Menoufiya University
Faculty of Engineering
Shebin El- Kom
Second Semester(Jun) Examination
Academic Year: 2014-2015
Date: 30/5/2015

Minufiya University

Dept.: Production Engineering
Year : Post-Graduate Diploma
Subject: Engineering Economy
Code : PRE 520
Time Allowed: 3 hours
Total Marks : 100 Marks

*Allowed Tables and Charts: Tables -Interest Factors for Discrete Compounding*
*Examiner: Dr/ Mohamed Hesham Belal.*

## *Answer All The Following Questions:*

### *Question No.(1):* [ 25 Mark]

(a)- Write notes on the Economic Concepts: Engineering Economy – Cash flow diagram – Feasibility Studies. [5]

(b)- The construction of a road is cost 7,000,000 L.E., while its maintenance costs as follows: annually 30,000 L.E. and periodically for asphalt is 80,000 L.E. every three years. Note that the annual rate of interest is 6% and the road project's has been taken as long-live project. What is the capital cost and the annual equivalent costs. [10]

(c)- An inventor is considering a business opportunity which requires the receipts and disbursements shown below.

| End of Year | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Disbursements(L.E.) | 100,000 | 90,000 | 50,000 | 100,000 | 0 | 0 |
| Receipts(L.E.) | 0 | 10,000 | 100,000 | 150,000 | 50,000 | 120,000 |

1- Draw the net cash flow for this investment opportunity,
2- Would you recommend investing in this project , if the MARR = 9% , using Discounted payback period method. [10]

### *Question No.(2):* [ 25 Mark]

(a)- Define the different methods for economical assessment of projects, Stating for these methods the decision rule for a single project. [7]

(b)- A company needs to buy a new production line for brick. There are two proposals available to do the same job: A- Automatic production line, B- Half automatic production line. The next table has the cash flow money for the two proposals.

| Proposal | First Cost (L.E.) | Annual operation cost (L.E.) | Annual labor cost (L.E.) | Salvage value (L.E.) | Estimated life (years) |
|---|---|---|---|---|---|
| A | 260,000 | 25,000 | 30,000 | 40,000 | 14 |
| B | 100,000 | 15,000 | 60,000 | 10,000 | 7 |

Which one can be chosen to have economical feasibility if the annual rate of return is 11% by using: 1- The Present Worth Value method,
2- The Annual Equivalent Value method, and
3- The Benefit-Cost Ratio method. [18]

## Question No.(3): [ 25 Mark]

(a)- Determine diagrammatically the elements of costs to state the selling price. [5]

(b)- A project needs to buy a new equipment with first cost 255,000 L.E. The annual return for this equipment in the first year is 60,000 L.E., while it decreases by amount 5,000 L.E annually. The estimated salvage value is 30,000 L.E at the end of 9 years. Use the present worth value method to:

1- indicate the sensitivity of the MARR value which fluctuates between 9% and 12%,

2- calculate the internal rate of return for this project and the conditions to have economical feasibility. [10]

(c)- Two alternatives are available to construct a new production line for brick and do the same job. If the two bids are : a- Automatic production line, b- Half automatic production line. The principle data for these bids are given in the next table. [10]

| Production Line | Depreciation (L.E./year) | Operation Cost (L.E./year) | Variable Cost (L.E./ton) |
|---|---|---|---|
| Automatic | 310,000 | 60,000 | 32 |
| Half Automatic | 208,000 | 36,000 | 68 |

1- How much brick must be product per year for the two bids to be equal?

2- Which bid can be chosen to have economical feasibility if the estimated annual production quantity: (i)- 2,500 ton, or (ii)- 4,200 ton?

3- Find the profit for the above two cases if the sold selling price is equally 180 L.E./ton.

## Question No.(4): [ 25 Mark]

(a)- What are meant by: Sensitivity Analysis – the Inventory and its important. [5]

(b)- A truck which cost 46,000 L.E. has an estimated useful life of 10 years and estimated salvage value of 9,600 L.E. What is the annual depreciation charge and book value at the end of the sixth year using: 1- Straight Line method, 2- Declining balance method, 3- Sum-of-years digit method. [10]

(c)- The demand for plastic components for a manufacturing company is 560 units per week. The production manager has estimated that the production cost is 5 L.E/ unit, the setup costs is 215 L.E/ production run and holding cost is estimated at 1.8% of unit cost per month. The production manager stated that the production rate is 700 units/day. Assume 320 days/ year and 52 weeks/ year.

*Calculate:* 1- The optimum production quantity per run,

2- The optimum number of production runs per year and the cycle time,

3- The total annual inventory cost,

4- The reorder point if the lead-time is 11 day.

5- Draw the inventory model showing all the information on it. [10]

*With my best wishes*

| This exam measure the following ILOs | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Question No. | Q1-a | Q2-a | Q3-a | Q4-a | Q1-b | Q2-b | Q3-b | Q4-b | Q1-c | Q2-c | Q3-c | Q4-c |
| | a-1 | a-3 | a-4 | a-3 | b-1 | b-5 | b-1 | b-5 | c-1 | c-2 | c-1 | c-2 |
| Skills | Knowledge & Understand | | | | Intellectual | | | | Professional | | | |