

Model answer of 1st term exam

2008 - 2009

Engineering economy and financing

2nd year civil

Question (1)

A- As a result of the economic world crisis, individuals consume amounts of many commodities \Rightarrow unexpected reduction in demand. such reduction forces many world firms (such as world car firms) to:

① lay off the temporal employees (workers). That is why the unemployment rates are expected to increase.

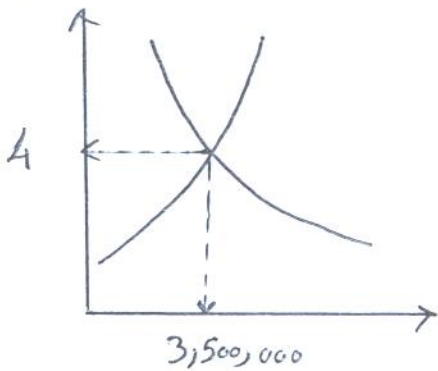
② reduce their production rates.

⑤

B-

$Q_s - Q_D$

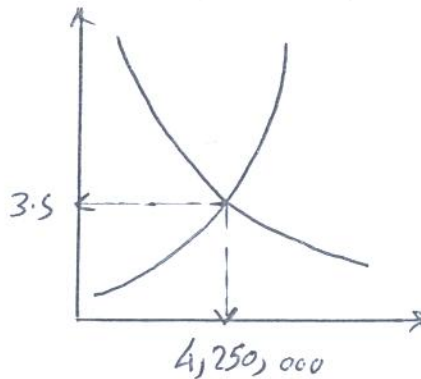
750,000	downward
0.0	Equilibrium
-1,500,000	upward
-4,000,000	upward
-7,500,000	upward



⑤

$Q_{s1} - Q_D$

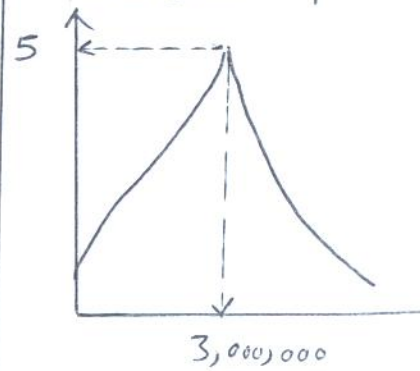
1,750,000	downward
1,000,000	downward
-500,000	upward
-3,000,000	upward
-5,500,000	upward



⑤

$Q_{s2} - Q_D$

0.0	Equilibrium
-1,000,000	upward
-3,000,000	upward
-5,750,000	upward
-8,000,000	upward



⑤

Question (2)

A

2008

$$F.C.M_{2008} = 0.3(25) + 0.2(24) + 0.2(80) + 0.3(30) = 37.30$$

$$F.U.S.P_{2008} = 0.3(100) + 0.2(120) + 0.2(200) + 0.3(300) = 184$$

$$\text{Break even volume}_{2008} = \frac{328000}{37.30} = 8793.56 \approx 8794 \text{ units } \textcircled{2}$$

$$\begin{aligned} \text{Profit}_{2008} &= 10,000(184) - [328000 + 10,000(146.7)] \\ &= \$45,000 \textcircled{2} \end{aligned}$$

$$\text{Break even sales revenues}_{2008} = \$1618096 \textcircled{2}$$

2009

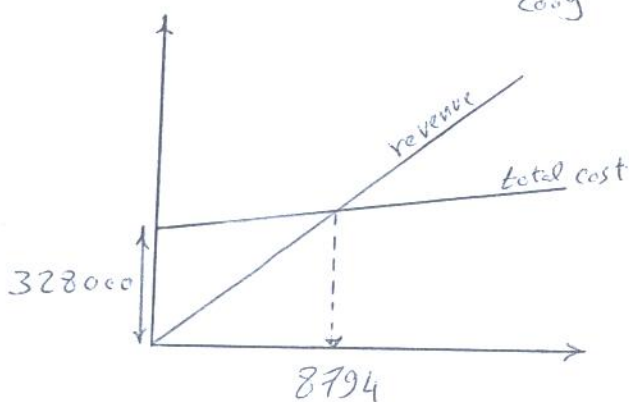
$$F.C.M_{2009} = 0.3(25) + 0.2(24) + 0.3(80) + 0.2(30) = 42.30$$

