



COLLEGE: COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY
SCHOOL: ELECTRICAL & ELECTRONICS ENGINEERING
PROGRAMME: CERTIFICATE IN ELECTRICAL SERVICEMAN'S COURSE
UNIT CODE: EEE 211
TITLE: APPLIED ELECTRICITY 1

FINAL EXAMINATION – PENSTER 2, 2017

TIME: 2 HOURS 10 MINUTES

DAY/DATE: TBC/ TBC TIME: TBC ROOM: TBC

INSTRUCTIONS TO STUDENTS

1. You are allowed **10 minutes Extra reading time** during which you are **NOT to write**.
2. Begin each **section** on a fresh page and use both sides of the sheet.
3. Write your candidate-number at the top of each attached sheet.
4. Insert all written foolscaps, graph paper, drawing paper, etc. in their correct sequence and secure with string.
5. For all sheets of paper on which rough or draft work has been done, cross it through and you **MUST ATTACH** to your answer scripts.
6. Write clearly the number(s) of the question(s) attempted on the top of each sheet.
7. Answers to all questions must be written in **INK** on the Answer sheet provided and show all working where necessary.
8. Only Non-programmable calculators are allowed.
9. **ATTEMPT** all questions.

SECTION A (20 MARKS)

In each of the following statements, one of the suggested answers is correct. Write your identified answer alphabet beside the question numbering in your answer sheet.

MULTIPLE CHOICE

1. In the structure of the atom the negatively charged particle is the:
 - a. electron
 - b. proton
 - c. neutron
 - d. nucleus

2. If an atom has more protons than electrons then that atom becomes:
 - a. negatively charged
 - b. positively charged
 - c. no charge
 - d. neutralized

3. The smallest units into which an element can be divided and still have all the physical and chemical characteristics of the element are called:
 - a. conductor
 - b. atom
 - c. semiconductor
 - d. molecule

4. The smallest particle into which any particular matter can be divided without changing the characteristics of that matter is called what?
 - a. conductor
 - b. atom
 - c. semiconductor
 - d. molecule

5. Which one of the following describes the process by which an originally neutral atom becomes charged by the removal of electrons and the atom itself becomes an ion:
 - a. Ionisation
 - b. mixture
 - c. molecule
 - d. nucleus

6. What is composed of molecules made up of different atoms?
- watts
 - matter
 - amperes
 - joules
7. A negatively charged body has more?
- electrons
 - protons
 - nucleus
 - None of the above
8. As the material rises in temperature, the molecules and their associated electrons gain energy. This extra energy is transferred through the material by means of collisions between electrons and atoms. This is best described as?
- Ionization
 - Convection
 - Radiation
 - Conduction
9. Which of the following offers high opposition to heat energy flow?
- copper
 - aluminum
 - glass
 - gold
10. $1/R_T = 1/R_1 + 1/R_2 + 1/R_3 + \dots$ this formula is adding total resistance of a circuit. This formula is for which type of circuit?
- Parallel circuit
 - Combination circuit
 - Series circuit
 - All of the above.
11. Which of the following gives the total resistance of a circuit when a 10Ω resistor and a 5Ω resistor are in series connected?
- 20Ω
 - 10Ω
 - 15Ω
 - 5Ω .

12. Cells that cannot be recharged by reversing the chemical changes that have taken place in them are which type of cells.
- Secondary cells
 - Primary cells
 - Both a and b mention above
 - None of the above
13. The chemical change that takes place on discharge can be reversed by applying the voltage to the cell and recharging it and the plates are restored to their original chemical state, and the process can be repeated, describes which types of cells?
- Secondary cells
 - Primary cells
 - Both a and b mention above
 - None of the above
14. An Inductor is a device that stores energy in the form of?
- Voltage
 - Inductance
 - Electrical Charge
 - None of the above
15. A $16\mu\text{F}$ capacitor and an $8\mu\text{F}$ capacitor are connected in series. Find the resulting capacitance?
- $5.3\mu\text{V}$
 - $5.3\mu\text{H}$
 - $5.3\mu\text{C}$
 - $5.3\mu\text{F}$
16. The magnetic force between two conductors carrying current in the opposite direction causes what between these two conductors?
- Repulsion
 - Attraction
 - Capacitance
 - None of the above
17. What is the unit of inductance?
- Electro-magnetic force
 - Henry
 - Capacitance
 - None of the above

