CMR INSTITUTE OF TECHNOLOGY	USN										

Internal Assessment Test - I

Sub:	ENGINEERING ECONOMICS							Code:	10ME71
Date:	18 / 09 / 2017	Duration:	90 mins	Max Marks:	50	Sem:	VII	Branch:	Mech

Answer Any Five Questions

		Marks	OBE	
			CO	RBT
1. (a)	What is decision making? Explain importance of decision making in engineering economics	[05]	CO1	L1
(b)	Explain with a neat sketch Law of Demand and Law of Supply.	[05]	CO1	L1
2.	Four million rupees are donated to a college, 20 students are to be awarded scholarships over next 20 years. Scholarships are each of Rs. 12,000 for first year and there after increases by Rs.1,800 per year over the following 19 years. Starting with end of fifth year Rs. 16,000 is spent for maintenance of college building. The cost rises linearly at the rate of Rs.1,900 starting with sixth year. Assume interest rate 10 percent and determine how much money will be available to construct auditorium now using present worth method.	[10]	CO2	L3
3.	An aircraft assembly fixture has a purchase price of Rs. 10 lakh and classed as 7 year property. Use of fixture is expected to result in an annual before tax savings of Rs. 3.75 lakh for a period of 7 years, assume salvage value is 0. Determine (i) The before tax present worth of investment at interest rate of 30 percent. (ii)The after tax, present worth of investment with tax rate 24 percent and interest rate 15 percent.	[10]	CO3	L4
4.	a) Management of engineering college has granted Rs.10 crore for construction of new mechanical science block. Annual maintenance of block is expected to be Rs10 lakhs. In addition Rs.12 lakhs will be needed every year for painting and major repairs. If budget granted has to take care of maintenance, how much of the amount can be used for initial construction cost? Deposited funds can earn 6% rate of interest, compounded annually.	[05]	CO3	L4
	b) An initial investment of Rs. 30,000 is made on a milling machine, the annual receipts and expenditures are Rs 23,400 and Rs 5,700. The life of machine is 7 years and for an interest rate of 8%. Calculate the payback period.	[05]	C03	L5

5.	Two types of power converters Alpha and Beta are under consideration for a particular application. An economic comparison is made at interest rate of 10%. Following cost estimation has been obtained. Determine the Present Worth of the two systems, select the best converter.(LCM Method)	[10]	CO1

Cost particulars	Alpha	Beta
Purchase price	Rs.10,00,000/-	Rs.10,20,000/-
Estimated service life	3 years	6 years
Salvage value	Rs.23,000/-	Rs.30,000/-
Annual operating cost	Rs.7,000/-	Rs.9,000/-

6.	A company wants to expand its storage facility, Three alternative site design proposals are available.	[10]	CO1

Particulars	Proposal A	Proposal B	Proposal C
Land Cost	3,40,000	4,10,000	5,12,000
Building & installation	60,000	78,000	87,000
Annual energy cost	45,000	44,000	32,000
Increase each year	3,000	2,000	1,000
Annual maintenance cost	20,000	18,000	15,500
Revenue generated/year	2,40,000	3,40,000	3,95,000
Salvage value	30,000	35,000	46,000
Life in Years	7	7	7

If minimum required rate of return is 15% per year, which proposal should be selected by future worth comparison method?

28/9/17. IAT-1 Solution [1, 3]

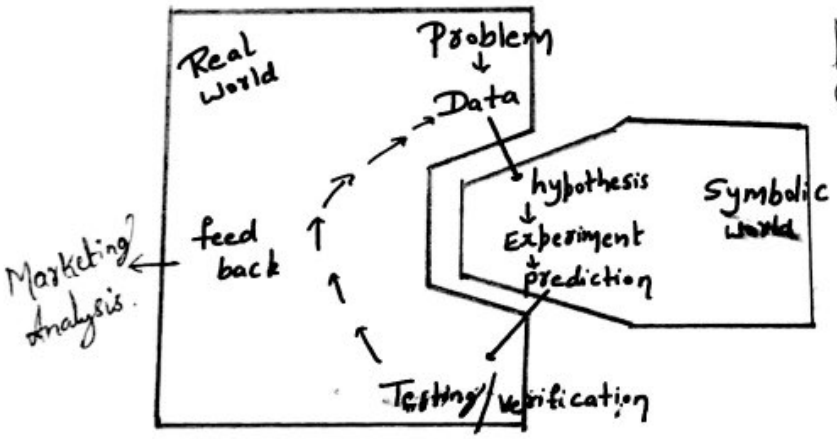
Problem solving and decision Making

. The fundamental approach to problem solving is scientific methods

· Scientific methods use both theoretical & practical knowledge to solve the same. It takes real world facts and figures and symbolic world of theories and hypothesis to solve problems, through an iterative process.

