

**UNIVERSITY COLLEGE TATI (UC TATI)****FINAL EXAMINATION QUESTION BOOKLET**

COURSE CODE	: DEE 1113
COURSE	: ELECTRICAL TECHNOLOGY 1
SEMESTER/SESSION	: 1-2023/2024
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 your hands 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) Answer the following question:

- i. Describe the term of active components. (2 marks)
- ii. Describe the term of passive components. (2 marks)
- iii. Differentiate **three (3)** comparison of active & passive components. (6 marks)

b) If there are $30J$ of energy and $5A$ of direct current through the filament of a light bulb in $3s$. Calculate:

- i. The charge flow in the filament, Q . (2 marks)
- ii. The voltage, V . (2 marks)
- iii. The power in watts, P . (2 marks)

c) Referring to the circuit in Figure 1:

- i. Describe the function of a multimeter. (2 marks)
- ii. Illustrate the placement of a multimeter to measure the voltage of resistor, R_2 . (3 marks)

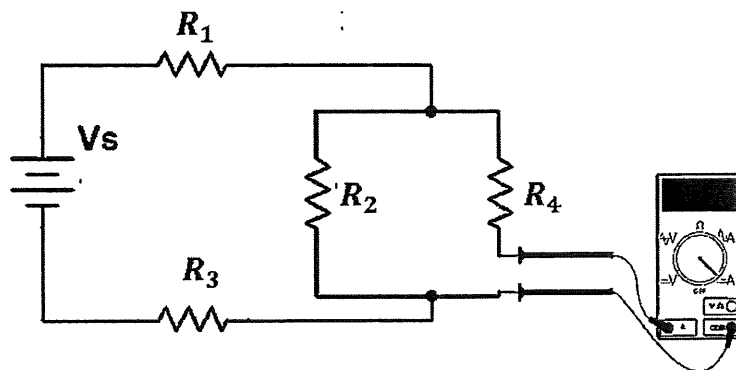


Figure 1

QUESTION 2

a) Answer the following question:

- i. Define the term of conductor. (1 mark)
- ii. Define the term of insulator. (1 mark)
- iii. Differentiate **two (2)** comparison of conductor and insulator. (4 marks)

b) Figure 2 shows a resistor with four bands. The color code for each band is given in Table 1. Identify:

- i. The resistance value. (2 marks)
- ii. The percent of tolerance. (1 mark)
- iii. The maximum value the resistor can tolerate. (2 marks)
- iv. The minimum value the resistor can tolerate. (1 mark)
- v. The condition of a resistor when the power rating is less than maximum power in a circuit. (2 marks)

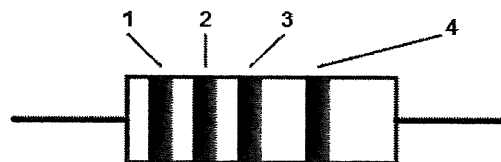


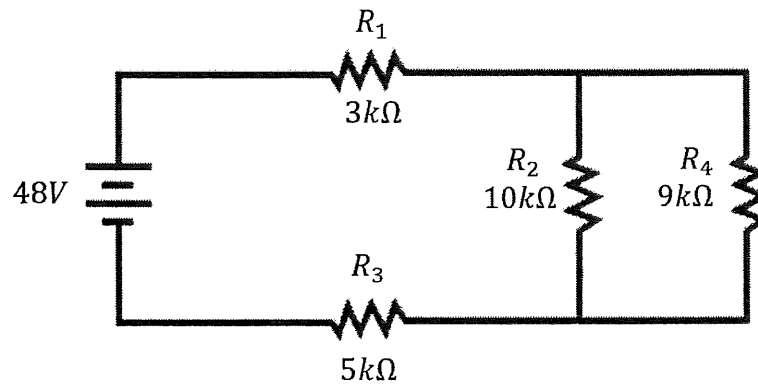
Figure 2

Table 1

Band	Color
1	Green
2	Blue
3	Violet
4	Silver

QUESTION 3

- a) Describe the following terms in a simple circuit with an illustration:
- Open circuit. (4 marks)
 - Closed circuit. (4 marks)
- b) Differentiate **four (4)** comparison of series and parallel circuit. (8 marks)
- c) Determine the voltage, V across each resistor, R_1 , R_2 , R_3 and R_4 in Figure 3 by using voltage divider law. (10 marks)

