(i) Printed Pages: 4 Roll No. .....

(ii) Questions : 14 Sub. Code : 0 8 3 9

Exam. Code : 0 0 1 6

Bachelor of Commerce 6th Semester

1048

OPERATIONAL RESEARCH

Paper–BCM-605

Time Allowed : Three Hours] **[Maximum Marks : 80**

Note :— (1) Attempt any **FOUR** questions of **5** marks each from Section-A.

(2) Attempt any **TWO** questions of 15 marks each from Section-B and Section-C.

SECTION—A

1. Explain application of Operations Research in business and management. 5

2. Use graphical method to solve the following L.P.P.

Maximize $Z = 6x_1 + x_2$

subject to $2x_1 + x_2 \geq 3$

$x_1 + x_2 \geq 2$

$x_1, x_2 \geq 0$ 5

3. What is decision making under 'risk' ? How are decisions made under risky situations ? 5

4. Solve the following game matrix :

$$\begin{matrix} & Y \\ X & \begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix} \end{matrix}$$ 5

5. Obtain the dual of following LPP :

Maximize $Z = 3x_1 + 5x_2 + 7x_3$

subject to $x_1 + x_2 + 3x_3 \leq 10$

$4x_1 - x_2 + 2x_3 \geq 15$

$x_1, x_2 \geq 0$, x_3 is unrestricted in sign. 5

6. Solve the following travelling salesman problem so as to minimise the cost per cycle :

From	A	B	C	D	E
A	–	3	6	2	3
B	3	–	5	2	3
C	6	5	–	6	4
D	2	2	6	–	6
E	3	3	4	6	–

5

SECTION—B

7. Define Operations Research. Explain the scope and significance of Operations Research. Describe some methods of O.R. 15

8. A firm manufactures two types of products A and B and sells them at a profit of Rs. 12 on type A and Rs. 13 on type B. Each product is processed on two machines G and H. Type A requires one minute of processing on G and two minutes on H; Type B requires one minute on G and one minute on H. The machine G is available for not more than 6 while machine H is available for 10 minutes during any working day. Formulate and solve the problem as a linear programming problem for optimization. 15

9. Use Simplex method to maximise

Max. $Z = 20x_1 + 6x_2 + 8x_3$

subject to constrains

$$8x_1 + 2x_2 + 3x_3 \leq 250$$

$$4x_1 + 3x_2 \leq 150$$

$$2x_1 + x_3 \leq 50$$

where as $x_1, x_2, x_3 \geq 0$ 15

10. Solve the transportation problem to maximise profits and give criterion for optimality.

	I	II	III	IV	Capacity
A	40	25	22	33	100
B	44	35	30	30	30
C	38	38	28	30	70
Requirement	40	20	60	30	200 / 150

15

SECTION—C

11. Solve the following game :

		B	
		I	II
A	I	2	4
	II	2	3
	III	3	2
	IV	–1	6

15

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

13. Explain the process of simulation. What are its applications ? Also discuss its significance. 15

14. Mineral Processing Company has received offers for two types of dumper A and B. A has a pay load of 25 tonnes and is priced at Rs. 4,00,000 while B also with a payload of 25 tonnes, is priced at Rs. 3,60,000. The operating costs over the estimated life of 5 years for both the types of dumpers are as follows :

Year	1	2	3	4	5
Type A (in Rs.)	8,000	9,000	10,000	11,000	12,000
Type B (in Rs.)	14,000	16,000	18,000	20,000	22,000

Which type of dumper is to be preferred ? 15