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	**:**	**Electrical Installation**
COURSE TITLE	**:**	**Principles and Technology II**
COURSE CODE	**:**	**ELE122**
LEVEL	**:**	**Associate Degree/ Year Twos**
PAPER	**:**	**One**
DATE	**:**	**Wednesday, 7th May 2025**
COMMENCEMENT TIME	**:**	**9:00a.m.**
DURATION	**:**	**TWO (2) HOURS**
INVIGILATOR(S)	**:**	**D. Jn Baptiste (Chief),** C. Mccann, E. Thomas, J. Charlemagne & K. Emmanuel
ROOM(S)	**:**	**LFT-1R-05**

GENERAL INFORMATION AND INSTRUCTIONS

- This paper consists of **Three (3)** sections. You are required to answer **Section A & B** on the exam paper and **Section C** on the foolscap provided.
- **Section A** consist of twenty-five (25) Multiple Choice Questions. You are required to answer **ALL** questions on this paper**. One mark is awarded for each correct answer.**
- **Section B** consist of two (2) Fill in the Blank Questions. You are required to answer **ALL** questions on this paper. Marks are awarded accordingly.
- **Section C** consist of three (3) Structured Questions. Answer **ALL** questions in this section on the foolscap provided. 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 – Multiple Choice Questions

Answer all questions on this paper. (One mark will be awarded for each correct answer)

1. There are two main classifications of cells:

   (A) ____ New cells and Old cells.
   (B) ____ Primary cells and Secondary cells.
   (C) ____ First class cells and Second class cells.
   (D) ____ Fast cells and Slow cells.

2. Inductance is represented by the symbol L, and the unit of inductance is:

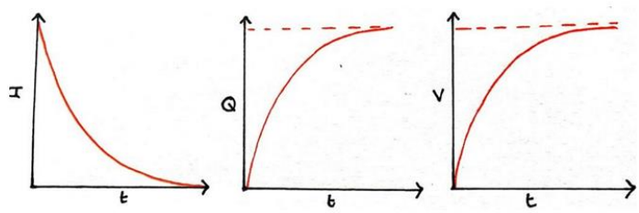
   (A) ____ Henry "H".
   (B) ____ Lumen "Lux".
   (C) ____ Farad "F".
   (D) ____ Weber "Wb".

3. In a battery, during an open circuit condition, the terminal voltage will be:

   (A) ____ more than the EMF of the cell.
   (B) ____ less than the EMF of the cell.
   (C) ____ equal to the EMF of the cell.
   (D) ____ changes with the internal resistance.

4. The graphs below show the relationship between the current, charge and voltage against time when a capacitor is:

   (A) ____ Charging.
   (B) ____ Discharging.
   (C) ____ Standby.
   (D) ____ Overheating.



5. The equivalent capacitance of two capacitors of 12 ɥF and 8 ɥF connected series is:

   (A) ____ 4,8 F.
   (B) ____ 4,8 ɥF.
   (C) ____ 20 F.
   (D) ____ 20 ɥF.

6. Find the charge on a 20 pF capacitor when the voltage applied to it is 0,3 kV.

   (A) ____ 6 nC
   (B) ____ 6×10^{-9} F
   (C) ____ $6{,}67 \times 10^{-14}$ C
   (D) ____ 1.5×10^{13} µF

7. What is the energy stored in a 8 ɥF capacitor when charged to 500 V.?

   (A) ____ 2000 W
   (B) ____ 4×10^{-3} joules
   (C) ____ 1 joule
   (D) ____ 2 joules

8. The symbol used to represent magnetic flux density is:

(A) ____ B
(B) ____ D
(C) ____ M
(D) ____ W

9. Which of these factors does not affect the inductance of an inductor?

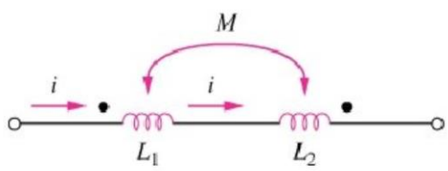
(A) ____ the way the turns are arranged
(B) ____ the number of turns of wire
(C) ____ to have a capacitor nearby
(D) ____ the cross-sectional area of the coil of wire

10. An 15 H inductor has a current of 8 A flowing through it. How much energy is stored in the magnetic field of the inductor?

