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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

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

COURSE NAME : ENGINEERING ECONOMY
COURSE CODE : BPK 30902
**PROGRAMME : BEJ/BFF/BDC/BDD/BDM/
BDC/BNA/BNB/BNC/BND/BNN**
EXAMINATION DATE : DECEMBER 2014/JANUARY 2015
DURATION : 2 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

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- Q1** (a) Twenty (20) years ago, your company has purchased a small factory building costing RM 300,000. However, book value of the building remains RM 230,000 only due to the decrease in market value. The factory is sold at the price of RM 180,000.

Determine the value from each of the following cost:

- (i) Cash Cost (2 marks)
- (ii) Book Cost (2 marks)
- (iii) Sunk Cost (2 marks)
- (iv) Opportunity Cost (2 marks)
- (v) Standard Cost (2 marks)
- (b) A group of EE team is making analysis in a decision to produce a new product with two alternative plants. Details are as follows:

Table Q1 (b)

Details	Plant A	Plant B
Labour Cost (RM per unit)	36.00	38.00
Raw Material Costs (RM per unit)	73.00	82.00
Factory Manager(RM per month)	6,600	5,800
Rental (RM per month)	7,800	6,300
Selling Price (RM per unit)	150.00	150.00

- (i) Calculate the Total Variable Cost (VC) and Fixed Cost (FC) (4 marks)
- (ii) Determine the Breakeven Point units per month (4 marks)
- (iii) Suggest the most profitable plant for production if the consumer demand is 500 units per month. (4 marks)

- (iv) The selling price has reduced by RM5.00 for site chosen in (iii).

Calculate how many units to be sold if the company is to maintain a profit level of RM2,880.00

(3 marks)

- Q2** (a) **Table Q2(a)** below shows the past price of Standard Malaysia Rubber (SMR) since 2012, whereby 2013 is the reference year having 246 as an index value. The weight place on SMR CV is one (1) time, SMR L is one and half (1.5) times and SMR 5 is two (2) times.

Table Q2(a)

SMR	Price (sen/kg) in Year		
	2012	2013	2014
SMR CV	1088	919	753
SMR L	1046	832	696
SMR 5	974	794	579

- (i) Calculate a weighted index for the price of a kg of SMR in 2014.
(4 marks)
- (ii) Calculate the corresponding 2015 prices of SMR from 2014 if 218 is the index value in 2014.
(6 marks)
- (b) The structural engineering design section of Agile E-Power, a multinational electrical utility corporation has developed several standard designs for a group of similar transmission line towers. The detailed design for each tower is based on one of the standard designs. A transmission line project involving 60 towers has been approved. The estimated number of engineering hours needed to accomplish the first detailed tower design is 123.

Determine:

- (i) The number of engineering hours needed to design the eight and sixteenth tower using a 95% learning curve.
(5 marks)
- (ii) The reduction percentage when the production is doubled.
(5 marks)

- (iii) The estimated cumulative average hours required to produce the first five tower designs.

(5 marks)

- Q3** (a) The XYZ Company is planning to increase their production process by upgrading the machinery to higher capacity processor with initial cost of RM 86,000, operation and maintenance cost RM 8,600 per year, life cycle seven (7) years, salvage value of RM 6,000. Hence increase in production that will generate an income of RM 35,000 per year.

Evaluate the investment based on future worth (FW) method with an expected MARR of 10% per year using a proper cash flow diagram.

(10 marks)

- (b) A SME Company is considering investing RM 150,000 for six (6) months in three (3) alternatives offered by financial institution. First option was a quarterly compounded interest of 1.90% per annum, second option was a daily compounded interest of 2.00% per annum (360 days per year), and third option was a semi-annually compounded interest of 2.05%.

Suggest the best option to the SME Company.

(15 marks)

- Q4** Your company are invited to propose a new multipurpose transportation terminal in southern region state as a hub for air, sea and land transportation. Also included in the project is to build custom and immigration facilities. The land acquisition is estimated to be RM30 million. Construction cost for the terminal and other facilities is expected to be RM 86 million with an additional annual maintenance cost of RM 9 million. The custom and immigration facilities building and sophisticated equipment should also be considered with a cost of RM 27 million and RM 6 million per year maintenance expenditures.

In addition, yearly terminal fees will be collected amounting to RM 18 million, yearly power consumptions save by the road users for RM 8 million, yearly revenues received through the direct and indirect businesses of RM 10 million, and yearly fees collected by the local and state authorities of RM 6 million.

- (a) Derive 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 20 years and a MARR of 20% per year to determine whether the project should be proceed.

(16 marks)

- END OF QUESTION -

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LIST OF FORMULA

1. $p (1 + i)^n$
2. $C_n = C_k (I_n/I_k)$
3.
$$I_n = \frac{W1 (C_{n1}/C_{k2}) + W2 (C_{n2}/C_{k2}) + W... (C_{n...}/C_{k...})}{W1 + W2 + W...} \times I_k$$
4. Conventional B-C ratio with PW

$$B-C = PW(B) \div [(I - PW(MV)) + PW(O\&M)]$$
5. Modified B-C ratio with PW

$$B-C = [PW(B) - PW(O\&M)] \div [I - PW(MV)]$$
6. Conventional B-C ratio with AW

$$B-C = AW(B) \div [CR + AW(O\&M)]$$
7. Modified B-C ratio with AW

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

LIST OF DISCRETE COMPOUNDING

1. (F/P, 10%, 7) : 1.9487
2. (P/F, 10%, 7) : 0.5132
3. (F/A, 10%, 7) : 9.4872
4. (P/A, 10%, 7) : 4.8684
5. (A/F, 10%, 7) : 0.1054
6. (A/P, 10%, 7) : 0.2054
7. (F/P, 20%, 20) : 38.3376
8. (P/F, 20%, 20) : 0.0261
9. (F/A, 20%, 20) : 186.6880
10. (P/A, 20%, 20) : 4.8696
11. (A/F, 20%, 20) : 0.0054
12. (A/P, 20%, 20) : 0.2054