18. A charge of $200\mu\text{F}$ capacitor has a potential difference of 30V . Calculate the charge on the plates?
- 0.006 A
 - 0.006 volts
 - 0.006 ohms
 - 0.006 coulombs
19. Right hand thumb rule for a solenoid shows that the fingers points in the direction of the current flowing through the coil and the thumb will point in the direction of what?
- South pole
 - North pole
 - Voltage flow
 - None of the above
20. 1 kWhr equals?
- $3,600,000\text{J}$
 - $1,000\text{ J}$
 - $1,000\text{ watts}$
 - 3.6 watts

SECTION B (15 MARKS)

Write down the question numbers in your answer booklet and beside it write the word(s) from the possible answer list provided that best completes the statement.

Answer list: Current, repels, low, electrical, attracts, One constant, high, low temperature parallel, resistance, heat, chemical effect, attraction, electrical effect, conducts.

- A Like charges ____ 1 ____ each other. Unlike charges ____ 2 ____
- B Ammeters are connected in a circuit to measure the amount of ____ 3 ____ flow.
- C Heat energy moves from ____ 4 ____ to ____ 5 ____ temperature levels
- D In a series circuit there is ____ 6 ____ value of current throughout the circuit.
- E The voltage across a ____ 7 ____ section is constant across each resistor in that section.

- F Ohm meters are connected in a circuit to measure the amount of _____ 8 _____.
- G When you are heating water in a hot water kettle, this appliance consumes _____ 9 _____ energy and transforms into _____ 10 _____ energy.
- H Electrochemistry in general refers to two processes – one using electrical energy to create a _____ 11 _____, the other a chemical effect to create _____ 12 _____.
- I The magnetic force between two conductors carrying current in the same direction causes _____ 13 _____ between the two conductors.
- J. Materials that _____ 14 _____ electricity quite easily are called conductors and materials that offer a high opposition to the flow of electricity are called insulators and pure semi-conductors are insulators at _____ 15 _____ and reasonably good conductors at higher temperature.

SECTION C (10 MARKS)

Write down the question numbers in your answer booklet and beside it write the answers in either **true** or **false**

1. Ammeters are connected in parallel to measure the current.
2. If a positively charged body is connected to a negatively charged body, the electron flow will be from negative to the positive body.
3. Ohms law states that $V = IR$
4. Power is product of voltage and current.
5. Ohm meters are connected in series.
6. Voltmeter is used to measure the voltage.
7. Thermal conductivity is the ability of a material to transmit heat by conduction
8. Energy is the potential to do work
9. Subdividing the water molecule produces two different materials called elements
10. The best conductors of heat is glass and rubber.

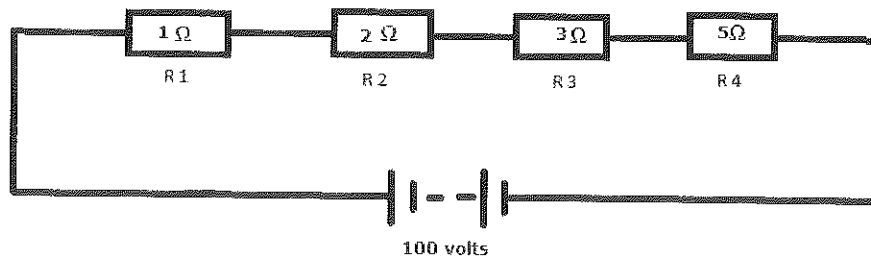
SECTION D - MATCHING (15 MARKS)

- | | |
|--|---|
| 1. Unit for voltage is | A. Causes electrons to flow in a circuit |
| 2. Symbol for resistance is | B. opposes current flow in a circuit. |
| 3. Unit for Current is | C. forces current through circuit |
| 4. Semi- conductor | D. $X_C = 1/(2\pi fC)$ |
| 5. Positively charged body | E. insulators at low temperature |
| 6. Insulator | F. Volts |
| 7. Current | G. Farad |
| 8. Conductors | H. Secondary Cell |
| 9. Resistance | I. high opposition to flow of electricity |
| 10. Potential Difference | J. Conducts electricity quite easily |
| 11. Capacitive reactance | K. Henry |
| 12. Inductive reactance | L. Ω |
| 13. The unit charge for capacitance is | M. Ampere |
| 14. What is the unit of inductance | N. $X_L = 2\pi fL$ |
| 15. Rechargeable cell | O. has more protons |

