



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF HEALTH AND APPLIED SCIENCES

DEPARTMENT OF NATURAL AND APPLIED SCIENCES

QUALIFICATION: BACHELOR OF SCIENCE (MAJOR AND MINOR)	
QUALIFICATION CODE: 07BOSC	LEVEL: 6
COURSE CODE: EAM601S	COURSE NAME: ELECTRICITY AND MAGNETISM
SESSION: JULY 2019	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

SUPPLEMENTARY/SECOND OPPORTUNITY EXAMINATION PAPER	
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INSTRUCTIONS
<ol style="list-style-type: none">1. Write all your answers in the answer booklet provided.2. Read the whole question before answering.3. Begin each question on a new page.

PERMISSIBLE MATERIALS

Scientific Calculator

THIS EXAMINATION PAPER CONSISTS OF 6 PAGES

(INCLUDING THIS FRONT PAGE)

SECTION A

QUESTION 1

[30]

Short Answer Question Types: Each question in this section carries two marks

1.1 Positive charge is obtained when (2)

- a. cellulose acetate is rubbed with silk b. polythene is rubbed with silk
c. ebonite rod is rubbed with fur d. glass rod is rubbed with fur

1.2 The electric field intensity is given by _____. (2)

- a. $\frac{Force}{Charge}$ b. $\frac{Charge}{Force}$ c. $Charge \times Force$ d. $\sqrt{Charge \times Force}$

1.3 Current is the rate at which charges move through (2)

- a. an insulator b. a conductor c. voltage d. amperes

1.4 Static electricity is produced due to (2)

- a. friction b. conduction c. insulation d. both a and c

1.5 The S.I unit of electric field is: (2)

- a. Am^{-1} b. NC^{-1} c. Cm^{-1} d. Cm^{-2}

1.6 The instrument used in the measurement of voltage is: (2)

- a. Voltmeter b. Wheatstone bridge c. Potentiometer D. Ammeter

1.7 A work of 70 J is done in transferring 20 C of charge from a point B to a point A in an electric field. Calculate the potential difference between A and B. (2)

- a. 2.5 V b. 1.5 V c. 3.5 V d. 4.0 V

- 1.8 When a charge, q is released from rest in a uniform electric field, E set up between two oppositely charged plate with respect to vertical distance, y , what is the equivalent expression of the **kinetic energy** of the falling charge? (2)
- a. $mv^2/2$ b. $2Ey$ c. qEy d. Eq
- 1.9 When an electron, e , is projected horizontally into a uniform electric field, E , with an initial velocity, V_0 , with an attraction towards positive charge at time, t , what is the value of the horizontal displacement? (2)
- a. eEt^2 b. at^2 c. V_0t d. eEt .
- 1.10 Capacitors have many applications in electrical circuit including the following except. (2)
- a. turning in radio circuit b. eliminating of spark in switches
c. rectification of coil in a transformer d. blocking noise in a.c. amplifies
- 1.11 The parallel plates of an air filled capacitor are everywhere 1.0 mm apart. What must the plate area be if the capacitor is to be 1.0 F? (2)
- a. $1.1 \times 10^8 \text{ m}^2$ b. $1.2 \times 10^8 \text{ m}^2$ c. $1.3 \times 10^8 \text{ m}^2$ d. $1.4 \times 10^8 \text{ m}^2$
- 1.12 The instrument used in the measurement of magnetic force is: (2)
- a. Magnetic flux b. Magnetometer c. Magnetic filling d. Iron filling
- 1.13 The ability of one coil to induce current in the nearby coil by the phenomenon of Induction when the current in the first coil changes is called _____ . (2)
- a. self-induction b. electromagnetic induction c. mutual induction
d. inductance
- 1.14 An electrical device that convert converts mechanical energy into electric energy or vice versa is called _____. (2)
- a. converter b. dynamo c. motor d. generator.
- 1.15 The root mean square value of the voltage in an ac circuit is: (2)
- a. $0.637 V_{\max}$ b. $0.707 V_{\max}$ c. $2 V_{\max}$ d. $\sqrt{2} V_{\max}$

SECTION B

QUESTION 2

[15]

- 2.1 Define electric potential at a point. (2)
- 2.2 State three method of producing charges. (3)
- 2.3 What did you understand by the term electric potential energy? (2)
- 2.4 Point charges of $0.3 \mu C$ place at the three vertex of an equilateral triangle each of whose side is 1m apart. Compute the electric potential energy of the system. (8)

QUESTION 3

[15]

- 3.1 What is the primary use of a capacitor components in an electric circuit? (2)
- 3.2 State three type of capacitors. (3)
- 3.3 Define the following term: (6)
- (i) Electromotive force (emf)
 - (ii) Potential difference (p.d)
 - (iii) Electric resistance.
- 3.4 Compute the energy stored in a $60pF$ Capacitor (4)
- (i) When charge to a potential difference of $2kv$.
 - (ii) When the charge on each plate is $30 nC$.

QUESTION 4**[15]**

4.1 What is an electric cell?

(2)

4.2 With the aid of a diagram, explain a simple primary cell.

(3)

4.3 What are the defect that affect a simple cell?

(2)

4.4 A battery of three cells in series, each emf 2 V and internal resistance 0.5 ohms , is connected to a 2 ohms resistor in series with parallel combination of two 3 ohms resistors. Draw the circuit and calculate

(8)

- (i) The total external resistance and total internal resistance
- (ii) The current in the circuit
- (iii) The lost volts
- (iv) The current through one 3 ohms resistor.

QUESTION 5**[15]**

5.1 State Lenz's law of electromagnetic induction.

(2)

5.2 What did you understand by the term dynamo?

(3)

5.3 Explain the term self-inductance.

(3)

5.4 If the current in the solenoid (coil of wire) increases uniformly from zero to 3 A in $3.0 \times 10^{-3}\text{ s}^{-1}$. Calculate (i) the magnitude of self-induced emf (take the inductance as 25mH). (ii) energy stored.

(7)

QUESTION 6

[10]

6.1 Define the following terms:

(2)

(i) Reactance

(ii) Impedance

6.2 Explain what is meant by root-mean-square value of an alternating current.

(3)

6.3 A capacitor of $60 \mu F$ is connected directly across a 150 V, 60 Hz ac source. Find

(5)

(i) The r.m.s value of the current.

(ii) The peak value of the current.

END!