UG–453 **BMS–33N**

B.Sc. DEGREE EXAMINATION — DECEMBER 2018.

Third Year

OPTIMIZATION TECHNIQUES

Time : 3 hours Maximum marks : 75

PART A — (5 × 5 = 25 marks)

Answer any FIVE questions.

1. Solve the following LPP by Simplex method.

   $Maximize\ Z = 4x + 10y$

   subject to

   $2x + y \le 50,$

   $2x + 5y \le 100,$

   $2x + 3y \le 90, and\ x, y \ge 0$

2. The assignment cost of assigning anyone operator (I, II, II, IV) to any one machine (A, B, C, D) is given in the following table

Machine /Operators	I	II	III	IV
A	10	5	13	15

B	3	9	18	3
C	10	7	3	2
D	5	11	9	7

Find the optimal assignment by Hungarian method.

3. Solve the following 2×2 game

$$\begin{array}{c} \\ A \\ \\ \end{array} \begin{array}{c} B \\ \begin{pmatrix} 5 & 1 \\ 3 & 4 \end{pmatrix} \end{array}$$

4. Explain the different costs involved in inventory problems.

5. In a super market, the average arrival rate of customer is 10 in every 30 minutes following Poisson process. The average time taken by the cashier to list and calculate the customer's purchase is 2.5 minutes, following expontial distribution. What is the probability that the queue length exceeds 6?

6. Write down the algorithm of solving integer programming problem by cutting plane method.

7. Find the initial basic feasible solution of the following transporting problem by Vogel Approximation Method.

Source/Destination	D_1	D_2	D_3	D_4	Availability
S_1	11	13	17	14	250

S_2	16	18	14	10	300
S_3	21	24	13	10	400
Requirements	200	225	275	250	

8. Solve the game whose pay off matrix is give below.

$$\begin{pmatrix} 9 & 3 & 1 & 8 & 0 \\ 6 & 5 & 4 & 6 & 7 \\ 2 & 4 & 3 & 3 & 8 \end{pmatrix}$$

5 6 2 2 1

PART B — (5 × 10 = 50 marks)

Answer any FIVE questions.

9. Solve the following LPP by Simplex method.

Maximize $Z = 2x + 3y$
subject to $-x + 2y \le 4$,
$x + y \le 6$,
$x + 3y \le 9$, *and* x, y *are unrestricted*

10. Solve the following transportation problem.

Source/Destination	D_1	D_2	D_3	D_4	Availability
S_1	11	20	7	8	50
S_2	21	16	2	12	40
S_3	8	12	18	9	70
Requirements	30	25	35	40	

11. Using graphical method, solve the rectangular game whose pay off matrix for player A is

$$\begin{pmatrix} 2 & -1 & 5 & -2 & 6 \\ -2 & 4 & -3 & 1 & 0 \end{pmatrix}$$

12. A particular item has a demand of 9000 units / year. The cost of one procurement is Rs. 100 and the holding cost per unit is Rs 2.40 per year. The replacement is instantaneous and no shortage is allowed. Determine

    (a) the economic lot size

    (b) the number of orders per year

(c) the between orders

(d) The total cost per year if the cost per unit is Rs. 5.

13. Workers come to tool store room to enquire about specials for accomplishing a particular project assigned to them. The average time between two arrivals is one minute and the arrivals are assumed to be in Poisson process. The average service time of the tool room attendant is 40 seconds. Determine

(a) average queue length.

(b) average number of workers in system

(c) mean waiting time of an arrival in the queue.

(d) Average time that a worker spends in the store room.

14. Find the optimum integer solution to the following LPP.

$Maximize\ Z = x + y$
$subject\ to\ 3x + 2y \leq 5,\ y \leq 2$

x, y are non — negative integers.

15. Explain any two methods of finding initial basic feasible solution to transportation problem.

16. Explain traveling sales man problem and explain a method of solving it.

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