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Roll:- 504 (BGE (III/II))

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Q.No. 3 (b) Solⁿ:

Given,	A	B
Investment	4,00,000	7,00,000
Annual revenue	1,75,000	2,50,000
Annual cost	25,000	35,000
Salvage value	40,000	70,000
Useful life	6	8

The LCM of 6 & 8 is 24 years.

Now for project A,
we should use for 4 times.

$$\begin{aligned}
 PW(12\%) &= -4,00,000 - 4,00,000(P/F, 12\%, 6) - 4,00,000 \\
 &\quad (P/F, 12\%, 12) - 4,00,000(P/F, 12\%, 18) \\
 &\quad + (1,75,000 - 25,000)(P/A, 12\%, 24) \\
 &\quad + 40,000(P/F, 12\%, 6) + 40,000(P/F, 12\%, 12) \\
 &\quad + 40,000(P/F, 12\%, 18) + 40,000(P/F, 12\%, 24) \\
 &= -4,00,000 - 4,00,000 \times 0.5066 - 40,000 \times 0.2567 + \\
 &\quad 4,00,000 \times 0.13 + 1,50,000 \times 2.7873 + 40,000 \times 0.5066 \\
 &\quad + 40,000 \times 0.0659
 \end{aligned}$$

$$PW(12\%) = \text{Rs } 448693$$

For Project B

$$PW(12\%) = -7,00,000 - 7,00,000(P/F, 12\%, 8) - 2,00,000(P/F, 12\%, 16) + (250,000 - 350,000) \times (P/A, 12\%, 124) + 20,000(P/F, 12\%, 18) + 20,000 \times (P/F, 12\%, 16) + 20,000 \times (P/F, 12\%, 124)$$

$$= -7,00,000 - 7,00,000 \times \frac{1}{(1.12)^8} - 7,00,000 \times \left(\frac{1}{(1.12)^6} \right)$$

$$+ 215,000 \times \frac{1.12^{10} - 1}{0.12 \times (1.12)^{10}} + 20,000 \times \frac{1}{(1.12)^{18}}$$

$$+ 20,000 \times \frac{1}{(1.12)^{16}} + 20,000 \times \frac{1}{(1.12)^{24}}$$

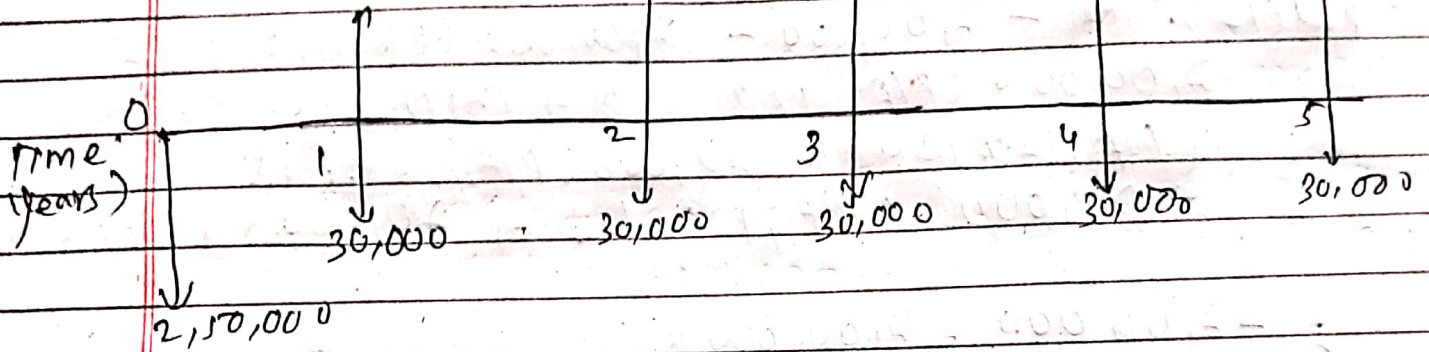
$$= 6,21,026.5655$$

Since P.W of B (621,026.5655) > P.W of A (448,093)

Project B is highly recommended, because

Q. No. 3 (a) soln:

Cash flow diagram is



Now,

Conventional Method,

B/C ratio using F.W method,

B/C ratio = $\frac{\text{F.W of benefit} - \text{F.W of dis benefit}}{\text{F.W of initial cost} + \text{F.W of operating \& maintenance cost} - \text{Salvage value}}$

$$= \frac{50,000 (F/A, 5, 15\%) + 30,000 (F/P, 5, 15\%)}{2,50,000 (F/P, 5, 15\%) + 30,000 (F/A, 5, 15\%) - 50,000}$$

$$= \frac{50,000 \left[\frac{(1.15)^5 - 1}{0.15} \right] + 30,000 \left[\frac{(1.15)^5 - 1}{0.15} \times \frac{1}{1.15} \right]}{2,50,000 [(1.15)^5] + 30,000 \left[\frac{(1.15)^5 - 1}{0.15} \right] - 50,000}$$

$$= 1.05$$

Using Modified Method,

$$\text{B/C ratio} = \frac{\text{F.W of benefit} - \text{F.W of operating \& maintenance cost} - \text{F.W of dis benefit}}{\text{F.W of initial cost} - \text{salvage value}}$$

$$= \frac{50,000 \left[\frac{(1.15)^5 - 1}{0.15} \right] + 30,000 \left[\frac{1.15^5 - 1}{0.15^2} \times \frac{0.15}{1.15} \right] - 30,000 \left[\frac{1.15^5 - 1}{0.15} \right]}{2,50,000 \left[\frac{(1.15)^5 - 1}{0.15} \right] - 50,000}$$

$$= \frac{1.06}{1.06}$$

Q.No. 2a)

