

Midterm Exam Study Guide and Information for the Exam

Exam Information – How to take the Exam:

In the instructions on the quiz, you will download the Excel spreadsheet with all of the exam questions.

You will do the work on the exam spreadsheet, and enter your answers in Canvas Exam (Quiz).

Answer to the nearest whole dollars for currency, and the nearest percentage (no decimals) for interest, and a whole number for the number of years. Do NOT enter commas or symbols (\$, or %). DO enter minus signs for negative values.

NOTE: FOR ROR (IRR and RATE) calculations, enter the ROR % to one decimal place

The Exam will be taken in class (Unless you need extra time). You can access notes, the e-book, SmartBook, Active learning exercises, homework problems, but not anyone (no texting, messaging, emailing, etc.), and no internet searches.

If you need extra time (via SDLS), take the exam in a quiet place (doesn't need to be at a testing center), and you will have your extra time set within the online exam.

The exam will begin in the classroom at 9 am (can come in early), and end promptly at 10:55 am (end of class time). Cannot start the exam outside of class.

MODULE 1: Chapter 1 – Foundations of Engineering Technology

- Steps in performing an Engineering Economic Analysis- Page 5
- Professional engineering ethics
- Interest rate:
 - Interest calculations and definitions
 - Rate of Return %
 - Terms:
 - P, F, A, n, i, t
 - Cash flow diagram
 - Inflows and outflows
 - Economic equivalence
 - Simple interest: Total Due = $P + Pin$
 - Compound interest: Total Due = $P (1+i)^n$
 - Minimum Attractive Rate of Return
 - Spreadsheet functions:
 - P: $PV(i\%,n,A,F)$ (opposite sign, add negative in front of function)
 - F: $FV(i\%,n,A,P)$ (opposite sign, add negative in front of function)
 - A: $PMT(i\%,n,P,F)$ (opposite sign, add negative in front of function)
 - N: $NPER(I\%,A,P,F)$
 - i: $RATE(n,A,P,F)$
 - i of any series: $IRR(First_cell:last_cell)$

- P of any series: $NPV(i\%, \text{second_cell}:\text{last_cell}) + \text{first_cell}$

MODULE 2: Chapter 2, Factors: How Time and Interest Affect Money

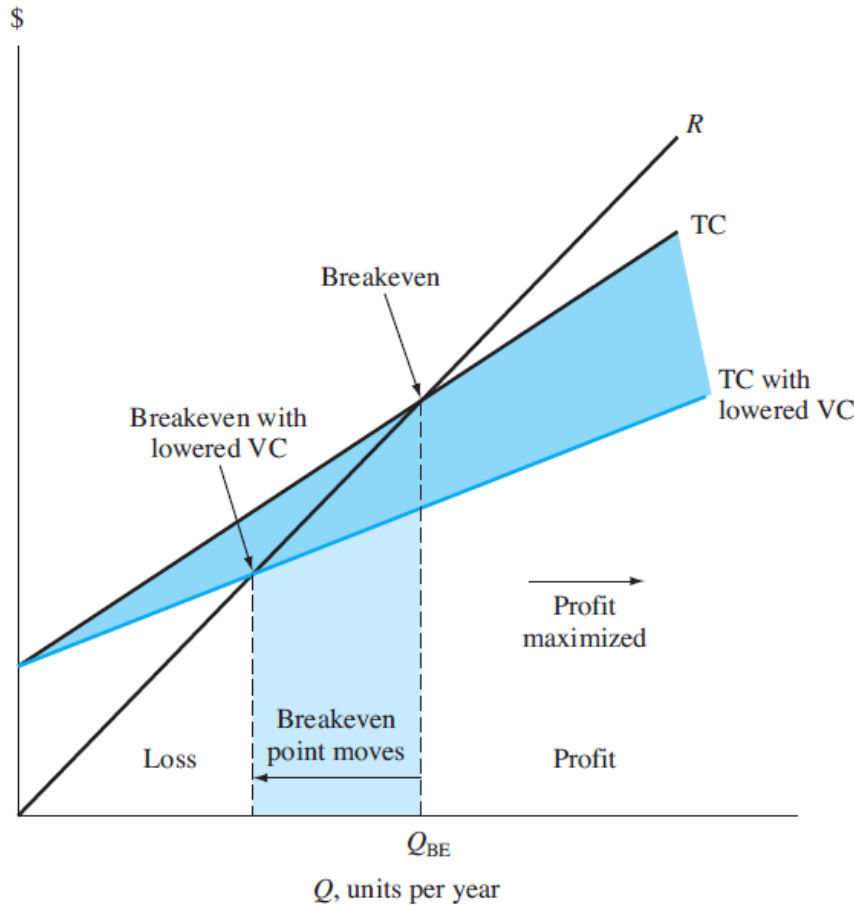
- Future value $F = FV$
- Present Value $P = PV = NPV$
- Equal sum series: $A = PMT$
- Arithmetic gradients
- Unknown i , RATE or IRR
- Unknown n , NPER

Module 3:

- Financial Accounting: Chapters 1, 2 and 13 in the Wild Book
 - Financial Statements
 - Income statement
 - Balance Sheets
 - Financial Ratios
- Cost Accounting: Chapters 14 & 18 in the Wild Book
 - Manufacturing = Product costs
 - Non-manufacturing = Period costs
 - Total Cost = Fixed Cost + Variable Cost
 - $Y = ax + b$
 - a = Slope = variable cost
 - b = Intercept = fixed cost
 - x = units (or quantity)

Module 4: Chapter 13 - Breakeven & Payback Analysis

- **Set $R = TC$ and solve for $Q = Q_{BE}$**
- $R = TC$
- $rQ = FC + vQ$
- $Q_{BE} = \frac{FC}{r-v}$
- When variable cost, v , is lowered, Q_{BE} decreases (moves to left)



- Payback Period Analysis:
 - **No-return payback** means rate of return is ZERO ($i = 0\%$)
 - **Discounted payback** considers time value of money ($i > 0\%$)

$$\text{No return, } i = 0\%; \text{ NCF}_t \text{ varies annually: } 0 = -P + \sum_{t=1}^{t=n_p} \text{NCF}_t \quad \text{Eqn. 1}$$

$$\text{No return, } i = 0\%; \text{ annual uniform NCF: } n_p = \frac{P}{\text{NCF}} \quad \text{Eqn. 2}$$

$$\text{Discounted, } i > 0\%; \text{ NCF}_t \text{ varies annually: } 0 = -P + \sum_{t=1}^{t=n_p} \text{NCF}_t(P/F, i, t) \quad \text{Eqn. 3}$$

$$\text{Discounted, } i > 0\%; \text{ annual uniform NCF: } 0 = -P + \text{NCF}(P/A, i, n_p) \quad \text{Eqn. 4}$$

- **Breakeven** amount is a *point of indifference* to accept or reject a project
- **One project breakeven:** *accept if quantity is $> Q_{BE}$*
- **Two alternative breakeven:** if *level $>$ breakeven*, select lower variable cost alternative (*smaller slope*)
- **Payback** estimates time to recover investment.
Return can be $i = 0\%$ or $i > 0\%$

- Use *payback as supplemental* to PW or other analyses, because n_p neglects cash flows after payback, and if $i = 0\%$, it neglects time value of money
- *Payback* is useful to sense the *economic risk* in a project