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COURSE CODE: CSC314

COURSE TITLE: OPERATIONS RESEARCH

ASSIGNMENT

****Question****

****QUESTION 1****

 Find the maximum value of   Ƶ = 2x + y,

                                                            Subject to x + 2y ≤ 10

                                                                             x + y ≤ 6

                                                                             x – y ≤ 2

                                                                             x – 2y ≤ 1

                                                                             x, y ≥ 0

****QUESTION 2****

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | D1 | D2 | D3 | D4 |
| S1 | 20 | 30 | 110 | 70 |
| S2 | 10 | 0 | 60 | 10 |
| S3 | 50 | 80 | 150 | 90 |

A PC manufacturing company has three factories S1, S2, and S3 as shown in the table above where they produce 60, 10 and 100 of their products weekly. They also have 3 distribution centres D1, D2, and D3, where the weekly requirements are 70, 50, 30 and 20 respectively. Determine an initial basic feasible solution to the above transportation problem using: (i) the regret method, (ii) Least Cost Method, and (iii) North-West Corner Rule Method. Comment briefly on your answers.

****SECTION B****

****QUESTION 3****

In a university, it was observed that results are influenced by varying teaching methods and staff competence. In the university, students’ results are classified as outstanding, fair and poor. An outstanding result has the probability 0.7 of remaining outstanding and the probability 0.3 of dropping to fair. A fair result has the probability 0.2 of moving to outstanding, 0.6 of remaining fair and 0.2 of dropping to poor. On the other hand, a poor result has the probabilities 0.4 of becoming fair and 0.6 of remaining in its state.

(a)        Present the information in directed graphs and construct its transition state matrix

(b)        Obtain the forecast of fair results after two transitions for the case (0.3, 0.6, 0.1)

(c)        Determine the steady state vector the transition matrix in (i)

****QUESTION 4****

In a queue, the arrival rate is 200 customers in 40 hours while the service rate is 480 customers in 80 hours. Determine the following:

1. the traffic intensity
2. Average number of items in the queue
3. Average number of items in the system
4. Average time in a queue before service is rendered
5. Average time in a system

****QUESTION 5****

A flour mill company has 9 bins of wheat which must be connected by wheat pipes so that wheat can be moved from one to another. To minimize the cost of construction they want to build as few pipes as possible. The cost in (millions of naira) of building a pipeline between two bins is given below.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bin | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1 | - | 4 | - | 6 | 7 | - | 3 | - | 5 |
| 2 | 4 | - | 5 | 2 | - | 3 | 1 | - | - |
| 3 | - | 5 | - | 7 | - | 2 | 2 | 4 | - |
| 4 | 6 | 2 | 7 | - | 4 | 1 | - | 3 | - |
| 5 | - | - | - | 4 | - | 1 | - | - | - |
| 6 | - | 3 | 2 | 1 | 1 | - | 2 | 2 | 4 |
| 7 | 3 | 1 | 2 | - | - | 2 | - | 5 | 2 |
| 8 | - | - | 4 | 3 | - | 2 | 5 | - | 6 |
| 9 | 5 | - | - | - | - | 4 | 2 | 6 | - |

1. How can the pipes be built at minimal cost?
2. What is the minimal cost?

****QUESTION 6****

****(a)****Consider the table below which contains the cost in naira of processing each of jobs A.B   and C on machines X, Y and Z.

|  |  |  |
| --- | --- | --- |
| 25 | 15 | 22 |
| 31 | 20 | 19 |
| 35 | 24 | 17 |

1. Show that assignment model is a special case of the transportation model.
2. Assign the different jobs to machines so as to minimize the cost

(b) (i)       Describe THREE areas of the application of Operation Research in Computing (ii)         Describe briefly TWO impacts of Operation Research in ANY organization.

























