UNIVERSITY COLLEGE TATI

UNIVERSITY COLLEGE TATI (UC TATI)

FINAL EXAMINATION QUESTION BOOKLET	
COURSE CODE	: BMT 1023 5/1
COURSE	: ELECTRICAL & ELECTRONICS TECHNOLOGY
SEMESTER/SESSION	: 1-2024/2025
DURATION	: 3 HOURS

Instructions:

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

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

THIS BOOKLET CONTAINS 9 PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1

a) State the definition of:

i. Capacitor. (2 marks)

ii. Inductor (2 marks)

b) Calculate the total capacitance of the two circuits shown in Figure 1 and Figure 2.

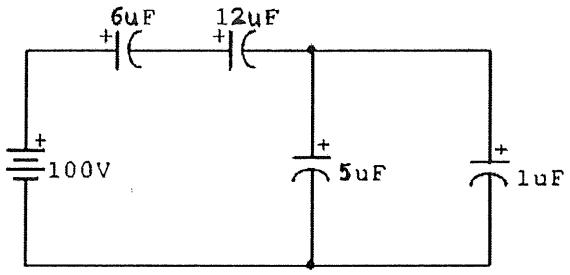

Figure 1

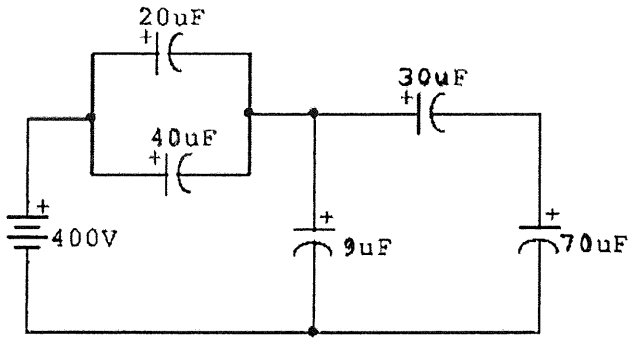

Figure 2

(8 marks)

c) Calculate the equivalent value of inductance between terminal A and terminal B given in Figure 3 and Figure 4.

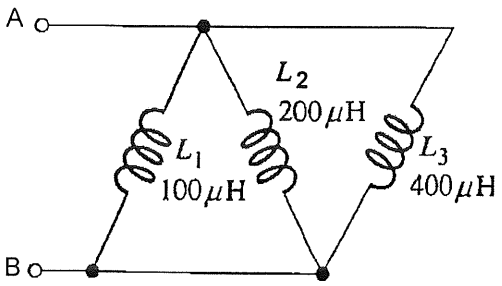

Figure 3

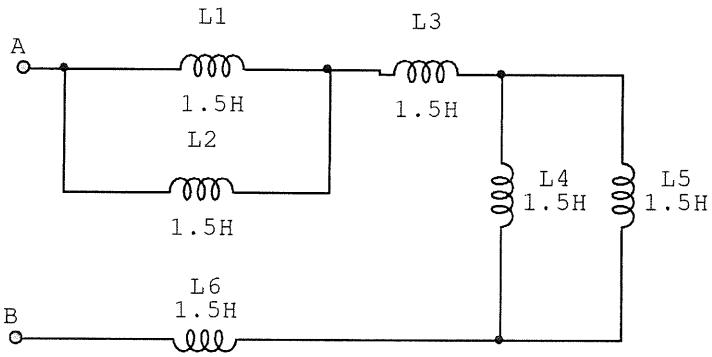

Figure 4

(8 marks)

QUESTION 2

a) There are two types of systems common to Malaysian homes; single and three phase systems. Differentiate both systems in terms of its wires and demand.

(4 marks)

b) List three (3) advantages of a three phase system. (3 marks)

c) A wye-connected three-phase alternator supplies power to a delta-connected resistive load in Figure 5. The alternator has a line voltage of 480 V. Each resistor of the delta load has 8 Ω of resistance. Find the following values:

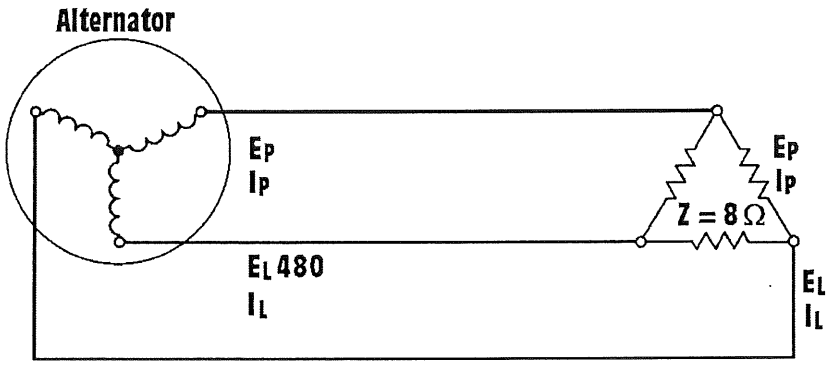

Figure 5

i. Line voltage of the load, $E_{L(Load)}$ (1 mark)

ii. Phase voltage of the load, $E_{P(Load)}$ (1 mark)

iii. Phase current of the load, $I_{P(Load)}$ (2 marks)

iv. Line current to the load, $I_{L(Load)}$ (2 marks)

v. Line current delivered by the alternator, $I_{L(Alt)}$ (1 mark)

vi. Phase current of the alternator, $I_{P(Alt)}$ (1 mark)

vii. Phase voltage of the alternator, $E_{P(Alt)}$ (2 marks)

viii. True power, P (3 marks)

