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Summer Semester Examination 2020, Date:23/09 /2020
Final term Examination

Course Code:	HSS-460			Course Title:	Engineering E & M
Prerequisite:	None			Instructor:	Jehanzeb Khan
Module:	6	Program:	BEE	Total Marks: 50	Time Allowed: 120 mins

Note: Attempt all questions.   Marks

Q.1   (a)   What interest rate would you need to turn $1,000 into $5,000 in 20 Years?   5

       (b)   You want to know how many periods it will take to turn $1,000 into $2,000 at 10%   5
              interest?

Q.2   (a)   PESCO wants to overhaul three Generators installed at Warsak Dam so that its   5
              output can be increased by 20% - which translate into additional cash flow of
              $20,000 at the end of each year for five years. If i= 15% per year, how much can
              PESCO afford to invest to overhaul these machines?

       (b)   Mr. Farhan an employ of INU makes 15 equal annual deposits of Rs.10,000   5
              each into Summit Bank account paying 5% interest per year. The first deposit
              will be made one year from today. How much money can be withdrawn from
              this bank account immediately after the 15th deposit?

Q.3   (a)   MR. Ali a Government servant on retirement received a lump sum amount of Rs.   5
              10 Million. He wishes to distribute to his four children at the rate of Rs. one
              Million per year. If the 10 Million amounts are deposited in a bank account that
              earns 6% interest per year, how many years it will it take to completely deplete
              the account?

       (b)   A peace of new equipment has been proposed by an engineer to increase the   5
              productivity of a certain manual welding operation. The investment cost is
              $25,000 and the equipment will have a market value of $5000 at the end of a
              study period of five years. Increased productivity attributable to the equipment
              will amount to $8,000 per year after extra operating costs have been subtracted
              from the revenue generated by the additional production. If the firm MARR is 20%
              per year, is the proposal a sound one? (Use FW method).

Q.4   (a)   An MRI machine was installed at Khyber teaching hospital Peshawar in year 2018   10
              at an initial cost of Rs 400,000 and expected to have zero salvage value at the end
              of useful life of 10 years. Determine the annual depreciation amount using SYD

method. Tabulate the annual depreciation amounts and the book value of the air condition at the end of each year.

Q.5   (a)   A company buys a Digital controlled (DC) machine for $28,000 (year zero) and uses   5 it for five years, after which time it is scrapped. The allowed depreciation deduction during the first year is $4,000. as the equipment falls into the seven-year MACRS-property category. (The first-year depreciation rate is 14.29 %.) The cost of the goods produced by this DC machine should include a charge for the depreciation of the machine. Suppose the company estimates the following revenues and expenses, including the depreciation for the first operating year:

Gross income = $50,000;

Cost of goods sold = $20.000;

Depreciation on DC machine = $4,000:

Operating expenses = $6,000.

If the company pays taxes at the rate of 40% on its taxable income, what is its Net income during the first year from the project'?

(b) Discuss different types of Business organization.   5

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QNo1:-

Part a)

Sol:- As we know that

$$i = \left(\frac{FV}{PV}\right)^{1/n} - 1 \longrightarrow ①$$

here we have $n = 20$ years, $Fv = \$5000$
$Pv = \$1000$ put these values in eq ①

$$1 \Rightarrow \quad i = \left(\frac{\$5000}{\$1000}\right)^{1/20} - 1 = 0.0838$$

$$i = 8.38\% \quad Ans$$

QNo1

Part b:-

Sol:- As $Pv = \dfrac{Fv}{(1-i)^n}$

Multiplying both side by $(1-i)^n$ & $\div$ b.s by PV

and taking Ln on both side
$$(1+i)^n = FV/PV$$
we get
$$Ln(1+i)^n = Ln(FV/PV)$$

$$Ln\left(\frac{FV}{PV}\right) = n \; Ln(1-i), \left(\div \text{ b.s by } Ln(1+i)\right)$$

So $\quad n = \dfrac{Ln(FV/PV)}{Ln(1+i)} \longrightarrow ①$

Here we have given $PU = \$1000$
$FU = \$2000$ and $i = 10\%$

Putting values in eq 1

$$n = \frac{\ln(2000/1000)}{\ln(1-0.1)}$$

$$= \frac{0.6931}{0.9531}$$

So $\boxed{n = 7.27 \text{ years}}$ Ans.

