



Iqra National University, Peshawar
Department of Electrical Engineering

Spring Semester Examination 2020, Date:22/06/2020
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: 6 Hours (online)
Note: Attempt all questions. Marks

- Q.1 (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? 5
- (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? 5
- Q.2 (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? 5
- (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 How much money can be withdrawn from this bank account immediately after the 15th deposit? 5
- Q.3 (a) A Property is depreciable if it meets certain basic requirements. What are those basic requirements? 3
- (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. 7

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'?

5

(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.

5

Q.5 (a) 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.

10

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



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Paper:

Final Term

Department:

B.Electrical Engineering

Module:

8th

Subject:

Engineering Economic and management

Instructor:

Dr. Engr. Jahanzeb Khan

Date:

22-june-2020

①

Que # 01

Part (A)

$$\therefore 100M = 100000000$$

Answer :-

We know That

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

Putting Values

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

$$P = 100000000 \left(\frac{1}{1.08} \right)^6$$

~~$$P = 100000000 \left(\frac{1}{1.08} \right)^6$$~~

$$P = 100000000 (0.6302)$$

$$P = 63020000$$

②

Que # 01

Part B

Answer

As we know that

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

$$16000000 = 100000 \left[\frac{(1+0.06)^4 - 1}{0.06(1+0.06)^4} \right]$$

$$\frac{16000000}{100000} = \left[\frac{(1+0.06)^4 - 1}{0.06(1+0.06)^4} \right]$$

$$160 = \left[\frac{(1+0.06)^4 - 1}{0.06(1+0.06)^4} \right]$$

$$160 \times 0.06(1+0.06)^4 = (1+0.06)^4 - 1$$

$$9.6(1.06)^4 = (1.06)^4 - 1$$

$$-0.6(1.06)^4 + (1.06)^4 = 1$$

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

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

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

$$(1.06)^n = 2.5$$

Taking \ln

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

$$0.916 = n * 0.0583$$

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

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

$$N = 15.7 \text{ years}$$

③

Q2 (A)

Answer

Given data

$$A = 30 \text{ million} = 30000000$$

$$i = 15\% = 0.15$$

$$N = 5 \text{ years}$$

We know that

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

Putting values

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

$$P = 30000000 \left[\frac{(1.15)^5 - 1}{0.15(1.15)^5} \right]$$

$$P = 30000000 \left[\frac{1.0114}{0.15(1.15)^5} \right]$$

$$P = 30000000 \left[\frac{1.0114}{0.3017} \right]$$

$$P = 30000000 [3.3522]$$

$$\Rightarrow \boxed{100566000} \text{ Ans}$$

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Que # 02 (B)

Answer :-

Given data

$$A = 10000 \$$$

$$i = 5\% = 0.05$$

$$N = 15 \text{ years}$$

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

Putting values

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

$$F = 10000 [21.5786]$$

$$F = 215786 \$$$

Q 3 (A)

⑤

Answer :-

Depreciable Property:-

Depreciable Property is any asset that is eligible for Tax and Accounting Purposes to Book depreciation in accordance with (IRS) rules.

Depreciable Property Include Vehicle Computer and office Equipments.

⊛ Depreciable Property Requirements:-

- It must be a property you own
- It must be used in your business or income-producing activity.
- It must have a determinable useful life.
- It must be expected to last for more than one year.

Q3 Part (B)

Solution: We know that

$$\text{From } dv = (B - svN) \left[\frac{2(N-k+1)}{N(N+1)} \right]$$

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

Putting the value of Sample 1

$$d_1 = 400000 \left[\frac{2(10+1-1)}{10(10+1)} \right]$$

$$d_1 = 400000 \left[\frac{2(10)}{10(11)} \right]$$

$$d_1 = 400000(0.1818)$$

$$\boxed{d_1 = 72720}$$

$$Bv_1 = 400000 - \left[2 \frac{(400000)}{10} \times 1 \right] + \left[\frac{400000}{10(11)} \right] 1(1+1)$$

$$\Rightarrow 400000 - [80000] + \left[\frac{400000}{110} \right] \times 2$$

$$d_4 = 400000 \left[\frac{2(10-4+1)}{10(10+1)} \right]$$

$$= 400000 \left[\frac{2(7)}{110} \right]$$

$$= 50909.0909$$

$$BV_4 = 400000 + \left[2 \left(\frac{400000}{10} \times 4 \right) + \left(\frac{400000}{110} \right) 4 \times 5 \right]$$

