

KATHMANDU UNIVERSITY
End Semester Examination
January/February 2024

Level : B.Arch.
Year : III
Time : 2 hrs. 30mins.

0 4 FEB 2024

Course : MGTS 305
Semester : I
F. M. : 40

SECTION "B"

Attempt *ALL* questions. Missing parameters can be assumed suitably.

1. a. Illustrate the importance of economics study to an Architectural Managers and explain various microeconomic and macroeconomic scenarios these managers face. [2]
- b. The table below shows the demand for prefab houses in Nepal for each of the last nine months. [4]

Month	1	2	3	4	5	6	7	8	9	10
Demand	10	12	13	17	15	19	20	21	20	

- i. What would be your forecast for the demand in month 10 using three- point moving average method?
- ii. Apply exponential smoothing with a smoothing constant of 0.3 to derive a forecast for the demand in month 10.
- iii. Among above two forecasts, which forecast do you prefer for month 10 and why?
- c. A firm is planning to manufacture a new product. The sales department estimates that the quantity that can be sold depends on the selling price. As the selling price is increased, the quantity that can be sold decreases. Numerically they estimate:
 $P = \$35 - 0.02Q$, Where P = selling price per unit, Q = quantity sold per year.
On the other hand, the management estimates that the average cost of manufacturing and selling the product will decrease as the quantity sold increases. They estimate $C = \$4Q + \8000 , where C = cost to produce and sell Q per year.
The firm's management wishes to produce and sell the product at the rate that will maximize profit, that is, where income minus cost will be a maximum. What quantity should the decision makers plan to produce and sell each year? [2]
2. a. Morris Glass Company has decided to invest funds for the next 5 years so that development of "smart" glass is well funded in the future. This type of new-technology glass uses electro- chrome coating to allow rapid adjustment to sun and dark in building glass, as well as assisting with internal heating and cooling cost reduction. The financial plan is to invest first, allow appreciation to occur, and then use the available funds in the future. All cash flow estimates are in \$1000 units, and the interest rate expectation is 8% per year.
Years 1 through 5: Invest \$7000 in year 1, decreasing by \$1000 per year through year 5.
Years 6 through 10: No new investment and no withdrawals.
Years 11 through 15: Withdraw \$20,000 in year 11, decreasing 20% per year through year 15.
Determine if the anticipated withdrawals will be covered by the investment and appreciation plans. [3.5]

- b. Consider two investments A and B with the following sequences of cash flows: [4.5]

n	Net Cash Flow	
	Project A	Project B
0	-\$120,000	-\$100,000
1	20,000	15,000
2	20,000	15,000
3	120,000	130,000

- i) Compute the IRR for each investment.
 ii) At MARR = 15%, determine the acceptability of each project.
 iii) If A and B are mutually exclusive projects, which project would you select?
- 3 a. A newly constructed bridge costs \$5,000,000. The same bridge is estimated to need renovation every 15 years at a cost of \$1,000,000. Annual repairs and maintenance are estimated to be \$100,000 per year. [3.5]
 (i) If the interest rate is 5%, determine the capitalized cost of the bridge.
 (ii) Suppose that, in (i), the bridge must be renovated every 20 years, not every 15 years. What is the capitalized cost of the bridge?
- b. The following costs are associated with three tomato-peeling machines being considered for use in a canning plant. [4.5]

	Machine A	Machine B	Machine C
First cost	\$52,000	\$63,000	\$67,000
Maintenance and operating costs	\$15,000	\$9,000	\$12,000
Annual benefit	\$38,000	\$31,000	\$37,000
Salvage value	\$13,000	\$19,000	\$22,000
Useful life (in years)	4	6	12

If the canning company uses an interest rate of 12%, which is the best alternative? Use NPW to make your decision.

- 4 a. A firm is purchasing production equipment for a new plant. Two alternative machines are being considered for a particular operation. Neither machine has any salvage value. Which machine should be purchased based on payback period method. [2]

	Tempo Machine	Dura Machine
Installed cost	\$30,000	\$35,000
Net annual benefit after all annual expenses have been deducted	\$12,000 the first year, declining \$3000 per year thereafter	\$1000 the first year, increasing \$3000 per year thereafter
Useful life, in years	4	8

- b. The city of Garden Ridge, Florida, has received designs for a new patient room wing to the municipal hospital from two architectural consultants. One of the two designs must be accepted in order to announce it for construction bids. The costs and benefits are the same in most categories, but the city financial manager decided that the estimates below should be considered to determine which design to recommend at the city council meeting next week and to present to the citizenry in preparation for an upcoming bond referendum next month. [3+3]

	Design A	Design B
Construction cost, \$	10,000,000	15,000,000
Building maintenance cost, \$/year	35,000	55,000
Patient usage copay, \$/year	450,000	200,000

The patient usage copay is an estimate of the amount paid by patients over the insurance coverage generally allowed for a hospital room. The discount rate is 5%, and the life of the building is estimated at 30 years.