(A) ____ 120 Joules
(B) ____ 480 Joules
(C) ____ 60 Joules
(D) ____ 960 Joules

11. Find the mutual inductance in this circuit if total inductance is 20 H, L_1 = 6 H and L_2 = 16 H.

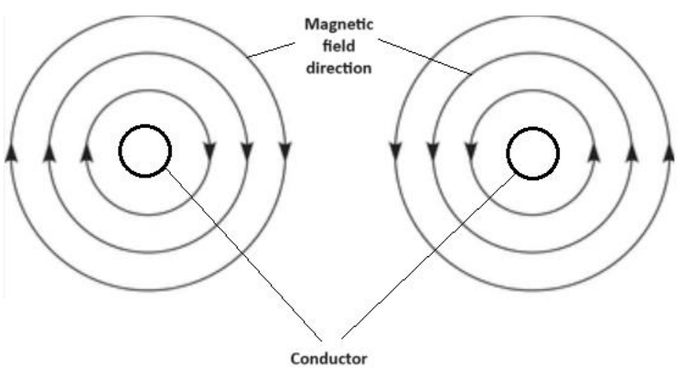
(A) ____ -2 H
(B) ____ 1 H
(C) ____ 2 H
(D) ____ 30 H



12. In an area of 3 m^2 there are 6 field lines each representing a flux of 2 Wb. What's the flux density?

(A) ____ 0,25 T
(B) ____ 4 T
(C) ____ 11 T
(D) ____ 36 T

13. An electrical current flowing through a conductor produces a magnetic field around the conductor. Using the right hand grip rule identify if the current is flowing away from viewer ⊗ or the current is flowing towards viewer ⊙.



14. Which of these is NOT an incandescent light bulb:

(A) ____ The general service
(B) ____ The reflectorized
(C) ____ The halogen
(D) ____ CFL

15. Identify the device showed below

(A) _____ Relay
(B) _____ Timer switch
(C) _____ Contactor
(D) _____ Automatic Transfer Switch (ATS)

16. Identify the device showed below

(A) _____ Light switch
(B) _____ Timer switch
(C) _____ Contactor
(D) _____ Thermostat switch

17. Identify the device showed below

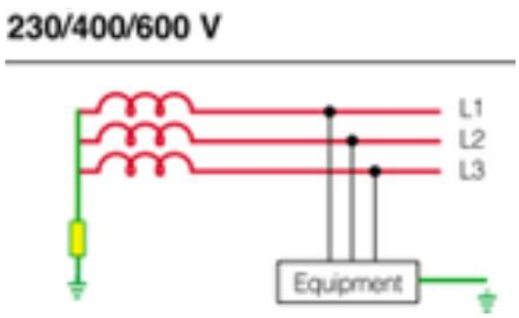
(A) _____ Relay
(B) _____ Timer switch
(C) _____ Centrifugal Switch
(D) _____ Automatic Transfer Switch (ATS)

18. Identify the device showed below

(A) _____ Light switch
(B) _____ Timer switch
(C) _____ mercury Switch
(D) _____ Thermostat switch

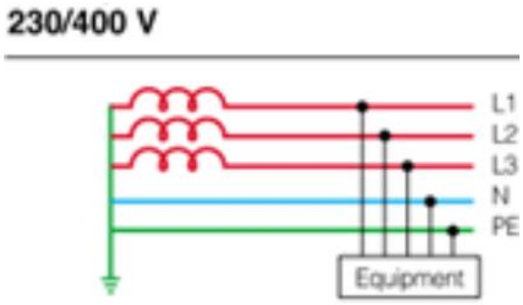
19. Identify the earthing system showed below

(A) _____ TNC
(B) _____ TNC-S
(C) _____ TT
(D) _____ TNS
(E) _____ IT



20. Identify the earthing system showed below

(A) ____ TNC
(B) ____ TNC-S
(C) ____ TT
(D) ____ TNS
(E) ____ IT



21. The main parts of an earthing circuit do NOT include:

(A) ____ Electric meter
(B) ____ Main earth terminal
(C) ____ Earth lead (Earthing conductor)
(D) ____ Circuit protective conductors (cpc)

22. Which of the is NOT a type of earth electrode?

(A) ____ Rod electrode
(B) ____ Pipe electrode
(C) ____ House's electrode
(D) ____ Plate electrode earthing

23. Identify the earth electrode showed below

(A) ____ Rod electrode
(B) ____ Plate electrode earthing
(C) ____ Pipe electrode
(D) ____ Wire electrode

24. The formula to calculate total earth fault loop impedance is:

(A) ____ $Z_s = Z_e \times (R_1 - R_2)$
(B) ____ $Z_s = Z_e - (R_1 + R_2)$
(C) ____ $Z_s = Z_e / (R_1 - R_2)$
(D) ____ $Z_s = Z_e + (R_1 + R_2)$

25. I bought a light bulb and the following information showed below. What will the color of the light be when the lamp is on?

