

CONFIDENTIAL



UTHM

Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2018/2019**

COURSE NAME : ENGINEERING ECONOMY
COURSE CODE : BPK 30902
PROGRAMME CODE : BDD/BFF/BNA/BNB/BNC//BND/BNE/BNF
EXAMINATION DATE : DECEMBER 2018 / JANUARY 2019
DURATION : 2 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS

TERBUKA

THIS QUESTION PAPER CONSISTS OF SEVEN (7) PAGES

CONFIDENTIAL

Q1 (a) Table Q1 shows the previous price of a gallon gasoline in 2016 and 2017. The weight placed on regular unleaded gasoline is three times the value of sale either of the premium or unleaded plus. Year of 2017 is the reference year. It is predicted that the price will increase as 8.5% in 2018 (from 2017). It is predicted Index value in 2018 is 115.7

Table Q1: The Price of Gasoline in Year of 2016 and 2017

Gasoline	Price (Cents/Gal) in Year	
	2016	2017
Premium (P)	120	130
Unleaded plus (UP)	109	118
Regular unleaded (RU)	99	107

(i) Determine Index value of reference year 2017, I_{K2017} . (6 marks)

(ii) Determine the corresponding 2019 price of gasoline from year of 2017. The Indexvalue in 2019 is 125. (6 marks)

(b) Railway Engineering Department of Universiti Tun Hussein Onn Malaysia has a student team that design a train model for a national competition. The time required for the team to assemble the first train model is 115 hours. Their improvement (learning rate/curve) is 85% which means that as output is doubled, their time to assemble a train model reduced by 25%.

(i) Determine the time it will take the team to assemble the 10th and 20th train model. (6 marks)

(ii) Calculate the total time required to assemble the first 10 and 20 train models. (6 marks)

(iii) Determine the estimated cumulative average assembly time for the first 10 and 20 train models. (6 marks)

TERBUKA

CONFIDENTIAL

Q2 (a) Farid is planning to open up his contractor firm in 10 years' time. Based on this year's research, he needs a total of RM 75000 to start the firm and the amount would increase each year at 10% interest rate. He does not plan to apply for any loan but to use his own money. For the time being, he is working with a private company as a technician and he planned to save some of his monthly salary to fulfill his dream.

(i) Calculate the cost of Farid's new firm after ten years?
(6 marks)

(ii) Farid is planning to put his saving for the firm into Tabung Haji. He had signed up for an account where he would earn 6% per year continuously for each amount he saved.

Calculate how much he should save each year for the next 10 years to ensure he has enough money to start his firm?
(6 marks)

(iii) If Farid's monthly income is RM2000 per month and remain the same for 10 years.

Explain whether his plan to have his own contractor firm would become reality?
(6 marks)

(b) Farid has finally opened up his contractor firm and his business is doing excellently successful. He is currently having 10 different branches all over Malaysia. At the age of 50, he started to think about his retirement plan and would like to open a special account to cater for his retirement. He opens another account in Tabung Haji and deposited an amount of RM 200,000 as his opening balance. He plans to save up to RM22,000 per year into his second account in Tabung Haji.

(i) Calculate the amount of money he will have saved when he is 65 years old, after 15 years of savings with the interest rate of 7% per year.
(8 marks)

(ii) Draw the cash flow diagram from Farid's point of view based on **Q2(b)(i)**.
(4 marks)

TERBUKA

CONFIDENTIAL

- Q3 (a)** Identify each of the following cash flows to indicate whether it is a benefit, a disbenefit, or a cost.
- (i) Lost of income to local business because of a new freeway.
 - (ii) Less travel time because of a loop bypass.
 - (iii) RM 40,000 annual income to local businesses because of tourism created by a national park.
 - (iv) Cost of fish from a hatchery to stock a lake at the state park.

(8 marks)

- (b) The cost of grading and spreading gravel on a short rural road is expected to be RM 300,000. The road will have to be maintained at a cost of RM 25,000 per year. Even though the new road is not very smooth, it allows access to an area that previously could only be reached with off-road vehicles. The improved accessibility has led to a 150% increase in the property values along the road.

- (i) Calculate the conventional B/C ratio with PW using an interest of 6% per year and a 20-year study period if the previous market value of a property was RM 900,000.

(10 marks)

- (ii) Justify whether the project should be proceeded or not.

(5 marks)

- (c) In the past, the Dhuha Khadijah Foundation has awarded many grants to improve the living and medical conditions of people in war-torn and poverty-stricken countries throughout the world. In a proposal for the foundation's board of directors to construct a new hospital and medical clinic complex in a deprived central African country, the project manager has developed some estimates as stated in **Table Q3**. These are developed, so she states, in a manner that does not have a major negative effect on prime agricultural land or living areas for citizens.

Table Q3 : Estimation cost of Dhuha Khadijah foundation

Award amount:	RM 20 million (end of) first year, decreasing by RM5 million per year for 3 additional years; local government will fund during the first year only
Annual costs:	RM 2 million per year for 10 years, as proposed
Benefits:	Reduction of RM 8 million per year in health-related expenses for citizens
Disbenefits:	RM 0.1 to 0.6 million per year for removal of arable land and commercial districts (Use: 0.6 million/yr)

TERBUKA

CONFIDENTIAL

This grant proposal is economically justified over a 10 year study period. The foundation's discount rate is 5% per year.

