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Que (01) Answer :-

Net Present value :- The NPV applies to a series of cash flows occurring at different times. The present time of a cash flow depends on the interval of time between now and the cash flow. It also depends on the discount rate. NPV accounts for the time value of money. It provides a method for evaluating and comparing capital projects or financial products with cash flows spread over time, as in loans, investments, payouts from insurance contracts plus many other applications. NPV is the sum of all terms,

$$\frac{R_t}{(1+i)^t}$$

where, t = Time cash flow

i = Discount rate

R_t = Net cash flow

Equivalent Annual Cost :-

EAC is the Annual Cost of owning and maintaining an asset to determined by dividing the net present value of the asset purchase, operations and maintenance cost by the present value of annuity factor. It is a capital budget tool used by companies to compare assets with unequal useful lives. The same

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Concept can be applied to analyse projects which have unequal useful lives.

$$EAC = \frac{NPV \times r}{1 - (1+r)^{-n}}$$

where, r = periodic discount rate
 n = numbers of years.

Benefit-cost-ratio :-

A (BCR) is an indicator used in cost-benefit analysis, that attempts to summarize the overall value for money of a project or proposal. A BCR is the ratio of the benefits of a project or proposal expressed in monetary terms, relative to its costs, also expressed in monetary terms.

ject Que(01) Solution :-

(a) Present value Method :-

$$F = F \times \left[\frac{\{(1+i)^n - 1\}}{i(1+i)^n} \right]$$

1) Present value benefit in 30 years.

$$= 1050,000,000 \times \left[\frac{(1+i)^n - 1}{i(1+i)^n} \right]$$

$$i = 0.05 \quad \text{and} \quad n = 30$$

eq-①

put the value in equation - ①

$$= 1050,000,000 \times 15.3724$$

$$= 16,141,073,578$$

(ii) Present value of Construction Cost
= 9,000,000,000

Present value of operation and maintenance

$$= 375,000,000 \times 15.3724$$

$$= 5,764,650,000$$

$$\text{Total Cost of revenue} = 9,000,000,000 + 5,764,650,000 = 14,764,650,000$$

(b) Equivalent Annual Cost Method:

$$(i) \text{ Annual Benefit} = 1050,000,000$$

$$(ii) \text{ Annual cost of operation and maintenance} = 375,000,000$$

Using formula:

$$EAC = 9,000,000,000 \times \left[\frac{i(1+i)^n}{(1+i)^n - 1} \right]$$

(Putting the value)

$$i = 0.05, \quad n = 30$$

$$= 9,000,000,000 \times 0.06505$$

$$= 585,450,000$$

$$\text{Total ECR} = 375,000,000 + 585,450,000$$

$$= 960,450,000$$

(iii) Net Annual Benefit (NAB):-

$$= 1,050,000,000 - 960,450,000$$

$$= 89,550,000$$

Benefit Cost Ratio:

(a) $B/C \text{ Ratio} = \frac{16,141,073,578}{14,764,650,000}$
 $= 1.093$

(b) $B/C \text{ Ratio} = \frac{1050000000}{960450000}$
 $= 1.093$

~~B/C Ratio~~

As B/C Ratio is greater than 1,
(The Project is Feasible)

Que (02) Answer :-

Internal Rate of Return :- The internal rate of return is a measure of an investment expected future rate of return. As the IRR is an estimate of a future annual rate of return, IRR should not be confused with the actual achieved investment return of an historical investment. The term internal refers to the fact that the calculation excludes external factors, such as risk-free rate, inflation, the cost of capital or various financial risks.

The difference between NPV and IRR :-

They both are used in the evaluation process for capital expenditure. Net present value are discount the stream of expected cash flows associated with a proposed project to their current value, which present a cash surplus or loss for the project. The Internal rate of return (IRR) calculates the percentage rate of return at which those same cash flows will result in a net present value of zero. The two capital budgeting methods have the following differences -

• Outcome :-

The NPV method result in a dollar value that a project will produce, while IRR generates the percentage return that the project is expected to create.

• Purpose :- The (NPV) method focuses on project Surpluses, while (IRR) is focused on the breakeven cash flow level of a project.

• Decision Support :- The (NPV) method presents an outcome that forms the foundation for an investment decision, since it presents a dollar return. The (IRR) method does not help in making this decision, since its percentage return does not tell the investor how much money will be made.

• Reinvestment rate :-

The presumed rate of return for the reinvestment of intermediate cash flow is the firm's Cost of Capital when (NPV) is used, while it is the internal rate of return under the IRR method.

• Discount rate issues :-

The (NPV) method requires the use of a discount rate, which can be difficult to derive, since management might want to adjust it based on the perceived risk levels. The (IRR) method does not have this difficulty, since the rate of return is simply derived from the underlying cash flows.

