Internal Assessment Test 2 –Dec. 2021

| Sub: | Management and Economics | | | | | Sub Code: | 18ME51 | Branch: | Mech |
|---|---|---|---|---|---|---|---|---|---|
| Date: | 20-12-21 | Duration: | 90 min's | Max Marks: | 50 | Sem/Sec: | V/A&B | | OBE |

**Answer All the Questions**
**Usage of Interest table is permitted**

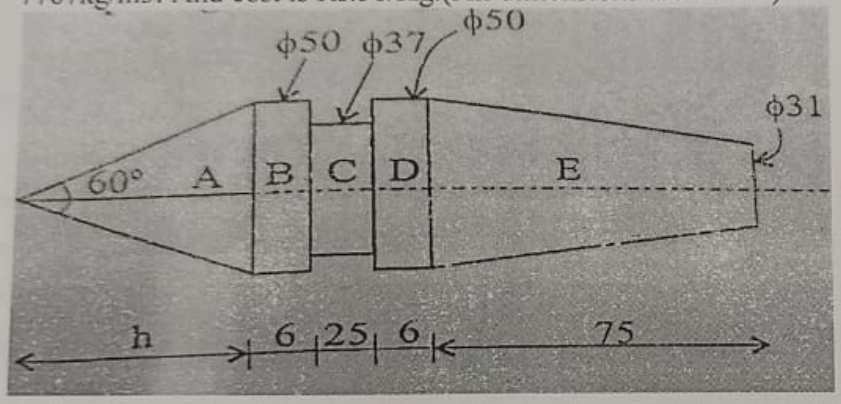
MARKS | CO | RBT

1) With a neat sketch explain how selling price of a product is determined. [05] CO2, CO4

2) Person wants to start a business, his initial investment is 7 lakhs and salvage is 1 lakh after five years, calculate Internal rate of return if revenue earned is as follows. [15] CO3, CO4

| Time | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Cash flow | 1,80,000 | 1,90,000 | 2,10,000 | 2,25,000 | 2,00,000 |

3) Calculate direct material cost for the figure shown below, if density of cast iron material is 7787kg/m3. And cost is Rs.58/Kg.(All dimensions are in mm). [15]