$$F.U.S.P_{2009} = 0.3(100) + 0.2(120) + 0.3(200) + 0.2(300) = 174$$

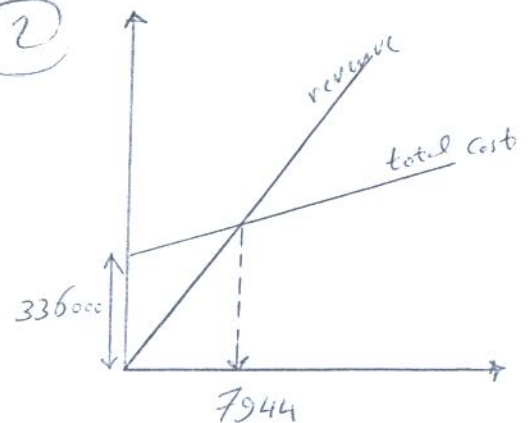
$$\text{Break even volume}_{2009} = \frac{336000}{42.30} = 7943.26 = 7944 \text{ units } \textcircled{2}$$

$$\begin{aligned} \text{Profit}_{2009} &= 10,000(174) - [336,000 + 10,000(131.70)] \\ &= \$87,000 \textcircled{2} \end{aligned}$$

$$\text{Break even sales revenues}_{2009} = \$1382256 \textcircled{2}$$



(2008)



(2009)

2.

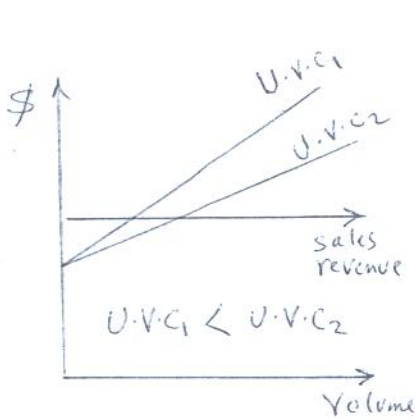
$$\text{Profit}_{2008} = \$45,000$$

$$\text{Profit}_{2009} = \$87,000$$

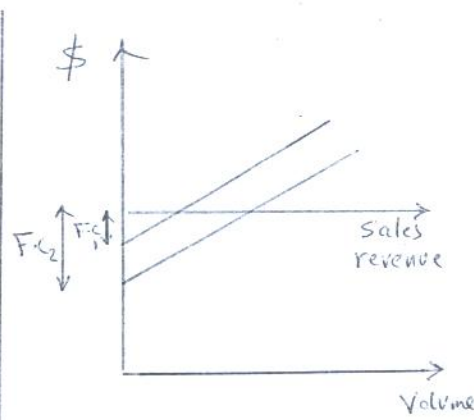
3. The profit for the two years is different because of:

- difference in associated Fixed cost, (2)
- difference in sales mix.

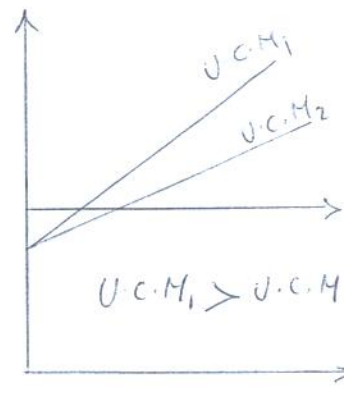
B



U.V.C
(2)



Fixed Cost
(2)



U.C.M
(2)

Question (3)

$$A- \quad i_e = \left(1 + \frac{0.12}{4}\right)^4 - 1 = 0.1255 \quad (A)$$

$$P = 100,000 \left[\frac{(1 + 0.1255)^{10} - 1}{0.1255(1 + 0.1255)^{10}} \right] - 5000 \left[\frac{(1 + 0.1255)^{10} - 1}{(0.1255)^2 (1 + 0.1255)^{10}} \right]$$

$$= 552525.2288 - 97985.81 = \$454539.41 \quad (B)$$

B-

$$i_e = e^{0.1} - 1 = 0.1052 \quad (4)$$

$$P = 30,000 \left[\frac{(1 + 0.1052)^{20} - 1}{0.1052(1 + 0.1052)^{20}} \right] - 10,000 \left[\frac{(1 + 0.1052)^{10} - 1}{0.1052(1 + 0.1052)^{10}} \right]$$

$$= 246597.6965 - 60096.706 = \$186500.99 \quad (6)$$

Question (4)