The folling steps gives a general problem-solving process Involving both worlds.

hypothesis → explanation made based on evidence.
↓
2 possibilities.

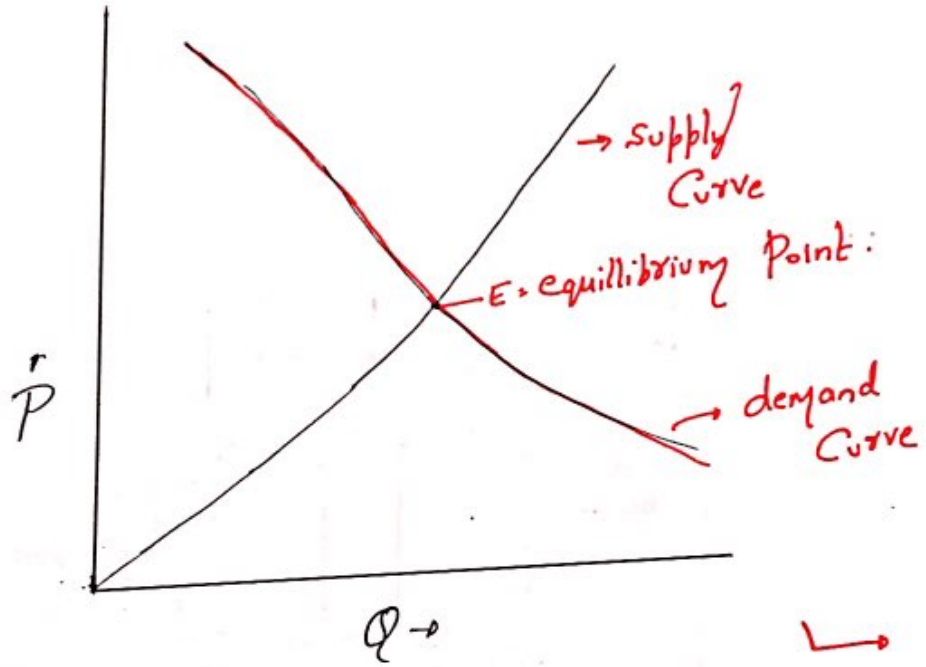


--- (2 Marks) fig.

→ Problems in engineering and managerial economy originate in real world of economic planning, management & control.
→ problem is defined and clarified by data from real world.
→ This information is subjected to analysis based on scientific principles to formulate hypothesis in symbolic terms.
→ By Manipulating and experimenting, an analyst Can simulate and project reality in multiple Configurations to understand OutComes. A CAD Software Can alter product design in many ways

→ 3marks either

LAW of Demand & Supply



↳ fig 2 Mark

Demand vs Supply.

Law of Demand:-

Demand for Commodity Increases as price decreases and Vice Versa, all the other things remain same. $D \propto 1/P$

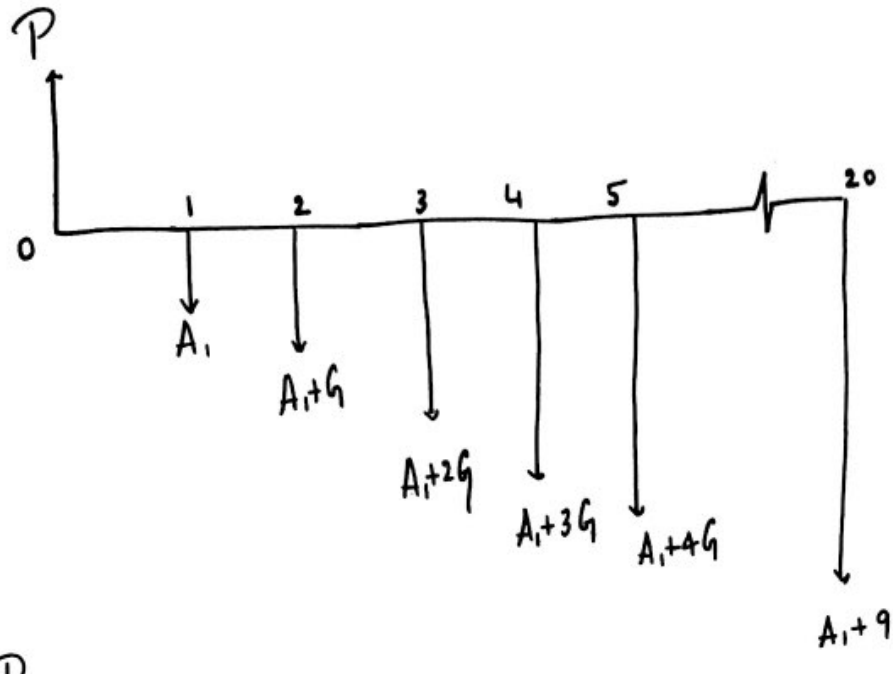
Law of supply:-

The Supply for Commodity Increases as price Increases and Vice Versa. Supply is directly proportional to price.