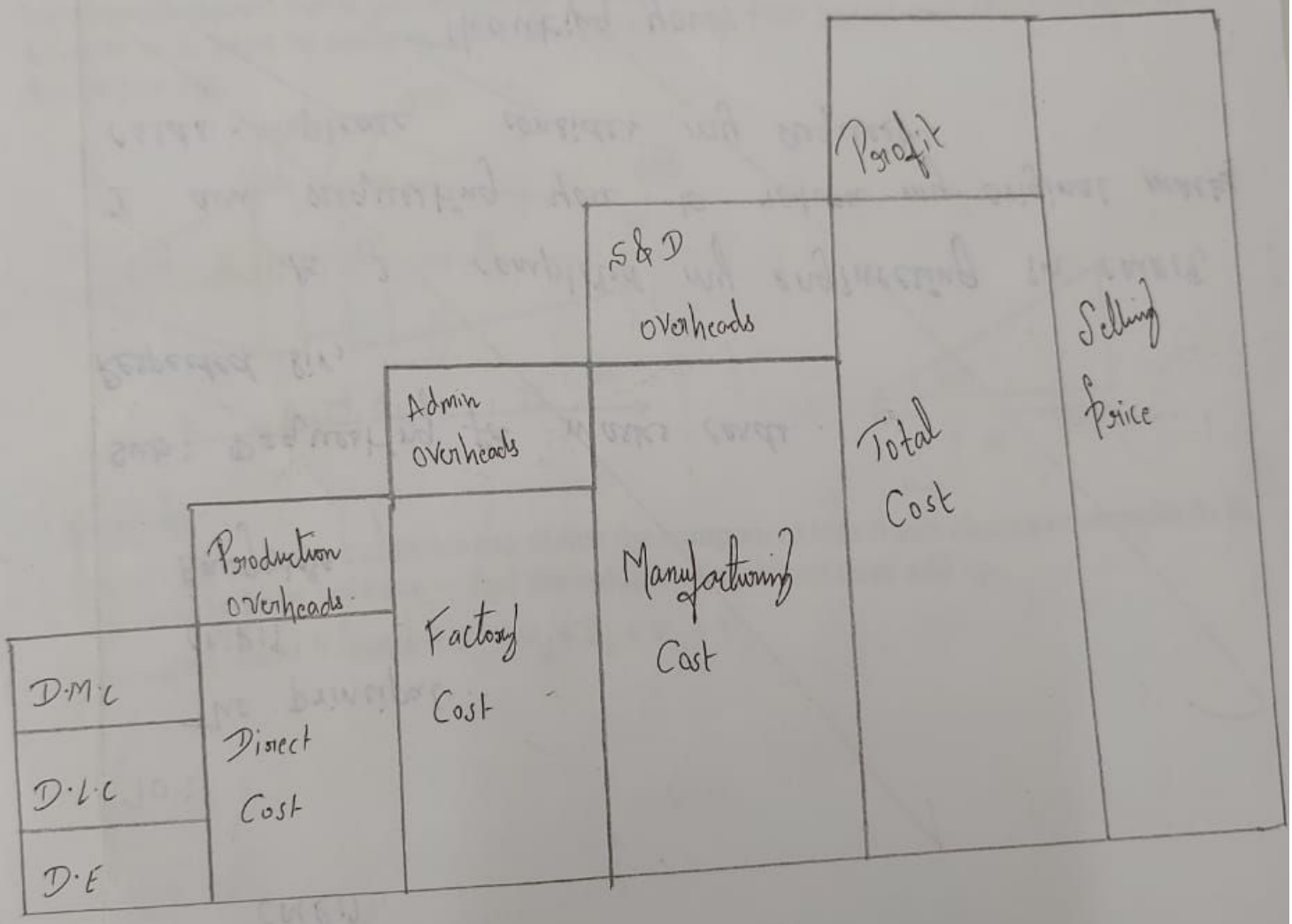



4).Solve the following by using PW analysis method assuming rate of interest at 7%. [15]

| | PLAN A | PLAN B | PLAN C |
|---|---|---|---|
| Years | 6 | 3 | 4 |
| First cost | 2,000 | 8,000 | 10,000 |
| Annual cost | 3,200 | 700 | 500 |

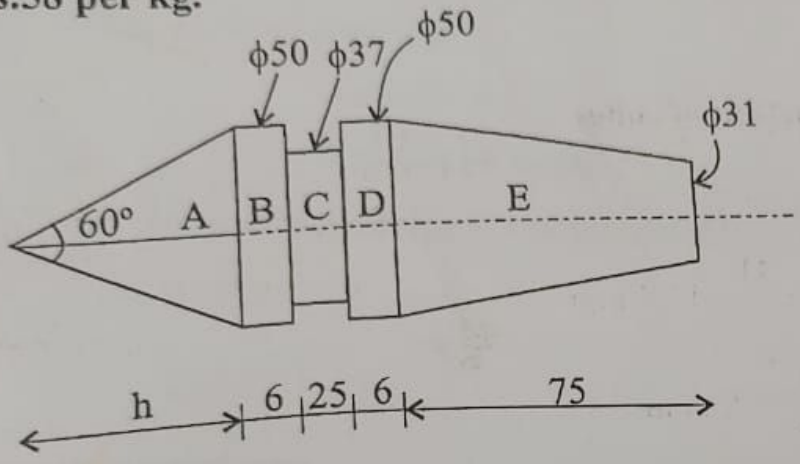
C.I C.C.I HOD

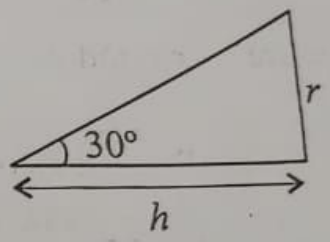
Determining Selling price of product.



Bangalore
India

1. **The following diagram shows the *'lathe dead centre"*, along with its dimensions, to be manufactured for a particular lathe. Estimate its weight and cost of material if Cast iron is used to make it. Take density of CI as 7787 kg/m³ and material cost as Rs.58 per kg.**




**Solution**

Observing the lathe centre we can divide the component into 5 sub-shapes or sections A, C, D and E. Now we have to find the volume of each and then add up.

Therefore, Total Volume = $V_A + V_B + V_C + V_D + V_E$

**Volume of A ($V_A$)**

This is nothing but a cone whose volume can be found out using the formula,

**Volume of sub-shape A (Conical)**

$$V_A = \frac{1}{3}\pi r^2 h$$

where, r = base diameter of the cone = 25 mm, h = height of the cone

$$\tan 30 = \frac{r}{h}$$

$$h = \frac{r}{\tan 30} = \frac{25}{0.5773} = 43.30 \text{ mm}$$

$$\therefore V_A = \frac{1}{3}\pi \times 25^2 \times 43.30 = 28{,}340 \text{ mm}^3$$

