



UNIVERSITY COLLEGE TATI (UC TATI)

FINAL EXAMINATION QUESTION BOOKLET

COURSE CODE	: DMT 1013
COURSE	: ELECTRICAL TECHNOLOGY
SEMESTER/SESSION	: 2-2024/2025
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 6 PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1

- a) State a function of resistor. (1 mark)
- b) List TWO (2) types of resistors. (2 marks)
- c) List THREE (3) electrical units and its symbol. (3 marks)
- d) FIGURE 1 shows a 4-band resistor, find the resistance value and tolerance. (2 marks)
- e) Name the colour code of $2.2\text{k}\Omega \pm 10\%$ four band resistor. (2 marks)

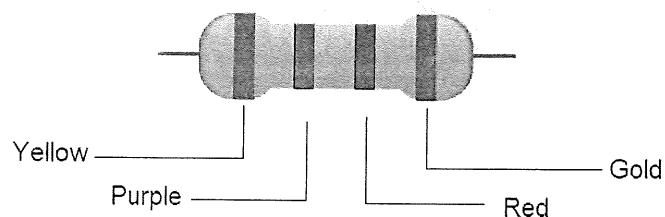


Figure 1

- f) State the definition of;
 - i. Current. (2 marks)
 - ii. Voltage. (2 marks)
- g) List THREE (3) types of basic electrical measuring instrument. (3 marks)
- h) Describe TWO (2) function of basic electrical measuring instrument in (g). (4 marks)

QUESTION 2

- a) State the definition of;
- i. Ohm's law. (2 marks)
 - ii. Kirchhoff's Voltage Law. (2 marks)
 - iii. Kirchhoff's Current Law. (2 marks)
- b) Refer to FIGURE 2.
- i. Find I_T , I_1 , I_2 and power. (4 marks)
 - ii. Determine total resistance by using Kirchhoff's laws. (4 marks)

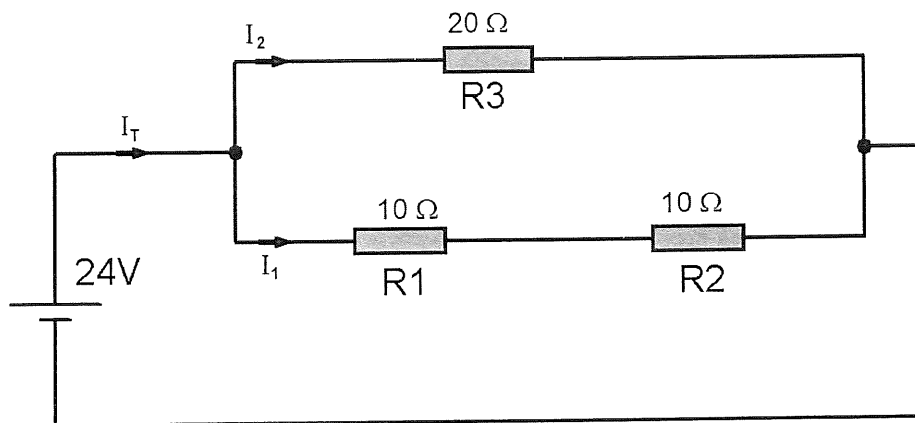


Figure 2

- c) Refer to FIGURE 3, determine;
- i. Total current I_o . (2 marks)
 - ii. Voltage V_o . (2 marks)
 - iii. Power dissipated in R_3 . (2 marks)

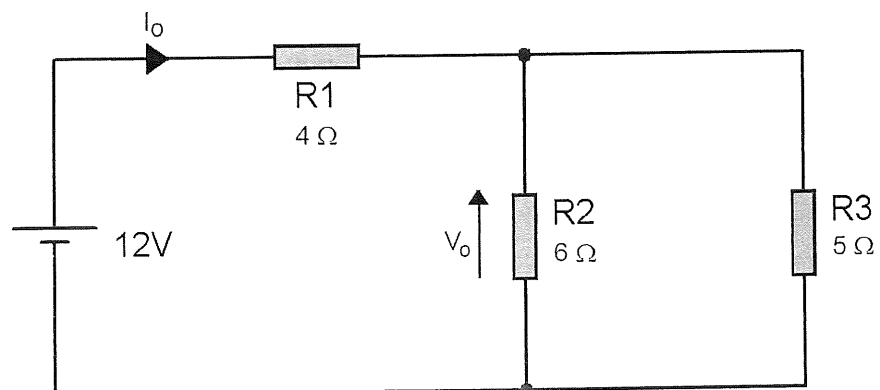


Figure 3

ELECTRICAL TECHNOLOGY (DMT1013)

d) FIGURE 4 shows two resistors are used for voltage divider at output, V_{out} .

