Mark Scored:

KATHMANDU UNIVERSITY
End Semester Examination [C]
July, 2017

Level : B. E./B. Pharm./B. Tech. Course : MGTS 301
Year : III Semester : I
Exam Roll No. : Time: 30 mins. F. M. : 20
Registration No.: Date JUL: 0 7 2017

SECTION "A"
[20 Q. × 1 = 20 marks]

Encircle the most appropriate answers from the given choices.

1. The fixed costs incurred by a small genetics research lab are $200,000 per year. Variable costs are 60% of the annual revenue. If annual revenue is $300,000, the annual profit (loss) is most nearly:
a. $66,000 profit b. ($66,000) loss c. $80,000 profit d. ($80,000) loss

2. Opportunity costs arise in production because
a. resources are unlimited
b. resources must be shifted away from producing one good in order to produce another
c. wants are limited in society
d. monetary costs of inputs usually outweigh non-monetary costs

3. If an investment triples in value in seven years, the rate of return on the investment is nearest to:
a. 6% b. 17% c. 25% d. 35%

4. A company produces a single, high-volume product. One year its production volume was 780,000 units, its fixed costs were $3.2 million and its variable costs were $16 per unit. What was the company's average cost per unit produced?
a. $20.10 b. $16.20 c. $36.40 d. $4.10

5. A manufacturer produces and sells exactly 600,000 units of a single product annually. The fixed cost of the company is $3.6 million per year, and the variable cost is $47 per unit. In the coming year, the company is selling its product at a price of $56 per unit. Calculate the breakeven point (BEP) in units for the coming year.
a. 600,000 b. 800,000 c. 400,000 d. 770,000

6. What is defines as the analysis and evaluation of the monetary consequences by using the theories and principles of economics to engineering applications, designs and projects?
a. Economic Analysis b. Engineering cost analysis
c. Engineering economy d. Design cost analysis

7. What refers to the cumulative effect of elapsed time on the money value of an event, based on the earning power of equivalent invested funds capital should or will earn?
a. Present worth factor b. Interest rate
c. Time value of money d. Yield

8. Which one of the following is the cost driver of Turbine Engine?
a. Maximum thrust b. horsepower c. empty weight d. floor space

9. Suppose an investor wants to have $10 million to retire 45 years from now. How much would she have to invest today with an annual rate of return equal to 15 percent?
a. $18,561 b. $17,844 c. $20,003 d. $ 21, 34510

10. What is the IRR of the project with all negative cash flows?
a. infinity b. Zero c. undefined d. any negative values

11. A piece of equipment used in a business has a basis of $50,000 and is expected to have a $10,000 salvage value when replaced after 30,000 hours of use. Find its depreciation rate per hour of use.
a. $1.67 per hour b. $2.33 per hour c. $ 1.33 per hour d. $5 per hour

12. What is the decision rule of cost benefit analysis?
a. Select the project if the B/C ratio is greater than 1
b. Select the project if the B/C ratio is less than 1
c. Select the project if the B/C ratio is negative.
d. Select the project if the B/C ratio is 0

13. In present value method one has to account for
a. interest rate prevalent at a given time
b. exchange rate prevalent at a given time
c. sales tax rate prevalent at a given time
d. both income and sales tax rates prevalent at a given time

14. Model which refers possibility for management to conduct sensitivity analysis are considered as
a. investment planning models b. financial planning models
c. cost planning models d. revenues forecast models

15. A project has $15,000 in annual worth of benefits, $5,000 in annual worth of disbenefits and $5,000 in annual worth in cost. What is the benefit cost ratio?
a. 2 b. 1 c. 3 d. 0

16. Economic life is the period of time (years) of owing that result in the minimum:
a. Future worth b. Present worth
c. Equivalent uniform annual cost d. Fixed cost

17. Under which method the amount of depreciation expensed remains same throughout the useful life of a fixed assets.
a. Straight line method b. reducing balance method
c. no of units produced method d. machine hours method

18. If the projects are mutually exclusive projects, which of the following statement should be accepted based on the following IRR. (Assume Minimum attractive rate of return= 14%)
a. Project A, IRR of Project A equals 10% b. Project B, IRR of Project B equals 16%
c. Project C, IRR of Project C equals 14% d. Project D, IRR of Project D equals 15%

19. Suppose that a market survey has shown that the best competitor's selling price is $27.50 per assembly. If a profit margin of 10% is desired, determine a target cost for the throttle assembly.
a. $ 30.25 b. $24.75 c. $ 25 d.$ 30.55

20. Suppose that an aircraft manufacturer desires to make a preliminary estimate of the cost of building a 600 MW fossil fuel plant for the assembly of its new long distance aircraft. It is known that a 200 MW plant cost $ 100 million 20 years ago when the appropriate cost index was 400, and that cost index is now 1200. The cost factor for a fossil power plant is 0.79. What is the current cost of a 200 MW plant?
a. $714 million b. $ 600 million c. $ 1200 million d. $ 300 million

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Time : 2 hrs. 30 mins.

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Semester : I
F. M. : 55

SECTION "B"

Attempt *ALL* the questions. Missing parameters can be assumed suitable.

