**MASTER OF BUSINESS ADMINISTRATION (MBA)**

**DMBA205 – OPERATIONS RESEARCH**

**Assignment Set – 1**

**Questions**

**1. What is Operations Research? Explain the role of Operations Research in Decision Making.**

**Ans:** Churchman, Aackoff, and Aruoff defined operations research as “the application of scientific methods, techniques and tools to the operation of a system with optimum solutions to the problems” where 'optimum' refers to the best possible alternative.

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**2. a) Solve the following linear programming problem using Two Phase Simplex Method:**

**Minimize Z = x 1 - 2x 2 – 3x 3**

**Subject to: -2x 1 + x 2 + 3x 3 = 2**

**2x 1 + 3x 2 + 4x 3 = 1**

**Where x 1 , x 2 , x 3 ≥ 0**

**Answer:**

**Solution:**  
**Problem is**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Min *z* | = |  |  | *x*1 | - | 2 | *x*2 | - | 3 | *x*3 | |
| subject to |

**b) Solve the following transportation problem using Matrix Minima Method? Also find the corresponding cost of transportation.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Warehouses** | | | | | | |
| **Factor y** |  | **W1** | **W2** | **W3** | **W4** | **Supply** |
| **Factor y** | **F1** | **21** | **16** | **25** | **13** | **21** |
| **Factor y** | **F2** | **17** | **18** | **14** | **23** | **23** |
| **Factor y** | **F3** | **32** | **17** | **28** | **41** | **19** |
| **Factor y** | **Demand** | **11** | **15** | **17** | **20** |  |

**Ans:** Let xij = no. of units of a product transported from ith factory (i = 1, 2, 3) to jth warehouse (j = 1, 2, 3, 4).

It should be noted that if in a particular solution the xij value is missing for a cell, this means that nothing

**3. Five wagons are available at stations 1,2 3,4 and 5. These are required at five stations A, B, C, D and E. The distances in km between various stations are given in the table below. How should the wagons be transported to minimize the total distance travelled?**

**Stations (s) A B C D E**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **10** | **5** | **9** | **18** | **11** |
| **13** | **2** | **6** | **12** | **14** |
| **3** | **9** | **4** | **4** | **5** |
| **18** | **5** | **12** | **17** | **15** |
| **11** | **6** | **14** | **19** | **10** |

**Ans:** Find the matrix

Given:

**Assignment Set – 2**

**Questions**

**4. a) Write any five differences between Critical Path Method [CPM] &amp; Program Evaluation and Review Technique [PERT]**

**Ans:**

**PERT**

* PERT – Project Evaluation and Review Technique
* PERT is a

**b) Customers arrive at a sales counter managed by a single person according to a poisson process with a mean rate of 20 per hour. The time required to serve a customer has an exponential distribution with a mean of 100 seconds. Find the average waiting time of customer in queue and in system.**

**Ans:** The average waiting time of a customer is 225 seconds.

**Step-by-step explanation:**

Given: Arrival

**5. A project manager has obtained the following optimistic, pessimistic and most likely times, in weeks, relating to the various activities related to the construction of a power project:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Activit (y)** | **Optimistic time**  **(in weeks)** | **Most likely time**  **(in weeks)** | **Pessimistic time**  **(in weeks)** |
| **1-2** | **6** | **9** | **18** |
| **1-3** | **5** | **8** | **17** |
| **2-4** | **4** | **7** | **22** |
| **2-5** | **4** | **7** | **10** |
| **3-4** | **4** | **7** | **16** |
| **3-5** | **2** | **5** | **8** |
| **4-5** | **4** | **10** | **22** |

**i) Draw a PERT diagram and mark clearly the Critical Path**

**ii) Determine the expected project length?**

**iii) What is the probability that the project would be successfully completed in 32 weeks?**

**6. What is Principle of Dominance in Game Theory? Reduce the following game by dominance property and solve it:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **1 2 3 4 5** | | | | | |
| **I**  **II**  **III**  **IV** | **1** | **3** | **2** | **7** | **4** |
| **3** | **4** | **1** | **5** | **6** |
| **6** | **5** | **7** | **6** | **5** |
| **2** | **0** | **6** | **3** | **1** |

**Player B**

**Player A**

**Ans:** The principle of dominance states that if one strategy of a player dominates over the other strategy in all conditions then the later strategy can be ignored. A strategy dominates over the other only if it is preferable over other in all conditions. The concept of dominance is especially useful for the