IQRA NATIONAL UNIVERSITY PESHAWAR

DEPTT. B.E. (ELECTRICAL)

8TH SEMESTER

SPRING 2020

FINAL TERM EXAMINATION

ENGINEERING MANAGEMENT AND ECONOMICS

NAME : ABDUL MATEEN

ID : 13009

INSTRUCTOR:
DR. JAHANZEB KHAN

DATE OF SUBMISSION:
22 / JUNE / 2020

Q1: (a) A property dealer in Hayatabad township has an option to purchase a twenty Marla plot that will be worth Rs.100 Million in six years. If the value of the plot increases at 8%, how much the property dealer is willing to pay for this property?

Given Data:

F = Rs. 100 Million = Rs. 100000000

I = 8% = 0.08

N = 6 years

To Find:

P = ?

Formula:

$$\mathbf{P = F\ (\frac{1}{1+i})^{n}}$$

Solution:

Putting values in above formula

We get,

$$\mathbf{P =}\ 100000000\ (\frac{1}{1+0.08})^{6}$$

P = 63016962.68831

P = Rs. 63.01 Millions

Q1: (b) MR. Hamza an employee of Iqra national university on retirement from service received a lump sum amount of Rs.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?

Given Data:

A = Rs. 10 Millions = Rs. 10000000

I = 6% = 0.06

P = 10 Millions

To Find:

N = ?

Formula:

$$\mathbf{P = A\ [\frac{(1+i)^{n}}{i(1+i)^{n}}]}$$

Solution:

Putting values in above formula

We get,

=> $10 = [\frac{(1+0.06)^n}{0.06(1+0.06)^n}]$

=> $10 = [\frac{(1.06)^n}{0.06(1.06)^n}]$

=> $10 * 0.06 (1.06)^n = (1.06)^n - 1$

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

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

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

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

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

=> $2.5 = (1.06)^n$

=> $\ln 2.5 = n * \ln (1.06)$

=> $0.916 = n * 0.0583$

=> $n = \frac{0.916}{0.0583}$

=> $\boxed{n = 15.7 \text{ years}}$

Q2 (a) : Four Generators installed at Turbela Dam, if undergoes a major overhaul now, its output can be increased by 30% - which translate into additional cash flow of Rs.30 Million at the end of each year for five years. If interest rate is 15% per year, how much can the WAPDA afford to invest to overhaul these Generators?

Given Data:

A = Rs. 30 millions = Rs. 30000000

N = 5 years

I = 15% = 0.15

To Find:

P = ?

Formula:

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

Solution:

$$P = 30000000\left[\frac{(1+0.15)^5-1}{0.15(1+0.15)^5}\right]$$

P = 30000000 × 3.3522

P = Rs. 100,566125.29

P = Rs. 10.05 millions

Q2 (b): Suppose Mr. Zafar make 15 equal annual deposits of $10,000 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?

Given Data:

A = $ 10,000

N = 15 years

I = 5% = 0.05

To Find:

P = ?

Formula:

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

Solution:

$$P = 10{,}000\left[\frac{(1+0.05)^{15}-1}{0.05}\right]$$

P = $ 10,000 (21.578)

P = $ 215,785.6

Q3(a): A Property is depreciable if it meets certain basic requirements. What are those basic requirements?

Ans: Property is depreciable if it meets the following basic requirements:

- It must be used in business or held to produce income.
- It must have a useful life and the life must be longer than one year.
- It must be something that wears out, decays, gets used up, becomes obsolete or loss value from natural causes.

Q3(b): An MRI machine was installed at Khyber teaching hospital Peshawar in year 2018 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.

