Uganda Martyrs University

FACULTY OF EDUCATION
SEMESTER ONE EXAMINATIONS 2022/23
BACHELOR OF EDUCATION (PRIMARY) YEAR THREE
PHYSICAL SCIENCE EDUCATION
PSC3102 ELECTRICITY AND MAGNETISM

DATE: Fri 13/01/2023 **Time: 2.00-5.00 PM**

Instructions:

- **Follow instructions on this question paper and answer booklet carefully.**
- **Write your registration number on each page of this question paper.**
- **Section A is compulsory (20 Multiple-Choice Questions)**
- **Attempt any four Questions in Section B and write answers in the answer booklet provided, beginning each selected question on a new page in the answer booklet.**
- **Illustrate appropriately in Section B.**
- **Copy the answer table below in your answer booklet and neatly fill in the correct alternative to each Section A question.**

ANSWER TABLE FOR SECTION A (Copy and complete it in your answer booklet)

Q	A	Q	A	Q	A	Q	A
1		6		11		16	
2		7		12		17	
3		8		13		18	
4		9		14		19	
5		10		15		20	

SECTION A

For each of the multiple-choice Question, choose the best choice that you believe is ri

Qn.#1. The study of electricity where the charges are not flowing is called

A). Static electricity
B). Electrostatics
C). Thermodynamics
D). None of the above

Qn.#2. In an electrical circuit three incandescent bulbs A, B and C of rating 40 W, 60 W and 100 W respectively are connected in parallel to an electric source. Which of the following is likely to happen regarding their brightness?

A). Brightness of bulb C will be less than that of B
B). Brightness of all the bulbs will be the same
C). Brightness of bulb B will be more than that of A
D). Brightness of bulb A will be the maximum

Qn.#3. The instrument used for measuring an electric current is:

A). Potentiometer
B). Galvanometer
C). Voltmeter
D). Ammeter

Qn.#4. Which of the following statements is true about magnetic lines of force?

A). Magnetic lines of force do not pass through the vacuum.
B). Magnetic lines of force are always closed.
C). Magnetic lines of force always intersect each other
D). Magnetic lines of force tend to crowd far away from the poles of the magnet

Qn.#5. A bar magnet is divided in two pieces. Which of the following statements is true?

A). Two new bar magnets are created
B). The bar magnet is demagnetized
C). The magnetic poles are separated
D). The magnetic field of each separated piece becomes stronger

Qn.#6. Which of the following is true of electrical forces?

A). Electrical forces are weaker than gravitational forces
B). Like charges attract, unlike charges repel
C). Positive and negative charges can combine to produce the third type
D). Electrical forces are produced by electrical charges

Qn.#7. A strong per
effect produced on the
A). A high voltage is
B). There is no effect
C). The insulation of th
D). The coil winding be

Qn.#

believe is right

Qn.#7. A strong permanent magnet is plunged into a coil and left in the coil. What is the effect produced on the coil after a short time?

A). A high voltage is induced
B). There is no effect
C). The insulation of the coil burns out
D). The coil winding becomes hot

Qn.#8. When we rub a glass rod with a silk cloth then

A). Glass rod acquires negative charge while silk acquires a positive charge
B). Glass rod acquires positive charge while silk acquires negative charges
C). Both glass rod and silk acquire a negative charge
D). Both glass rod and silk acquire a positive charge

Qn.#9. What is the study of electric charges in motion called?

A). Charge mobility
B). Electronic mobility
C). Static electricity
D). Current electricity

Qn.#10. The unit of electrical resistance is

A). Ohms
B). Volt
C). Joule
D). Watt

Qn.#11. Which of the following materials is magnetic?

A). Carbon
B). Copper
C). Nickel
D). Sodium

Qn.#12. What kind of material contains lots of free electrons?

A). Semiconductors
B). Conductors
C). Insulators
D). All the above

Qn.#13. An electric charge at rest produces

A). Only a magnetic field
B). Only an electric field
C). Both electric and magnetic fields
D). Neither electric field nor magnetic field

Qn.#14. Electrical resistivity of a given metallic wire depends upon

A). Its length
B). Nature of the material
C). Its thickness
D). Its shape

Qn.#15. The work done against electrostatic force gets stored in which form of energy?