QNo 2:-
part a:-
Sol:-
Given data
Annuity, $A = \$20,000$ $n = 5$ years
and $i = 15\%$
As we know that

$$P = A\left[\frac{(1-i)^n - 1}{i(1-i)^n}\right] \longrightarrow ①$$

Putting the values.

$$P = 20,000\left[\frac{(1+0.15)^5 - 1}{0.15 \times (1+0.15)^5}\right]$$

$$P = 20000(3.3522)$$

$$\boxed{P = 67,044}$$ Ans.

QNO2

Part b:-

So:- Given data

Annual deposit $A = \$10000$, intrest $i = 5\%$

Let $n = 15$

As we know that

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

putting the values.

$$F = (10000)\left[\frac{(1+0.05)^{15} - 1}{0.05}\right]$$

$$F = 10,000 \times (21.5786)$$

$$\boxed{F = \$215786.6} \quad Ans$$

Ans. 3 (a)

Given data :

$$P = 10,000,000.$$
$$A = 1,000,000.$$
$$i = 6\%$$

As we know.

$$P = A\left[\frac{(1+i)^n - 1}{i(1+i)^n}\right] \rightarrow \text{①}$$

Putting values in eq ① we get

$$10\,000\,000 = 1\,000\,000\left[\frac{(1 + 0.06)^n - 1}{0.06(1 + 0.06)^n}\right]$$

dividing both sides by 1,000,000.

$$\frac{10\,000\,000}{1\,000\,000} = \frac{(1.06)^n - 1}{0.06(1.06)^n}$$

$$10 = \frac{(1.06)^n - 1}{0.06(1.06)^n}$$

multiplying both sides by $[0.06(1.06)^n]$

$$10[0.06(1.06)^n] = \frac{(1.06)^n - 1}{0.06(1.06)^n}[0.06(1.06)^n].$$

$$0.6(1.06)^n = (1.06)^n - 1$$

by Rearranging.

we get. $1 = (1.06)^n - 0.6(1.06)^n.$

$$1 = (1.06)^n[1 - 0.6].$$

$$1 = (1.06)^n(0.4).$$

dividing both sides by 0.4

$$\left(\frac{1}{0.4}\right) = \frac{(1.06)^n(0.4)}{(0.4)}$$

$$2.5 = (1.06)^n$$

taking ln on bothsides.

$$\ln (2.5) = \ln (1.06)^n$$
$$0.916 = n \times \ln(1.06)$$
$$0.916 = n \times 0.0583$$
$$n = \frac{0.916}{0.0583}$$
$$n = 15.7 \text{ years.}$$

Sol.3 (b) .

Cash outflow.

Investment Cost $= P = \$ 25,000.$
$$F = P(1+i)$$
market value $= \$ 5000$
study period $(n) = 5$ years.
Annuity (A) $= \$ 8,000.$
$$i = 20\% \text{ per year.}$$

use FW method.

Cash out flow.

Investment Cost $(P) = \$ 25000.$
$$F = P(1+i)^n \qquad ; \; n = 5\text{years} \quad i = 0.2$$
$$F = 25000 (1 + 0.2)^5$$
$$F = \$ 62208.$$

Cash Inflow.

$$F_1 = A\left[\frac{(1+i)^n - 1}{i}\right]$$
$$= 8000 \left[\frac{(1+ 0.2)^5 - 1}{0.2}\right]$$
$$= 8000 \left(\frac{1.488}{0.2}\right)$$
$$= 8000 \; (7.441) = \$ 59532.8$$

Market value $F_2 = \$ 5000$.