* Inflation :-

Inflation is the quantitative measure of the rate at which the average price level of a basket of selected goods and services in an economy increased over some periods of time. It is the risk in the general level of prices where a unit of currency effectively buys less than it did in prior periods, often expressed as a percentage, inflation thus indicates a decrease in the purchasing power of a nation's currency. Inflation can be connected with deflation, which occurs when prices instead decline.

- Inflation is the rate at which the general level of prices for goods and services is rising and, consequently, the purchasing power of currency is falling.
- Inflation is classified into three types: Demand-pull inflation, Cost-push inflation and Built-in inflation.
- Most commonly used inflation indexes are the Consumer Price Index (CPI) and the Wholesale Price Index (WPI).
- Inflation can be viewed positively or negatively depending on the individual viewpoint and rate of change.

Solution Que(02) :-

End of year	NCF	$\frac{1}{(1+i)^n}$ $i = 8\%$ $n = 0 \text{ to } 4$	DCF(8%)	DCF(13%)
0	-9000000	1.0000	-9000000	9000000
1	2100000	0.9259	1944390	1858500
2	2700000	0.8573	2314710	2114370
3	3450000	0.7938	2738610	2391195
4	4200000	0.7350	3087000	2575860
			1084710	-60075

$$i = 8\% + \left(\frac{1084710}{1084710 + 60075} \right) \times (13 - 8)\%$$

$$= 8\% + 0.947 \times (5)\%$$

$$= 12.74\%$$

Formula :-

$$i = (1 + i)(1 + f) - 1$$

$$0.1274 = (1 + i)(1 + 0.04) - 1$$

$$= (1 + i) = 1.1247 / 1.04$$

$$= (1 + i) = 1.084$$

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$$s = 1.084 - 1$$

$$s = 0.084$$

$$s = 8.4 \% \text{ (IRR)}$$

Que (03). Solution :-

Pipe	P	V	P-v	(P-v)/P	Volume % Sale	% Per Unit	Col 5 x Col 6 =
Cast Iron	450000	300000	150000	0.3333	25%	33.33%	8.33%
Steel	525000	375000	150000	0.2857	35%	28.57%	10%
Concrete	600000	450000	150000	0.25	40%	25%	28.33% 10%

Total Contribution Sales = 28.33%

$$\textcircled{a} \text{ BEP} = \text{Fixed cost} / \text{Contribution}$$

$$= \$ 200 \text{ m} / 0.2833$$

$$= \$ 705.9654 \text{ m}$$

$$= \$ 706 \text{ m}$$

BEP Capacity of Sub Contracts =

$$\text{BEP capacity} / \text{Maximum Capacity}$$

$$= \$ 706 / \$ 900 \times 100$$

$$= 78.44 \%$$

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(b) At 95% of Capacity

$$\text{Profit} = TR - TC$$

$$= TR - (VC - FC)$$

$$= (900 \text{ m} \times 95\%) - 810 \text{ m} (1 - 0.2833) - 200 \text{ m}$$

$$= 855 \text{ m} - 580 \text{ m} - 200 \text{ m}$$

$$= \$ 75 \text{ m}$$

Que (4) Solutions-

Scheme A:-

Equivalent Annual Cost of Installation and maintenance.

$$= 120,000 \times \left[\frac{0.5 (1 + 0.05)^{14}}{(1 + 0.05)^{14} - 1} \right]$$

$$+ \$ 200,000 \times \left[\frac{1 + 0.05^{10}}{1 + 0.05^{10} - 1} \right]$$

$$= \$ 18,000$$

$$= \$ 120,000 \times 0.1010 + \$ 200,000 \times 0.0651 +$$

$$\$ 18,000$$

$$= \$ 43,140$$

Scheme B:-

Equivalent Annual Cost of Installation and maintenance.

$$= \$ 285,000 \times \left[\frac{0.5 (1 + 0.05)^{20}}{(1 + 0.05)^{20} - 1} \right]$$

$$+ \$ 100,000 \times \left[\frac{0.05 (1 + 0.05)^{30}}{1 + 0.05^{30} - 1} \right] + \$ 16,000$$

$$= \$ 45,367$$

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Scheme B :-

Equivalent Annual Cost of Installation
and maintenance.

$$= \$ 190,000 \times \left[0.05 (1 + 0.05^{16}) / (1 + 0.05^{16-1}) \right]$$

$$+ \$ 160,000 \times \left[0.05 (1 + 0.05^{30}) / (1 + 0.05^{30-1}) \right]$$

$$+ \$ ~~16,000~~ 16,500$$

$$\rightarrow \$ ~~16,000~~ \times 0$$

$$= \$ 190,000 \times 0.0933 + \$ 160,000 \times 0.0651 + \$ 16,500$$

$$= \$ 44,453$$

MA-105B

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