

Roll No.

23/3201**B.C.A. (Fourth Semester) Examination, 2023****Fourth Paper****(Optimization Techniques)***Time : 3:00 Hours]**[Maximum Marks : 75*

Note : Attempt any **five** questions. **All** questions carry equal marks.

Note : The answers to short answer type questions should not exceed **200** words and the answers to long answer type questions should not exceed **500** words.

1. Discuss transportation problem. Describe the steps used in North-west corner method alongwith its advantages and disadvantages. Determine an initial basic feasible solution to the following transportation problem using this method. $1+3+3+3+5=15$

		TO				
		I	II	III	IV	Supply
From	A	13	11	15	20	2
	B	17	14	12	13	6
	C	18	18	15	12	7
Demand		3	3	4	5	

P.T.O.**23/3201**

2. Differentiate **between** a transportation and an assignment problem. Discuss the steps used in **reduced** matrix method and solve the following **minimal** assignment problem.

		Men				
		1	2	3	4	
Job	I	12	30	21	15	$3+4+8=15$
	II	18	33	9	31	
	III	44	25	24	21	
	IV	23	30	28	14	

3. Explain characteristics of a queueing system. Also discuss the customers behaviour in a queue and definition of various terms used in queueing. $3+6+6=15$
4. Describe Poisson process and its postulates. Also prove that if arrival pattern in a queueing problem follows a poisson process, then the random variable T representing the inter arrival time follows the exponential distribution and vice-versa. $4+11=15$
5. Prove the policy of a machine is continued upto the time the average cost per year of it decrease and is replaced at the time when this cost begins to increase. A machine owner finds from his post records that the cost per year maintaining a machine A whose purchase price is Rs. 6000.00 are as given below: 15

2

23/3201

Year	1	2	3	4	5	6	7	8
Maintenance Cost (In Rs.)	1000	1200	1400	1800	2300	2800	3400	4000
Resale price (In Rs.)	3000	1500	750	375	200	200	200	200

Find at what age is the replacement due?

6. To derive an economic lot size formula and the minimum average costs under the following assumptions: 15

- (i) Demand is uniform
- (ii) Production is instantaneous
- (iii) lead time is zero
- (iv) C_1 = holding cost per unit per unit time
- (v) C_3 = set up cost per production run time and
- (vi) Shortages are not allowed.

7. Discuss the concept of job sequencing and its assumptions. Discuss Johnson method for n jobs on 2 machines. We have five jobs, each of which must go through two machines A and B in the order AB. Processing times in hours are given in the table below: <https://www.mgkvponline.com> 4+4+7=15

Jobs	1	2	3	4	5
Machine A (A _i)	5	1	9	3	10
Machine B (B _i)	2	6	7	8	4

Determine the sequence for the five jobs that will minimize the elapsed time T.

3

P.T.O.

23/3201

8. (a) XYZ manufacturing company is using a machine whose purchase price is Rs. 65,000=00 The installation charges amount to Rs. 18,000=00 and the machine has a scrap value of only Rs. 8,000=00 because of firm has a monopoly of this type of work. The maintenance cost in various years is given in the following table: 8

Years	Maintenance Cost (in Rs)
1	1250
2	3750
3	5000
4	7500
5	10500
6	14500
7	20000
8	24000
9	30000

Determine after how many years should the machine be replaced, assuming that the machine replacement can be done only at the year end.

(b) Discuss basic requirements and basic assumptions of a linear programming problem. 3+4=7

4