



# DON BOSCO COLLEGE

(Affiliated to the University of Calicut)

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## SECOND INTERNAL EXAMINATION MARCH 2019

### SECOND SEMESTER BCA

### BCA2C04: OPERATIONS RESEARCH

**Time: 3 hours**

**Max. Marks: 80**

#### *Part – A*

*Answer All Questions*

*Each Carries 1 Mark*

1. What is unbalanced transportation problem?
2. What is meant by degeneracy in Transportation Problem?
3. Define mathematical model of a Transportation problem?
4. Define mathematical model of an Assignment problem?
5. Explain Least Cost method in TP
6. How do we convert a minimization case of Assignment problem into maximization?
7. Define OR.
8. Any two limitations of OR
9. Define feasible region?
10. What is linear programming?

**(10\*1 =10 marks)**

#### *Part - B*

*Answer All Questions*

*Each Carries 2 Marks*

11. Explain different steps involved in Transportation problem?
12. Define transshipment problem
13. Define travelling salesman problem and explain how it can be solved as an assignment problem
14. Explain the steps involved in MODI method/U-V Method
15. Define unbounded solution.
16. Define feasible and infeasible solution.
17. What is extreme point?
18. What are various phases of operation research?

**(8\*2=16 marks)**



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## Part – C

*Answer ANY six*

*Each Carries 4 Marks*

19. Explain the two phase method of solving LPPP

20. What are the phases of Operation Research?

21. Solve graphically

$$\text{Maximize } Z = 22x_1 + 18x_2$$

$$\text{Subject to } 3x_1 + 2x_2 \leq 48$$

$$x_1 + x_2 \leq 20$$

$$x_1, x_2 \geq 0$$

22. Write the dual of:

$$\text{Minimize } Z = 4x_1 + 2x_2 + x_3$$

$$\text{Subject to } x_1 + x_2 \leq 10$$

$$3x_1 + x_2 + x_3 \geq 23$$

$$7x_1 - x_3 = 6$$

$$x_1, x_2, x_3 \geq 0$$

23. Define artificial variables.

24. Define slack variables.

25. When is Big M method useful?

26. What is the condition for optimality in simplex table?

27. What is the condition for entering variable in simplex table?

**(6 \*4=24 marks)**

## Part — D

*Write essays on any three*

*Each carries 10 marks*

28. What are the steps involved in Hungarian Method?



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Solve the following Assignment problem

Programmers	Projects			
	1	2	3	4
A	120	100	80	90
B	80	90	110	70
C	110	140	120	100
D	90	90	80	90

29. Solve the following Transportation problem and find the optimum solution

<u>Source</u>	<u>Destination</u>				Supply
	P	Q	R	S	
A	21	16	25	13	11
B	17	18	14	23	13
C	32	17	18	41	19
Demand	6	10	12	15	

30. A firm can produce three types of cloth A, B and C. Three kinds of wool is required for it, say red, green and blue wools. One unit length of type A cloth needs 2 yards of red wool, 5 yards of blue wools, one unit length of type B cloth needs 3 yards of red wool, 4 yards of green wool, and 2 yards of blue wool, and one unit length of type C cloth needs 6 yards of green and 5 yards of blue wools. The firm has only a stock of 10 yards of red wool, 12 yards of green wool, and 17 yards of blue wool. It is assumed that the income obtained from one unit length of type A, B and C are Rs 4.00, 5.00 and 6.00 respectively. Determine how the firm should use the available material, so as to maximize the income from the finished cloths.

31. Solve the following using dual simplex method

$$\text{Minimize } Z = 400x_1 + 450x_2$$

$$\text{Subject to } 5x_1 + 10x_2 \geq 45$$

$$20x_1 + 50x_2 \geq 80$$

$$x_1, x_2 \geq 0$$

32. Explain the steps involved in the solution of an operation research problem.

(3\*10 =30 marks)