- i. Use incremental B/C analysis to select design A or B.
 - ii. Once the two designs were publicized, the privately owned hospital in the directly adjacent city of Forest Glen lodged a complaint that design A will reduce its own municipal hospital's income by an estimated \$500,000 per year because some of the day-surgery features of design A duplicate its services. Subsequently, the Garden Ridge merchants' association argued that design B could reduce its annual revenue by an estimated \$400,000, because it will eliminate an entire parking lot used by their patrons for short-term parking. The city financial manager stated that these concerns would be entered into the evaluation as disbenefits of the respective designs. Redo the B/C analysis to determine if the economic decision is still the same as when disbenefits were not considered.
- 5 a. What is depreciable property? The RX Drug Company has just purchased a capsulating machine for \$76,000. The plant engineer estimates the machine has a useful life of 5 years and no salvage value. Compute the depreciation schedule for the machine using: [6]
- (i) Straight-line depreciation.
 - (ii) Sum-of-years'-digits depreciation.
 - (iii) Double declining balance depreciation.
- b. An equipment with initial cost \$900 has been purchased for use in a sand and gravel pit. The pit will operate for 5 years, while a nearby airport is being reconstructed and paved. Then the pit will be shut down, and the equipment removed and sold for \$70. Compute the unit-of-production depreciation schedule if the airport reconstruction schedule calls for 40,000 m³ of sand and gravel as follows.: [2]

Year	Required Sand and Gravel (m ³)
1	4,000
2	28,000
3	16,000
4	8,000
5	4,000

Use following formulas if needed:

Uniform series

$$(F/A, i, N) = \{(1+i)^N - 1\} / i$$

$$(P/A, i, N) = \{(1+i)^N - 1\} / \{i (1+i)^N\}$$

$$(A/F, i, N) = i / \{(1+i)^N - 1\}$$

$$(A/P, i, N) = i(1+i)^N / \{(1+i)^N - 1\}$$

Gradient series

$$(A/G, i, N) = [\{(1+i)^N - iN - 1\} / i \{(1+i)^N - 1\}]$$

$$(P/G, i, N) = [\{(1+i)^N - iN - 1\} / i^2 (1+i)^N]$$

$$(P/A_1, g, i, N) = [\{1 - (1+g)^N (1+i)^{-N}\} / (i - g)] \text{ if } i \neq g$$

$$(P/A_1, g, i, N) = \{N / (1+i)\} \text{ if } i = g$$

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Marks Scored:

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Date

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SECTION "A"

[20Q. × 0.5 = 10 marks]

Encircle the most appropriate option from the given choices

1. Economics can be best described as
 - a. production technology
 - b. consumption decisions
 - c. how society decides what, how, and for whom to produce
 - d. the best way to run society
2. The supply and demand model applies when three of the following four conditions are met. Which condition is not required?
 - a. There must be many buyers.
 - b. There must be many sellers
 - c. The buyers and sellers must trade an identical item
 - d. The item traded must be a product.
3. If you have the demand and supply function as: $Q_d = 600 - 30P$ and $Q_s = -300 + 120P$, the equilibrium price and output are
 - a. $P = \$6$ and $Q = 420$
 - b. $P = \$2$ and $Q = 540$
 - c. $P = \$10$ and $Q = 300$
 - d. $P = \$3.33$ and $Q = 500$
4. Which of the following is not a qualitative forecasting technique?
 - a. Surveys of consumer expenditure plans
 - b. Time-series analysis
 - c. Perspectives of foreign advisory councils
 - d. Consumer intention polling
5. The price of burgers increases by 22% and the quantity of burgers demanded falls by 25%. This indicates that demand for burgers is
 - a. unitarily elastic
 - b. perfectly elastic
 - c. inelastic
 - d. elastic
6. At 9 percent compounded annually, how long will it take \$200 to quadruple?
 - a. 12 years
 - b. 16 years
 - c. 48 years
 - d. 8 years
7. Carl is considering attending a concert with a ticket price of \$35. He estimates that the cost of driving to the concert and parking there will cost an additional \$20. In order to attend the concert, Carl will have to take time off from his part-time job. He estimates that he will lose 5 hours at work, at a wage of \$6 per hour. Carl's opportunity cost of attending the concert equals
 - a. \$85
 - b. \$65
 - c. \$55
 - d. \$30

