KATHMANDU UNIVERSITY SCHOOL OF ENGINEERING

First Internal Examination

June 2026

Group A:
Q. No. 1, 3, 5, 7, and 9
Group B:
Q. No. 2, 4, 6, 8, and 10

Subject: MGTS 301 Engineering Economics

Time: 1 hr.
Full Marks: 20

[4Q × 5 = 20 marks]

*Answer any **FOUR** questions from each group.*

1. A certain college graduate, Sallie Evans, has $24,000 in student-loan debt at the end of her college career. The interest rate on this debt is 0.75% per month. If monthly payments on this loan are $432.61, how many months will it take for Sallie to repay the entire loan?
2. In 2014, the average debt for college student loans is $28,700. This amounts to a $330 monthly payment for a "standard" loan repayment plan over 10 years. What monthly interest rate is being charged on this typical student loan?
3. Maintenance expenses for a bridge on the Ohio River are estimated to be $20,000 per year for the first 8 years, followed by two separate $100,000 expenditures in years 12 and 18. The expected life of the bridge is 30 years. If i = 6% per year, what is the equivalent uniform annual expense over the entire 30-year period?
4. A certain fluidized-bed combustion vessel has an investment cost of $100,000, a life of 10 years, and negligible market (resale) value. Annual costs of materials, maintenance, and electric power for the vessel are expected to total $10,000. A major relining of the combustion vessel will occur during the fifth year at a cost of $30,000. If the interest rate is 15% per year, what is the lump-sum equivalent cost of this project at the present time?
5. Suppose that annual income from a rental property is expected to start at $1,300 per year and decrease at a uniform amount of $50 each year after the first year for the 15-year expected life of the property. The investment cost is $8,000, and i is 9% per year. Is this a good investment? Assume that the investment occurs at time zero (now) and that the annual income is first received at EOY one.
6. A retail outlet is being designed in a strip mall in Nebraska. For this outlet, the installed fiberglass insulation to protect against heat loss in the winter and heat gain in the summer will cost an estimated $100,000. The annual savings in energy due to the insulation will be $18,000

at EOY one in the 10-year life of the outlet, and these savings will increase by 12% each year thereafter. If the annual interest rate is 15%, is the cost of the proposed amount of insulation justified?

7. A large automobile manufacturer is considering the installation of a high-tech material handling system for $30,000,000. This system will save $7,500,000 per year in manual labor, and it will incur $2,750,000 in annual operating and maintenance expenditures. The salvage value at the end of the system's 10-year life is negligible. If the company's hurdle rate (MARR) is 10% per year, should the system be recommended for implementation? Use New Present Worth method.

8. Determine the annual worth (AW) of the following engineering project when the MARR is 15% per year. Is the project acceptable?

	Proposal A
Investment cost	$10,000
Expected life	5-years
Market (salvage) value[a]	-$1,000
Annual receipts	$8,000
Annual expenses	$4,000

[a]A negative market value means that there is a net cost to dispose of an asset.

9. A plasma arc furnace has an internal combustion temperature of 7,000◦C and is being considered for the incineration of medical wastes at a local hospital. The initial investment is $300,000 and annual revenues are expected to be $175,000 over the six-year life of the furnace. Annual expenses will be $100,000 at the end of year one and will increase by $5,000 each year thereafter. The resale value of the furnace after six years is $20,000. What is the internal rate of return on the furnace?

10. A remotely situated fuel cell has an installed cost of $2,000 and will reduce existing surveillance expenses by $350 per year for eight years. The border security agency's MARR is 10% per year. What is the fuel cell's IRR if the salvage value is negligible?

Good Luck