KATHMANDU UNIVERSITY
End Semester Examination
February, 2025

Marks Scored:

Level : B.Sc.
Year : III

Course : MGTS 301
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date 18 FEB 2025

SECTION "A"

[20 Q. × 0.5 = 10 marks]

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

1. A non-monetary increase in supply will lead to
   a. a decrease in the equilibrium price and an increase in the equilibrium quantity
   b. a decrease in the equilibrium price and a decrease in the equilibrium quantity
   c. an increase in the equilibrium price and an increase in the equilibrium quantity
   d. an increase in the equilibrium price and a decrease in the equilibrium quantity

2. Economics is _____
   a. Applicable only when scarcity is not a problem.
   b. related only profit making decision
   c. the study of choice under conditions of scarcity
   d. exclusively the study of business firms

3. Fit Rite Company manufactures a complete line of men's and women's shoes for independent merchants. The average selling price of its finished product is $85 per pair. The variable cost for this same pair of shoes is $58. The company incurs fixed costs of $170, 000 per year. What sales volume the firm must achieve to attain a profit $50,000?
   a. 4,444 pairs b. 6,296 pairs c. 2,588 pairs d. 8,148 pairs

4. The _____Market has few seller but they have large market share.
   a. Oligopoly b. Monopoly c. Monopolistic d. Perfect competition

5. You want to buy a ticket to see Broccoli Spears next month in Toronto. It will cost you $100 for the ticket plus $60 in gas. Your regular job is flipping Micky-D burgers at 10 hours a day, $10/hr. Your opportunity cost is:
   a. $160 b. $100 c. $260 d. $140

6. Betty receives $25,000 as a 21st birthday present. She decides to make regular deposits of 1,000 on her 22nd birthday, adding $200 more each year (1,200 on the 23rd etc... What is her future worth on her 56th birthday?
   a. 1000(P/A,6%, 34) +200(P/G,6%,34)
   b. 1000(P/A,6%, 34) +200(P/G,6%,34) + 25000(F/P,6%,34)
   c. 1000(P/A,6%, 34) +200(P/G,6%,34) + 25000(F/P,6%,35)
   d. (1000(P/A,6%, 34) +200(P/G,6%,34))(F/P,6%,34) + 25000(F/P,6%,35)

7. A bank interest account pays 0.75% per month. What is the effective annual interest rate?
   a. 1.38% b. 9% c. 13.82% d. 9.38%

8. GM Oshawa spends $500,000 annually for a mandatory safety inspection of its Impala assembly line. A new computer-based monitor would eliminate the need for the inspection. If GM's MARR is 10% a year, how much can GM spend on this new technology if it wants to recover its investment in 15 years?
a. $3,803,000 b. $15.886,240 c. $119,696 d. $2,088,625

9. If a company buys a bull dozer for $60,000 and rents it out at $15,000 per year, the length of time to recover the investment, at 10%, is
a. 4 years b. 5.1 years c. 4.8 years d. 5.35 years

10. Marie is sponsored by a local firm to go to UOIT. She can borrow any amount at no interest until she graduates and then she pays back the loan at 5% per year. She borrows $9,000 for the first 4 years. (Note that she borrows at the beginning of the year but pays money back at the end of the year). She wants to pay the loan off in 5 payments. Which of the following expresses the situation (assume a MARR of 5% too)?
a. PW = 36,000(A/P, 5%, 5)
b. PW = 9000[P/A, 5%, 4]
c. PW= 9000[1+ (P/A, 5%, 3)] – 36000(A/P, 5%, 5)(P/A, 5%, 5)(P/F, i5%4)
d. PW = 9000[1+(P/A, 5%, 3)] – 36000(A/P, 5%, 5)(P/F, 5%, 4)

