32. A book binder has one printing press, one binding machines, and the manuscripts of a number of a different books .The time required to perform ,the printing and binding operations for each book is shown below.

Books	1	2	3	4	5
Printing time(hr)	30	120	50	20	90
Binding time(hr)	80	100	90	60	30

Determine the order in which books should be processed, in order to minimize the total time required to turn out all the books.

(3 × 10 = 30 Marks)

****

17U226 (Pages: 3) Name:..……..……

Reg.No……..……

SECOND SEMESTER B.C.A. DEGREE EXAMINATION, APRIL 2018

(CUCBCSS – UG)

Mathematics – Complementary course

CC17U BCA2 C04 – OPERATIONS RESEARCH

(2017 – Admissions Regular)

Time: Three Hours Maximum: 80 Marks

Part - I

Answer ***all*** questions. Each question carries 1 mark.

1. What is the nature of the objective function of an LP problem?
2. Explain the necessity of artificial variables.
3. The variables which are assigned the value 0 in an linear programming problem is……..
4. Name the method to solve a given transportation problem which gives the most approximate solution.
5. Explain the concept of degeneracy in a transportation problem.
6. When do we call a transportation problem balanced?
7. Name the method used for solving an assignment problem.
8. Expand PERT.
9. What do you mean by pessimist time?
10. Define total float.

(10 × 1 = 10 Marks)

Part - II

Answer ***all*** questions. Each question carries 2 marks.

11. What are the features of OR?
12. Write the standard form of a mathematical model of Linear Programming Problem.
13. Write the dual of the following LP problem: Maximize $f(x) = 3x_1 + 4x_2$, subject to the constraints $3x_1 - x_2 \leq 2, x_1 + 2x_2 \leq 1, x_1 \geq 0, x_2$ *unrestricted*
14. Explain Big-M method to solve an LP problem.
15. Distinguish between Transportation problem and assignment problem.
16. Explain travelling salesman problem.
17. Describe the method of processing n jobs through 2 machines.
18. Explain network scheduling by an example.

(8 × 2 = 16 Marks)

Part - III

Answer any ***six*** questions. Each question carries 4 marks.

19. Explain two-phase method of solving a L.P.P.

20. Solve the following LPP simplex method

    Maximize $z = 2x_1 + x_2$; subject to $x_1 + x_2 \leq 3,\ 2x_1 - x_2 \leq 4,\ x_1, x_2 \geq 0$

21. Explain any one method to obtain an initial basic feasible solution for a transportation problem.

22. Solve the following transportation problem.

	D_1	D_2	D_3	D_4	Supply
Q_1	1	2	2	3	70
Q_2	2	4	0	1	38
Q_3	1	2	2	5	32
Demand	40	28	30	42	

23. What do you mean by no passing rule in a sequencing algorithm?

24. The following is the cost matrix of assigning 4 clerks to 4 key punching jobs. Find the optimal assignment if clerk 1 cannot be assigned to job 1. Find the minimum cost

	Job			
	--	5	2	0
	4	7	5	6
Clerk	5	8	4	3
	3	6	6	2

25. Solve the following assignment problem.

	I	II	III	IV
A	32	26	35	38
B	27	24	26	32
C	28	22	25	34
D	10	10	16	16

26. Construct network diagram. Also find the critical path.

Activity	1-2	1-3	2-4	3-4	3-6	4-8	5-6	5-7	6-8	7-8
Time	7	2	1	1	6	3	4	8	1	2

27. Distinguish between PERT and CPM.

($6 \times 4 = 24$ Marks)

Part - IV

Answer any ***three*** questions. Each question carries 10 marks.

28. Solve the LPP using dual simplex method

    Minimize Z $= 3x_1 + 5x_2 + 2x_3$

    Subject to $-x_1 + 2x_2 + 2x_3 \geq 3;$

    $x_1 + 12x_2 + x_3 \geq 2;$

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

    $x_1, x_2, x_3 \geq 0$

29. There are forest areas F_1, F_2, F_3, F_4 and timber depots D_1, D_2, D_3. The following table gives the produce of each forest areas, the minimum timber required and the cost of transportation per unit of timber from each forest area to each depot. Find the distribution of the entire forest produce for minimum cost of transportation.

	D_1	D_2	D_3.	
F_1	3	4	6	100
F_2	7	3	8	80
F_3	6	4	5	90
F_4	7	5	2	120
	110	110	60	

30. The normal cost and duration, crash cost and duration of activities of a project are given. If the overhead cost is Rs.40 per day, determine the optimal cost schedule.

Activity	Normal cost	Normal Duration	Crash cost	Crash Duration
(1,2)	200	3	440	1
(2,3)	240	2	320	1
(2,4)	100	4	140	3
(3,4)	80	5	140	2

31. A small project is composed of seven activities whose time estimates are as follows

Activity	Optimistic time	Most likely time	Pessimistic time
(1,2)	1	1	7
(1,3)	1	4	7
(1,4)	5	3	8
(2,5)	1	1	1
(3,5)	2	7	14
(4,6)	2	5	8
(5,6)	3	6	15

Draw the project network and calculate the variance and standard deviation of the project.