A). Solar energy
B). Thermal energy
C). Potential energy
D). Kinetic energy

Qn.#16. Resistance is a measure of a material's opposition to

A). Voltage
B). Current
C). Electric force
D). Movement of protons

Qn.#17. The magnetism of a magnet is due to

A). Earth
B). Due to pressure of big magnet inside the earth
C). Cosmic rays
D). Spin motion of electrons

Qn.#18. The space outside the magnet where its pole has a force of attraction or repulsion on a magnetic pole is called

A). Free Space
B). Electromagnetic field
C). Field Magnetic field
D). Electric field

Qn.#19. Two coils are placed closed to each other. The mutual inductance of the pair of coils depends upon

A). the rate at which currents are changing in the two coils
B). relative position and orientation of two coils
C). the material of the wires of the coils
D). the currents in the two coils

Qn.#20. Self-inductance occurs when:

A). the resistance is changing
B). the current is changing
C). the circuit is changing
D). the flux is changing

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Qn.#21.

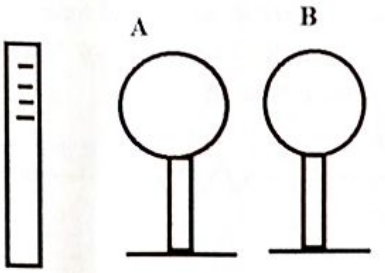
a) State the law of ele
b) The figure below sh
insulating base. A ne

SECTION B: ATTEMPT ANY FOUR QUESTIONS
(All Questions Carry Equal Marks)

Qn.#21.

a) State the law of electrostatics (1 mark)

b) The figure below shows two metal spheres A and B in contact and each standing on an insulating base. A negatively charged rod is brought near to the sphere A as shown



i) State the charges that will be induced at A and B (2 marks)

ii) Explain your observation in (b) (i) above (2 marks)

c) Briefly explain what is meant by the following

i) static electricity? (2 marks)

ii) an electric force? (2 marks)

d) The electric forces are much stronger when electrons are closer to the positive charge, explain. (4 marks)

e) Draw electric field patterns between a point charge which is positively charged and a negatively charged parallel plates. (2 marks)

f) In Mr. Luzige's home, the children watch a T.V screen for five hours per day. If the screen is of 150 W and the electricity rate is shs.439 per KWh, calculate the bill he pays at the end of the 30 days. (3 marks)

Qn.#22.

a) i) Define the term conductor (1 mark)

ii) Briefly explain why a metal wire heats up when conducting electricity. (2 marks)

b) Give two examples of each of the following.

i) Metallic conductors (2 marks)

ii) Ionic conductors (2 marks)

iii) Semi-conductors (2 marks)

iv) Insulators (2 marks)

c) Briefly, explain what is meant by the following electrical components

i) Capacitor (1 mark)

ii) Resistor (1 mark)

iii) Fuse (1 mark)

iv) Switch (1 mark)

d) i) What is the difference between Direct Current (DC) and Alternating Current (AC)? (2 marks)

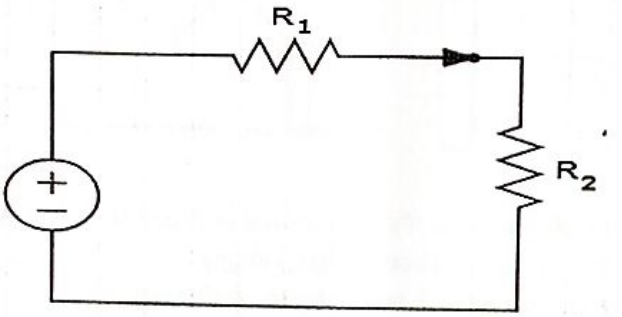
ii) Give three advantages as to why AC power is easily used all-over the world. (3 marks)

Qn.#23.