Cash Inflow = $F_1 + F_2$.

$= 59532.8 + 5000$

$= \$ 64532.8$.

Now

FW = Cash Inflow – Cash out flow.

$= 64532.8 – 62208$.

FW $= \$ 2324.8$.

Q No 4

part a

Sol :– SYD Method

Sum of the year. in digits $= 10 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1 = 55$

Now for Year 1 $= \dfrac{10}{55} = 0.18181818$

d_k = Total cost × year $= 400000 \times 0.18181818$

Rs $= 72727.27$

Year 2 $= \dfrac{9}{55} = 0.1636$

$d_k = 400,000 \times 0.1636$

Rs $= 65454.54$

Year 3 $= \dfrac{8}{55} = 0.1454$

$d_k = 400000 \times 0.1454$

Rs. $= 58181.81$

Year 4 = 7/55 = 0.12727

dk = 400,000 × 0.12727

Rs = 50909.09 Ans.

Year 5 = 6/55 = 0.1090

dk = 400,000 × 0.1090

Rs = 43636.36

Year 6 = 5/55 = 0.090909

dk = 400000 × 0.090909

Rs = 36363.63

Year 7 = 4/55 = 0.07272

dk = 400000 × 0.07272

Rs = 29090.90

Year 8 = 3/55 = 0.05454

dk = 400,000 × 0.05454

Rs = 21818.18 Ans.

Year 9 = 2/55 = 0.03636

d_k = 400 000 × 0.03636

Rs = 14545.45

Year 10 = 1/55 = 0.0181818

d_k = 400 000 × 0.0181818

Rs = 7272.72

Depreciation & Book value for each year are EOY

k	d_k	BV_k
0	—	400 000
1	Rs 72727.27	3272.73
2	Rs 65454.54	2618.18
3	Rs 58181.81	2036.36
4	Rs 50909.09	1527.27
5	Rs 43636.36	1090.91
6	Rs 36363.83	727.27
7	Rs 29090.90	436.36
8	Rs 21818.18	218.18
9	Rs 14545.45	7272.72
10	Rs 7272.72	0

QNo5 Ans. 5.

Part (a)   Given data :

     Cost of DC machine = $28000,

     Gross Income   Rev = $50 000.

     Cost of goods Sold = $20 000.

     Depreciation on DC machine = $4000.

     Operating expenses = $6000.

     taxes pay rate 40%.

     Net income = ?

Sol:

Items	Amount
Gross Income	= 50 000

Expenses.

Cost of goods Sold	= 20,000
Depreciation	= 4,000
Operating expenses	= 6000

     Total expenses = 20000 + 4000 + 6000 = 30 000.

Taxable Income = Gross Income − Expenses (total).

       = 50000 − 30000.

       = $20000

Taxes (40%) on taxable income.

       = 20000 × 40%

       = 20,000 × 0.4

Taxes @ 40% = $8000.

     Net Income = 20000 − 8000

       = $12,000.

QNo5 :-

Part (b)   Discuss different types of Business Organization.

Following are the five common Business Organization.

1.   Sole Proprietorship.

     It is the simplest & most common form of Business. It is owned and run by a single

person for his own benefit. The business existence is entirely dependent on the owners decision. All profit are subject to the owner

2. Partnership :

It is a single business where two or more people share ownership. Each partner contributes to all aspects of the business including money, property, labor or skill. Each partner shares in profit & losses of business

3. Corporation :-

A corporation is an independent legal entity owned by shareholders. Corporations are more complex form of business because they tend to have costly administrative fees & complex tax and legal requirements

4. Limited Liability Company (LLC).

Similar to a limited partnership an LLC provides owners with limited liability while providing some of the income advantages of a partnership. Essentially, the advantages of partnerships and corporations are combined in LLC.

5. Not - For - Profit :

An organization that has been approved by the internal Revenue Service to operate for a religious, charitable or educational purpose such as schools, churches etc.