11. Consider the following cash flow: (year) amount:
(0) -P; + (1)1,000; + (2) 850; + (3) 700 + (4) 550; + (5) 400; + (6) 400; + (7) 400; + (8) 400;
Which equation is correct? If MARR is 8%.
a. P = 1000(P/A, 8%,8) -150(P/G, 8%, 8) + 150(P/G, 8%, 5)(P/F, 8%,4)
b. P = 400(P/A, 8%, 8) + 600(P/F, 8%, 5) - 150(P/G, 8%,4)
c. P = 150(P/G, 8%, 4) + 850(P/A, 8%, 4) + 4000(P/A, 8%, 4)(P/F, 8%,4)
d. P = 1000(P/A, 8%,8) -150(P/G, 8%, 8) + 150(P/G, 8%, 4)(P/F, 8%,4)

12. Which ranking order is closest to the incremental B-C ratio analysis for the following mutually exclusive alternatives?

Alternative	A	B	C	D	E
Annual Benefits ($)	1800	5600	8400	2600	6600
Annual Cost ($)	2000	4200	6800	2800	5400

a. B → C → E b. B → E → C c. C → E → B d. E → C → B

13. IRR is a discount rate that makes the present value of cost
a. Equal to the present value of benefits
b. Equal to the present value of cash disbursement
c. Equal to the present value of salvage value of the project
d. Equal to the present value of cash outflow

14. PW and IRR give the conflicting decision in the case of mutually exclusive projects because of the assumption of different
a. Reinvestment b. MARR c. Salvage value d. Project life

15. Which of the following is true about the conventional and modified B/C ratios?
a. They use different equivalent worth methods.
b. They provide the same ratio values.
c. They provide the same conclusions.
d. They provide liquidity evaluation for public project.

18 FEB 2025

16. Typically, there are two alternatives in a replacement analysis. One alternative is to replace the defender now. What is the other alternative?
    a. Keep the defender until there is an improved challenger that is better than the current challenger.
    b. Keep the defender for another year and then re-examine the situation.
    c. Keep the defender for its remaining useful life.
    d. The alternative with longest useful life under consideration

17. A machine has a first cost of $15,000. At the end of 4 years, it can be salvaged for $3,500. What is the depreciation rate for Year 1 using Sum of the years digits method (SOYD)?
    a. 19.17% b. 23.33% c. 40% d. 30.67

18. Which depreciation method doesn't produce a declining pattern of depreciation over an asset's service life?
    a. Straight line method
    b. Diminishing balance method
    c. Sum-of the-digits method
    d. The unit of production method

19. What is the cost of Alt. Y that will make it at the breakeven point with Alt. X, assuming an 8% interest rate?

Alternatives	First Cost	Annual Benefit	Salvage Value	Useful life
X	$150	$40	$100	6 years
Y	?	$65	$200	6 years

    a. $97.936 b. $328.59 c. $98.529 d. $166.52

20. Sensitivity analysis is the process of determining
    a. the important input variables
    b. the important output variables
    c. the important input and output variables
    d. whether the boss is thick-skinned or not

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SECTION "B"
[6 Q. × 4 = 24 marks]

Attempt ANY SIX questions.

1. You deposit $10,000 annually into a life insurance fund for the next 10 years, after which time you plan to retire. Instead of a lump sum, you wish to receive annuities for the next 20 years. What is the annual payment you expected to receive beginning in year 11 if you assume an interest earning rate of 7 percent and 9 percent during the deposit period?

OR

Engineers at SeaWorld, a division of Buseh Gardens, Inc. have completed an innovation on an existing water sport ride to make it more exciting. The modification costs only $8,000 and is expected to last 6 years with a $1,300 salvage value for the solenoid mechanisms. The maintenance cost is expected to be high at $1,700 the first year and increased by 11% per year thereafter. Determine the equivalent present worth of the modification and maintenance cost if the interest rate is 8% per year.

2. Explain the various types of cost originate in manufacturing or construction work. And how sunk cost is different from opportunity cost?

OR

Miriam is interested in estimating the annual labor cost for a new production facility. She was able to obtain the following labor cost data. [2+2]

- Labor cost index value was at 124 ten years ago and is 188 today
- Annual labor costs for a similar facility were $575,500 ten years ago.
- Time required for 1st unit would be 32 minutes.

a. What would be the estimated labor cost according to the labor cost index?
b. What is the time required to produce the 100th unit of a production according to the learning curve rate of 80%?