$S \propto P$

↳ Explanation 3M

(2A) · C·F·D from College point of View.



→ 3M

P = 40 Million

A_1 = ₹ 12,000] → n = 20 yrs

G_1 = ₹ 1800

A_2 = ₹ 16000] → n = 16 yrs.

G_2 = ₹ 1900

i = 10 %.

$PW(\text{Cost}) = PW(A_1) + PW(A_2)$

$A = A_1 + G_1 (A/G, 10, 20)$

$= 12000 + 1800 (6.5081)$

A = ₹ 23714.58/-

→ 2M

$P_W(A_1) = A_1' \times (P/A, 10, 20)$

$= 23714.58 \times 8.5136$

$P_W(A_1) = ₹ 201896.44$

Stabalizing A_2:-

$A_2' = A_2 + G\,(A/G, 10, 16)$

$= 16000 + (1900 \times 5.5493)$

$= ₹ 26543.67/-$ → 2M

$P_W(A_2') = A_2' \times (P/A, 10, 16)$

(26543.7×7.8237)

$= ₹ 207669.71/-$

$P_W(A_2) = F \cdot (P/F, 10, 5)$

$= 207669.71 \times 0.6209$

$= ₹ 128942.12/-$

$P_W(\text{cost}) = ₹ 330838.56/-$ → 3M

Amount available to build Auditorium = $P - P_W(\text{cost})$

1). P = 10,00,000/-

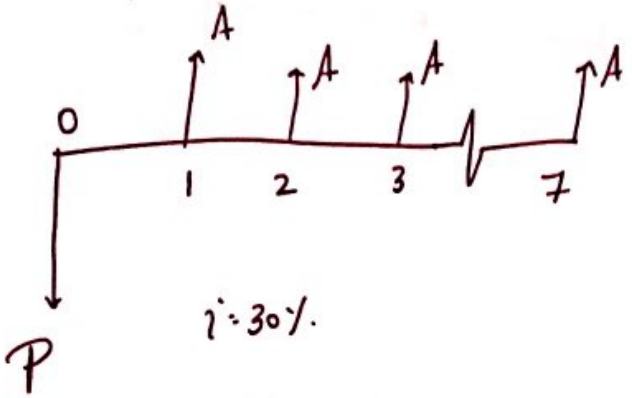
N = 7yrs.

A = 3,75,000

S = 0

i = 30%.

(before tax)



— 2M

$$P_W = P_{(n)} - P_{(cost)}$$

$$P_W = S + A \cdot (P/A, i, n) - P_{(cost)}$$

$$= 0 + 375000\,(P/A, 30, 7) - 10,00,000$$

$$= 375000\,(2.8021) - 10,00,000$$

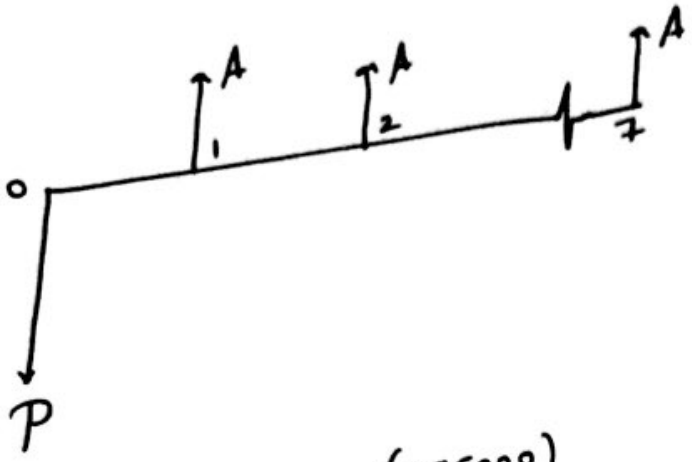
$$\rightarrow 1050787.5 - 1000000$$

$$\boxed{P_W = ₹\ 50,787.5/-}$$

— 3M

(a)

