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Marks	36.80/40.00
Grade	**92.00** out of 100.00

Question 1

Correct

Mark 6.00 out of 6.00

A newly constructed bridge costs $4000000. The same bridge is estimated to need renovation every 15 years at a cost of $870000. Annual repairs and main-tenance are estimated to be $99000 per year.

(a)If the interest rate is 6%, determine the capitalized cost of the bridge. 6272960.08 ✔

(b) Suppose that, in (a), the bridge must be renovated every 20 years, not every 15 years. What is the capitalized cost of the bridge?

6044176.08 ✔

(c) Repeat (a) and (b) with an interest rate of 10%. What have you to say about the effect of interest on the results? As interest rate increases, CE value Decreases ✔

Question 2

Partially correct

Mark 3.20 out of 4.00

Consider the following sets of investment projects:

Project's Cash flow($)				
n	A	B	C	D
0	-6100	-3900	-5000	-6600
1	0	1500	4000	3800
2	0	1800	3000	3800
3	15500	2100	2000	3800

Compute the equivalent annual worth of each project at i=14% and determine the acceptability of each project.

AE_A= 1497.08 ✗

Acceptability of project A= Accept ✓

AEB= 94.02 ✓

Acceptability of project B= Accept ✓

AEC= 933.45 ✓

Acceptability of project C= Accept ✓

AED= 957.17 ✓

Acceptability of project D= Accept ✓

Question 3

Correct

Mark 1.00 out of 1.00

Emerson Electronics Company just purchased a soldering machine to be used in its assembly cell for flexible disk drives. The soldering machine cost $250,000. Because of the specialized function it performs, its useful life is estimated to be five years. It is also estimated that at that time its salvage value will be $40,000. What is the capital cost for this investment if the firm's interest rate is 18%?

Capital Cost= 74353.35 ✓

Question 4

Correct

Mark 6.00 out of 6.00

Consider the cash flows for the following investment projects.

	Cash Flow Data				
n	A	B	C	D	E
0	-$1,300	-$1,800	-$3,600	$1,500	-$1,800
1	1,350	1,000	1,000	-$430	$540
2	800	800	X	-$430	$540
3	200	800	1,500	-$430	$540
4	100	150	X	-$430	$540

(a) Suppose projects A and B are mutually exclusive. On the basis of the Net Present Worth (NPW) criterion, which project would be selected? Assume that MARR= 18%

NPW_A= 591.92 ✔

NPW_B= 186.28 ✔

Better Choice= Project A ✔

(b) Repeat (a), using the Net Future Worth (NFW) criterion.

NFW_A= 1147.60 ✔

NFW_B= 361.15 ✔

Better Choice= Project A ✔

(c) Find the minimum value of X that makes project C acceptable.

X= 1490.79 ✔

(d) Assume that projects D and E are mutually exclusive. On the basis of the NFW criterion, which project would you select?

NFW_D= 665.53 ✔

NFW_E= -673.47 ✔

Better Choice= Project D ✔

(e) Would you accept project D at i=19%.

PW_D= 365.41 ✔

Accept Project= YES ✔

Question 5

Partially correct

Mark 0.60 out of 3.00

Consider the following two mutually exclusive investment projects:

Cash Flow Data		
n	Project A	Project B
0	-$21,500	-$26,300
1	17,500	25,500
2	17,000	18,000
3	15,000	

On the basis of the Net Present Worth (NPW) criterion, which project would be selected if you use an infinite planning horizon with project repeatability (the same costs and benefits) likely? Assume that i=12%.

NPW_A= 34550.64 ✗

NPW_B= 29505.85 ✗

Better Choice= Project A ✓

Question 6

Correct

Mark 3.00 out of 3.00

Consider the following two mutually exclusive projects:

n	B1		B2	
	Cash Flow	Salvage Value	Cash Flow	Salvage Value
0	-$15,700		-$14,800	
1	-2000	6000	-2100	6000
2	-2000	4000	-2100	3000
3	-2000	3000	-2100	1000
4	-2000	2000		
5	-2000	2000		

Salvage values represent the net proceeds (after tax) from disposal of the assets if they are sold at the end of each year. Both B1 and B2 will be available (or can be repeated) with the same costs and salvage values for an indefinite period.

Assuming a common service period of 15 years, which project is a better choice at MARR= 9%?

PW_{B1}= -45963.39 ✓

PW_{B2}= -61597.81 ✓

Better Choice= Project B1 ✓

Question 7

Correct

Mark 5.00 out of 5.00

Consider each of the after-tax cash flows shown below.