**Volume of sub-shape B and D - (Cylindrical and identical)**

Let $V_B = V_D = \pi r^2 \times 6$

$= \pi \times 25 \times 6$

$= 11{,}780.97 \text{ mm}^3$

**Volume of sub-shape C - (Cylindrical)**

$$V_C = \pi r^2 \times l$$

$$= \pi\left(\frac{37}{2}\right)^2 \times 25$$

$$= 26{,}880.25 \text{ mm}^3$$

**Volume of sub-shape E – (Frustum of cone)**

$$V_E = \frac{\pi(r^2 + rR + R^2)h}{3}$$

where r = radius of top face $= \frac{31}{2} = 15.5$ mm

R = radius of base $= \frac{50}{2} = 25$ mm

h = 75 mm

$$V_E = \frac{\pi[(15.5)^2 + (15.5 \times 25) + (25)^2]75}{3}$$

$$V_E = 98{,}390.75 \text{ mm}^3$$

**Total volume of the lathe center**

$$V = V_A + V_B + V_C + V_D + V_E$$

$$V = 28{,}340 + 11781 + 26880 + 11781 + 98391$$

$$V = 177172 \text{ mm}^3$$

$$V = 1.77172 \times 10^{-4} \text{ m}^3$$

**Weight of the material**

$$W = 1.77172 \times 10^{-4} \times 7787$$

$$W = 1.3796 \text{ kg}$$

**Cost of Material**

Cost = Weight of material in kg × Cost per kg

Cost = 1.3796 × 58

**Cost = Rs. 80.02**

The following alternatives are available to accomplish an objective of 12 year duration. i: 7%

| | Plan A | Plan B | Plan C |
|---|---|---|---|
| Life Cycle (yrs) | 6 | 3 | 4 |
| First Cost (Rs) | 2,000 | 3,000 | 10,000 |
| Annual Cost (Rs) | 3,200 | 700 | 500 |

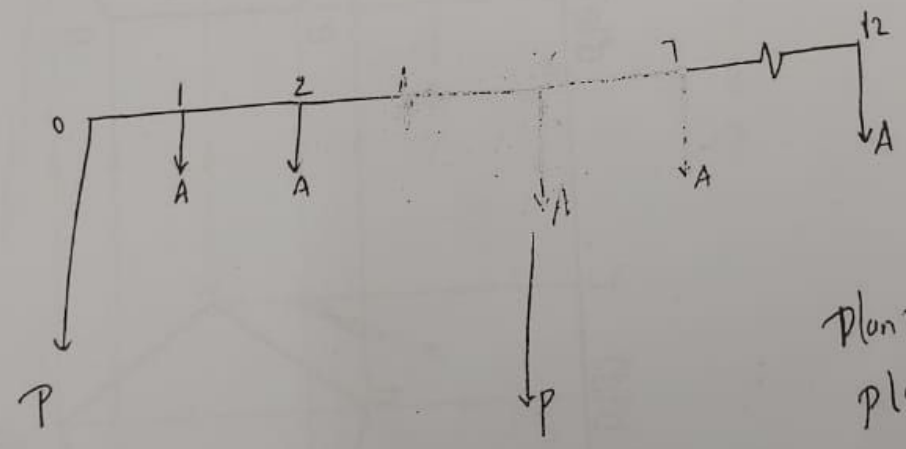
Plan A:-

P = ₹2000

A = 3200

n = 6 (to be doubled)

i = 7%




Plan B = -29,772

Plan C = -27,420

$P_W(A) = P_W(n) - P_W(C)$

$= -2000 - 2100 \left(\frac{P}{F}\ 7\%\ 6\right) - 3200\ (P/A\ 7\%\ 12)$ 7.4427

$= -28,749/-$

usiness are as listed be...
stimates a salvage value of ₹1,00,000 at the end of 5 years.

| Period | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| sh flow | -700000 | 180000 | 190000 | 210000 | 225000 | 2000 |

Initial Investment, P = ₹7,00,000 → Cost

Revenues for years 1 to 5, $R_1$ = ₹1,80,000
$R_2$ = ₹1,90,000
$R_3$ = ₹2,10,000
$R_4$ = ₹2,25,000
$R_5$ = ₹2,00,000 | Revenues