3. A retrofitted space heating system is being considered for a small office building. The system can be purchased and installed for $150,000 and it will save estimated 500,000 kilowatt hours (kWh) of electric power each year over a decade. A kilowatt hour of electricity costs $0.12 and the company uses a MARR of 15 percent per year in its economic evaluation of refurbished systems. The market value of the system will be 7.5 % of the installed value at end of useful life, and additional annual operating and maintenance expenses are $22,000. Evaluate the system based on rate of return method. Is there any conflict in selecting the system based on benefit cost ratio method? Why or why not? [2+2]

P.T.O.

4. Consider the following alternatives. Assume 12% interest rate. [2+2]

Alternative	X	Y	Z
Initial Cost	$100,000	$150,000	$326,000
Uniform Annual Benefit	$16,000	$25,000	-
Annual cost	-	-	$8,000
Periodic upgrade cost	-	-	$42,000(every sixth year)
Useful Life in years	∞	15	92
Salvage Value	0	$10,000	0

a. Find the annual worth (AW) of alternative X and Y.

b. What must be the capitalized worth (CW) for alternative Z.

5. Acme Chemical borrowed the bank loan of $90,000 to buy the equipment at the rate of 10 percent interest rate. Which it thinks has a salvage value of $10,000 after 4 years. The equipment might be viable after year 4, the company prefers to be conservative and end all calculations at that time. Compute the depreciation schedule of the equipment under Sum-of-year-digits method and Declining balance method.

6. The new machine costs $10,000 and have operating cost 2,200 in first year then increases by 20% per year. Market value will be $6,000 after one year and will decline by 15% each year. The company expect the machine last for 5 years and MARR=15%. Find the economic service life of the new machine.

7. Write short notes on (**ANY TWO**)
   a. Law of demand and supply
   b. Break even analysis
   c. Self liquidating project

SECTION "C"

[2 Q. × 8 = 16 marks]

Attempt ANY TWO questions.

8. A company is planning to install a new automated plastic-molding press. Four different mutually exclusive presses are available. The initial investments, annual revenue and salvage value for these four alternatives are as follows:

Alternative	A	B	C	D
Initial investment	$350,000	$450,000	$600,000	$800,000
Annual revenue	$90,000	$100,000	$110,000	$165,000
Salvage Value	$50,000	$75,000	$75,000	$90,000

Recommend the best molding press using incremental rate of return analysis. Assume that useful life = 10 years for all projects and expected to earn at least 16% per year.

18 FEB 2025

9.

a. How capitalized cost is different from capitalized worth? [3]

b. Two mutually exclusive design alternatives are being considered. The estimated sales and cost data for each alternative are given in following table. Suppose that each design is still capable of producing 20,000 units per year but the estimated reject rate is different for each alternative. This means that the expected revenue will differ among the alternatives since only non defective units can be sold. Annual expenses are based on fixed and variable costs. Determine which alternative is preferable. Give the reason of your choice. [5]

Alternatives	Design-1	Design-2
Investment cost	$60,000	$40,000
Reject rate	0.50%	1.20%
Unit selling price per unit	$4.80	$5.25
Variable costs per unit	$0.90	$1.60
Annual expenses (fixed)	$30,000	$25,000
Market value	$10,000	$6,500
Useful life	4 years	6 years
MARR	15%	

10. It is given that the project initial investment required $200,000 and has a salvage value of $22,000 at the end of 8 years useful life. The project generates the annual net revenue will be $62,000, It is assume that the MARR = 12%.

