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   5
          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?

     (b) MR. Hamza an employee of Iqra national university on retirement from service   5
          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?

Q.2 (a) Four Generators installed at Turbela Dam, if undergoes a major overhaul now, its   5
          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?

     (b) Suppose Mr. Zafar make 15 equal annual deposits of $10,000 each into   5
          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 How much money can be withdrawn from this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) 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   7
          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.

Q4   (a)   A company buys a Digital controlled (DC) machine for $28,000 (year zero) and   5
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   5
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   10
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

Engineering Management & Economics

Q 1   Part (a)

$$F = 100 \text{ million}$$

$$i = 8\%$$

$$N = 6$$

As we know that

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

$$P = 100m\left(\frac{1}{1+0.08}\right)^6$$

$$P = 100m\left(\frac{1}{1.08}\right)^6$$

$$P = 100m \ (0.92)^6$$

$$P = 100m \ (0.6063)$$

$$\underline{P = 60.63 \ m} \quad \text{Ans}$$

Q1   Part   B

$$P = 10m \ , \quad A = 1m \ , \quad i = 6\%$$

As we know that

$$P = A\left[\frac{(1+0.06)^n - 1}{0.06(1+0.06)^n}\right]$$

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

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

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

$$0.1 = (1.06)^n - 0.6(1.06)^n$$

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

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

$$2.5 = (1.06)^n$$

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

$$0.916 = n \times 0.0583$$

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

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

Q2   Part (A)

$$A = 30 \text{ millions}$$

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

$$i = .15$$

As we Know that

$$P = A \frac{(1+i)^n - 1}{i(1+i)^n} \longrightarrow ①$$

$$P = \frac{30(1+0.15)^5 - 1}{0.15(1+0.15)^n}$$

$$P = \frac{30m(2.011 - 1)}{0.15(2.011)}$$

$$P = \frac{30m(1.011)}{0.30165}$$

$$P = 30m(3.3525)$$

$$P = 100.575 \text{ million Ans.}$$

$$\boxed{Q_2 \qquad \text{Part (B)}}$$

$$A = 10000$$

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

$$I = 5\%$$

As we know that

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

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

$$= 10000 \left[21.5786\right]$$

$$= 215786 \text{ \$ Ans}$$

$$\boxed{Q_3 \qquad \text{Part A}}$$

A property is depreciable if it meets the following basic requirment.

① It must be used in business or held to produce income

② It must have a useful life and the life must be longer than one year.

③ It must be something that wears out, decays, yet, used up, become obsolet or loss value from natural cources.

x————x————x

Q3   Part B

we   Know   that

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

$$BVK = B - \left[\frac{2 (B-\delta vN)}{N} \right] k + \left[\left(B-\delta vN \Big/ N(N+1) \right) \right] k(k+1)$$

putting   value   for   Sample   ①

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

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

$$d_1 = 400000 (0.1818)$$

$$d_1 = 72720$$

$$Bv_1 = 400000 - \left[\frac{2(400000)}{20} \times 1 \right] + \left[\frac{400000}{10(11)} \right] 1(1+1)$$

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

$$400000 - 80000 + 7272.7$$

$$\Rightarrow 327272.7$$

for d_2

$$d_2 = 400000 \left[\frac{2 \ (10-2+1)}{10(10+1)} \right]$$

$$d_2 = 400000 \left[\frac{2 \ (8+1)}{10(11)} \right]$$

$$d_2 = 400000 \left[18/110 \right]$$

$$d_2 = 65454.5$$

BV₂

$\Rightarrow$ $400000 - \left[\dfrac{2(400000)}{10}\right] \times 2 + \left[\dfrac{400000}{10(11)}\right] 2 \times 3$

$\Rightarrow$ $40000 - 80000 \times 2 + \left[\dfrac{400000}{110}\right] \times 6$

$\Rightarrow$ $400000 - 160000 + 3636.36 \times 6$

$\Rightarrow$ $400000 - 160000 + 2118.16$

$\Rightarrow$ $\underline{261818.16}$. Ans .

Q4   Part   A

Given

Gross income and expenses as
Stated, income-tax rate = 40%.

Finding

net income

Consider the purchase of the machine
to have been made at the end of
years, Zero which is also the beging
of year one

Items	Amount
Gross income (Revenues)	$50 000
Cost of good Sold	$20,000
Depreciation	$2 000
Operating expenses	$6000 .
Taxable income	$20000
Taxes (40%)	$8000
net income	12000 .

———x———x———x———

Q4   Part   B

Benefits:-

  Improvement of the image of the area of abbotabad city.
potrential to attract conferences and Conventions to abbotabad city potential to attract professional sports franchises to the city

  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 maintanence 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   Part   A .

AW of Cost = $50000 + 225000$

= $ 275000

taxes insurance = 0.1 ($ 275000)

= $27500

Up Keep/year = 30 (12 × 30) (0.9)

= 30 (360) (0.9)

= 30 (324)

= 9720$

CR   Cost/year =

=> 275000 (A/p , 12% , 20) − 50000 (A/F , 12% , 20))

= $ 36123

Assume that investment in land is secord

at year 20

Equivalent AW (of 6e costs) = −27500 − 9720 − 36123

= −73343

therefore

minimum anual rental required equals.

73343 $

with annual compounding the mothly rental

R is R = 73343 (12 × 30) (0.9)

= 73343 (360) (0.9)

= 73343/324

= 226·36$