

(i) Printed Pages : 4

Roll No.

(ii) Questions : 14

Sub. Code :

1	7	8	3	9
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Exam. Code :

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Bachelor of Commerce 6th Semester

(2056)

OPERATIONAL RESEARCH

Paper : BCM-605

Time Allowed : Three Hours]

[Maximum Marks : 80

Note :— Attempt **four** short answer type questions from Section A.
Attempt **two** questions each from Section B and C respectively.

SECTION-A

1. Give uses of Operations Research.
2. What is Basic Solution in Transportation Problem?
3. A firm manufactures two types of products A and B and sells them at a profit of Rs. 12.00 and Rs. 13.00 respectively. Each product is processed on two machines G and H. Product A requires one minute of processing on Machine G and two minutes on Machine H while Product B requires one minute of processing on Machine G and one minute on Machine H. Machine G is available for not more than 6 minutes while Machine H is available for 10 minutes during any working day. Formulate the problem as a Linear Programming Problem.

4. Make Dual of the following:

$$\text{Max. } Z = 2x_1 + 3x_2 + x_3$$

$$\text{Subject to } 4x_1 + 3x_2 + x_3 = 6$$

$$x_1 + 2x_2 + 5x_3 = 4$$

Where x_1, x_2 & $x_3 \geq 0$

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5. Use Lowest Cost Entry Method to solve the following Transportation Problem:

		Warehouses			Supply
		W_1	W_2	W_3	
Plants	P_1	7	6	9	20
	P_2	5	7	3	28
	P_3	4	5	8	17
	Demand	21	25	19	65

6. Solve the following game by odds method :

		Y		
		Y_1	Y_2	
X	X_1	1	0	5×4
	X_2	-4	3	

SECTION-B

7. Write an essay on the methodology of O.R. Explain briefly the techniques used in solving O.R. problems.
8. Use Simplex Method to solve the following:
 Max. $Z = 5x_1 + 3x_2$
 Subject to $x_1 + x_2 \leq 2$
 $5x_1 + 2x_2 \leq 10$
 $-2x_1 - 8x_2 \geq -12$
 Where $x_1, x_2 \geq 0$
9. A company has four vehicles to be run on four routes. The distance (kms) for each route and the kms run per litre of diesel for each vehicle in each of the routes are given below. Drivers are associated with the vehicles :

		Kms. per litre in the route of			
		I	II	III	IV
Vehicles	A	4.0	5.0	5.0	3.0
	B	4.5	6.0	5.0	3.5
	C	5.0	5.5	6.0	4.0
	D	4.8	5.8	5.5	3.0
Distance in kms		200	300	250	150

Which vehicle should be assigned to which route in order to minimize the total consumption of diesel by all the four vehicles?

10. Solve the following problem and test its optimality :

Plants	Project A	Project B	Project C	Supply
W	4	8	8	56
X	16	24	16	82
Y	8	16	24	77
Demand	72	92	41	

2×15

SECTION-C

11. Solve the game by using principle of Dominance :

		Q			
		I	II	III	IV
P	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

12. Following mortality rates have been observed for a certain type of fuses:

Week	1	2	3	4	5
% failing by the end of week	5	15	35	75	100

There are 1000 fuses in use and it costs Rs. 10 to replace one individual fuse. If all fuses were replaced simultaneously, it would cost Rs. 2.50 per fuse. At what intervals should the group replacement be done? Which policy is better?

13. Strong is a Dentist who schedules all her patients for 30 minutes appointments. Some of the patients take more or less than 30 minutes depending on the type of dental work to be done. The following summary shows the various categories of work, their probabilities and the time actually needed to complete the work:

Category	Time required (Minutes)	Probability of category
Filling	45	.40
Crowning	60	.15
Cleaning	15	.15
Extraction	45	.10
Checkup	15	.20

Simulate the dentist's clinic for 4 hours and determine the average waiting time for the patients as well as the idleness of the doctor. Assume that all the patients show up at the clinic exactly at their scheduled arrival time starting at 8:00 AM. Use the following random numbers:

40, 82, 11, 34, 25, 66, 79.

14. What do you understand by Decision Tree Analysis? How is a decision tree drawn and how is such an analysis useful in decision making? Explain taking an example. 2×15