

**PGDM (IB), 2015-17**  
**Management Science**  
**IB-304**

**Trimester – III, End-Term Examination: March 2016**

**Time allowed: 2 hrs 30 min**

**Max Marks: 50**

Roll No: \_\_\_\_\_

**Instruction:** Students are required to write Roll No on every page of the question paper, writing anything except the Roll No will be treated as **Unfair Means**. In case of rough work please use answer sheet.

**Section – A**

**Attempt any 3 out of 5 questions from this section. Each question carries 5 marks .**

Question 1 Evening shift resident doctors in a government hospital work five consecutive days and have two consecutive days off. Their five days of work can on any day of the week and their schedule rotates indefinitely. The hospital requires the following minimum number of doctors to work on the given days:

Sun	Mon	Tues	Wed	Thus	Fri	Sat
35	55	60	50	60	50	45

No more than 40 doctors can start their five working days on the same day. Formulate this problem as an LP model to minimize the number of doctors employed by the hospital.

Question 2 Describe the mathematical Model of a Transportation problem.

Question 3 The New England Cheese Company produces two cheese spreads by blending mild cheddar cheese with extra sharp cheddar cheese. The cheese spreads are packaged in 12-ounce containers, which are then sold to distributors throughout the Northeast. The Regular blend contains 80% mild cheddar and 20% extra sharp and the Zesty blend contains 60% mild cheddar and 40% extra sharp. This year, a local dairy cooperative offered to provide up to 8100 pounds of mild cheddar cheese for \$1.20 per pound and up to 3000 pounds of extra sharp cheddar cheese for \$1.40 per pound. The cost to blend and package the cheese spreads, excluding the cost of the cheese, is \$0.20 per container. If each container of Regular is sold for \$1.95 and each container of Zesty is sold for \$2.20, how many containers of Regular and Zesty should New England Cheese produce?

Question 4 'Linear programming is one of the most frequently and successfully applied operations research technique to managerial decisions.' Elucidate this statement with some examples.

Question 5 Regardless of the way one defines linear programming, certain basic requirements are necessary before this technique can be employed to business problems. What are these basic requirements in formulation? Explain briefly.

**Section – B**

**Attempt any 2 out of 3 questions from this section. Each question carries 10 marks.**

Question 1 i) What are the assumptions of linear programming? Explain with the help of examples.

ii) Write your understanding on following:

- a) Feasible solution
- b) Infeasibility solution
- c) Unbounded solution
- d) Alternative optimal solution

Question 2 Test the consistency of the following pair-wise comparison matrix.

$$\begin{pmatrix} 1 & 3 & 6 \\ 1/3 & 1 & 8 \\ 1/6 & 1/8 & 1 \end{pmatrix}$$

Question 3 One unit of product A contributes Rs 7 and requires 3 units of raw material and 2 hours of labor. One unit of product B contributes Rs 5 and requires 1 units of raw material and 1 hours of labor. Availability of raw material at present is 48 units and there are 40 hours of labor. Write the dual of the Problem.

**Section - C**

**Compulsory Case Study (15 Marks)**

The New England Cheese Company produces two cheese spreads by blending mild cheddar cheese with extra sharp cheddar cheese. The cheese spreads are packaged in 12-ounce containers, which are then sold to distributors throughout the Northeast. The Regular blend contains 80% mild cheddar and 20% extra sharp and the Zesty blend contains 60% mild cheddar and 40% extra sharp. This year, a local dairy cooperative offered to provide up to 8100 pounds of mild cheddar cheese for \$1.20 per pound and up to 3000 pounds of extra sharp cheddar cheese for \$1.40 per pound. The cost to blend and package the cheese spreads, excluding the cost of the cheese, is \$0.20 per container. If each container of Regular is sold for \$1.95 and each container of Zesty is sold for \$2.20, how many containers of Regular and Zesty should New England Cheese produce?

**Sensitivity Report**

**Adjustable Cells**

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
\$C\$3	Re	9600	0	0.82	0.566666667	0.3
\$D\$3	Ze	5200	0	1.04	0.6	0.425

**Constraints**

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
\$E\$6	Mild	8100	0.8	8100	3900	3600
\$E\$7	Extra Sharp	3000	2.266666667	3000	2400	975

- a) Why all reduced costs for this problem are zero?
- b) Interpret the shadow price of the constraints table.
- c) Explain the range of the Adjustable cells table.