



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 How much money can be withdrawn from this bank account immediately after the 15<sup>th</sup> 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'?

(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.

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.

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 : Engineering Management

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" Question # 01 "

" Part (a) "

Solution :-

we know that

$$P = F(1 + i)^n \rightarrow (i)$$

So putting values in eq (i)  
we get

$$P = 100m (1 + 0.08)^6$$

$$P = 100m (1.08)^6$$

$$P = 100m (1.587)$$

$$P = 100m (34.0122)$$

$$P = 3401.22 \text{ Million}$$

Question # 01

Part (b)

Solution:-

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

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

$$10 \times 0.06(1.06)^n = (1.06)^n - 1$$

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

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

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

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

$$2.5 = (1.06)^n$$

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

$$0.916 = n \times 0.0583$$

$$N = 0.916 / 0.0583$$

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

"Question # 02"

"Part (a)"

Given :-

$$A = 20 \text{ Million}$$
$$i = 0.15$$
$$N = 5 \text{ years}$$

Solution :- we know that

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

Putting values

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

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

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

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

$$P = 30000000 \left[ 8.3522 \right]$$

$$P = 100566000$$



Question # 02  
Part (b)

Solution :-

Given

$$A = \$10,000$$

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

$$I = 5\%$$

$$F = A [(1+i)^N - 1/i]$$

$$F = \$10000 (21.5786)$$

$$F = 21,5786$$

Question # 03  
Part (a)

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 & the life must be longer than one year

→ It must be something that wears out, decays, gets used up, become obsolete or loss values from natural causes. ⑤

"Question # 03"

"part b"

Sample Calculation

$$d_1 = \$400000 \left[ 2(10-1+1)/10(11) \right] = \$72727.27$$

$$d_2 = \$400000 \left[ 2(10-2+1)/10(11) \right] = \$65454.54$$

$$d_3 = \$400000 \left[ 2(10-3+1)/10(11) \right] = \$58181.81$$

$$d_4 = \$400000 \left[ 2(10-4+1)/10(11) \right] = \$50909.09$$

$$d_5 = \$400000 \left[ 2(10-5+1)/10(11) \right] = \$43636.36$$

$$d_6 = \$400000 \left[ 2(10-6+1)/10(11) \right] = \$36363.63$$

$$d_7 = \$400000 \left[ 2(10-7+1)/10(11) \right] = \$29090.90$$

$$d_8 = \$400000 \left[ 2(10-8+1)/10(11) \right] = \$21818.18$$

$$d_9 = \$400000 \left[ 2(10-9+1)/10(11) \right] = \$14545.45$$

$$d_{10} = \$400000 \left[ 2(10-10+1)/10(11) \right] = \$7272.72$$

$$BV_1 = \$400000 - \left[ 2(\$400000)/10 \right] 1 + \left[ 400000/10(11) \right] 1 \times 5$$

$$BV_2 = \$400000 - \left[ 2(\$400000)/10 \right] 2 + \left[ 400000/10(11) \right] 2 \times 5$$

$$BV_3 = \$400000 - \left[ 2(\$400000)/10 \right] 3 + \left[ 400000/10(11) \right] 3 \times 5$$

$$BV_4 = \$400000 - \left[ 2(\$400000)/10 \right] 4 + \left[ 400000/10(11) \right] 4 \times 5$$

$$BV_5 = \$400000 - \left[ 2(\$400000)/10 \right] 5 + \left[ 400000/10(11) \right] 5 \times 5$$

$$BV_6 = \$400000 - \left[ 2(\$400000)/10 \right] 6 + \left[ 400000/10(11) \right] 6 \times 5$$

$$BV_7 = \$400000 - \left[ 2(\$400000)/10 \right] 7 + \left[ 400000/10(11) \right] 7 \times 5$$



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"Question # 4"  
"Part (a)"

Given:- Gross income & expenses at started;  
Income tax rate is 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 might not be typical)

<u>Item</u>	<u>Amount</u>
Gross Income	\$50,000
Cost of gold sold	\$20,000
Depreciation	\$2,000
Operating expenses	\$6,000
Taxable income	\$20,000
Taxes (40%)	\$8,000
Net Income	\$12,000



(7)

"Question # 04"

"Part (b)"

Solution :-

Benefits :- → Improvement of the Image of  
Abbotabad city.

- Potential to attract conferences & 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 & construction of parking facility, Facility operating & maintenance costs. Insurance costs

Disbenefits :- Loss of use of portion of the park, bike path natural trail, & the pond.

Loss of wild life habitats in urban area

(8)

" Question # 05 "

Solution :-

$$\text{Units} = 30$$

First to determine the equivalent of 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.

$$\begin{aligned} \text{Initial Investment Cost} &= \$50,000 + \$225,000 \\ &= \$275,000 \end{aligned}$$

$$\begin{aligned} \text{Taxes \& Insurance per year} &= 0.1(\$275,000) \\ &= \$27,500 \end{aligned}$$

$$\begin{aligned} \text{Upkeep per year} &= \$85(12 \times 30)(0.9) \\ &= \boxed{\$11,340} \end{aligned}$$