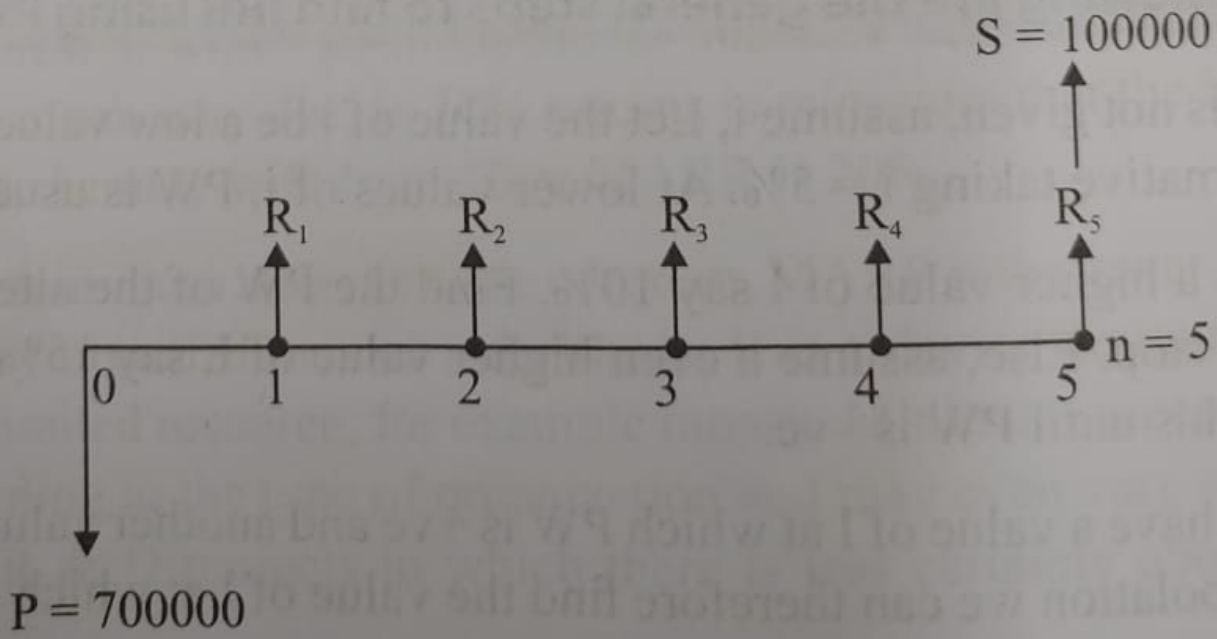
Salvage value, S = 1,00,000

Life of business, n = 5 years

Present worth, PW = ?

Internal rate of return, I = ?

r the above problem would be



**Step 1 :** ... for I say i = 5% and find PW

PW (at I = 5%) = PW (Revenues) – PW (costs)

$= R_1 (P/F, i, n) + R_2 (P/F, i, n) + R_3 (P/F, i, n) + R_4 (P/F, i, n) + R_5 (P/F, i, n)$

$+ S(P/F, i, n) - P$

= 1,80,000 (P/F, 5%, i) + 1,90,000 (P/F, 5%, 2) + 2,10,000 (P/F, 5%, 3)

+ 2,25,000 (P/F, 5%, 4) + 2,00,000 (P/F, 5%, 5) + 1,00,000 (P/F, 5%, 5) – 7,00,000

= 1,80,000 (0.9524) + 1,90,000 (0.9070) + 2,10,000 (0.8638) + 2,25,000 (0.8227)

+ 2,00,000 (0.7835) + 1,00,000 (0.7835) – 7,00,000

PW (at i = 5%) = ₹2,45,317

**Step 2:** Now, let i = 10% and find the PW

PW (at i = 10%) = PW (Revenue) – PW (Costs)

= 1,80,000 (P/F, 10%, 1) + 1,90,000 (P/F, 10%, 2) + 2,10,000 (P/F, 10%, 3)

+ 2,25,000 (P/F, 10%, 4) + 2,00,000 (P/F, 10%, 5) + 1,00,000 (P/F, 10%, 5) – 7,00,000

PW (at i = 10%) = ₹ 1,18,372

**Step 3:** Since PW is still +ve, increase value of i say i = 15% and find PW

PW (at i = 15%) = 1,80,000 (0.8696) + 1,90,000 (0.7561) + 2,10,000 (0.6575)

+ 2,25,000 (0.5718) + 2,00,000 (0.4972) + 1,00,000 (0.4972) – 7,00,000

PW (at I = 15%) = ₹16,077.

**Step 4 :** Since PW is again slightly +ve, assume i = 18% and find PW.

PW (at i = 18%) = 1,80,000 (0.8475) + 1,90,000 (0.7182) + 2,10,000 (0.6086)

+ 2,25,000 (0.5158) + 2,00,000 (0.4371) + 1,00,000 (0.4371) – 7,00,000

PW (at i = 18%) = ₹– 35,947

**Step 5 :** Therefore, we have, PW = 16,077 when i = 15% and PW = -35,947 when i = 18%

Therefore we can find i at which PW = 0 by interpolation

$$i_{IRR} = i_{(PW+Ve)} + \frac{PW\,(+Ve) - 0}{PW\,(+Ve) - PW\,(-Ve)} \times \text{increment in i from +Ve to –Ve}$$

$$i_{IRR} = 0.15 + \left[\frac{16,077 - 0}{16,077 - (-35,947)} \times (0.18 - 0.15)\right]$$

$i_{IRR} = 0.1592$ (or)

$\mathbf{i_{IRR} = 15.92\%}$ This is the internal Rate of Return