QUESTION 3

a) Draw the symbol of diode. (2 marks)

b) Explain what is a diode in terms of its basic structure and current flow. (4 marks)

c) Explain the importance of diode in an electronic circuit. (4 marks)

d) Bipolar Junction Transistor (BJT) is constructed with three doped semiconductor regions. Draw the basic structure of the BJT. (2 marks)

e) There are two types of BJT available in electronics.

i. State the types of the BJT. (2 marks)

ii. Illustrate the basic symbol for each type and label them. (4 marks)

f) State two (2) applications of transistors. (2 marks)

g) List two (2) advantages of a digital system. (2 marks)

h) Convert the following decimal number to binary number for:

i. 56_{10} (2 marks)

ii. 294_{10}. (2 marks)

i) Convert the following binary number to decimal number.

i. 10111_2 (2 marks)

ii. 1100101_2 (2 marks)

j) Consider a chemical factory where the exhaust fans help to blow the pollutants out. When the fan are operating, a logic 1 is obtained. The output of all the fans is connected to the NAND gate which is followed by the alarm circuit. This is shown in Figure 6. Describe the application of the NAND gate for this case.

(4 marks)

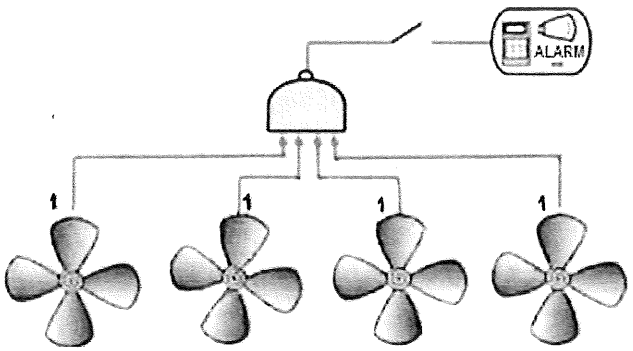

Figure 6

QUESTION 4

a) Based on Figure 7, determine the blank output, F for the truth table shown in Table 1.

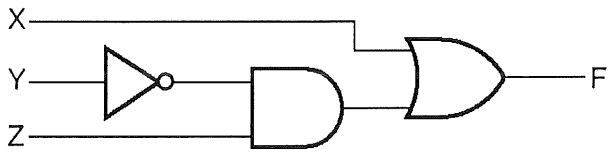

Figure 7

Table 1

inputs			output
X	Y	Z	F
0	0	0	0
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	1
1	1	0	
1	1	1	

(6 marks)

b) A microcontroller basically contains of one or more following components:

- Central processing unit(CPU)
- Random Access Memory)(RAM)
- Read Only Memory(ROM)
- Input/output ports
- Timers and Counters
- Interrupt Controls
- Analog to digital converters
- Digital analog converters
- Serial interfacing ports
- Oscillatory circuits

i. Describe the Central processing unit(CPU) in terms of its responsibility and primary function. (4 marks)

ii. Explain the function of memory in a microcontroller. (2 marks)

iii. Explain the parallel input/output ports in a microcontroller. (2 marks)

c) State two(2) applications of microcontroller. (2 marks)

d) In electrical engineering, electric machine is a general term for electric motors and electric generators.

i. Describe electric generator. (2 marks)

ii. Describe electric motor. (2 marks)

e) List three(3) categories of AC motors. (3 marks)

f) Determine the synchronous speed of a 3 phase induction motor having 20 poles when it is connected to a 50Hz source. (3 marks)

----------End of Question----------

APPENDIX 1

General Formula for Electrical & Electronics Technology

i) Voltage Divider : $V_x = \left(\frac{R_x}{R_T}\right) V_S$

ii) Current Divider : $I_x = \left(\frac{R_T}{R_x}\right) I_T$

iii) Current Divider of 2 resistors :

$$I_1 = \left(\frac{R_2}{R_1 + R_2}\right) I_T$$

v) Wye – Delta Formula

Wye	Delta
$E_{Line} = E_{Phase} \times 1.732$	$E_{Line} = E_{Phase}$
$I_{Line} = I_{Phase}$	$I_{Line} = I_{Phase} \times 1.732$

(vi) Rules of Boolean Algebra

1. $A + 0 = A$
2. $A + 1 = 1$
3. $A \cdot 0 = 0$
4. $A \cdot 1 = A$
5. $A + A = A$
6. $A + \bar{A} = 1$
7. $A \cdot A = A$
8. $A \cdot \bar{A} = 0$
9. $\bar{\bar{A}} = A$
10. $A + AB = A$
11. $A + \bar{A}B = A + B$
12. $(A + B)(A + C) = A + BC$