	Cash Flow Data			
n	A	B	C	D
0	-$2,800	-$8,300	-$5,400	-$4,000
1	650	-2,500	-2,000	-500
2	650	-2,000	-2,000	-500
3	650	-1,500	-2,000	4,000
4	650	-1,500	-2,000	3,000
5	650	-1,500	-2,000	3,000
6	650	-1,500	-2,000	2,000
7	300		-2,000	3,000
8	300			

(a) Compute the net future-worth values for projects A and D at i=8%

NFW_A= 1003.20 ✔

NFW_D= 9496.89 ✔

(b) Suppose that projects B and C are mutually exclusive. Suppose also that the required service period is eight years and that the company is considering leasing comparable equipment with an annual lease expense of $3000 for the remaining years of the required service period. Using Net Present Worth (NPW) analysis, which project is a better choice?

$NPW_B(8\%)$= -19960.19 ✔

$NPW_C(8\%)$= -17433.55 ✔

Better Choice= Project C ✔

Question 8

Correct

Mark 1.00 out of 1.00

6.18 A large refinery–petrochemical complex is to manufacture caustic soda, which will use feedwater of 40,000 litres per day. Two types of feedwater storage installation are being considered over the 40 years of their useful life.

- **Option 1.** Build an 80,000-litre tank on a tower. The cost of installing the tank and tower is estimated to be $164,000. The salvage value is estimated to be negligible.
- **Option 2.** Place a tank of 80,000-litre capacity on a hill, which is 150 metres away from the refinery. The cost of installing the tank on the hill, including the extra length of service lines, is estimated to be $120,000, with negligible salvage value. Because of the tank's location on the hill, an additional investment of $12,000 in pumping equipment is required. The pumping equipment is expected to have a service life of 20 years, with a salvage value of $1000 at the end of that time. The annual operating and maintenance cost (including any income tax effects) for the pumping operation is estimated at $1000.

If the firm's MARR is known to be 12%, which option is better, on the basis of the present-worth criterion?

Better Choice= Option 2 ✔

Question 9

Correct

Mark 6.00 out of 6.00

6.21 Saskatchewan Environmental Consulting (SEC) Inc. designs plans and specifications for asbestos abatement (removal) projects in public, private, and governmental buildings. Currently, SEC must conduct an air test before allowing the reoccupancy of a building from which asbestos has been removed. SEC subcontracts air-test samples to a laboratory for analysis by transmission electron microscopy (TEM). To offset the cost of TEM analysis, SEC charges its clients $100 more than the subcontractor's fee. The only expenses in this system are the costs of shipping the air-test samples to the subcontractor and the labour involved in shipping the samples. With the growth of the business, SEC is having to consider either continuing to subcontract the TEM analysis to outside companies or developing its own TEM laboratory. With recent government regulation requiring the removal of asbestos, SEC expects about 1000 air-sample testings per year over eight years. The firm's MARR is known to be 15%.

- **Subcontract option.** The client is charged $400 per sample, which is $100 above the subcontracting fee of $300. Labour expenses are $1500 per year, and shipping expenses are estimated to be $0.50 per sample.
- **TEM purchase option.** The purchase and installation cost for the TEM is $415,000. The equipment would last for eight years, at which time it should have no salvage value. The design and renovation cost is estimated to be $9500. The client is charged $300 per sample, based on the current market price. One full-time manager and two part-time technicians are needed to operate the laboratory. Their combined annual salaries will be $50,000. Material required to operate the lab includes carbon rods, copper grids, filter equipment, and acetone. The costs of these materials are estimated at $6000 per year. Utility costs, operating and maintenance costs, and the indirect labour needed to maintain the lab are estimated at $18,000 per year. The extra income-tax expenses would be $20,000.

(a) Calculate the followings:

Unit profit for Subcontract Option: $ 98.00 ✔

Unit Cost for TEM Purchase Option: $ 188.60 ✔

(b) What is the required number of air samples per year to make the two options equivalent? (The answer should be an integer)

Number of Air samples: 934 ✔

Question 10

Correct

Mark 5.00 out of 5.00

A chemical company is considering two types of incinerators to burn solid waste generated by a chemical operation. Both incinerators have a burning capacity of 20 tonnes per day. The following data have been compiled for comparison:

	Incinerator A	Incinerator B
Installed cost	$1300000	$750,000
Annual O&M costs	$50,000	$81000
Service life (years)	23	10
Salvage value	$60,000	$30000
Income taxes	$35000	$30,000

If the firm's MARR is known to be 9%, determine the processing cost per tonne of solid waste incurred by each incinerator. Assume that incinerator B will be available in the future at the same cost.

Equivalent Annual Cost:

$AEC(9\%)_A$=$ 219833.53 ✔

$AEC(9\%)_B$=$ 225890.46 ✔

Processing cost per tonne:

C_A= 30.11 ✔ per tonne

C_B= 30.94 ✔ per tonne

Better choice: Incinerator A ✔

◄ Assignment 4 Answers with more reasoning

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Midterm #1 Review Questions and Answers ►