

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)

DEPARTMENT OF MECHANICAL AND PRODUCTION ENGINEERING

Semester-Final Examination

Summer Semester, A.Y. 2022-2023

Course No. IPE 4639

Time : 3 hours

Course Title: Engineering Economy and Finance

Full Marks : 150

There are 6 (Six) Questions. Answer all of them.

Use the graph paper wherever necessary. Marks in the margin indicate the full marks.

1a) Explain the use of internal rate of return (IRR) in capital investment planning and individual financial planning. Give examples. **Defend** if IRR is a good option for long-term projects where discount rates vary. 7
CO3
PO1

1b) An existing manufacturing company is reviewing two projects. Its management must decide whether to move forward with one, both, or none. Its annual cost of capital is 10%. The cash flow structures for each project are as follows: 10
CO3
PO11

Project	Year (all money in dollars)					
	0	1	2	3	4	5
A	-10,000	3,400	3,800	3,200	3,000	1,400
B	-4,000	800	1,400	1,000	800	600

The company must calculate the IRR for each project. The initial outlay (period = 0) will be negative.

i. Draw the cash flow diagrams for both projects. 3+5
CO3
PO11

ii. Showing all calculations, justify the project the company should proceed with.
1c) Manufacturing projects incur costs as well as generate revenues over the years (chips production, and service projects incur costs but generate no or constant revenue over the years (residential garbage collection). From the benefit-cost point of view, how are you going to select the best manufacturing and one best service project from among a few alternatives in either case? Select the best alternative based on data in table below:

Alternative	Initial investment BDT	Benefits BDT	Costs BDT
A	1,000,000	48,000	40,000
B	1,500,000	48,000	60,000
C	800,000	40,250	35,000
D	1,250,000	58,500	45,000

2a) Describe the purposes of depreciation and depletion calculations. 5

2b) State at least five prominent causes of declining the value of an asset. 5

2c) The first cost of an asset is \$500,000. Estimated salvage value after 5 years is expected to be 5% of the first cost. Use the necessary data from the table below. 15

i. Compare depreciation for 5-year MACRS and DOB.

ii. Determine the total depreciation over the next 4 years and comment on the model that offers larger total depreciation after 4 years. All
CO4
PO11

iii. Find the book value for each model after 4 years and at the end of recovery period.

Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
3-year	33.33	44.45	14.81	7.41	-	-	-	-
5-year	20.00	32.00	24.49	11.52	11.52	5.67	-	-
7-year	14.29	24.49	17.49	12.49	8.93	8.92	8.93	4.46

3a) Describe at least five consequences of inflation in an economy. 5

3b) A middle-income family experienced the following situations (Table) in its family expenses in recent years. The income of the family increased 7% each year. Determine the consumer price indices (CPI) and explain the ease or hardship of financial management in the family. Also determine the inflation rates in the years 2022 and 2023. The base year is 2021. Find the average inflation rate. PO11
12
PO11

Market basket	Quantity/ amount	Year 2021		Year 2022		Year 2023	
		Price per unit BDT	Cost of market basket	Price per unit BDT	Cost of market basket	Price per unit BDT	Cost of market basket
Food	500 kg	55		65		75	
Cloth	12 pieces	500		750		950	
Education	3 children	36,000		50,000		75,000	
Health	5 persons	24,000		40,000		60,000	
Travel	1,000 km	20		30		45	

3c) **Distinguish** between the current-money and constant-money in economic analysis. In question 3(b), suppose the total expenditure of the family in year 2021 is the first year-constant-money. **Find** the year 2023 constant money value based on the CPI calculations you have earlier.

8
PO2
All
CO4

4a) In the fiscal year 2019-2020, a manufacturing company manufactured three special goods namely X, Y and Z. Two hundred and fifty units of X were sold at the rate of 20,000; 195 units of Y at 25,000 per unit, and another 3,500 kg of a chemical was sold at 2,000/kg. earned the following amount of money by selling its products. The company estimated that 5% of its income from the items sold was given as a discount and agents charge. In addition, the company earned 2.5 million by renting out its equipment and services. However, the company paid 7.5 million and 0.8 million in terms of operating and maintenance costs respectively. The depreciation charge on its assets during the period was 0.55 million. Consider all money in dollars (\$). **Determine** the following:

12
CO4
PO2

- Gross income of the company.
- Adjusted gross income.
- Taxable income.
- Income tax to be paid.

Taxable income limits (\$)	Taxable range (\$)	Tax rate, T
1-50,000	50,000	0.15
50,001-75,000	25,000	0.25
75,001-150,000	75,000	0.34
150,001-350,000	200,000	0.39
350,001-10 mil	9.665 mil	0.34

4b) Suppose the initial cost of the business is \$5 million. Also, the depreciation charge, taxable income and income tax remain constant as per previous calculations. **Furnish** a table like the one below in your answer booklet and determine the present worth of the business when MARR is 10%.

8
CO4
PO11

EOY	BTCF	Depreciation	TI	Income tax	ATCF
0					
1					

4c) **Write** a short note on capital gains and losses of a corporation.

5
PO11

- In terms of the key issues, **explain** in detail how the public sector economy affects the life of people.
- State** the main causes of corruption and **describe** how a government can check it for the welfare of the people and country.
- Explain** your understanding about sustainable development. **Use** the necessary diagrams.
- XY Co would cut timber for \$500,000. An estimated 200 million board feet of lumber are harvestable.

6
6
8

- Determine the depletion amount for the first 2 years if 20 million and 25 million board feet are removed.
- If, after 2 years total removable board feet are re-estimated to be 250 million from time $t = 0$, compute the new cost-depletion factor for years 3 and later.

All
CO5
PO7
PO8

- Differentiate** between conventional finance and Islamic finance from the points of Riba, profit sharing and risk handling. Explain how Islamic banking systems do manage risk.
- Explain** the divine concept of development and sustainability. **Show** the related illustrations/figures.
- From the point of capability building **describe** the statement, "human is the master key for development".

8
10
7
All
CO5
PO8
PO12

-End of the question paper-