- (i) Determine the AW for each parameter over 10 years (in RM1 million units).
(7 marks)
- (ii) Determine the AW for each parameter over 10 years using the modified B/C ratio method (In RM1 million units)
(10 marks)

- END OF QUESTIONS -

FINAL EXAMINATION

SEMESTER/SESSION: SEM I/2018/2019

PROGRAMME:

BNA/BNB/BNC/BND/BNE/BNF/BFF/BDD

COURSE NAME : ENGINEERING ECONOMY

COURSE CODE: BPK 30902

LIST OF FORMULA

1. $p(1+i)^n$
2. $C_n = C_k (I_n/I_k)$
3. $Z_u = K(u^n)$
4. $n = \log s / \log 2$
 $W1 (C_{n1}/C_{k2}) + W2 (C_{n2}/C_{k2}) + W... (C_{n...}/C_{k...})$
5. $I_n = \frac{W1 (C_{n1}/C_{k2}) + W2 (C_{n2}/C_{k2}) + W... (C_{n...}/C_{k...})}{W1 + W2 + W...} \times I_k$
6. Conventional B-C ratio with PW
 $B-C = PW(B) \div [(I - PW(MV)) + PW(O\&M)]$
7. Modified B-C ratio with PW
 $B-C = [PW(B) - PW(O\&M)] \div [I - PW(MV)]$
8. Conventional B-C ratio with AW
 $B-C = AW(B) \div [CR + AW(O\&M)]$
9. Modified B-C ratio with AW
 $B-C = [AW(B) - AW(O\&M)] \div CR$

LIST OF DISCRETE COMPOUNDING

- | | | | |
|-----|---------------|---|---------|
| 1. | (F/P, 5%, 4) | : | 1.2155 |
| 2. | (P/F, 5%, 4) | : | 0.8227 |
| 3. | (F/A, 5%, 4) | : | 4.3101 |
| 4. | (P/A, 5%, 4) | : | 3.5460 |
| 5. | (A/F, 5%, 4) | : | 0.2320 |
| 6. | (A/P, 5%, 4) | : | 0.2820 |
| 7. | (P/G, 5%, 4) | : | 5.103 |
| 8. | (A/G, 5%, 4) | : | 1.4391 |
| 9. | (F/P, 5%, 10) | : | 1.6289 |
| 10. | (P/F, 5%, 10) | : | 0.6139 |
| 11. | (F/A, 5%, 10) | : | 12.5779 |
| 12. | (P/A, 5%, 10) | : | 7.7217 |
| 13. | (A/F, 5%, 10) | : | 0.0795 |
| 14. | (A/P, 5%, 10) | : | 0.1295 |
| 15. | (P/G, 5%, 10) | : | 31.652 |
| 16. | (A/G, 5%, 10) | : | 4.0991 |
| 17. | (F/P, 6%, 10) | : | 1.7908 |
| 18. | (P/F, 6%, 10) | : | 0.5584 |
| 19. | (F/A, 6%, 10) | : | 13.1808 |
| 20. | (P/A, 6%, 10) | : | 7.3601 |
| 21. | (A/F, 6%, 10) | : | 0.0759 |
| 22. | (A/P, 6%, 10) | : | 0.1359 |
| 23. | (P/G, 6%, 10) | : | 29.602 |

TERBUKA

FINAL EXAMINATION

SEMESTER/SESSION: SEM I/2018/2019

PROGRAMME:

BNA/BNB/BNC/BND/BNE/BNF/BFF/BDD

COURSE NAME : ENGINEERING ECONOMY

COURSE CODE: BPK 30902

LIST OF DISCRETE COMPOUNDING

24.	(A/G, 6%, 10)	:	4.0220
25.	(F/P, 6%, 20)	:	3.2071
26.	(P/F, 6%, 20)	:	0.3118
27.	(F/A, 6%, 20)	:	36.7856
28.	(P/A, 6%, 20)	:	11.4699
29.	(A/F, 6%, 20)	:	0.0272
30.	(A/P, 6%, 20)	:	0.0872
31.	(P/G, 6%, 20)	:	87.230
32.	(A/G, 6%, 20)	:	7.6051
33.	(F/P, 7%, 15)	:	2.7590
34.	(P/F, 7%, 15)	:	0.3624
35.	(F/A, 7%, 15)	:	25.1290
36.	(P/A, 7%, 15)	:	9.1079
37.	(A/F, 7%, 15)	:	0.0398
38.	(A/P, 7%, 15)	:	0.1098
39.	(P/G, 7%, 15)	:	52.446
40.	(A/G, 7%, 15)	:	5.7583
41.	(F/P, 10%, 10)	:	2.5937
42.	(P/F, 10%, 10)	:	0.3855
43.	(F/A, 10%, 10)	:	15.9374
44.	(P/A, 10%, 10)	:	6.1446
45.	(A/F, 10%, 10)	:	0.0627
46.	(A/P, 10%, 10)	:	0.1627
47.	(P/G, 10%, 10)	:	22.891
48.	(A/G, 10%, 10)	:	3.7255

TERBUKA

CONFIDENTIAL