P510/2

PHYSICS

Paper 2

1hr 30 minutes

NAMPUNGE COMMUNITY HIGH SCHOOL

S5 MID TERM II EXAMS 2023

INSTRUCTIONS:

Attempt all the questions in this paper

Assume where necessary

Permittivity of free space $\varepsilon_o = 8.85x10^{-12} Fm$

The constant $\frac{1}{4\pi\varepsilon_0} = 9.0x10^9 F^{-1}m^{-1}$

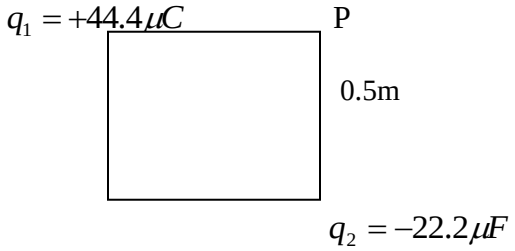
Question one

(a) Define the following terms
   (i) Electric potential 1 mark
   (ii) Electric field intensity 1 mark

(b) Explain briefly what happens to the potential energy as two point charges of the same sign are brought closer (2 marks)

(c) Explain how two insulating bodies rubbed together acquire charges (3 marks)

(d) The figure below shows two point charges placed at corners of square of side 0.5m



(i) Find the electric field intensity at P (3 marks)

(ii) Potential energy at P if a charge of $+10\mu C$ is placed at P (4 marks)

(e) Describe briefly how a lightening conductor works (6 marks)

Question two

(a) Define the following terms

(i) Capacitance of a capacitor (1 mark)

(ii) Relative permittivity (1 marks)

(iii) Dielectric strength (1 mark)

(b) Briefly describe the energy changes that take place when charging a capacitor using a dry cell (3 marks)

(c) Sketch on the same axis **P.d** against **time** for charging and discharging process for a capacitor (2 marks)

(d) A $2\mu F$ capacitor can withstand a p.d of 1000V and uses a dielectric with a dielectric constant 6 which breaks down if the electric field intensity in it exceeds $4x10^7 NC^{-1}$ Find

(i) Thickness of the dielectric (2 marks)

(ii) Effective area of each plate (3 marks)

(iii) Energy stored per volume (2 marks)

(e) Describe the action of dielectric (5 marks)

Question three

(a) (i) State the laws of reflection of light (2 marks)

(ii) A ray of light incident on a plane mirror. The mirror is then turned through an angle of α keeping the direction of light constant. If the reflected ray turned through an angle of β, find the relation between α and β (04 marks)

(b) Describe how a sextant is used to determined the angle of elevation of a star (5 marks)

(c) A plane mirror is placed 10cm in front of a convex mirror so that it covers about half of the convex mirror surface. A pin placed at 20cm in front of the mirror gives an image that coincides with that of the pin in convex. Find the focal length of the convex mirror (4 marks)

(d) Determine n experiment to determine the refractive index of a small quantity of liquid using a concave mirror (5 marks)

THE END