1. a. Explain why the subject of engineering economy is important to the practicing engineer. [2]

   b. You have been invited by friends to fly to Germany for October fest next year. For international travel, you apply for a passport that costs $97 and is valid for 10 years. After you receive your passport, your travel companions decide to cancel the trip because of "insufficient funds." You decide to also cancel your travel plans because traveling alone is no fun. Is your passport expense a sunk cost or an opportunity cost? Explain your answer. [2]

   c. A cell phone company has a fixed cost of $1,500,000 per month and a variable cost of $20 per month per subscriber. The company charges $39.95 per month to its cell phone customers
      i. What is the breakeven point for this company?
      ii. The company currently has 73,000 subscribers and proposes to raise its monthly fees to $49.95 to cover add-on features such as text messaging, song downloads, game playing, and video watching. What is the new breakeven point if the variable cost increases to $25 per customer per month?
      iii. If 10,000 subscribers will drop their service because of the monthly fee increase in Part (b), will the company still be profitable? [3]

   d. The structural engineering design section within the engineering department of a regional electrical utility corporation has developed several standard designs for a group of similar transmission line towers. The detailed design for each tower is based on one of the standard designs. A transmission line project involving 50 towers has been approved. The estimated number of engineering hours needed to accomplish the first detailed tower design is 126. Assuming a 95% learning curve,
      i. What is your estimate of the number of engineering hours needed to design the eighth tower and to design the last tower in the project?
      ii. What is your estimate of the cumulative average hours required for the first five designs? [3]

2. a. Three different bank loan rates for electric generation equipment are listed below. Determine the effective rate on the basis of the compounding period for each rate.
      i.8.75% per year, compounded quarterly.
      ii.9.25% per year, compounded monthly.
      iii.8.5% per year, compounded weekly.
      Which bank would you recommend? Why? [4]

   b. An industrial engineer is considering two robots for purchase by a fiber-optic manufacturing company. Robot X will have a first cost of $80,000, an annual maintenance and operation (M&O) cost of $30,000, and a $40,000 salvage value. Robot Y will have a first cost of $97,000, an annual M&O cost of $27,000, and a $50,000 salvage value. Which should be selected on the basis of a future worth comparison at an interest rate of 15% per year? Use a 3-year study period. [3]

c. When you take your first job, you decide to start saving right away for your retirement. You put $5,000 per year into the company's diamond saving plan, which averages 8% interest per year. Five years later, you move to another job and start a new diamond saving plan. You never get around to merging the funds in the two plans. If the first plan continued to earn interest at the rate of 8% per year for 35 years after you stopped making contributions, how much is the account worth? [3]

3. a. A telecommunications firm is considering a product expansion of a popular cell phone. Two alternatives for the cell phone expansion are summarized below. The company uses a MARR of 8% per year for decisions of this type, and repeatability may be assumed. Which alternative should be recommended and why? [6]

	Expansion A	Expansion B
Capital investment	$1,000,000	$1,250,000
Annual revenue	$760,000	$580,000
Annual expenses	$500,000	$360,000
Salvage value	$100,000	$150,000
Useful life	6 Years	8 Years

b. Two mutually exclusive alternatives for office building refrigeration and air conditioning are being investigated. Their relevant costs and lives are summarized as follows: [4]

	Absorption Chilling (AC)	Compression Chilling (CC)
Investment	$60,000	$80,000
Annual operating expenses	$60,000	$32,000
Salvage (market) value	$10,000	0
Useful life	6 years	6 years

4. a. An asset for drilling was purchased and placed in service by a petroleum production company. Its cost basis is $60,000, and it has an estimated MV of $12,000 at the end of an estimated useful life of 14 years. Compute the depreciation amount in the third year and the BV at the end of the fifth year of life by each of these methods: [4]

i. The Straight Line (SL) method.

ii. The 200% Diminishing Balance method with switchover to SL.

b. An $80,000 baling machine for recycled paper was purchased by the XYZ Company two years ago. The current MV of the machine is $50,000, and it can be kept in service for seven more years. MARR is 12% per year and the projected net annual receipts (revenues less expenses) and end-of-year market values for the machine are shown below. When is the best time for the company to abandon this project? [6]

End of Year	1	2	3	4	5
Net annual receipts	$30,000	$20,000	$18,000	$25,000	$42,000
Market value	$20,000	$22,000	$25,000	$20,000	$10,000

5. a. A retrofitted space-heating system is being considered for a small office building. The system can be purchased and installed for $120,000, and it will save an estimated 300,000 kilowatt-hours (kWh) of electric power each year over a six-year period. A kilowatt-hour of electricity costs $0.10, and the company uses a MARR of 15% per year in its economic evaluations of refurbished systems. The market value of the system will be $8,000 at the end of six years, and additional annual operating and maintenance expenses are negligible. Use the benefit–cost method to make a recommendation. [4]

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b. Consider a proposal to enhance the vision system used by a postal service to sort mail. The new system is estimated to cost \$1.1 million and will incur an additional \$200,000 per year in maintenance costs. The system will produce annual savings of \$500,000 each year (primarily by decreasing the percentage of misdirected mail and reducing the amount of mail that must be sorted manually). The MARR is 10% per year, and the study period is five years at which time the system will be technologically obsolete (worthless). The PW of this proposal is $PW(10\%) = -\$1{,}100{,}000 + (\$500{,}000 - \$200{,}000)(P/A, 10\%, 5) = \$37{,}236$. Determine how sensitive the decision to invest in the system is to the estimates of investment cost and annual savings. **[6]**

6. Write short notes on (*ANY TWO*) **[5]**

a. Consumer goods and Producer goods

b. Internal rate of return (IRR)

c. Learning curve