



MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS

2018/2019 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER

SCHOOL OF SCIENCE AND INFORMATION
SCIENCES

UNIVERSITY EXAMINATIONS FOR THE DEGREE
OF BACHELOR OF SCIENCE (COMPUTER SCIENCE)
FOURTH YEAR FIRST SEMESTER EXAMINATION

COURSE CODE: PHY1100

COURSE TITLE: BASICS PHYSICS

DATE: 3RD DECEMBER, 2018

TIME: 0830 - 1030 HRS

INSTRUCTIONS

- Answer Question **ONE** and any other **TWO**
- *You may need the following constants where necessary:*
- $\pi = 3.14$; , $8.8541878176 \times 10^{-12} \text{ F/m}$ $\epsilon_0 = \times$, $g = 9.81 \text{ ms}^{-2}$,
- $\mu_0 = 4\pi \times 10^{-7} \text{ N}^1 \text{A}^{-2}$

This paper consist of six printed pages

QUESTION ONE 30 MARKS (COMPULSORY)

a. Differentiate between

i) Paramagnetic and ferromagnetic materials **(1marks)**

ii). Permanent and temporary magnets **(1marks)**

b. Define i. root mean square rms **(1 mark)**

ii. impedance **(1 mark)**

iii. inductive reactance **(1mark)**

iv. When 10 volts are applied to an ac circuit the current flowing in it is 100mA .Find impedance **(2 marks)**

c. State two advantages and two disadvantages of high voltage DC transmission. **(2marks)**

d. For a p n junction diode, draw a typical V-I characteristic. What is meant by

i. Forward resistance

ii. Static resistance

iii. Dynamic resistance of a diode. **(3marks)**

e. With the help of neat diagram, explain the functioning of a full-wave rectifier.

(3marks)

f. Explain the functioning of a bipolar junction transistor. **(2marks)**

g. What are the three modes in which a transistor can operate? Explain the meaning of each mode of operation. **(3marks)**

h. Define **(2marks)**

i. Fusion

ii. Fission

i. What is wave – particle duality? **(1mark)**

.j i. What do you understand by the term wave-particle duality of matter? **(2 marks)**

ii. . State three properties used to detect X-rays. **(3mks)**

i. For interference to occur the sources of the waves have to be coherent

i) Give two properties of coherent source **(1 marks)**

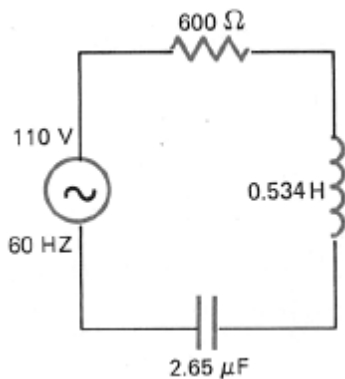
ii) Two light bulbs placed closed to each do not form a coherent pair.

Explain why

(1 marks)

QUESTION TWO (20 MARKS)

- a. i. Differentiate between relative permeability of a material and intensity of a material **(1 marks)**
- ii. Define the term magnetic susceptibility **(1 marks)**
- b. Given a 110-V (60-Hz) AC source in a circuit consisting of a $2.65 \mu\text{F}$ capacitor, a 0.534-H coil, and $600\text{-k}\Omega$ resistance find
- i. The current in the circuit, **(4marks)**
- ii. The phase angle between current and voltage (and state which lead), **(2marks)**
- iii. The power factor, and **(2marks)**
- iv. power dissipated in the circuit. **(2marks)**



- c. An AC voltmeter reads 250 V, what is its peak and instantaneous values if the frequency of alternating voltage is 50 Hz. **(3mark)**
- d. A $100 \mu\text{F}$ capacitor is connected to an alternating voltage of 24 V and frequency of 50 Hz. Calculate
- i. X_c **(2marks)**
- ii. Current **(2marks)**
- e. State one condition of resonance frequency to occur **(1mark)**

QUESTION THREE (20 MARKS)

a. i. Define half life of a radioactive material **(2 marks)**

(ii) Explain the three types of radioactive decay processes giving examples of each. **(6 marks)**

b. Differentiate between the following **(2mks)**

i). Absorption and emission spectra

ii). Nuclear fission and fusion **(2marks)**

b) i) Name the particles of an atom and state their charges **(3mks)**

ii) A nuclide notation is written as ${}^X_Z A$ State what the symbols; A, Z and X stands for. **(3mks)**

c) Why is radioactive half-life important **(2marks)**

QUESTION FOUR (20 MARKS)

a. Explain hypermetropia and myopia eye defects and show how it can be corrected use diagrams. **(4 marks)**

b) i. Briefly discuss with help of diagrams how total internal reflection occurs. **(5 marks)**

ii. Calculate the refractive index of a material with a critical angle of 42° **(2marks)**

c). State three laws for location of images on a convex lens. **(3 marks)**

d. Consider a thin convex lens, of refractive index n placed in air. Let R_1 and R_2 be the radii of curvature of the two coaxial spherical surfaces.

Show that the focal length f is given by: $1/f=(n-1)(1/R_1-1/R_2)$

(3 marks)

e. A lens has one radius of curvature 30cm and the other double of it. If its focal length is 40cm, calculate its refractive index **(3 marks)**

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