UNIVERSITY COLLEGE TATI

UNIVERSITY COLLEGE TATI (UC TATI)

FINAL EXAMINATION QUESTION BOOKLET		
COURSE CODE	:	BET 2022
COURSE	:	UTILIZATION OF ELECTRICAL ENERGY
SEMESTER / SESSION	:	02 – 2024/2025
DURATION	:	2 HOURS

Instructions:

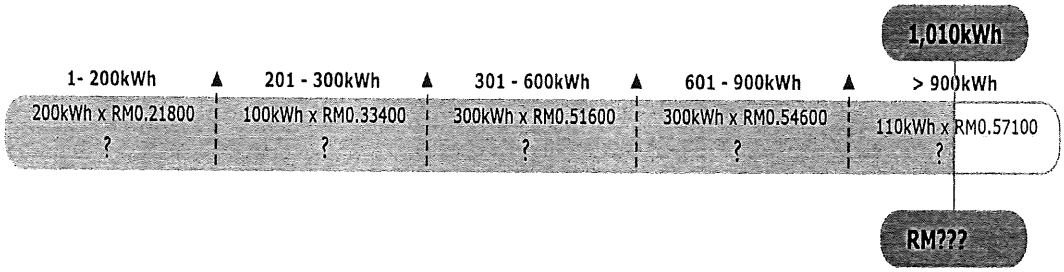
1. This booklet contains **4** questions. Answer **ALL**.
2. All answers should be written in the answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, raise your hand and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

THIS BOOKLET CONTAINS 7 PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1

a) The **Figure 1** below show the bill of TNB tariff rates for Umar's house. Calculate the real amount of bill for this Domestic Tariff A.



Keterangan		Tanpa ST	Dengan ST	Jumlah
Jumlah Penggunaan Anda (1,010 kWh)	RM	?	?	?
ICPT (RM0.00/kWh)	RM	0.00	0.00	0.00
Caj Penggunaan Bulan Semasa	RM	?	?	?
Service Tax (8%)	RM			18.13
Kumpulan Wang Tenaga Boleh Baharu (1.6%)	RM			7.33
Caj Semasa	**RM**			?

Cukai Perkhidmatan 8% dikenakan kepada pelanggan kediaman (Tarif A) bagi penggunaan melebihi 600 kWh untuk tempoh bil 28 hari dan ke atas

Maklumat Meter

No. Meter	Bacaan Meter		Penggunaan	Unit
	Dahulu	Semasa		
M 2142121651	41,339	42,349	1,010	kWh

Saluran Pembayaran

- **myTNB**
- **PERBANKAN INTERNET**
- **EPAY** (Petronas, KK Mart, Caltex)
- **KIOS @ KEDAI TENAGA**
- **e-WALLET** (Boost, Touch 'n Go eWallet)

Perlu Bantuan?

- **1-300-88-5454** Pertanyaan akaun dan bil
- **15454** Gangguan bekalan elektrik di rumah dan lampu jalan
- **tnbcareline@tnb.com.my**
- **TNB CareLine**
- **Tenaga_Nasional**

Untuk maklumat lanjut, sila layari www.mytnb.com.my

Kedai Tenaga Terdekat :
TNB KEMAMAN
TNB KEMAMAN,JLN SULAIMANI
24000 CUKAI
TERENGGANU
Tel : 09-8583300

Figure 1

(10 marks)

QUESTION 2

a) A 415/240 panel board serves the following loads. Calculate the total Connected Load (CL), Demand Load (DL) and the current through the cable in **Table 1** below. Refer the Industrial Electrical System design panel board and switchboards timetable in **Appendix 1**.

Table 1

No.	Load	Rating
1.	Water Heating	5.0 kW
2.	Spare capacity	13.0 kVA with PF = 0.85
3.	Air Conditioning	11.0 kVA with PF = 0.87
4.	Lighting	15.0 kVA with PF = 0.90
5.	Resistance Heat	14.0 kW
6.	Motors Gate	10.0 kVA with PF 0.83

(10 marks)

QUESTION 3

a) Calculate the voltage drop at the service panel for the system in Figure 2 below. The total load is 30kVA at 0.87 lagging power factor.

