $Maximize Z = 5x_1 - 2x_2 + 3x_3$

$$x_2 + 3x_3 \le 5$$

$$x_1, x_2, x_3 \ge 0$$
.

5. In the following transportation problem, if a unit from a source is not shipped to one of its destination, a storage cost at the rate of \$5, \$4 and \$3 for sources 1,2 and 3 is incurred. Additionally all the supply at the source 2 must be shipped out to make room for a new product. Find the optimal solution. (15)

	1	2	3	Supply
A	1	2	1	20
В	0	4	5	40
C	2	3	3	30
Demand	30	20	20	

Write short notes on (any three) 6.

 $(3 \times 5 = 15)$

- (a) Phases of Operation Research
- Applications of Operation Research (b)
- Degeneracy in transportation problem

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 Hungarian Problem

 Basic feasible solution. (c)
- Hungarian Problem (d)
 - Basic feasible solution.