**Assignment**

**I. Attempt Each Of The Following Problems:**

**1. Define a convex set.**

**2. Show that the set **

**3. Determine the convex hull of the following sets: **

**II. Formulate an LP model for the following problems.**

**1. A manufacturer has 3 machines *A, B, C* with which he produces three different articles P, Q, R. The different machine times required per article, the amount of time available in any week on each machine and the estimated profits per article are furnished in following table:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Article** | **Machine time (in hrs.)** | | | **Profit per article**  **(in rupees)** |
| **A** | **B** | **C** |
| **P**  **Q**  **R** | **8**  **2**  **3** | **4**  **3**  **0** | **2**  **0**  **1** | **20**  **6**  **8** |
| **Available Machine hrs.** | **250** | **150** | **50** |  |

***Formulate the problem as a linear programming problem.***

**2. Two alloys A and B are made from four different metals I, II, III and IV according to the following**

**specifications: A: at most 80% of I, at most 30% of II, at least 50% of III, B:between   
 40% & 60% of II, at least 30% of III, at most 70% of IV. The four metals are extracted from three different ores whose constituent’s percentage of these metals, maximum available quantity and cost per ton are as follows:**

**Constituent %**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Ore** | **Max. Quantity (tons)** | **I** | **II** | **III** | **IV** | **Others** | **Price**  **(Rs.per ton)** |
| **1**  **2**  **3** | **1000**  **2000**  **3000** | **20**  **10**  **5** | **10**  **20**  **5** | **30**  **30**  **70** | **30**  **30**  **20** | **10**  **10**  **0** | **30**  **40**  **50** |

**Assuming the selling prices of alloys A and B are Rs. 200 and Rs. 300 per ton respectively.**

**Formulate the above as a linear programming problem selecting appropriate objective and**

**constraint functions.**

**3. A television company has three major department for manufacture of its models, A and B. monthly**

**capacities are given as follows:**

|  |  |  |  |
| --- | --- | --- | --- |
| ***Department*** | ***Per unit time requirement(hours)*** | | ***Hours available***  ***This month*** |
| ***Model A*** | ***Model B*** |
| ***I***  ***II***  ***III*** | ***4.0***  ***2.5***  ***4.5*** | ***2.0***  ***1.0***  ***1.5*** | ***1600***  ***1020***  ***1600*** |

**The margin profit of model A is Rs. 400 each and that of model B is Rs. 100 each. Assuming that**

**the company can sell any quantity of either product due to favorable market conditions, determine**

**the optimum out-put for both the models, the highest possible profit for this month and the slack**

**time in the three departments.**

**III. Answer The Following Question Clearly.**

**1. a) Define a basic solution to a given system of m simultaneous linear equations in n unknowns.**

1. **How many Basic Feasible Solution are thereto a given system of 3 simultaneous**

**linear equations in 4 unknowns.**

**2. Define the following terms.**

**a) Basic Variable. b) Basic Solution. c) Basic Feasible Solution. d) Degenerate Solution.**

**3. What is degeneracy in simplex? Solve the following LPP using simplex:**

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**4. With reference to the solution of LPP by simple method/table when do you conclude as**

**follows: a) LPP has multiple solutions, b) LPP has no limit for the improvement of the**

**objective function, c) Lpp has no feasible solution.**

**VI. Solve the following Linear Programming Problems using Simplex Method**

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**V. Solve The following LP Problems by Two-Phase Method.**

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**VI. Obtain The Dual Of The Following LP Problems.**

**VII. Use Duality *In Obtaining An Optimal Solution , if any for the following* LP Problems.**

** VIII. Use Dual Simplex Method To Solve The Following LP Problems.**

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