

**CONFIDENTIAL**



**UTHM**  
Universiti Tun Hussein Onn Malaysia

**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER II  
SESSION 2014/2015**

COURSE NAME : ENGINEERING ECONOMY  
COURSE CODE : BEE 31902  
PROGRAMME : BACHELOR OF ELECTRICAL  
ENGINEERING WITH HONOURS  
AND BACHELOR OF ELECTRONIC  
ENGINEERING WITH HONOURS  
EXAMINATION DATE : JUNE 2015 / JULY 2015  
DURATION : TWO HOURS  
INSTRUCTION : ANSWER ALL QUESTIONS

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

**CONFIDENTIAL**

- Q1** (a) Seven (7) years ago, MEE Company has invested in an equipment costing RM 425,000 with allocation of a fixed depreciation value of RM 42,500 or 10% per year. The company is about to replace the old equipment with a brand new fully computerised machinery. The old machinery was sold at RM 25,000 to a BEE company.

Determine the value from each of the following costs;

- (i) Cash cost
- (ii) Book cost
- (iii) Sunk cost
- (iv) Opportunity cost; and
- (v) Standard cost

(5 marks)

- (b) Your construction firm, U&I Builder was awarded with a job to carry out road surfacing of a new Ledang-Segamat Highway. **Table Q1** shows the costs involved if you set up your asphalt-mixing plant equipment at the site. Estimated cost will be RM 4.50 per cubic meter (m<sup>3</sup>) to haul the asphalt-paving material from the mixing plant to the job location.

**Table Q1: Set Up Cost of Asphalt-Mixing Plant Equipment**

Cost factor	Parameter
Average hauling distance	6 km
Monthly rental of site	RM 5,000
Cost to set up and remove equipment	RM 34,000
Hauling expense	RM 4.50/m <sup>3</sup>
Flag person	RM 100/day
Authority permit	RM 500
Monthly administration staff salaries	RM 900

The job requires 200,000 cubic meters (m<sup>3</sup>) of asphalt-paving material for every kilometre. Your company are given 28 weeks (6 working days per week). Determine the total of fixed costs and variable costs respectively for the project.

(10 marks)

- (c) Cost for a 1200-kw boiler set was RM 125,000 15 years ago while the cost index for this generator was 201 and is now 623 with 0.90 cost capacity factor. Your company is considering a 3000-kw and 3600-kw unit of the same general design to power plant machineries. All the models required an additional component, which currently costs RM 80,000 each.

Calculate the total cost of the 3000-kw unit and 3600-kw unit and suggest the best alternative if given limited budget of RM 1,000,000 only.

(10 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 machine are capable to generate annual income of RM 135,000 and by 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 8,000 sq meters, four units of warehouse, two cool rooms and a loading facility. The unit's factors given are RM 145 per sq meter, RM 32,000 per unit, RM 16,000 per cool room and RM 9,000 per loading facility.

Additional to that, estimating cost for working capital as to run the factory for six (6) months are also needed. The costs included are raw materials of RM 28,000 per month, labour wages of RM 9,000 per month, utilities expenses of RM 2,500 per month, fixed loan repayment of RM 3,000 per month, and administration salary of RM 3,250 per month. Contingency expenses of 10% from the total working capital estimated should also be included.

Show the total cost estimation using appropriate table.

(15 marks)



**Q3** GST Corporation is considering a new project to construct a new jetty near Pontian, for the use of gateway tourism’s ferry to and from Singapore and Indonesia. Also included in the project is to build custom and immigration facilities. The land acquisition is estimated to be RM 2.6 million. Construction cost for the jetty and other facilities is expected to be RM 7.2 million with an additional annual maintenance cost of RM 0.2 million. Finally, the projected increase in marina travellers will require an additional jetty traffic controller with an annual cost of RM 0.4 million. Market value of some assets at the end of useful life is estimated RM 1.3 million.

In addition, yearly rental receipts from ferry and boats will be collected amounting to RM 0.9 million, jetty charges collected from passengers for RM 0.4 million, conveniences benefit to the local community of revenues received through the direct and indirect businesses for RM 0.5 million, and additional tourism income to state of Johor of RM 0.3 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 refers to a summation of all the costs related to its life spin and may be divided into two general phases. **Table Q4** shows the distribution of project activities costs with total investment received of RM 850,000.

**Table Q4: Cost Distribution of Project Activities**

Cost Activities	RM
1 <sup>st</sup> period - Cost for feasibility study & research expenses	15,000
2 <sup>nd</sup> period- Cost for development of prototype and testing	20,000
3 <sup>rd</sup> period - Cost for details design planning	25,000
4 <sup>th</sup> period - Cost required for working capital	150,000
5 <sup>th</sup> period - Costs for maintenance & upgrade service	600,000
6 <sup>th</sup> period - Cost for Disposal	40,000

- (a) Describe each of the time periods within the related phases. (10 marks)
- (b) Determine the costs committed, costs cumulative and costs saving using suitable costs table. (10 marks)
- (c) Plot Life Cycle Cost graph. (5 marks)

**FINAL EXAMINATION**

SEMESTER/SESSION: SEM II/2014/2015  
 COURSE NAME : ENGINEERING ECONOMY

PROGRAMME: BEJ/BEV  
 COURSE CODE: BEE31902

**LIST OF FORMULA**

1.  $C_B = C_k (I_n/I_k)$
2.  $C_A = C_B (S_A/S_B)^X$
3. Conventional B-C ratio with PW  
 $B-C = PW(B) \div [(I - PW(MV)) + PW(O\&M)]$
4. Modified B-C ratio with PW  
 $B-C = [PW(B) - PW(O\&M)] \div [I - PW(MV)]$
5. Conventional B-C ratio with AW  
 $B-C = AW(B) \div [CR + AW(O\&M)]$
6. Modified B-C ratio with AW  
 $B-C = [AW(B) - AW(O\&M)] \div CR$

**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    |