

TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2082 Chaitra

Exam.	Regular (New Course)		
Level	BE	Full Marks	60
Programme	BCE, BGE	Pass Marks	24
Year / Part	III / I	Time	3 hrs.

Subject: - Engineering Economics (ENCE 307)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. a) Distinguish between microeconomics and macroeconomics, also explain why an engineer focus primarily on the former during project evaluation. [2+2]
- b) How engineers view the externality due to the economic tradeoff? Explain with example and curves. With a fall in the price of a commodity from Rs.10 per unit to Rs.8 per unit, the quantity supplied of the commodity falls by 500 units. The price elasticity of supply is 2. Calculate the quantity supplied of this commodity at the price of Rs.8 per unit. [2+3]
2. a) An engineering firm is choosing between two types of road pavement materials: Material A has a high cost but low annual maintenance while Material B has a low initial cost but requires frequent, expensive repairs: [2+4]
 - (i) Which cost classification should the engineer use to compare these two?
 - (ii) Explain the importance of Life -Cycle Costing (LCC) analysis in selecting the most economic design alternative.
- b) GDP and Monetary Policies are important parameter for the countries economical merits. Explain these two parameters. If average inflation rates for 5 consecutive years are 10% and inflation rate for 6th year is 20%, what will be the average inflation rate over the 6 year period? [2+2+2]
3. a) Produce the annuity series with 'A' magnitude for project life of 'N' years with MARR of i % and develop a relation for the annuity cash magnitude (A) and its equivalent present worth (P). [4]
- b) A bank grants you a loan of NPR 26,00,000 at an interest rate of 6.25% per annum compounded quarterly. If you repay the loan by paying a monthly EMI of NPR 2,00,000, determine the total number of installments required to fully repay the loan. Also, find the amount of the final installment. [3]
4. Mr. Uprety purchased a building for market price of NPR 2,00,00,000 in year 2075 B.S. There incurred an annual maintenance cost of NPR 1,00,000 per year in 2076 B.S. and thereafter maintenance cost has annual increment of 10% to previous year. At the beginning of year 4, due to seepage Mr. Uprety was forced to retrofitted his building roof with the epoxy sealant with the cost NPR 2,00,000. As Mr. Uprety is now planning, for the election from Jhapa 5 and for thathe is resettlement in Jhapa. So, he sold the building for NPR 2,75, 00,000 in 2082 B.S. During the period of ownership, the building was also rented for NPR 5, 00,000 per year paid at the beginning of each year. Use AW method to evaluate the investment if MARR = 8%. Assume the purchase was done at the start and selling of building was done at the end of year convention. [6]

5. A manufacturing firm is planning to modernization its plant. The following four projects are under consideration for evaluation. The relation among the project are as Project A and B are mutually exclusive, Project C is contingent upon Project A, Project D is contingent upon either Project C. Assume the MARR = 7% and the capital budget available is NPR 14,00,000. [2+1+4+1]

	Project A (Solar Power Installation)	Project B (Energy Efficient Machinery)	Project C (Automation Software)	Project D (Worker Training Program)
Initial cost (NPR)	8,00,000	12,00,000	6,00,000	2,00,000
Net Annual saving (NPR)	2,00,000	3,50,000	1,80,000	90,000
Project life (years)	5	5	5	5

- Identify the type of project relations involved.
 - Determine which alternative is infeasible and why?
 - Use future worth methods and evaluate the feasible alternatives.
 - Recommend the best alternative.
6. a) You are appointed as the CEO of a company, based on the inventory survey you found that the asset replacement is necessary for your company, if so what force you to replace the assets? Find the economic service life of the machine which has initial cost of NPR 7,50,000 and depreciate by 20% per year. There is no maintenance cost for the first year where as the maintenance cost for second- year is NPR 20,000 and increases by NPR 3,000 linearly for the subsequent years. The operating cost per year is NPR 50,000. Assume MARR = 8%. [2+4]
- b) None of the engineering projects are decide under the probability of certainty. If so, as an operation manager, what analysis do you do to visualize the risk information of any engineering project. Perform sensitivity analysis of a project over a range of $\pm 15\%$ for Initial Investment and useful life. Take MARR = 10%, currency is in NPR. [2+3]

Initial Investment	Annual Revenue	Annual Cost	Useful life	Salvage value
1,50,000	44,000	10,000	8years	30,000

7. What are the advantages of declining balance depreciation method over straight line depreciation method? An asset has installed value of NPR 4,50,000 and salvage value is zero. It is classed as 5-year property. Determine MACRS depreciation schedule. The estimated revenue and operating cost over the period of 5 years are tabulated below. Calculate after tax cash flow if tax rate is 25 %. [2+5]

EOY	1	2	3	4	5
Revenue (NPR)	1,50,000	2,20,000	2,20,000	2,20,000	2,00,000
O&M cost (NPR)	75,000	85,000	87,000	99,000	1,05,000
