UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2013/2014

COURSE NAME	:	ENGINEERING ECONOMY
COURSE CODE	:	BPK30902
PROGRAMME	:	BEJ/BEV/BDC/BDD/BDM/BNB
EXAMINATION DATE	:	JUNE 2014
DURATION	:	2 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

Q1 (a) The equipment required to place 160 cubic milimetre of concrete is two (2) gasoline engine vibrators and one (1) concrete pump. The vibrators cost RM 76 per day and the concrete pump costs RM 580 per day.

Estimate:

(i) the cost of the equipment per cubic milimetre of concrete per day.

(3 marks)

(ii) the equipment cost for placing 56 cubic milimetre of concrete per day.

(2 marks)

(b) Five years ago, CDE Company has invested in a machinery costing RM 650,000 with allocation of a fixed depreciation value of RM 65,000 or 10 percent per year. The company is about to replace the old machinery with a brand new fully computerised machinery. The old machinery was sold at RM 75,000 to a SME company.

Determine the value of the following costs:

(i)   Cash Cost
(ii)   Book Cost
(iii)   Sunk Cost
(iv)   Opportunity Cost
(v)   Standard Cost

(10 marks)

(c) Cost for a generator set of 1200-KW was RM 75,000 ten years ago while the cost index for this generator was 186 and is now 370 with 0.80 cost capacity factor. Your company is considering a 3000-KW and 3600-KW unit of the same general design to power a small-medium isolated plant. All the models required an additional pre-compressor, which currently costs RM 28,500 each.

(i) Calculate the total cost of the 3000-KW unit and 3600-KW unit.

(8 marks)

(ii) Suggest the best alternative if given limited budget of RM 350,000 only.

(2 marks)

Q2 (a) An aluminium supply company plans to add a new aluminium smelting machines into existing production processes that has been suggested by the company's engineer. The machine has a life span of 3 years and requires an initial cost of RM 100,000. Annual operating cost is RM 15,000. It is expected that at the end of the life of this machine, it can be sold at RM 25,000.

Evaluate the investment based on future worth (FW) method with an expected MARR of 15% per year with a proper cash flow diagram.

(10 marks)

(b) We need an early estimating using factor technique for capital expenditure of new factory consisting of 2,800 sq meters, three units of warehouse, two cool rooms and a loading facility. The unit's factors given are RM 112 per sq meter, RM 28,000 per unit, RM 13,000 per cool room and RM 8,000 per loading facility.

Additional to that, estimating cost for working capital as to run the factory for nine (9) months are also needed. The costs included are raw materials of RM 23,000 per month, labor wages of RM 7,000 per month, utilities expenses of RM 1,500 per month, fixed loan repayment of RM 3,225 per month, and administration salary of RM 2,750 per month. Contingency expenses of ten percent (10%) from the total working capital estimated should also be included.

Demonstrate the total cost estimation using appropriate table.

(15 marks)

Q3 A highway company is considering a project of constructing a new highway road from Johor Bahru, Johor to Kota Bahru, Kelantan. The 500 kilometre project will be started with purchasing of land from local owner and state government costing about RM 26 million. Cost of construction is estimated to be RM 72 million and yearly maintenance is about RM 2 million. A traffic control building and sophisticated equipment should also be considered with a cost of RM 4 million and RM 1 million per year maintenance expenditures. Some construction equipments will be sold at the end of construction period at the market value of RM 13 million.

In addition, yearly toll fees will be collected amounting to RM 9 million, petrol consumptions save by the road users for RM 4 million, revenues received through the direct and indirect businesses of RM 5 million, and fees collected by the local and state authorities of RM 3 million.

(a) Determine the value of Total Cost, Benefit and Disbenefit from the above statement.

(9 marks)

(b) Apply the B-C ratio method for both conventional and modified cases using PW and AW methods with the study period of 30 years and a MARR of 20% per year. Determine whether the company should proceed with the highway road project.

(16 marks)

Q4 The Life Cycle Cost is refers to a summation of all the costs related to its life spin and may be divided into two general phases.

Differentiate each of the time periods within the related phases with suitable cost table and graph using the following information activities as per table **Q4** if the total project investment received is RM 100,000.

Table Q4: Cost Distribution of Project Activities

Cost Activities	RM
1st period - Cost for feasibility Study	5,000
2nd period- Cost for development of prototype and testing	10,000
3rd period - Cost for details design planning	15,000
4th period - Cost required for working capital	20,000
5th period - Costs for maintenance & upgrade service	30,000
6th period - Cost for Disposal	10,000

(25 marks)

-END OF QUESTIONS-

FINAL EXAMINATION

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LIST OF FORMULA

1. $C_B \quad = C_k\,(I_n/I_k)$

2. $C_A \quad = C_B(S_A/S_B)^X$

3. Conventional B-C ratio with PW

    $\text{B-C} = \text{PW(B)} \div [(I - \text{PW(MV)}) + \text{PW(O\&M)}]$

4. Modified B-C ratio with PW

    $\text{B-C} = [\text{PW(B)} - \text{PW(O\&M)}] \div [I - \text{PW(MV)}]$

5. Conventional B-C ratio with AW

    $\text{B-C} = \text{AW(B)} \div [\text{CR} + \text{AW(O\&M)}]$

6. Modified B-C ratio with AW

    $\text{B-C} = [\text{AW(B)} - \text{AW(O\&M)}] \div \text{CR}$

LIST OF DISCRETE COMPOUNDING

1. (F/P, 15%, 3)   :   1.5209
2. (P/F, 15%, 3)   :   0.6575
3. (F/A, 15%, 3)   :   3.4725
4. (P/A, 15%, 3)   :   2.2832
5. (A/F, 15%, 3)   :   0.2880
6. (A/P, 15%, 3)   :   0.4380
7. (F/P, 20%, 30)   :   237.3763
8. (P/F, 20%, 30)   :   0.0042
9. (F/A, 20%, 30)   :   1181.8816
10. (P/A, 20%, 30)   :   4.9789
11. (A/F, 20%, 30)   :   0.0008
12. (A/P, 20%, 30)   :   0.2008