Initial cost = Rs 5,00,000

useful life = 10 years

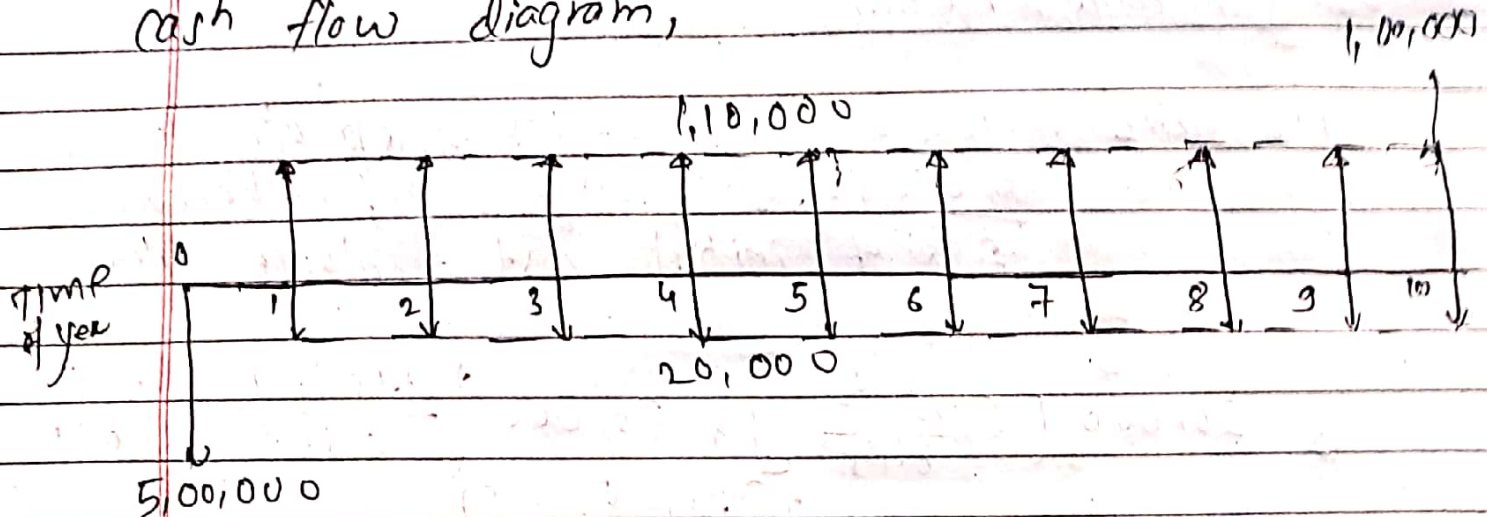
Annual Revenue = Rs 1,10,000

Annual cost = Rs 20,000

Salvage value = Rs 1,00,000

MARR = 12%

cash flow diagram,



Using present worth method,

$$\begin{aligned}
 PW &= -5,00,000 + 1,10,000(P/A, 12\%, 10) - \\
 &\quad 20,000(P/A, 12\%, 10) + 1,00,000(P/F, 12\%, 10) \\
 &= -5,00,000 + 1,10,000 \times \left[\frac{(1+0.12)^{10} - 1}{0.12 \times 1.12^{10}} \right] \\
 &\quad - 20,000 \left[\frac{1.12^{10} - 1}{0.12 \times 1.12^{10}} \right] + \frac{1,00,000}{(1.12)^{10}}
 \end{aligned}$$

$$\begin{aligned}
 &= -5,00,000 + 1,10,000 \times 5.650 - 20,000 \times 5.650 \\
 &\quad + 1,00,000 \times 0.322
 \end{aligned}$$

$$PW(12\%) = \text{Rs } 40,700$$

Using Annual worth method,

$$AW = -5,00,000 (A/P, 12\%, 10) + 1,10,000 - 20,000 + 1,00,000 (A/F, 12\%, 10)$$

$$= -5,00,000 \times \frac{0.12 \times 1.12^{10}}{1.12^{10} - 1} + 90,000 +$$

$$1,00,000 \times \frac{0.12}{1.12^{10} - 1}$$

$$= -5,00,000 \times 0.177 + 90,000 + 1,00,000 \times 0.057$$

$$A.W = \text{Rs } 7200$$

Using Future worth method,

$$FW = -5,00,000 (F/P, 12\%, 10) + (1,10,000 - 20,000) (F/A, 12\%, 10) + 1,00,000$$

$$= -5,00,000 \times (1.12)^{10} + 90,000 \times \frac{1.12^{10} - 1}{0.12} + 1,00,000$$

$$F.W = \text{Rs } 126410$$