1-

$$\begin{aligned} E_{PS} &= 30 \left[\frac{(1+0.2)^{16} - 1}{0.2} \right] - 30 + 5 \left[\frac{(1+0.2)^6 - 1 - 6 \times 0.2}{(0.2)^2} \right] (1+0.2)^{10} \\ &= 2623.264 - 30 + 5 \times 8.325 = \$3201.58 \end{aligned}$$

(4)

2-

$$\begin{aligned} E_{PS} &= 3201.58 - 30 \left[\frac{(1.20)^3 - 1}{0.2} \right] (1.20)^4 \\ &= \$2975.15 \end{aligned}$$

(4)

3-

$$\begin{aligned} E_{PS} &= 30 \left[\frac{(1+0.2)^{16} - 1}{0.2(1+0.2)^{16}} \right] + 5 \left[\frac{(1+0.2)^6 - 1 - 6 \times 0.2}{(0.2)^2 (1+0.2)^6} \right] + 5 \left[\frac{(1+0.2)^6 - 1 - 6 \times 0.2}{(0.2)^2 (1+0.2)^6} \right] (1+0.2)^{-6} \\ &= 141.887 + 32.903 + 5.314 = \$180.10 \end{aligned}$$

(4)

4-

$$E_{PS} = 180.10 - 30 \left[\frac{(1+0.2)^4 - 1}{0.2(1+0.2)^4} \right] (1+0.2)^{-6} = \$154.091$$

(4)

5-

$$E_{PS} = 30 \left[\frac{(1+0.2)^{16} - 1}{0.2(1+0.2)^{16}} \right] (1+0.2)^{10} = \$878.53$$

(4)

6-

$$E_{PS} = 878.53 - 30 \left[\frac{(1+0.2)^3 - 1}{0.2(1+0.2)^3} \right] = \$815.33$$

(4)

Question(5)

A-

Owner

(2)

Public

* Sources of funds

- bonds
- Tax revenues
- Grants
- Loans

* exemption from taxes

* Social benefits
important justification

* MARR \Rightarrow much lower

Private

* Major mechanisms

- Equity \Rightarrow stock
issuance
- Debt \Rightarrow
borrow money
bonds

* Because of higher costs
and risks, require higher
return

* high MARR

(2)

Contractor

- * Payment schedule
 - Break out payments
into components
 - often some compromise
between contractor and
owner
 - Architect certifies
progress
 - retention on payment
(about 10%)
- * Contractors frequently
borrow from banks
- * Some owners may assist
in funding

B-

* The objective of a feasibility study is to find out if an information system project can be done, and if so, how.

A feasibility study should tell management team:

- whether the project can be done
- what are alternative solutions
- what are the criteria for choosing among them
- Is there a preferred alternative?

* Dimensions of feasibility

- Operational
- Technical
- Economic
- Schedule

(2)

C-

1- Using MARR = 15%

Project (1)

$$NPV_1 = 20 \left[\frac{(1+i)^9 - 1}{i(1+i)^9} \right] + 10 \left[\frac{(1+i)^9 - 1}{i(1+i)^9} \right] (1+i)^{-9} - 100$$
$$= \$ 8.9954 \quad (3.5)$$

Project (2)

$$NPV_2 = 25 \left[\frac{(1+i)^9 - 1}{i(1+i)^9} \right] + 5 \left[\frac{(1+i)^9 - 1}{i(1+i)^9} \right] (1+i)^{-9} - 100$$
$$= \$ 26.071 \quad (3.5)$$

As Project (2) has a higher net present value, it should be selected.

2- To find IRR for each project

Project (1)

i	NPV	
16%	4.24	\Rightarrow IRR \approx 17%
17%	-0.156	

(3.5)

Project (2)

i	NPV	
21%	1.14	\Rightarrow IRR \approx 21.5%
22%	-2.18	

(3.5)