(A) ____ Yellow (Warm white)
(B) ____ Blue (Cool white)
(C) ____ White (Neutron white)
(D) ____ Green

light bulb information:
- 100-240 V
- 12 W
- 4000 K
- 1200 lumens
- 50-60 Hz.

Total [25 marks]

SECTION B: Fill in the Blanks Questions

Answer all questions on this paper. (Marks are awarded accordingly)

Question One: Choose the most appropriate answer from the table below.

• Battery • Self-inductance	• Magnetic flux density • Electrolyte • Cell	• Switch • Capacitor

a) An _____ is a compound which will undergo electrolysis. Examples include salt water, copper sulphate and sulphuric acid.

b) A _____ is a device that stores chemical energy and makes it available in an electrical form. In it, chemical energy is directly converted to electrical energy.

c) A _____ is a combination of more than one cell.

d) A _____ basically consists of two parallel plates, very close to each other but separated by an insulating material called a dielectric.

e) When the e.m.f. is induced in the same circuit as that in which the current is changing, the property is called _____.

f) _____ is the amount of flux passing through a defined area that is perpendicular to the direction of the flux.

g) A_____ is a device used for changing the course or flow of current in an electrical circuit. (**7 Marks**)

Question Two: Select the most appropriate answer identifying each EARTHING element selected in the picture below**.**

• **Main earth terminal bar** • **Bounding conductor** • **Protective conductor**	• **Earthing conductor** • **Earth electrode** • **Copper bar**

1- _____

2- _____

3- _____

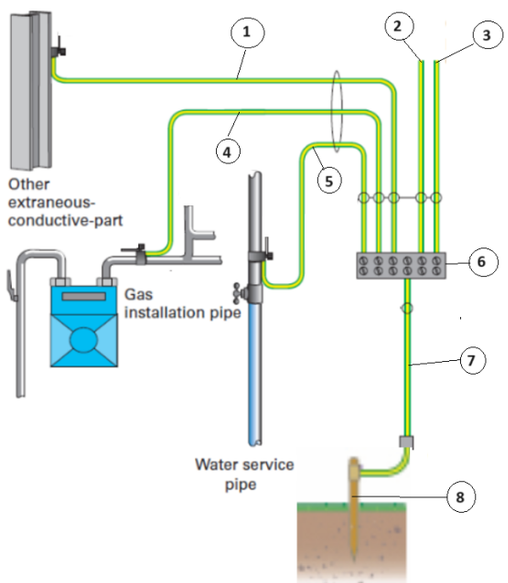
4- _____

5- _____

6- _____

7- _____

8- _____



(8 marks)
Total [15 marks]

SECTION C – Structured Questions

You are required to answer all question within this section on the foolscap provided. (Marks are awarded accordingly).

1. YTen 1.5 V cells, each having an internal resistance of 0.2 Ω, are connected in series to a load of 58 Ω. Determine:

   a) The current flowing in the circuit [5 marks]

   b) The p.d. at the battery terminals. [5 marks]

2. A ceramic capacitor has an effective plate area of 800 mm^2 separated by 0.5 mm of ceramic of relative permeability of 80. Calculate:

   a) the capacitance of the capacitor. [5 marks]

   b) if the capacitor given a charge of 2.2 μC, what will be the p.d. between the plates? [5 marks]

   c) How much will be the energy stored in this capacitor**?** [5 marks]

   $\varepsilon_0 = 8.85 \times 10^{-12}$ F/m

3. Part of a magnetic circuit is made from steel of length 150 mm, cross sectional area 12 cm^2 and relative permeability 600. Calculate:

   a) Reluctance [5 marks]

   b) The absolute permeability of the steel. [5 marks]

   $\mu_r = 4\pi \times 10^{-7}$ H/m

Total [35 marks]

END OF EXAMINATION!!!