8. If the payback period is 4 years and the uniform increases in cash flows per year is \$2750000, then the net initial investment can be
 a. \$10,511,000 b. \$12,105,000 c. \$1,100,000 d. \$11,000,000
9. The annual payment on a \$1,000 loan over a four-year period at 10% per year interest is \$315.42. The unrecovered balance immediately after the first payment has been made is nearest to:
 a. \$784.5 b. \$684.58 c. \$884.58 d. \$1,100
10. If you deposit \$1,000 now and are promised payments of \$500 three years from now and \$1,500 five years from now, the equation that will yield the correct rate of return is:
 a. $1000 = -500(P/F, i, 3) - 1500(P/F, i, 5)$ b. $-1000 = 500(P/F, i, 3) + 1500(P/F, i, 5)$
 c. $0 = -1000 + 500(P/F, i, 3) + 1500(P/F, i, 5)$ d. $0 = 1000 + 500(P/F, i, 3) + 1500(P/F, i, 5)$
11. The construction cost of a permanent park is \$600,000. Annual maintenance and operation costs are \$120,000 per year. At an interest rate of 10% per year, the capitalized cost of the park is nearest to:
 a. \$600,000 b. \$720,000 c. \$1,200,000 d. \$1,800,000
12. In independent projects evaluation, the results of internal rate of return and net present value lead to
 a. cash flow decision b. same decisions
 c. cost decision d. different decisions
13. Alternative A has a first cost of \$10,000, an annual operating cost of \$5,000 and a salvage value of \$2,000. Alternative B has an initial cost of \$25,000, an annual operating cost of \$1,000 and a salvage value of \$12,000. If both alternatives have a five-year life, the equation that will yield the rate of return on the incremental investment is:
 a. $0 = -\$15,000 - 4,000(P/A, i, 5) + 10,000(P/F, i, 5)$
 b. $0 = -\$15,000 + 4,000(P/A, i, 5) - 10,000(P/F, i, 5)$
 c. $0 = -\$15,000 + 4,000(P/A, i, 5) + 12,000(P/F, i, 5)$
 d. $0 = -\$15,000 + 4,000(P/A, i, 5) + 10,000(P/F, i, 5)$
14. The LCM of lives is required to perform an analysis for different life assets for the following methods
 a. AW and B/C b. Life cycle costs
 c. PW, AW, and IRR d. Payback period
15. A manufacturing process has fixed costs of \$20,000 per year with variable costs of \$15 per unit. If the company sells each unit for \$20, the number of units that must be sold each year in order to reach breakdown is nearest to
 a. 4,000 units b. 3,000 units c. 2,000 units d. 1,000 units
16. The difference between a modified B/C ratio and a conventional B/C ratio is that the modified ratio:
 a. Places M&O costs in the denominator
 b. Subtracts M&O (maintenance and operating) costs from the numerator
 c. Places M&O costs in the numerator and disbenefits in the denominator
 d. Places disbenefits and M&O costs in the denominator

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17. Depreciation is
- The residual value of a fixed asset plus its original cost.
 - The cost of a replacement for a fixed asset.
 - The cost of an asset wearing away.
 - The part of the cost of the fixed asset consumed during the period of use by the business
18. A depreciable asset with a three-year life has a first cost of \$30,000 with a \$6,000 salvage value. The machine's operating cost is \$10,000 in year one, \$12,000 in year two and \$14,000 in year three. According to the straight line method, the depreciation charge in year 2 is closest to:
- \$8,000
 - \$10,000
 - \$20,000
 - \$22,000
19. A company has purchased a die set for forming sheet metal automobile fenders. The set cost \$750,000 and has the capability of forming 125,000 parts. The set of dies have no value at the end of life. In the first year, 55,000 parts were manufactured. How much depreciation may be taken for that year?
- \$55,000
 - \$75,000
 - \$330,000
 - \$125,000
20. Which of the following is **NOT TRUE** for the variable cost?
- Variable cost is zero when output quantity is zero
 - Costs like insurance, license fees, etc are example of variable cost
 - Initially with increase in production variable cost per quantity reduces but beyond some point it increases sharply
 - Economic of scale greatly effects variable cost

