

KATHMANDU UNIVERSITY
End Semester Examination
July/August, 2024

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

09 AUG 2024

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

SECTION "B"
[40 marks]

Attempt ALL question. Missing parameters can be assumed suitably.

- 1 a. What is economics? Explain the importance of economic analysis. How can you compare economics with science? Explain [3]
- b. Use a supply and demand diagram to analyze each of the following scenarios. Explain briefly. Be sure to show how both the equilibrium price and quantity change in each case. [3]
- i. The economic downturn has led to more people staying home to watch movies, rather than go to a movie theater. Show how this change in behavior affects the market for microwave popcorn.
 - ii. Suppose that drought conditions in agricultural regions increase the costs of irrigation. How would this affect the market for fruits and vegetables?
 - iii. The New York Times recently reported on technological advances leading to an increase in the number of female cows. Female cows are valuable to farmers because they can be used to produce milk. However, while farmers now have more female cows available to produce milk, they are not happy. Use a supply and demand diagram for the milk market to explain why.
- c. You have been asked to estimate the per unit selling price of a new line of clothing. [2]
Pertinent data are as follows:
Direct labor rate: \$15.00 per hour
Production material: \$375 per 100 items
Factory overhead: 125% of direct labor
Packing costs: 75% of direct labor
Desired profit: 20% of total manufacturing cost
Past experience has shown that an 80% learning curve applies to the labor required for producing these items. The time to complete the first item has been estimated to be 1.76 hours. Use the estimated time to complete the 50th item as your standard time for the purpose of estimating the unit selling price.
- 2 a. A couple wants to begin saving money for their child's education. They estimate that \$10,000 will be needed on the child's 18th birthday, \$12,000 on the 19th birthday, \$14,000 on the 20th birthday, and \$16,000 on the 21st birthday. Assume an 8% interest rate with only annual compounding. The couple is considering two methods of setting aside the needed money. [4]
- i. How much money would have to be deposited into the account on the child's first birthday (note: a child's "first birthday" is celebrated one year after the child is born) to accumulate enough money to cover the estimated college expenses?
 - ii. What uniform annual amount would the couple have to deposit each year on the child's first through seventeenth birthdays to accumulate enough money to cover the estimated college expenses?

- b. Hayes, Angle, Reed, and Davis (HARD) a local concrete finishing company is [4]
 considering investing in newer, more productive curb forming equipment. Data
 concerning the three best alternatives are presented below.

	A	B	C
Initial Investment	50,000	22,000	15,000
Annual Net Income	5,093	2,077	1,643
Computed IRR	8%	7%	9%

Each alternative has a twenty year useful life with no salvage value. If the MARR for
 HARD is
 6.5%, which alternative should be chosen based on IRR method?

- 3 a. Samara, an engineer working for GE, invested her bonus money each year in company [3]
 stock. Her bonus has been \$8000 each year for the past 6 years (i.e., at the end of years
 1 to 6). At the end of year 7, she sold the stock for \$52,000 to buy a condo; she
 purchased no stock that year. In years 8 to 10, she again invested the \$8000 bonus.
 Samara sold all of the remaining stock for \$28,000 immediately after the investment at
 the end of year 10.

Determine the external rate of return, using the modified internal rate of return approach
 with an investment rate of 12% per year and a borrowing rate of 8% per year.

- b. A chemical processing corporation is considering three methods to dispose of a non- [5]
 hazardous chemical sludge: land application, fluidized-bed incineration, and private
 disposal contract. The estimates for each method are shown. Determine which has the
 least cost on the basis of a present worth comparison at 10% per year for the following
 scenarios:

- i. The estimates as shown below
- ii. The contract award cost (disposal contract) increases by 20% every 2-year renewal

	Land Application	fluidized-bed incineration	disposal contract
First cost, \$	-130,000	-900,000	0
Annual operating cost, \$ per year	-95,000	-60,000	-120,000
Salvage value, \$	25,000	300,000	0
Life, years	3	6	2

- 4 a. Which among the following project should be selected based on discounted payback method assuming a 10% discount rate? [3]

	Project A	Project B
Year	Cash flow	Cash flow
0	-\$1000	-\$1000
1	\$250	\$350
2	\$250	\$350
3	\$250	\$350
4	\$250	\$350
5	\$250	\$350
6	\$250	
7	\$250	

- b. Two municipal cell tower designs are being considered by the city of Newton. If the city expects a modified benefit- cost ratio of 1.0 or better, which design would you recommend based on the data that follows? Assume repeatability. The city's cost of capital is 10% per year. [5]

	Verizon	Cellgene
Initial investment (first cost)	\$75,000	\$175,000
Useful life in years	6	12
Market value at end of useful life	\$20,000	\$37,500
Annual benefits from operation	\$28,800	\$38,800
Annual operating expenses	\$9,800	\$11,300

- 5 a. What are the characteristics of depreciable asset? A machine costs \$5000 and has an estimated salvage value of \$1000 at the end of 5 years useful life. Compute the depreciation schedule for the machine by [4]
- Straight line (SL)
 - Double declining balance (DDB)
- b. The White Swan Talc Company purchased \$120,000 of mining equipment for a small talc mine. The mining engineer's report indicates the mine contains 40,000 cubic meters of commercial quality talc. The company plans to mine all the talc in the next 5 years as follows: [4]

Year	Talc Production (m ³)
1	15,000
2	11,000
3	4,000
4	6,000
5	4,000

At the end of 5 years, the mine will be exhausted and the mining equipment will be worthless. The company accountant must now decide whether to use sum of-years' - digits depreciation or unit-of-production depreciation. Compute the depreciation schedule for each of the two methods.

