**Dr B R Ambedkar National Institute of Technology Jalandhar**

**Dept. of Humanities and Management**

HMX-201 Engineering Economics and Industrial Management

B Tech (VI Semester) CSE **(Test A)**

End Semester Test (23.07.2020)

Time 1.30 Hrs Marks 30

***Attempt all questions. It is an open book examination. You should not interact with anyone in any way during the entire period of examination till you upload your answer sheet in single pdf and send it back to the email address from where you have received question paper. To avoid error, click reply to sender’s email and upload your answer sheet.***

***Answer sheet must be uploaded by within 20 minutes after the duration of exam gets over. Before uploading, check that quality of image is good.***

***All calculations and rough work must be done on answer sheet against the question, otherwise marks will be deducted. Use space on the right alongside the question being attempted for this purpose.***

***Write your name, roll no and other details on the answer sheet clearly according to instructions given by examination section. All pages of the answer sheet must be numbered.***

1 In a basketball game, US employs two basic offenses the shuffle and the overload; England uses three defenses the zone, the man-to-man. The points US expects to score (estimated from past games), using each offense against each England, are given in the following payoff table:

|  | **England Defense** | | |
| --- | --- | --- | --- |
| **US Offense** | **Zone** | **Man-to-Man** | **Combination** |
| Shuffle | 72 | 60 | 83 |
| Overload | 58 | 91 | 72 |

Solve the game. Also explain the results and value of game. (5)

2 A mattress Store in Mumbai stocks mattresses in its warehouse and sells it through an adjoining showroom. The store keeps several brands and styles of mattress in stock; however, its largest sale comes from its own brand Soft On. The store wants to determine the optimal order size and total inventory cost for this brand of mattress, given an estimated annual demand of 10,000 pairs, an annual carrying cost of Rs 700 per pair, and an ordering cost of Rs 10000. Assuming that production facility operates the same days, the store remains open for sales with daily production rate of 150 pairs, the store would also like to know optimal order quantity, minimum cost, the number of orders that will be made annually and the time between orders (i.e., the order cycle), given that the store is open every day except Sunday, Thanks giving Day, and Diwali Day (which is not on a Sunday). (5)

3 A firm is considering replacement of machine whose present cost price is Rs 18,000. The scrap value and maintenance cost for next 8 years are as follows:

Year 1 2 3 4 5 6 7 8

Scrap Value 15000 12000 9000 6000 4000 3000 1500 0

Maintenance Cost 500 800 1000 1500 2000 2400 3500 4000

Considering discount rate of 10%, when the machine should be replaced? (5)

Year 1 2 3 4 5 6 7 8

PWF @ 10% 0.9091 0.8264 0.7513 0.6830 0.6209 0.5645 0.5132 0.4665

PWFS @10% 0.909 1.736 2.487 3.170 3.791 4.355 4.868 5.335

CRF @10% 1.1 0.592 0.416 0.329 0.277 0.243 0.219 0.201

SFF @ 10% 1.0 0.476 0.302 0.215 0.164 0.130 0.105 0.087

CAFS @ 10% 1.0 2.1 3.31 4.641 6.105 7.716 9.487 11.436

CAF @ 10% 1.1 1.21 1.33 1.46 1.611 1.772 1.950 2.144

4 Given is the following simplex tableau for a linear programming problem.

| **cj** | **Basic Variables** | **Quantity** | **4** | **6** | **0** | **0** | **M** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **x1** | **x2** | **s1** | **s2** | **A1** |
| M | A1 | 2 | 0 | 1/2 | -1 | 1/2 | 1 |
| 4 | x1 | 6 | 1 | 1/2 | 0 | -1/2 | 0 |
|  | zj | 24 + 2M | 4 | M/2 + 2 | -M | M/2-2 | M |
|  | zj-cj |  | 0 | M/2-4 | -M | M/2-2 | 0 |

1. Is this a maximization or a minimization problem? Why?
2. What are the values of the decision variables in this tableau?
3. Were any of the constraints in this problem originally equations? Why?
4. What is the value of s2 in this tableau?
5. Is this solution optimal? Why? If the solution is not optimal, complete the next iteration (tableau) and indicate if it is optimal. (2x5=10)

5 The chairperson of the department of management at State University wants to forecast the number of students who will enroll in production and operations management (POM) next semester, in order to determine how many sections to schedule. The chair has accumulated the following enrollment data for the past eight semesters:

| **Semester** | **Students Enrolled in POM** |
| --- | --- |
| 1 | 400 |
| 2 | 450 |
| 3 | 350 |
| 4 | 420 |
| 5 | 500 |
| 6 | 575 |
| 7 | 490 |
| 8 | 650 |

1. Compute a three-semester weighted moving average forecast for semesters 4 through 9 by assigning weights 0.70, 0.20 and 0.10 starting with the most recent semester.
2. Compute the exponentially smoothed forecast ( = .20) for the enrollment data.
3. Compare both the forecasts. (2+2+1)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Q | 1 | 2 | 3 | 4 | 5 |
| DL | 2 | 2 | 2 | 2 | 2 |