Operations Research Assignment #3 Due date : 27:05:22

Q-1) A company needs to determine the optimal replacement policy for a current 3-years-old machine over the next 4 years. The company requires that a 6-year-old machine be replaced. The cost of a new machine is $200,000. The following table gives the data of the problem. Determine the optimal decision for the machine.

|  |  |  |  |
| --- | --- | --- | --- |
| Age t yrs. | Revenue r(t) ($) | Operating cost, c(t) | Salvage value, s(t), $ |
| 0 | 20,000 | 200 | -------- |
| 1 | 19,000 | 600 | 80,000 |
| 2 | 18,500 | 1200 | 60,000 |
| 3 | 17,200 | 1500 | 50,000 |
| 4 | 15,500 | 1700 | 30,000 |
| 5 | 14,000 | 1800 | 10,000 |
| 6 | 12,200 | 2200 | 5,000 |

Given that the machine is *t* years old at the start of year *i*, then for years *i,i+1*,…..,*n* the revenue ***fi(t)*** is given as

*r(0) +s(t)-c(0)-I+fi+1(1)*, if REPLACE

*r(t)-c(t)+fi+1 (t+1)*, if KEEP

**and for nth year**

*r(0)+s(t)+s(1)-c(0)-I*, if REPLACE

*r(t)+ s(t+1)-c(t)* if KEEP

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Q-2) Explain the following term with at least one example.

1. Dynamic programming, characteristics of dynamic programming & Deterministic dynamic programming
2. Integer programming with proto type example,
3. Binary Integer programming (BIP) & its application and formulation with example,
4. Perspective approach on solving integer programming
5. The branch-and-cut approach to solve BIP problems.
6. The constraints programming