After tax



2M

$A = 3,75,000 - .24\,(375000)$

$= 2,85,000/-$

$P_{W(after\ tax)} = P_{(31)} - P_{(cost)}$

$= S + A \cdot (P/A, i, n) - P(cost)$

$= 0 + 2,85,000\,(4.1604) - 10,00,000$

$P_W = ₹\ 1,85,714/-$

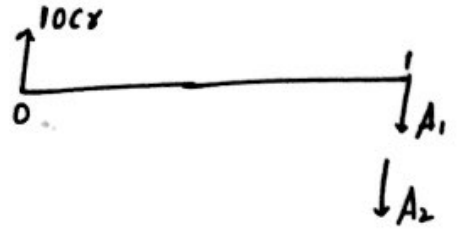
3M

4 a) Given

Capitalized Cost = ₹10,00,00,000/-

annual maint A_1 = ₹10,00,000/- + 12,00,000/-

$i = 6\%$



→ 1M

Total Annual Cost = 22,00,000/-

Capitalized Cost = Initial Investment + $\frac{TAC}{i}$ → 1M

Initial Investment = $100000000 - \left[\frac{2200000}{0.06}\right]$ → 2M

∴ Initial Construction Cost → ₹6,33,33,333.33/-

4b). P: ₹30,000

A_n = ₹23,400

A = ₹5700

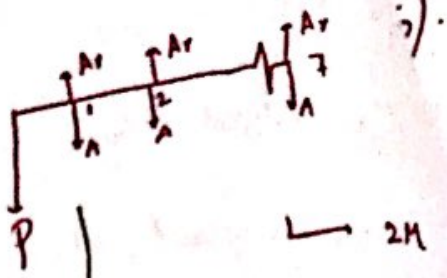
i = 8%

n = 7 years.

Payback period: $\frac{P}{R-C}$

$= \frac{30,000}{(23400 - 5700)} = 1.69$

So payback period is 1.69 years.



2M

1M

2M

Alpha Converter :-

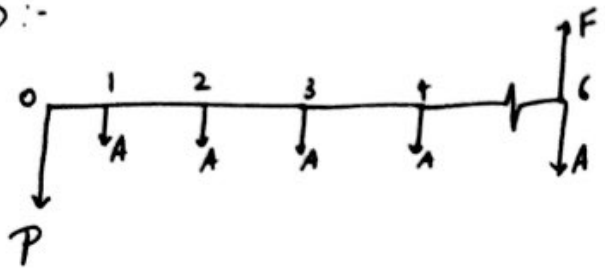
P = ₹ 10,00,000/-

n = 6 years

F = ₹ 23,000/-

A = ₹ 7000/-

C.F.D :-



— 2M

$P_W(\alpha) = P_W(\text{revenue}) - P_W(\text{cost})$

$P_{W(\text{revenue})} = F(P/F, 10, 6)$

$= 23000 \times 0.5445$

$P_{W(\text{rev})} = ₹ 12983.5/-$

$P_{W(\text{cost})} = P + P_{W(A)} + P_{W(\text{PC 3yrs})}$

$= 10,00,000 + [A \cdot (P/A, 10, 6)] + [F \times (P/F, 10, 3)]$

$= P + (7000 \times 4.3553) + (10,00,000 \times 0.7513)$

$P_{W(\text{cost})} = ₹ 17,81,787.1$

— 3M

$\therefore P_W(\alpha) = ₹ 17,81,787.1/-$

Beta Convertor:

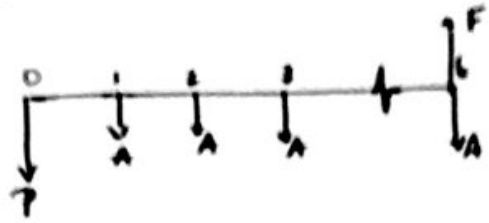
P = ₹10,20,000/-

A = ₹9000

F = ₹30,000

n = 6yrs.