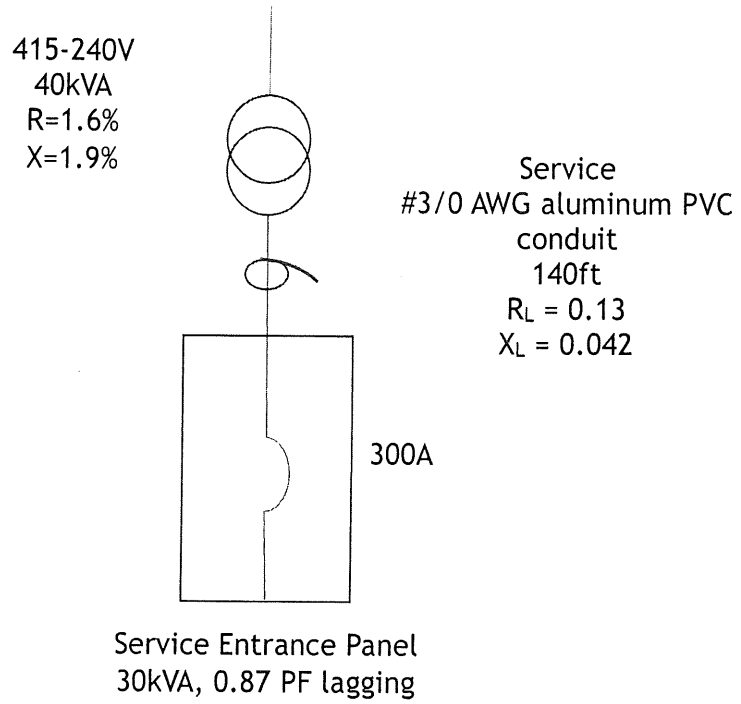


Figure 2

(10 marks)

QUESTION 4

a) Classify between bonding and grounding. (4 marks)

b) Write down the **three (3)** reasons for earthing. (3 marks)

c) Describe the earth continuity conductor impedance as an indicator of improper earthing. (3 marks)

.....End of question.....

APPENDIX 1

Industrial Electrical System Design Panelboards and Switchboards

No.	Connected Load	Demand Factor
1.	Lighting	1.25
2.	Receptacles	1.00
	1st 10 kVA@100%	0.50
	Remainder@50%	
3.	Resistance Heat	1.00
4.	Heat Motor	1.00 or 0.00
5.	Air Conditioning Motors	1.00 or 0.00
6.	Motors	1.00
7.	Other Loads	1.00 or 1.25*
8.	Water Heating	1.00
9.	Kitchen	0.65 to 1.00
10.	Spare Capacity	1.00
11.	Largest Motor	0.25

APPENDIX 2

FORMULA SHEET

Transformer:

$$R_{TR} = \frac{1}{100}\left[\frac{(R\%)(240V)^2}{SVA}\right] = \Omega$$

$$X_{TR} = \frac{1}{100}\left[\frac{(X\%)(240V)^2}{SVA}\right] = \Omega$$

Cable:

$$R_L = 2 \times \frac{RL}{1000} \times (ft) = \Omega$$

$$X_L = 2 \times \frac{XL}{1000} \times (ft) = \Omega$$

$$I = \frac{SVA}{240V} = A\angle -\cos^{-1}(pf)^\circ = A$$

Voltage drop at transformer:

$$\left|V_{drop}\right| \approx I \times \left[RTR\Omega \times \cos(\theta^\circ) - XTR\Omega \times \sin(\theta^{\circ\circ})\right] = V$$

$$\%V_{drop} = \frac{V}{240V} \times 100\% = \%$$

voltage drop at cable:

$$\left|V_{drop}\right| \approx I \times \left[RL\Omega \times \cos(\theta^\circ) - XL\Omega \times \sin(\theta^\circ)\right] = V$$

$$\%V_{drop} = \frac{V}{240V} \times 100\% = \%$$

The total voltage drop at the panel