a) i) State Ohm's law (1 mark)

ii) Briefly describe an experiment which can be performed to verify ohms law. (5 marks)

b) In the circuit below resistors R_1 and R_2 are in series and have resistances of 5 Ω and 10 Ω, respectively. The voltage across resistor R_1 is equal to 4 V. Find the current passing through resistor R_2 and the voltage across the same resistor. (4 marks)



c) If another resistor R_3 was connected in parallel to resistor R_2.

i) Calculate the effective resistance for the whole circuit. (2 marks)

ii) Comment about the voltage through resistor R_3. (1 mark)

d) Give two examples of ohmic and non ohmic conductors. (2 marks)

e) State three factors affecting the resistance of a conductor. (3 marks)

f) Give two reasons why parallel arrangement is used in domestic wiring. (2 marks)

Qn.#24.

a) Explain the following concepts in relation to magnetism in a brief manner.

i) A magnet (1 mark)

ii) A pole (1 mark)

iii) A magnetic material (1 mark)

iv) Demagnetization (1 mark)

v) Magnetic field (1 mark)

vi) Magnetic flux (1 mark)

b) With two examples of each, distinguish between non-magnetic and ferro-magnetic materials. (4 marks)

c) i) What is a neutral point in a magnetic field? (1 mark)

ii) Sketch the magnetic field pattern around two magnets with; (4 marks)

a) Like poles close

b) Unlike poles close

d) i) Explain how an iron bar can be magnetized by electrical method. (3 marks)

ii) Explain why a magnet loses its magnetism when placed in a coil of wire carrying an alternating current. (2 marks)

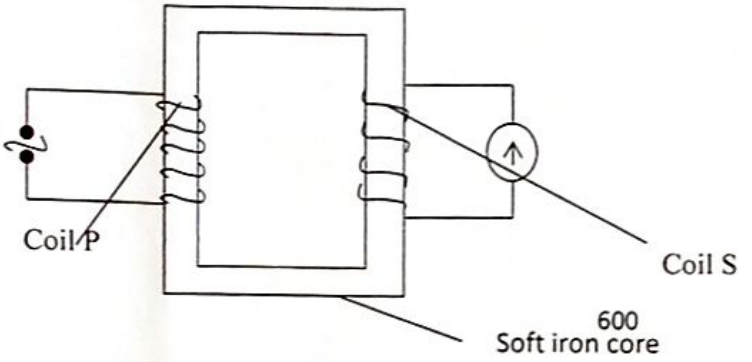
s law. (5 marks)
Ω and 10
the world. (3

Qn.#25.

a) i) What is an electromagnet? (1 mark)

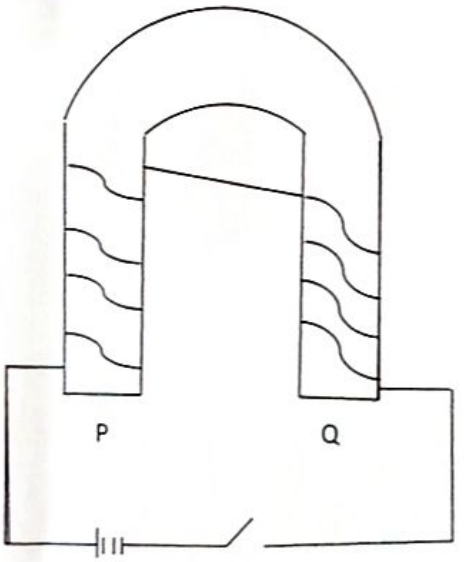
ii) Describe with the aid of a labeled diagram how an electric bell works. (5 marks)

b) The figure below shows two coils P and S wound on a soft iron core. Coil P has 1,000 turns while S has 600 turns and a resistance of 100Ω.



Determine the maximum current measured on the ammeter. (5 marks)

c) An insulated coil is wound round a U-shaped core and connected to a battery to make an electromagnet as shown below.



i) State the polarities of the ends P and Q. (2 marks)

ii) What material is used for the core and why. (2 marks)

iii) Through which ways can the strength of this electromagnet be increased? (3 marks)

iv) State any two uses of electromagnets. (2 marks)

END