CFD



$$P_{W(\beta)} = P_{W(\alpha)} - P_{W(C)}$$

$$P_{W(rev)} = F \cdot (P/F, 10, 6)$$

$$= 30000 \times 0.5645$$

$$= ₹\ 16935/-$$

$$P_{W(cost)} = P + P_{W(A)}$$

$$= 10,20,000 + A \times (P/A, 10, 6)$$

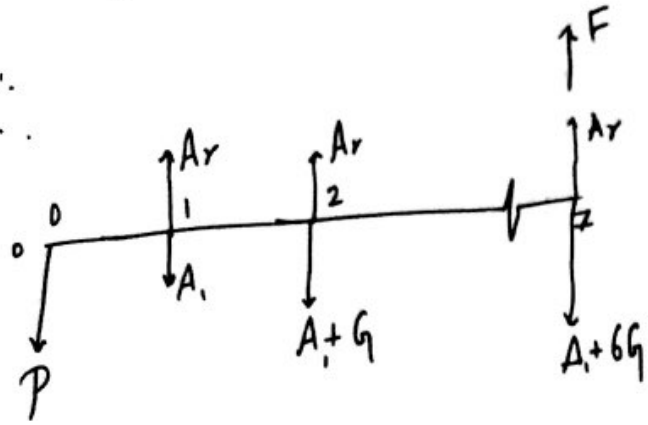
$$= ₹\ 10,59,197.7/-$$

$$\boxed{P_{W(\beta)} = -10,42,262.7}$$

∴ We Choose "β" power Convertor.

6) Future Worth.

Proposal A:-



2M

P: ₹40,000/-

A = ₹ 65,000/-

G: ₹ 3000

A_n: ₹ 2,40,000

F: ₹ 30,000

n: 7yrs.

$F_{W(A)} = F_{W(n)} - F_{W(c)}$

$F_{W(n)} = F + A_a \times (F/A, 15, 17)$

= ₹ 2686032/-

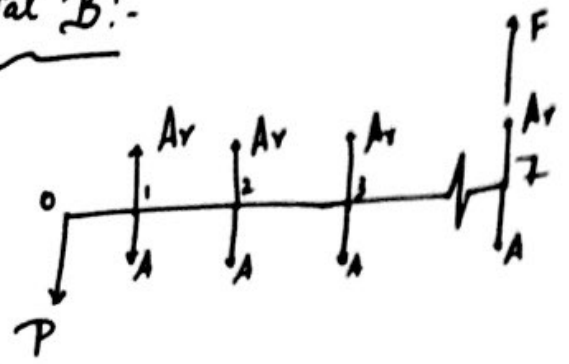
$F_{W(cost)} = P \times (F/P, 15, 7) + \left[A + G\,(A/G, 15, 7) \right] + \{ F/A, 15, 7$

$F_{W(cost)}$ = ₹ 1864676.34

$F_{W(A)}$ = ₹ 8,21,355.66/-

2M

Proposal B:-



P: ₹488000

A: ₹62000

G: ₹2000

A_n: ₹3,40,000

F: ₹35,000

n: 7yrs.

$F_{W(B)} = F_{W(n)} - F_{W(cost)}$.

$F_{W(revenue)} = F + A_n (F/A, 15, 7)$

$= 35000 + (340000 \times 11.0668)$

$= ₹\ 37,97,712/-$

$F_{W(cost)} = P_x (F/P, 15, 7) + \left[\{A + G(A/G, 15, 7)\} \times (F/A, 15, 7)\right]$

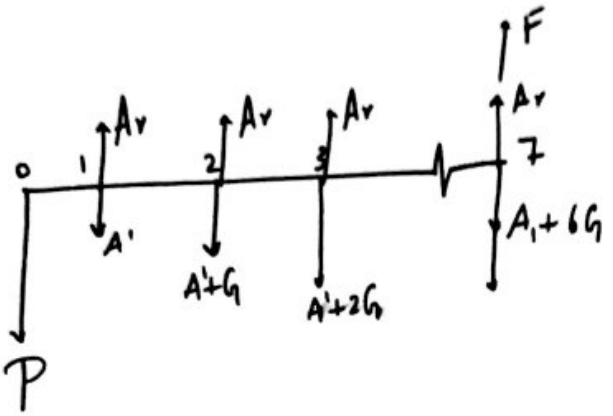
$= 488000 \times 2.66 + \left(62000 + (2000 \times 2.4498)\right] \times 11.0668$

$F_{W(cost)} = ₹2038444.49$

$F_{W(B)} = ₹17,59,267.5/-$ ⟶ 3M

Proposal C:-

P: ₹599000
A = ₹47500
G = ₹1000
A_n = ₹3,95,000
F = ₹46,000



$$FW(C) = FW(n) - FW(C)$$

$$FW(n) = F + A_n(F/A, 15, 7)$$

$$= 46000 + (395000 \times 11.066P)$$

$$\sim ₹\ 4,41,73861/-$$

$$FW(cost) = P.(F/P, 15, 7) + A + G(A/G, 15, 7) \times (F/A, 15, 7)$$

→ 3M.

$$\sim ₹\ 2146124.44/-$$

We choose proposal C to attain profit.