**Figure 3**

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- d) Determine the current, I through each resistor, R_1 , R_2 , R_3 and R_4 in Figure 4 by using Kirchhoff's laws (KVL and KCL). (10 marks)

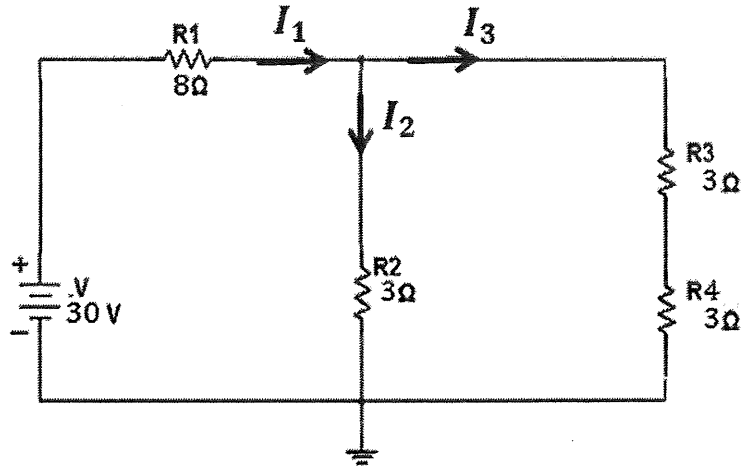


Figure 4

QUESTION 4

- a) Explain the process of charging a capacitor using DC. (8 marks)
- b) Describe the fundamental construction of an inductor. (4 marks)
- c) Determine the following terms in Figure 5 under DC condition:
 - i. Voltage, V at capacitor. (4 marks)
 - ii. Energy stored in capacitor, W . (3 marks)

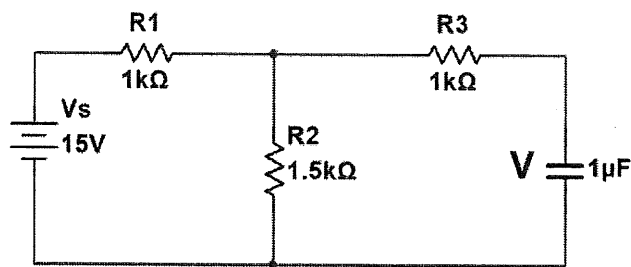


Figure 5

- d) Determine the total inductance, L_T of the circuit in Figure 6. Show all calculation. (10 marks)

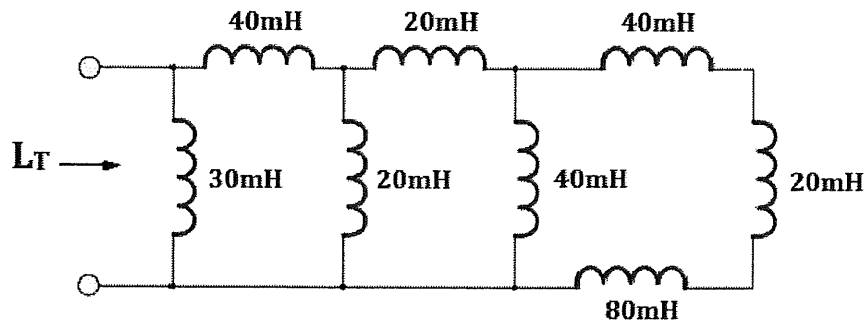


Figure 6

-----End of question-----

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TABLE OF FORMULAS

Basic Electrical				
$Q = ne$	$I = \frac{Q}{T}$	$V = \frac{W}{Q}$	$P = \frac{W}{t}$	$W = Pt$
DC Circuit				
$V = IR$	$V_x = \frac{R_x}{R_T} V_S$	$I_x = \frac{R_T}{R_x} I_T$	$P = VI$ $P = \frac{V^2}{R}$ $P = I^2 R$	
Capacitor				
$C = \frac{Q}{V}$	$C = \frac{\epsilon A}{d}$	$X_C = \frac{1}{2\pi fC}$	$W = \frac{1}{2} CV^2$	$V_{rms} = I_{rms} X_C$
Inductor				
$L = \frac{V}{I}$	$L = \frac{N^2 \mu A}{l}$	$X_L = 2\pi fL$	$W = \frac{1}{2} LI^2$	$V_{rms} = I_{rms} X_L$