$$400000 + [320000] + 72727.2727$$

$$= 792727.2727$$

$$d_5 = 400000 \left[\frac{2(10-5+1)}{10(10+1)} \right]$$

$$43636.3$$

$$BV_5 = 400000 - \left[2 \left(\frac{400000}{10} \right) \right] \times 5 + \left(\frac{400000}{110} \right) 5 \times 4$$

$$400000 = 400000 + 72727.2$$

$$BV_5 = 72727.2$$

$$d_6 = 400000 \left[\frac{2(10.6+1)}{10(11)} \right]$$

$$d_6 = 36363.6$$

$$d_4 = 400000 \left[\frac{2(10-4+1)}{10(10+1)} \right]$$

$$= 400000 \left[\frac{2(7)}{110} \right]$$

$$= 50909.0909$$

$$BV_4 = 400000 + \left[2 \left(\frac{400000}{10} \times 4 \right) + \left(\frac{400000}{110} \right) 4 \times 5 \right]$$

$$400000 + [320000] + 72727.2727$$

$$= 792727.2727$$

$$d_5 = 400000 \left[\frac{2(10-5+1)}{10(10+1)} \right]$$

$$43636.3$$

$$BV_5 = 400000 - \left[2 \left(\frac{400000}{10} \right) \right] \times 5 + \left(\frac{400000}{110} \right) 5 \times 4$$

$$400000 = 400000 + 72727.2$$

$$BV_5 = 72727.2$$

$$d_6 = 400000 \left[\frac{2(10-6+1)}{10(11)} \right]$$

$$d_6 = 36363.6$$

$$d_8 = 21818.18$$

$$\Rightarrow 21817.9$$

$$d_9 = 400000 \frac{2(10-9+1)}{10(11)}$$

$$d_9 = 14545.4$$

$$BV_9 = 400000 - \left[2 \left\{ \frac{400000}{10} \right\} \times 9 + \left\{ \frac{400000}{110} \right\} \times 9 \times 10 \right]$$

$$BV_9 = 400000 - 720000 + 327272.7$$

$$BV_9 = 7272.9$$

Q4 (A):

Answer

∴ 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 assume that the only depreciation charges for year one are those for the DC machine a situation that may not typical)

Item	Amount	
Gross Income (Revenues)	\$ 50,000	: Net Income
Expenses		\$ 12,000
Cost of Sold	\$ 20,000	
Depreciation	\$ 2,000	
Operating Expenses	\$ 6,000	
Taxable Income	\$ 20,000	
Taxes	\$ 8,000	

Q 4 (Part B)

Answer:

Benefits: → Improvement of the image of the Area of Abbot Abad City.

→ Potential to attract Conferences and Conventions to Abbot Abad City.

→ Potential to attract Professional Sports Franchise to the City.

→ Revenues from Rental of the Facility
Use of Facility for Civic events.

Cost: 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 portion of the Park like Path Natural Trail, and the Pond
Loss of wild life habitat in urban Area.

⑨

Q5(A)Answer~~Given data.~~

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.

$$\rightarrow \text{Initial Investment Cost} = \$50,000 + \$225,000 = \boxed{\$275,000}$$

$$\rightarrow \text{Taxes and Insurance Per Year} = 0.1(\$275,000) = \boxed{\$27,500}$$

$$\rightarrow \text{UPkeep/Year} = \$30(12 \times 30)(0.9) = \boxed{\$9,720}$$

$$\rightarrow \text{CR Cost/Year} = \$275,000(A/P, 12\%, 20) - \$50,000$$

$$(A/F, 12\%, 20) = \boxed{\$36,123}$$

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

(v)

$$\text{Equivalent AW (of Cost)} = -\$27500 - \$9720 -$$

$$\$36123 = \boxed{\$-73343}$$

Therefore minimum Annual Rent Required

equal \$73343 and with Annual Compounding
the monthly Rental Amount R is

$$R = \$73343 / (12 \times 25) (0.9) = \boxed{\$271.64}$$

$$\boxed{R = \$271.64}$$