

**SIR ARTHUR LEWIS COMMUNITY COLLEGE**  
**FACULTY OF ENGINEERING**  
**ACADEMIC YEAR (2024/2025) - SEMESTER TWO**  
**END OF SEMESTER EXAMINATION**

**LECTURER(S)** : **Mr Arnaldo Sanchez Rojo**  
**PROGRAMME TITLE** : **Computer Systems Engineering**  
**COURSE TITLE** : **Electricity**  
**COURSE CODE** : **ELE112**  
**LEVEL** : **Associate Degree/ Year Twos**  
**PAPER** : **One**  
**DATE** : **Friday, 2<sup>nd</sup> May 2025**  
**COMMENCEMENT TIME** : **9:00a.m.**  
**DURATION** : **TWO (2) HOURS**  
**INVIGILATOR(S)** : **C. Biscette (Chief) & C. Charles**  
**ROOM(S)** : **VAR-0R-03**

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**GENERAL INFORMATION AND INSTRUCTIONS**

- This paper consists of **TWO (2)** sections. Answer all questions on the foolscap paper provided.
- **Section A** consist of four (4) long answer questions. You are required to answer **ALL** questions. Marks are awarded accordingly.
- **Section B** consist of two (2) short answer questions. You are required to answer only one (1) questions. Marks are awarded accordingly.
- Students must sign **IN** and **OUT** on the examination class list.
- Students must **not** write their names on their answer sheets, only their ID number
- Please number your responses accurately.
- Calculators are needed.

**DO NOT TURN THIS COVER SHEET UNTIL**  
**YOU ARE TOLD TO DO SO!!!**

### SECTION A: Long Answer Questions

**Answer all questions in this section.** (Marks are awarded accordingly).

1. A parallel plate capacitor has 21 interleaved plates, each 90 mm by 70 mm separated by mica sheets of 0.2 cm thick. Assuming the relative permittivity of the mica is 5, and a potential difference of 380 V is maintained across the terminals of the capacitor calculate:
- a) The capacitance of the capacitor. [5]
  - b) The charge of the capacitor [5]
  - c) The electric field strength [5]
  - d) the electric flux density [5]
  - e) The energy stored in the capacitor [5]

$$\epsilon_0 = 8.85 \times 10^{-12} \text{ F/m} \quad [25 \text{ marks}]$$

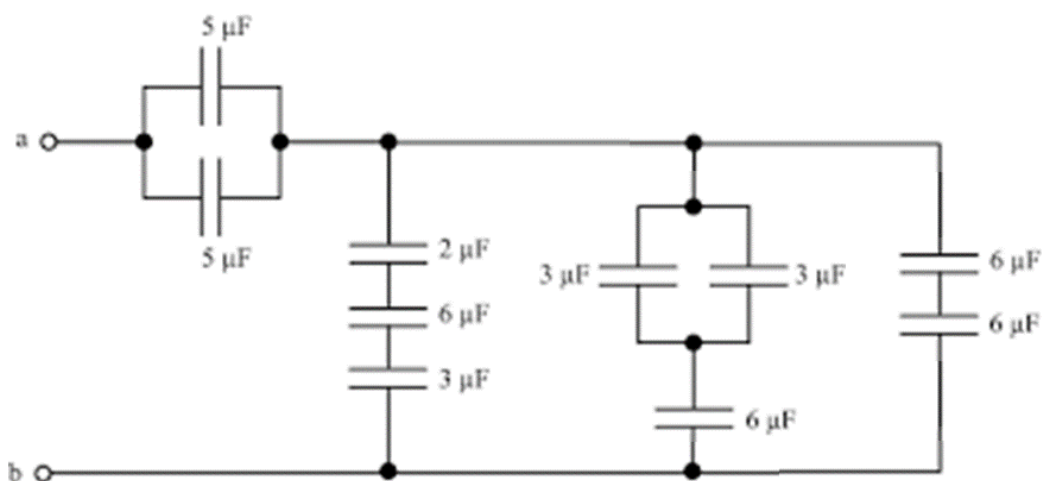
2. A coil of 1500 turns is wound uniformly over a mild steel ring of relative permeability 20, having a mean circumference of 750 mm and a uniform cross-sectional area of 1200 mm<sup>2</sup>. If the current through the coil is 3 A, calculate:
- a) the magnetic field strength [5]
  - b) the magnetic flux density [5]
  - c) the total flux [5]
  - d) the reluctance of the ring [5]

$$\mu_0 = 4\pi \times 10^{-7} \text{ H/m} \quad [20 \text{ marks}]$$

3. A coil of resistance 12 Ω and inductance 2 H is connected in series with a 5.4 μF capacitor. The circuit is connected to a 240 V, 50 Hz supply. Calculate:
- a) the inductive reactance [5]
  - b) the capacitive reactance [5]
  - c) the total impedance [5]
  - d) the total current [4]
  - e) the impedance of the coil [4]
  - f) the voltage drop across the coil [4]
  - g) the voltage drop across the capacitor [4]
  - h) the phase angle [4]

**[35 marks]**

4. Calculate the total capacitance between **A** and **B** for the circuit shown below:



**[8 marks]**

**88 Marks Total**

## SECTION B: Short Answer Questions

Answer one (1) question in this section. (Marks are awarded accordingly).

### Question One

A  $15\ \Omega$  resistor is connected in series with a parallel bank of resistors of  $40\ \Omega$  and  $50\ \Omega$ . The whole network is connected to a  $60\ \text{V D.C}$  supply.

- a) Draw the circuit described above. [3]
- b) Calculate the total current drawn from the supply [3]
- c) Calculate the voltage drop across the  $15\ \Omega$  resistor and the parallel branch [3]
- d) Calculate the power dissipated by the network. [3]

[12 marks]

### Question Two

- a) Draw a simple diagram of a transformer, naming the relevant parts [6]
- b) Explain the operation of a simple transformer [4]
- c) A transformer has 500 primary turns and 3000 secondary turns. If the primary voltage is  $240\ \text{V}$ , determine the secondary voltage, assuming an ideal transformer. [2]

[12 marks]

**12 Marks Total**

**END OF EXAMINATION!!!**