Solution:

SYD METHOD:

$$d_k = (B - SV_N)\left[2\left(\frac{N - k + 1}{N(N+1)}\right)\right]$$

$$BV_k = B - \left[\frac{2(B-SV_N)}{N}\right]k + \left[\frac{(B-SV_N)}{N(N+1)}\right]k(k+1)$$

Step # 1:

The first step is to sum the digits or numbers starting with the life and going back to one. For example, an asset with a life of 5 would have a sum of digits as follows:

10 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1 = 55

Step # 2:

To find the percentage for each year divide the year's digit by the sum. In the example above the percentage would be calculated as follows:

Year 1 $= \frac{10}{55} = 18.18\%$

Year 2 $= \frac{9}{55} = 16.36\%$

Year 3 $= \frac{8}{55} = 14.54\%$

Year 4 $= \frac{7}{55} = 12.72\%$

Year 5 $= \frac{6}{55} = 10.91\%$

Year 6 $= \frac{5}{55} = 9.09\%$

Year 7 $= \frac{4}{55} = 7.27\%$

Year 8 $= \frac{3}{55} = 5.45\%$

Year 9 $= \frac{2}{55} = 3.636\%$

Year 10 $= \frac{1}{55} = 1.818\%$

Calculation for year 2 are:

B = 400000

$SV_N = 0$

k = 2

n = 10

$$\mathbf{d_k = (400000 - 0)\ \left[2\left(\frac{10 - 2 + 1}{10(10+1)}\right)\right]}$$

$d_k = 65454.55$

$$\mathbf{BV_k = 400000 - \left[\frac{2(400000-0)}{10}\right]2 + \left[\frac{(400000-0)}{10(10+1)}\right]2(2+1)}$$

$BV_k = 261818.18$

Calculation for year 3 are:

B = 400000

$SV_N = 0$

k = 3

n = 10

$$\mathbf{d_k = (400000 - 0)\ \left[2\left(\frac{10 - 3 + 1}{10(10+1)}\right)\right]}$$

dk = 58182.82

$$\mathbf{BV_k = 400000 - \left[\frac{2(400000-0)}{10}\right]3 + \left[\frac{(400000-0)}{10(10+1)}\right]3(3+1)}$$

BVk = 203636.36

Calculation for year 4 are:

B = 400000

$SV_N = 0$

k = 4

n = 10

$$\mathbf{d_k = (400000 - 0)\ \left[2\left(\frac{10 - 4 + 1}{10(10+1)}\right)\right]}$$

dk = 50909.09

$$\mathbf{BV_k = 400000 - \left[\frac{2(400000-0)}{10}\right]4 + \left[\frac{(400000-0)}{10(10+1)}\right]4(4+1)}$$

BVk = 152727.27

Calculation for year 5 are:

B = 400000

$SV_N = 0$

k = 5

n = 10

$d_k = (400000 - 0) \left[2\left(\frac{10 - 5 + 1}{10(10+1)}\right)\right]$

dk = 43636.36

$BV_k = 400000 - \left[\frac{2(400000-0)}{10}\right] + \left[\frac{(400000-0)}{10(10+1)}\right] 5\,(5+1)$

BVk = 109091.91

Calculation for year 6 are:

B = 400000

$SV_N = 0$

k = 6

n = 10

$\mathbf{d_k = (400000 - 0)} \left[\mathbf{2}\left(\frac{\mathbf{10 - 6 + 1}}{\mathbf{10(10+1)}}\right)\right]$

dk = 36364.64

$\mathbf{BV_k = 400000 - \left[\frac{2(400000-0)}{10}\right] 6 + \left[\frac{(400000-0)}{10(10+1)}\right] 6(6+1)}$

BVk = 72727.27

Calculation for year 7 are:

B = 400000

$SV_N = 0$

k = 7

n = 10

$\mathbf{d_k = (400000 - 0)} \left[\mathbf{2}\left(\frac{\mathbf{10 - 7 + 1}}{\mathbf{10(10+1)}}\right)\right]$

d_k = 29091.91

$\mathbf{BV_k = 400000 - \left[\frac{2(400000-0)}{10}\right] 7 + \left[\frac{(400000-0)}{10(10+1)}\right] 7(7+1)}$

BV_k = 43636.36

Calculation for year 8 are:

B = 400000

$SV_N = 0$

k = 8

n = 10

$$d_k = (400000 - 0)\ \left[2\left(\frac{10 - 8 + 1}{10(10+1)}\right)\right]$$

$$\boxed{d_k = 21818.18}$$

$$BV_k = 400000 - \left[\frac{2(400000-0)}{10}\right]8 + \left[\frac{(400000-0)}{10(10+1)}\right]8(8+1)$$

$$\boxed{BV_k = 21818.18}$$

Calculation for year 9 are:

B = 400000

$SV_N = 0$

k = 9

n = 10

$$d_k = (400000 - 0)\ \left[2\left(\frac{10 - 9 + 1}{10(10+1)}\right)\right]$$

$$\boxed{d_k = 14545.45}$$

$$BV_k = 400000 - \left[\frac{2(400000-0)}{10}\right]9 + \left[\frac{(400000-0)}{10(10+1)}\right]9(9+1)$$

$$\boxed{BV_k = 7272.73}$$

Calculation for year 10 are:

B = 400000

$SV_N = 0$

k = 10

n = 10

$$d_k = (400000 - 0)\ \left[2\left(\frac{10 - 10 + 1}{10(10+1)}\right)\right]$$

$$\boxed{d_k = 7272.73}$$

$$BV_k = 400000 - \left[\frac{2(400000-0)}{10}\right]10 + \left[\frac{(400000-0)}{10(10+1)}\right]10(10+1)$$

$$\boxed{BV_k = 0}$$

EOY , k	D_k	BV_k
0.		400000
1.	72727.27	327273.73
2.	65455.55	261818.18
3.	58182.82	203636.36
4.	50909.09	152727.27
5.	43636.36	109091.91
6.	36364.64	72727.27
7.	29091.91	43636.36
8.	21818.18	21818.18
9.	14545.45	7272.73
10.	7272.73	0

Q4(a): A company buys a Digital controlled (DC) machine for $28,000 (year zero) and uses 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'?

Given: Gross income and expenses as stated; income-tax rate = 40%.

Find: Net income.

Consider the purchase of the machine to have been made at the end of year zero, which is also the beginning of year one.

(Note that our example explicitly assumes that the only depreciation charges for year one are those for the DC machine. a situation that may not be typical.)

Item	amount	
Gross income (Revenues)	$50,000	
Expenses		
Cost of good sold	$20,000	
Depreciation	$2,000	
Operating expenses	$6.000	
Taxable income		$20,000
Taxes (40%)	$8,000	
Net income	$12,000	

Q4(b): A new convention center and sport complex has been proposed by Abbottabad development Authority at Shimla Pahari . This public project, if approved will be financed through the issue of bonds. The facility will be located near the city in a wooded area which includes a bike path, a nature trail and a pond. Because the city already owns the park, no purchase of land is necessary. List the project's benefits, costs, and any disbenefits.

Ans:

Benefits:

- Improvement of the image of the area of Abbotabad city.
- Potential to attract conferences and conventions to Abbotabad city.
- Potential to attract professional sports franchises to the City.
- Revenues from rental of the facility.
- Use of facility for civic events.

Costs:

- Architectural design of the facility,
- Construction of the facility,
- Design and construction of parking facility,
- Facility operating and maintenance costs,
- Insurance costs.

Disbenefits:

- Loss of use of portion of the park,
- bike path natural trail,
- and the pond.
- Loss of wildlife habitat in urban area.

Q5: Star Marketing company is considering building a 30-unit apartment complex in Regi Model town. Because of the long term growth potential of the town, it is felt that Star marketing company could average 90% of full occupancy for the complex each year. If the following items are reasonably accurate estimates, what is the minimum monthly rent that should be charged if a 12 % MARR (per year) is desired? Use the AW method.

Land investment cost	**$50,000**
Building investment cost	**$225,000**
Study period	**$20 years**
Upkeep expenses per unit per month	**$30**
Property taxes and insurance per year	**10% of the total investment**

Solution:

First to determine the equivalent AW of all costs at the MARR of 12 % /year.

To earn exactly 12%,the annual rental income, adjusted for 90% occupancy , must equal the AW of costs.

Initial investment cost = $50,000+$225,000 = $275,000

Taxes and insurance per year = 0.1($275,000) = $27,500

Upkeep/year = $30(12*30)(0.9) = $9,720

CR cost/year = $275,000 (A/P,12%,20) - $50,000 (A/F,12%,20)

= $36,123

(Assume that investment in land is recovered at the year of 20)

Equivalent AW (of costs) = -$27,500 - $9,720 - $36,123 = - $73,343

Therefore minimum annual rental required equals $73,343 and with annual compounding, the monthly rental amount R is R= $73343/(12*30)(0.9) = $ 226.367