

**C 81761**

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Name.....

Reg. No.....

**SECOND SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION, APRIL 2020**

B.C.A.

BCA 2C 04—OPERATIONS RESEARCH

(2017 Admissions)

Time : Three Hours

Maximum : 80 Marks

**Section A**

*Answer all questions.*

*Each question carries 1 mark.*

1. What do you mean by transshipment problem ?
2. Define unbalanced transportation problem.
3. When is the solution to a LPP infeasible ?
4. What is primal and dual of LPP ?
5. Explain Non degenerate basic feasible solution.
6. Cite any two areas where assignment technique is applied.
7. Define No passing Rule.
8. Define Optimal Solution.
9. Cite any two uses of OR.
10. What is degeneracy in transportation problem ?

(10 × 1 = 10 marks)

**Section B**

*Answer all questions.*

*Each question carries 2 marks.*

11. Explain the mathematical formulation of an LPP.
12. Explain project crashing.
13. Explain dual simplex method.
14. Define shadow price.
15. Explain how a transportation problem is expressed in the form of an LPP.
16. Write any two uses of Network techniques.

**Turn over**

17. What is dummy activity ?  
 18. Define Slack and Surplus Variables.

(8 × 2 = 16 marks)

### Section C

Answer any **six** questions.

Each question carries 4 marks.

19. Write a note on Project Crashing.  
 20. Explain any method of solving Initial feasible solution of Transportation problem.  
 21. Explain different phases in the application of Network Technique.  
 22. Distinguish between Transportation and assignment problem.  
 23. Define Independent, total and free float.  
 24. Explain optimal project duration and crash cost.  
 25. Write the characteristics of dual problem.  
 26. Describe loops in transportation problem.  
 27. Explain the steps involved in critical path method.

(6 × 4 = 24 marks)

### Section D

Answer any **three** questions.

Each question carries 10 marks.

28. A company has three jobs on hand. Each of these must be processed through two departments, the sequential order for which is Department A- press shop, Department B-finishing. The table below lists the number of days required by each job in each department :

	Job I	Job II	Job III
Department A	8	6	5
Department B	8	3	4

Find the sequence in which three jobs should be processed so as to take minimum time to finish all the three jobs. What are i) Minimum total time ii) idle time for both departments.

29. Solve by duality Method

Min  $Z = 2x_1 + x_2$  Subject to,

$$3x_1 + x_2 \geq 3$$

$$4x_1 + 3x_2 \geq 6$$

$$x_1 + 2x_2 \geq 3$$

$$x_1, x_2 \geq 0$$

30. Solve the following travelling Salesman Problem :

	To city				
	1	2	3	4	5
1	–	10	25	25	10
2	1	–	10	15	2
3	8	9	–	20	10
4	14	10	24	–	15
5	10	8	25	27	–

31. Solve the transportation problem to minimize the total transportation cost :

					Supply
	18	12	14	16	40
	24	24	27	33	80
	42	34	31	26	130
Demand	90	80	30	50	

32. A company produces two types of cow boy hats. Each hat of the first type requires twice as Much labour time as the second type. If all hats are of the second type only, the company can produce only produce a total of 500 hats a day. The market limits daily sales of the first and second types to 150 and 250 hats. Assuming that the profit per hat are Rs.8 and for type 1 and Rs. 5 for type 2. Formulate the problem as a linear programming model in order to determine the number of hats to be produced of each type so as to maximise the profit and solve the LPP.

(3 × 10 = 30 marks)