- i. Explain the voltage drop across R_2 when both resistors having the same resistance value. (3 marks)
- ii. Explain what happen to the output, V_{out} , if value of R_2 is double. (3 marks)
- iii. Express the voltage drop across R_2 using the voltage divider formula. (4 marks)
- iv. Determine voltage drop across R_1 and R_2 when $R_1 = 100 \text{ ohm}$, $R_2 = 300 \text{ ohm}$ and $V_s = 12V$. (5 marks)

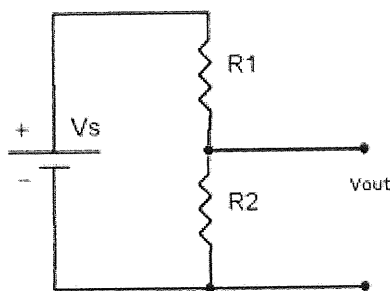


Figure 4

e) The dc motor draws 6 A from a 120-V source;

- i. Calculate the power input in watts. (3 marks)
- ii. Assuming the motor is 100% efficient, calculate the power output in horsepower. (4 marks)

QUESTION 3

- a) List THREE (3) types of capacitors. (3 marks)
- b) For the circuit in FIGURE 5, determine the total capacitance. (3 marks)

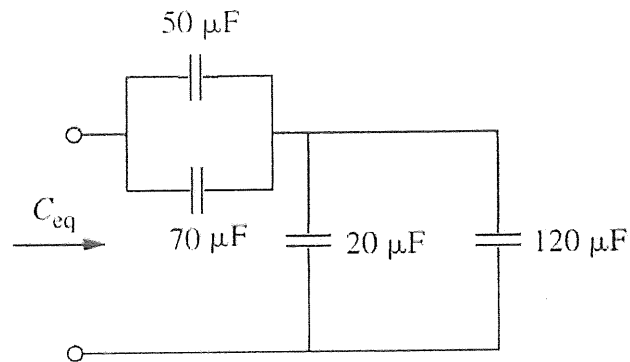


Figure 5

- c) Determine the total capacitance, C_{eq} for the circuit on FIGURE 6. (3 marks)

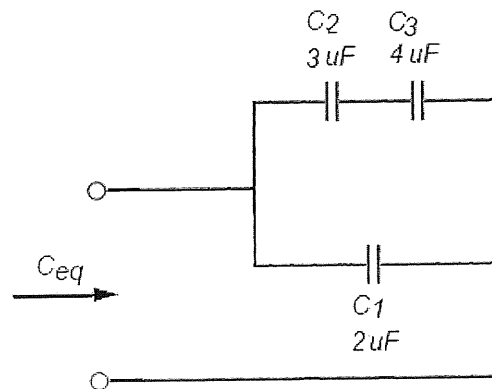


Figure 6

- d) Describe the difference between capacitor and capacitance. (3 marks)
- e) Describe electrical characteristic of capacitor in steady-state DC circuit. (3 marks)

QUESTION 4

- a) State the definition of inductor. (2 marks)
- b) State TWO (2) functions of inductor. (2 marks)
- c) List THREE (3) type of inductor. (3 marks)
- d) Determine the total inductance, L_{eq} of the circuit on FIGURE 7. (4 marks)

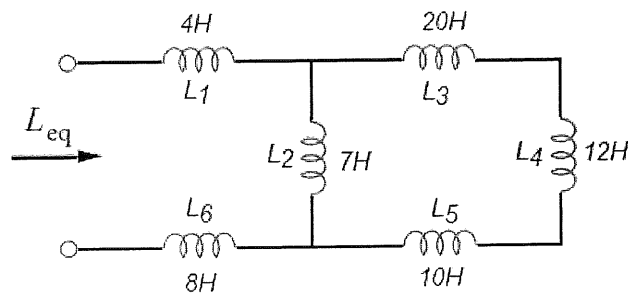
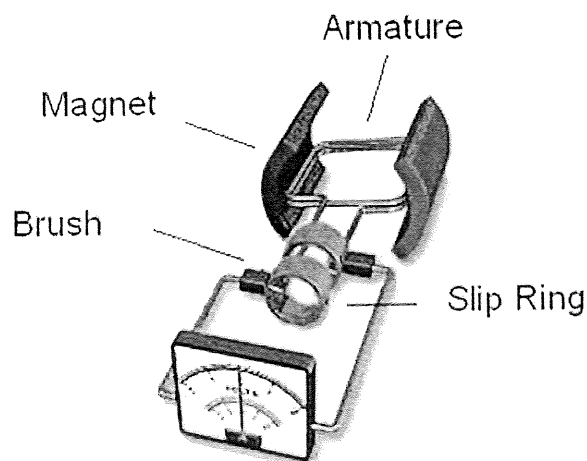


Figure 7

- e) A $2.5\mu H$ inductor and $3.0\mu H$ inductor are connected in series and current through is $2A$. Calculate the total energy stored in inductors. (4 marks)
- f) State the definition of;
- Amplitude. (1 mark)
 - Period. (1 mark)
 - Peak value. (1 mark)
 - RMS value. (1 mark)
- g) Describe function for constructional details of an alternator in detail shown in FIGURE 8.



(3 marks)

Figure 8

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