1b Replacement of assets that deteriorate with time (3)

Considering time value of money.

A firm pays Rs 10,000 for its machine. The operating and maintenance costs are about Rs 2500 per year for first 2 years and then go up by approximately Rs 1500 per year. Considering discount rate 10%, when it should be replaced?

(1) Year	(2) Maintenance cost (C(t))	Pvf-10% (3)	PV of Maintenance cost (4) (2x3)	M(n) in Pv (5)	TC (6) C+M(n)	CRF @10% (7)	Average Cost (8) (PV) Annual (6x7)
1	2500	0.9091	2272.75	2272.55	12272.55	1.10	13499.80
2	2500	0.8264	2066	4338.75	14338.75	0.5762	8261.98
3	4000	0.7513	3005.2	7343.95	17343.95	0.4021	6974.00
4	5500	0.6830	3756.5	11100.45	21100.45	0.3155	6657.19
5	7000	0.6209	4346.3	15446.75	25446.75	0.2638	6712.85
6	8500	0.5645	4798.25	20245	30245	0.2296	6944.25
7	10000	0.5132	5132	25377	35377	0.2054	7266.44
8	11500	0.4665	5364.75	30741.75	40741.75	0.1874	7635.00
9	13000	0.4241	5513.3	36255.05	46253.05	0.1736	8029.88
10	14500	0.3855	5589.75	41844.8	51844.8	0.1628	8440.33

In the above example, Scrap value has not been given. If scrap value is given. You may assume any value for the same that will keep on decreasing with Passage of time. In this situation, two columns will be added. One column will be related to actual scrap values at the end of year. Second column will be related to Pv of scrap value after discounting scrap values. The Pv of scrap value will be deducted from TC. Hence Tc will be revised as $Tc = C + PV(M(n)) - PV(SV(n))$. Accordingly Annual Cost (Cv) column will also change.

If we assume scrap value of machine will be as follows:

End of Year	1	2	3	4	5	6	7	8	9	10
Scrap value	8000	7000	6000	5000	4000	3000	2000	1000	1000	1000

the above table will be revised as follows:

Column nos 1, 3, 4, 5 & 7 will remain unchanged.
New Columns 2a and 5a will be added, columns 6 and 8 will be revised as follows.

1	2a	5a (2a x 3)	TC (6 = C+4-5a)	Annual cost CPV (6x7)
1	8000	7272.8	4999.75	5499.73
2	7000	5784.8	8553.95	4928.79
3	6000	4507.8	12835.15	5161.01
4	5000	3415	17685.45	5579.66
5	4000	2483.6	22963.15	6057.67
6	3000	1693.5	28551.5	6555.42
7	2000	1026.4	34350.6	7055.61
8	1000	466.5	40275.25	7547.58
9	1000	424.1	45830.95	7956.25
10	1000	385.5	51459.30	8377.57