Perform a sensitivity analysis over a range of ±15% with 5% increment using FW formulation and suggest which of the considered parameters of the project is more sensitive and why? Plot the sensitivity graph (spider plot).

a. Investment (I)

b. Annual Net Revenue (R)

c. Useful life (N)

Use following formula if needed:

1. $(F/A,i\%,n)= \frac{(1+i)^n-1}{i}$
2. $(P/A,i\%,n)= \frac{(1+i)^n-1}{i(1+i)^n}$
3. $(P/G,i\%,n)= \frac{(1+i)^n-in-1}{i^2(1+i)^n}$
4. $(P/A,g,i\%,n)= \frac{\left[1-\left(\frac{1+g}{1+i}\right)^n\right]}{i-g}$

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SECTION "A"

[20 Q. × 0.5 = 10 marks]

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

1. The NBC 206: Architectural Design Requirements states that the tread for the stair of a residence shall not be less than:
   a. 250mm b. 275mm c. 280mm d. 300

2. A single-flight staircase with 11 numbers of risers and a landing will need a total length of stairwell if the riser is 160mm and the tread is 280mm and the landing has a width of 900mm:
   a. 3.5m b. 3.7 m c. 3.9m d. 4.0m

3. A lintel band of 230 width and 150mm depth is provided. The depth of the beam or lintel is important to resist the load. So, in case of an earthquake, the depth of the lintel with which it resists the load is considered to be:
   a. 125mm b. 150mm c. 225mm. d. 230mm

4. The minimum depth at the edge of an RCC foundation pad recommended by the NS and IS codes is.
   a. 100mm. b. 150mm. c. 200mm. d. 250mm.

5. In two-ways RCC slab, the main reinforcement bottom bars are laid first.
   a. Along short span. b. Along long span.
   c. Alternatively long and then short. d. whichever is convenient.

6. Voids between stone soling or brick dry soling are filled with sand and compacted by:
   a. Vibration. b. Compactor.
   c. By pouring water on it. d. Monkey jumper.

7. If any RCC framed building is designed with the concrete M25 ($25N/mm^2$), you would use the ratio of cement, sand, and aggregate as follows:
   a. 1:3:4 b. 1:2:4 c. 1:1.5:3 d. 1:1:2

8. In a circular RCC column, the longitudinal (main) bars shall be less than:
   a. 4 number of bars. b. 6 numbers of bars.
   c. 8 numbers of bars. d. 9 numbers of bars,

9. In Steel structure, the joints connected with rivets or bolt are considered:
   a. Hinged connection. b. Rigid connection.
   c. Non-rigid connection. d. Partially rigid connection.

10. The lapping of the top reinforcement bars in the RCC beam is recommended at the mid-span because this region has:
a. Maximum tensile stress at the top. b. Neither tension nor compression.
c. Maximum tensile stress at the bottom. d. Only shear stress.

11. An RCC column with a section of 350x450 that is 4.10m high is considered as.
a. Short column. b. Long column. c. Week column. d. Balanced column.

12. Bottom formwork of a RCC staircase with less than 4.5 m. span can be removed after:
a. 2 days. b. 7 days. c. 14 days. d. 21 days.

13. A sitting angle cleat to support the steel beam at the steel column from:
a. Side of the beam at web. b. From the top.
c. From the bottom. d. Splice at the webs.

14. Reinforcement bars of the RCC slabs are bent up (curtailed) at the discontinuous edge at the distance of
a. 0.15 L. b. 0.25L. c. 0.3 L. d. 0.35 L.

15. Fibre cement board is made of cement reinforced with:
a. Cellulose fibre b. Iron fibre. c. Carbon fibre. d. Glass fibre.

16. Cement Board Partition wall is fixed on:
a. Metal studs. b. Timber frame.
c. Light steel angle frame. d. Aluminium frame.

17. Tempered / Toughened glass are stronger than ordinary glass by:
a. 3 times. b. 4 times. c. 5 times. d. 6 times

18. A ceiling with curved moulding that starts from the main walls of the room up to the actual ceiling, creating a round concave surface at the side is called:
a. Vaulted ceiling. b. Coffered ceiling. c. Coved ceiling. d. Tray ceiling.

19. Queen post steel truss is used for a maximum span of:
a. 6 m. b. 8 m. c. 10 m. d. 15 m.

20. The joints in the Aluminium Composite Panel (ACP) are filled with 'Baker Rod' and then sealed with:
a. Silica. B. Silicon c. Cellulose glue. d. Wall putty.