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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Exam Roll No. :

Time: 30 mins.

Registration No.:

Course : MGTS 305

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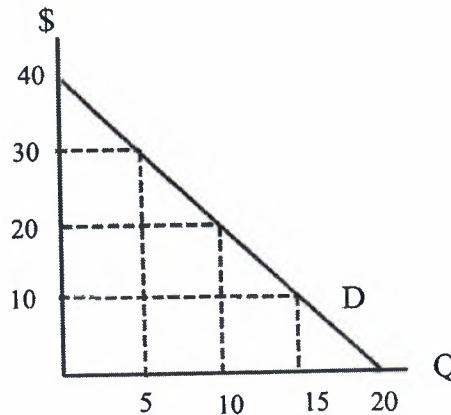
Date : 09 AUG 2024

SECTION "A"

[20 Q. × 1 = 20 marks]

Choose and encircle in the most appropriate option from each set of choices

- Economics is
 - applicable only when scarcity is not a problem.
 - the study of choice under conditions of scarcity.
 - fundamentally the same as sociology.
 - exclusively the study of business firms.
- In the figure below, if the price of this good falls from \$30 to \$20, but the consumer is prohibited from buying more than 5 units of the good, by how much will consumer surplus increase?



- \$100
 - \$75
 - \$50
 - \$25
- Suppose that, following a decrease in the supply of good X, we observe that the price of good Y decreases. If no other curves have shifted, which of the following can we infer?
 - Goods X and Y are complements.
 - Goods X and Y are substitutes.
 - Good X is an inferior good.
 - None of the above.
 - Suppose that you are willing to pay \$20 to see a movie on Saturday night. A ticket costs \$10, and the next-best alternative use of your time would be to go to dinner with a friend. The cost of the dinner is \$20 and you value the experience of having dinner with your friend at \$60. The opportunity cost of seeing the movie is equal to:
 - \$50
 - \$30
 - \$20
 - \$10
 - Suppose that a 10 percent increase in price results in a 50 percent decrease in quantity demanded. What does price elasticity of demand equal?
 - 0.2
 - 0.5
 - 5
 - 10

6. The length of time required for money to quadruple in value at an interest rate of 6% per year is nearest to:
- 30 years
 - 24 years
 - 18 years
 - 12 years
7. A cash flow sequence is described by $1000 + 50k$, where k is in years. The sequence extends from year one through year eleven. The interest rate is 8% per year. The value of G is:
- \$50
 - \$100
 - \$1000
 - \$1050
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
- \$10,511,000
 - \$12,105,000
 - \$1,100,000
 - \$11,000,000
9. A company plans to start a sinking fund so that it will have money to purchase a new 18-wheeler ten years from now. The cost of the truck is expected to be \$200,000 and the company uses an interest rate of 10% per year. If the company makes the first deposit one year from now, how much should each deposit be?
- \$12,540
 - \$15,390
 - \$17,480
 - \$32,540
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:
- $1000 = -500(P/F,i,3) - 1500(P/F,i,5)$
 - $-1000 = 500(P/F,i,3) + 1500(P/F,i,5)$
 - $0 = -1000 + 500(P/F,i,3) + 1500(P/F,i,5)$
 - $0 = 1000 + 500(P/F,i,3) + 1500(P/F,i,5)$
11. In an incremental investment rate of return analysis of multiple mutually exclusive alternatives that have different lives, the incremental investment cash flow must extend through:
- The longest life of all of the alternatives under consideration
 - The least common multiple of the lives of all of the alternatives under consideration
 - The life of the longer of the two alternatives under consideration
 - The least common multiple of the lives of the two alternatives under consideration
12. In a cost-capacity equation for estimation, an exponent value less than 1.0 indicates
- Diseconomies of scale
 - Economies of scale
 - Nonlinear relations
 - Space occupied
13. Alternative X has a first cost of \$10,000, an annual operating cost of \$5,000 and a salvage value of \$2,000. Alternative Y 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:
- $0 = -\$15,000 - 4,000(P/A,i,5) + 10,000(P/F,i,5)$
 - $0 = -\$15,000 + 4,000(P/A,i,5) - 10,000(P/F,i,5)$
 - $0 = -\$15,000 + 4,000(P/A,i,5) + 12,000(P/F,i,5)$
 - $0 = -\$15,000 + 4,000(P/A,i,5) + 10,000(P/F,i,5)$
14. An example of an indirect cost category is
- Material cost
 - Engineering changes
 - Quality control costs
 - Total plant cost

