Q.P. Code 38887

(01)

CEE [Paper Solution]

Que. 2 (b)

$S = 1000/-$, $n = 4$, $i = 0.03$,

i> $P = S \dfrac{1}{(1+i)^n} = 1000 \times \dfrac{1}{(1+0.03)^4}$

$$\boxed{P = 888.5 \text{ Rs.}}$$

ii> Discount $= F.V - P.V$

$= 1000 - 888.5$

$= 111.5$ Rs.

iii> $P = 700/-$

$P = S \dfrac{1}{(1+i)^n}$

$i = \left(\dfrac{S}{P}\right)^{1/n} - 1 = \left(\dfrac{1000}{700}\right)^{1/4} - 1$

$$\boxed{i = 0.0933 = 9.33\%}$$

Que. 3 (b),

for filter 1, dia = 2 m

length = 5 m

peripheral area $= 2\pi RL = 31.416 \ m^2$

for filter 2,

cost = Rs. 30000 per $50 \ m^2$ in 1974

$$\boxed{\text{cost of filter 2 in 1984}} = \boxed{\text{cost of filter 2 in 1974}} \times \boxed{\frac{\text{CI in 1984}}{\text{CI in 1974}}}$$

$= 30,000 \times \dfrac{182}{151}$

$= 36158.94$ per $50 \ m^2$ of area.

Use six-tenth rule,

O_2

$$\text{cost of filter 1} = \text{cost of filter 2} \times \left[\frac{\text{PF area of filter 1}}{\text{PF area of filter 2}}\right]^{0.6}$$

$$= \underline{27,360.50 \text{ Rs.}}$$

Que. 4 (b).

$C_V = 10,000/-$, $V_S = 2000/-$

$n = 10$ yrs , $i = 0.07$, $K = ?$

$$K = C_V + \frac{CR}{(1+i)^n - 1}$$

$$= 10,000 + \frac{10,000 - 2000}{(1+0.07)^{10} - 1}$$

$$\boxed{K = 18,272 \text{ Rs.}}$$

Que. 5 — 20 m

components	costs (Rs)
purchased equip. cost, E	1,00,000/-
purchased equip. installⁿ cost (39%)	39,000/-
instrumentⁿ (28% E)	28,000/-
piping (31% E)	31,000/-
Electrical (10% E)	10,000/-
Building (22% E)	22,000/-
Yard improvement (10% E)	10,000/-
service facility (55% E)	55,000/-
Direct plant cost	2,95,000/- (ans)
+	
Indirect plant cost: Engg. & supervision (32% E)	32,000/-
Indirect plant cost: construction expenses (34% E)	34,000/-
total Direct + Indirect plant =	3,61,000/-

03

contractors fees (5% D+I) 18050 /-
contingency fees (10% D+I) 36100 /-

Fixed capital Invest = D + I + contractors + contingency
= 3,61,000 + 18050 + 36100
= 4,15,150 /- (ans ii)

total capital investment = Working capital + Fixed capital

TCI = WCI + FCI
TCI = 20% TCI + FCI.

0.8 TCI = FCI

$$TCI = \frac{4,15,150}{0.8} = \boxed{5,18,937 \text{ Rs}}$$ (ans iii)

Q.6 @

$$\text{Rate of Return} = \frac{\text{Avg net profit}}{\text{total cap. invest.}} \times 100$$

Avg net profit = value of heat saved − (oper. cost + Fixed charges)

Design I,

Avg net profit = 10,000 − (7500 + 25000)
= 67,500 /-

$$ROR = \frac{67500}{2,50,000} \times 100 = 27\ \%$$

Design II,

Avg. net profit = 92500 /-

ROR = 23.12 %

Design III,

Avg net profit = 1,02,500/-

ROR = 20.5 %.

Design IV,

Avg net profit = 1,27,500/-

ROR = 19.6 %.

Since all four designs has above 16 % ROR, so we have to do analysis on return on incremental basis.

compare design II with I,

$$\frac{\text{~~Annual incrementon ROI~~}}{} = \frac{\text{Difference in net profit of II \& I}}{\text{Diff}^n \text{ in initial investment}} \times 100$$

$$= \frac{92500 - 67500}{400000 - 250000} \times 100 = 16.6\%$$

Since design has 16.6 % of inc. return on invest. than design I, Design I is rejected. Design II is preferred.

Now, compare III with II

Annual increment on ROI = $\cancel{\frac{127500 - 92500}{500000 - 400000} = 10\%}$

$$\frac{102500 - 92500}{500000 - 400000} = 10\%$$

Design II is preferred.

compare IV with II,

$$\text{Annual increment on ROI} = \frac{127500 - 92500}{650000 - 400000} \times 100$$

$$= 14\%$$

Hence among all 4, Design II will be preferred.