

**UNIVERSITY COLLEGE TATI (UCTATI)****FINAL EXAMINATION QUESTION BOOKLET**

COURSE CODE	: BCE 3183
COURSE	: ENGINEERING ECONOMY
SEMESTER/SESSION	: 1-2024/2025
DURATION	: 3 HOURS

Instructions:

1. This booklet contains **5** questions. Answer **ALL** questions.
2. You are allowed to bring "**Compounded Interest Table**"
3. All answers should be written in answer booklet.
4. Write legibly and draw sketches wherever required.
5. If in doubt, raise your hands and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

THIS BOOKLET CONTAINS 8 PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1

a) Indicate the following statements is **True (T)** or **False (F)**

- i) In industries, interest earned over a specific period of time is called as rate of return (ROR), where larger capital funds are committed to engineering oriented programme (T/F) (1 mark)
- ii) Simple interest is calculated using the principal only, ignoring any interest accrued in preceding interest period (T/F) (1 mark)
- iii) The amount of money deposited 1 year ago is equivalent to RM 1000 now at interest rate of 5% per year is RM 952.38 (T/F) (1 mark)
- iv) Pesama Sdn Bhd have to pay RM 130,000 to Commercial Bank for RM 100,000 loan after three years lent at 10% per year simple interest (T/F) (1 mark)
- v) Inflation represents a decrease in the value of given currency (T/F) (1 mark)

b) Identify the following factors are either economic (tangible) or noneconomic (intangible)

- i) First Cost (1 mark)
- ii) Leadership (1 mark)
- iii) Taxes (1 mark)
- iv) Salvage Value (1 mark)
- v) Morale (1 mark)

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- c) Identify the four engineering economy symbols and their values from the following problem statement. Use a question mark with the symbol whose value is to be determined. Sketch the cash flow diagram for each option.
- i) A green algae, *Chlamydomonas reinhardtii*, can produce hydrogen when temporarily deprived of sulfur for up to 2 days at a time. A small company needs to purchase equipment costing \$3.4 million to commercialize the process. If the company wants to earn a rate of return of 10% per year and recover its investment in 8 years, determine must be the net value of the hydrogen produced each year?
- (5 marks)
- ii) Vision Technologies, Inc., is a small company that uses ultra-wideband technology to develop devices that can detect objects (including people) inside of buildings, behind walls, or below ground. The company expects to spend \$100,000 per year for labor and \$125,000 per year for supplies before a product can be marketed. At an interest rate of 15% per year, determine the total equivalent future amount of the company's expenses at the end of 3 years?
- (5 marks)

QUESTION 2

A construction management company is examining its cash flow for 7 years. The company expects to replace office machines and computer equipment at various times over the 7 years planning period. Specifically, the company expects to spend RM 30,000 now, RM 50,00 one year from now, RM 70,000 three years from now and RM 100,000 six years from now. Given the interest rate 10% per year.

- a) Illustrate the cash flow diagram (5 marks)
- b) Determine the annual worth of the planned expenditure (5 marks)
- c) Determine the present worth of the planned expenditure (5 marks)
- d) Determine the future worth of the planned expenditure (5 marks)

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QUESTION 3

A pipeline engineer working in Kuwait for the oil giant BP wants to perform a present worth analysis on alternative pipeline routings—the first predominately by land and the second primarily undersea. The undersea route is more expensive initially due to extra corrosion protection and installation costs, but cheaper security and maintenance reduces annual costs.

	Land	Undersea
Installation cost, \$ million	-215	-350
Pumping, operating, security, \$ million per year	-22	-2
Replacement of valves and appurtenances in year 25, \$ million	-30	-70
Expected life, years	50	50

In order to select the best alternative, perform the present worth (PW) economical analysis for the engineer at 15% per year (20 marks)

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QUESTION 4

ABC company is evaluating to purchase new machine. Two new machines brand X and Y have the following estimates.

	X	Y
First Cost, \$	-120,000	-200,000
Annual cost, \$ per year	-40,000	-20,000
Salvage value, \$	7,000	25,000
Life, years	10	10

Determine the alternative that is economically best after tax analysis, using classical SL depreciation over 10 years life. Given MARR is 10% per year and tax rate is 30%

(20 marks)

QUESTION 5

Megah Holding Sdn Bhd is investigating the advisability of converting a plant that manufactures economy cars into one that will make retro sports cars. The initial cost for equipment conversion will be RM 800 million with a 20% salvage value at year 5. The following information is available

Fixed costs , $FC = \text{RM } 20 \text{ million per year}$

Variable cost per unit , $v = \text{RM } 70,000$

Revenue per unit, $r = \text{RM } 120,000$

- a) Determine the breakeven point using the breakeven graph, indicate the profit and loss margin (for range of $Q : 0 - 600$) (10 marks)
- b) Determine the current profit per year for the facility if the production capacity is 6000 units (4 marks)
- c) At interest rate of 12% per year, determine the minimum quantity (Q) car production per year to recover it's investment in 3 years (6 marks)

-----End of questions-----

Appendix

$$R = TC$$

Revenue = total cost

$$rQ = FC + vQ$$

Q – quantity

r - revenue

FC – Fixed cost

v – variable cost

$$\text{at breakeven, } Q_{BE} = \frac{FC}{r-v}$$