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The Assam Royal Global University, Guwahati

Royal School of Engineering & Technology

B.Tech. CSE 7th Semester

Special Supplementary Examination, August 2024

Course Title: Operation Research

Course Code: MEE022G7051

Time: 3 Hours **Maximum Marks: 70**

Note: Attempt all questions as per instructions given.

The figures in the right-hand margin indicate marks.

Use of Scientific calculator is permitted.

Section – A

1. Attempt **all questions**. (Maximum word limit 50) **2 x 8**

   a. What is Operation Research?
   b. What is the significance of artificial variable in linear programming problem?
   c. What do you mean by an unbalanced transportation problem?
   d. What is degenerate basic feasible solution in transportation problem?
   e. What is the difference between linear programming problem and nonlinear programming problem,
   f. What is the use of Lagrange's multiplier method?
   g. What is a service channel in queuing theory?
   h. Why inventory control is important?

Section – B

2. Attempt **any two** of the following: **6x 2**

   a. What is a linear programming problem? Differentiate between slack and surplus variables in LPP.
   b. A company produces 2 types of hats. Every hat A requires twice as much labour time as the second hat B.If the company produces only hat B then it can produce a total of 500 hats a day. The market limits daily sales of hat A and hat B to 150 and 250 respectively. The profits on hat A and hat b are Rs.8 and Rs.5 respectively. Solve graphically, to get the optimal solution..
   c. Use simplex method to solve the LPP

      Max $Z=3X_1+2X_2$

      Subject to, $X_1+X_2 \leq 4$

      $X_1-X_2 \leq 2$

      $X_1, X_2 \geq 0$

3. Attempt **any two** of the following: **7 x 2**

   a. Derive the mathematical formulation of a transportation problem.
   b. Using the following cost matrix, determine a)optimal job assignment b)the cost of assignments

Mechanics/Job	1	2	3	4	5
A	10	3	3	2	8
B	9	7	8	2	7
C	7	5	6	2	4
D	3	5	8	2	4
E	9	10	9	6	10

c. Give mathematical formulation and applications of integer programming problem. Also, differentiate between pure and mixed integer programming problem.

4. Attempt **any two** of the following: **7 x 2**

a. What is non-linear programming? What are the necessary and sufficient conditions for optimality for i)one-variable-unconstrained problem, ii)multivariable unconstrained problem.
b. What are the types of non-linear programming problem? Discuss, in details
c. Discuss in details, Lagrange's multiplier method in non-linear programming.

5. Attempt **any two** of the following: **7 x 2**

a. Discuss the different categories of inventory cost.
b. Write a note on queuing system.
c. The annul demand of an item is 3,200 units.The unit cost is Rs.6 and inventory carrying chares are 25 percent per annum.If the cost of one procurement is Rs.150,determine the, (i)EOQ (ii)Number of orders per year (iiiTime between two consecutive orders