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**(20517)** Roll No.....  
**BCA-IV Sem.**

**18019**

**B.C.A. Examination, May 2017**

**Optimization Techniques**

**(BCA-404)**

**(New)**

**Time : Three Hours ] Maximum Marks : 75**

**Note :** Attempt all the sections as per instructions.

**Section-A**

**Note :** Attempt all five questions. Each question carries 3 marks.

1. What is the condition in algorithm that an L.P.P. has unbounded solution?
2. Define inventory problem. List the various

**P.T.O.**

- costs associated with an inventory problem.
3. Define money value, present value and discount rate.
4. Define queue length, waiting time and busy period.
5. Explain sequencing problem.

**Section-B**

**Note :** Attempt any two questions from this section. Each question carries 7.5 marks.

$7\frac{1}{2} \times 2 = 15$

6. Solve the following assignment.

Problem :

Man →	1	2	3	4
Job ↓				
I	12	30	21	15
II	18	33	9	31
III	44	25	24	21
IV	23	30	28	14

**18019/2**

7. Solve by graphical method the linear programming problem .

$$\min z = 20x_1 + 10x_2$$

such that  $x_1 + 2x_2 \leq 40$

$$3x_1 + x_2 \geq 30$$

$$4x_1 + 3x_2 \geq 60$$

and  $x_1, x_2 \geq 0$

8. We have five jobs, each of which have to go through the machines A, B and C in the order ABC.

Processing time in hours

Jobs	1	2	3	4	5
Machine A ( $A_i$ )	5	7	6	9	5
Machine B ( $B_i$ )	2	1	4	5	3
Machine C ( $C_i$ )	3	7	5	6	7

18019\3

P.T.O.

Determine a sequence for the jobs that will minimize the total elapsed time.

### Section-C

**Note :** Attempt any **three** questions out of the following **five** questions. Each question carries 15 marks.

9. Solve the following LPP

$$\text{Max } z = 40x_1 + 35x_2$$

subject to

$$2x_1 + 3x_2 \leq 60$$

$$4x_1 + 3x_2 \leq 96$$

$$x_1, x_2 \geq 0$$

18019\4

10. Solve the following transportation problem

	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	Available
O <sub>1</sub>	2	7	4	5
O <sub>2</sub>	3	3	1	8
O <sub>3</sub>	5	4	7	7
O <sub>4</sub>	1	6	2	14
Required	7	9	18	

11. On average 96 patients per 24 hour day require the service of an emergency clinic. Also on average a patient requires 10 minutes of active attention. Assume that the facility can handle only one emergency at a time. Suppose that it costs the clinic Rs. 100 per patient treated to obtain an average serving time of 10 patients and that each minute of decrease in the average time would cost by Rs. 10 per patient treated. How much

would to be budgeted by the clinic to decrease the average size of the queue from one and one third patients to half a patient?

12. The cost of new machine is Rs. 5000. The maintenance cost of n<sup>th</sup> year is given by  $C_n = 500(n-1)$ ,  $n=1, 2, \dots$ . Suppose that the discount rate per year is 0.5. After how many years it will be economical to replace the machine by new one?

13. Use graphical method to minimize the time needed to process the following jobs on machines shown below i.e. for each machine find the job which should be done first. Also calculate the total time needed to complete both jobs.

Job1		Job2	
Sequence of Machines	Time	Sequence of Machines	Time
A	2	C	4
B	3	A	5
C	4	D	3
D	6	E	2
E	2	B	6