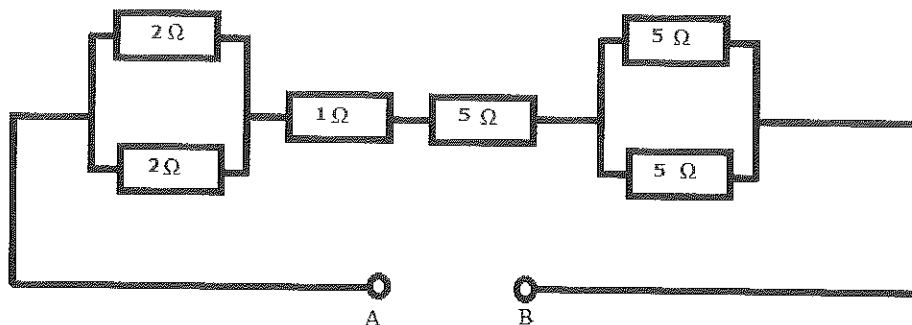
SECTION E (40 MARKS)

1. There are three recognized process of heat transfer. What are the names of these three processes? (3 marks)
2. There are four factors that affect the resistance of a conductor, what are these four factors? (2 marks)

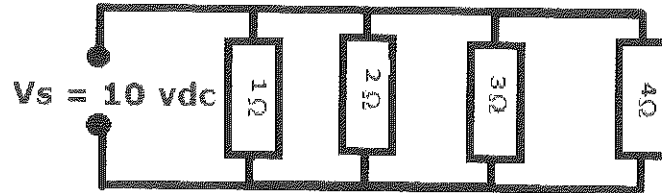
3. In measuring temperature what two scales are used? (1 marks)
4. A coil has an inductance of 0.05 H. what would be the inductive reactance when connected to a 240V, 50 Hz supply? (2 marks)
5. Magnetic reluctance is dependable on three factors; one is permeability of the circuit material. What are the remaining two factors? (2 marks)
6. Calculate the following for the series circuit shown below. (5.5 marks)
- Total resistance
 - Total current
 - Total supplied power
 - Current in R_3
 - Voltage in R_3



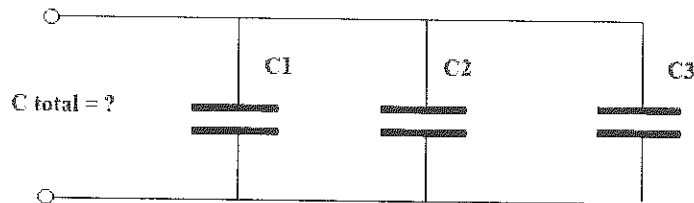
7. Find the total resistance between the terminals A and B in the circuit shown below (3 marks)



8. Calculate the following for the parallel circuit shown below. (5.5 marks)
- Total resistance
 - Total current
 - Total supplied power
 - Voltage in R_3
 - Current in R_3



9. Three Capacitors are connected in parallel in a dc circuit as shown, calculate the total capacitance when C_1 is $4\mu\text{F}$, C_2 is $8\mu\text{F}$ and C_3 is $12\mu\text{F}$. (2 marks)



10. A 100 watts street light stays on for 11 hours in the night; calculate its power consumption in kWhr. If the tariff rate is \$0.33c per kWhr, calculate the cost of electricity used for a period of 30 days? (4 marks)
11. It is desired to manufacture a 15Ω resistor from 0.2 mm^2 cross-sectional area manganin wire. What length is required? if $\rho = 48 \times 10^{-8} \Omega \text{ m}$ (4 marks)
12. When the maximum value of an alternating current is 10A, Calculate the following:
- Average value? (1 marks)
 - R.M.S. value? (1 marks)
 - Peak value? (1 marks)
 - Draw the waveform on the graph paper provided showing the average, rms and maximum values over a period of 360° . (3 marks)

*****The End *****