နိုင်ငံခြားစာစစ်ဌာနများတွင်စစ်ဆေးသည့်မေးခွန်းလွှာ

2019

MATRICULATION EXAMINATION
DEPARTMENT OF MYANMAR EXAMINATION

PHYSICS **Time Allowed: (3) Hours**

WRITE YOUR ANSWERS IN THE ANSWER BOOKLET

The symbols in this paper have their usual significance

SECTION (A)

(Answer **ALL** questions)

1. Choose the correct answer from the following. (4 marks)

   (i) The normal atmospheric pressure at sea level is .....
   (**A.** 760 mmHg , **B.** 760 cmHg , **C.** 760 mHg)

   (ii) Through a convex lens, the size of image depends upon the .....
   (**A.** focal length , **B.** object distance , **C.** image distance)

   (iii) The electrical energy supplied by a battery is transformed into heat energy when a current flows through a .....
   (**A.** capacitor , **B.** battery , **C.** resistor)

   (iv) In a stationary wave, the distance between two successive nodes is equal to .....
   (**A.** $3\frac{\lambda}{2}$, **B.** $\frac{\lambda}{2}$, **C.** $\frac{\lambda}{4}$)

2. Match the following. (4 marks)

(i)	Work	**A.** most deviated
(ii)	Violet light	**B.** stores electrical energy
(iii)	Capacitor	**C.** unit of frequency
(iv)	Hz	**D.** energy transferred

3. If a weighted rod floats with 8 cm of its length under water, what length is under the surface of alcohol when the rod floats in it? (4 marks)
(Density of water is 1000 $kg\ m^{-3}$, Density of alcohol is 800 $kg\ m^{-3}$).

4. What is meant by the dispersion of light? (4 marks)
Draw a ray diagram of the refraction of light on a plane surface.

5. The concrete roof of a house with the thickness 20 cm has an area of 200 m^2. The temperature inside the house is 15°C and outside is 35°C. Find the rate of heat flow which passed through the concrete. (The thermal conductivity of the concrete is 0.65 $Wm^{-1}K^{-1}$.) (4 marks)

6. Two capacitors of capacitances $6\ \mu F$ and $12\ \mu F$ are connected in series with a $12\ V$ battery. Find the potential difference across the $12\ \mu F$ capacitor. (4 marks)

7. Describe the nuclear fission and draw the diagram of the nuclear fission. (4 marks)

8. State Coulomb's law in words (or) in symbols. (4 marks)
Draw diagrams to show that resistances of $8\ \Omega$ and $9\ \Omega$ can be obtained by using three $6\ \Omega$ resistors and one $18\ \Omega$ resistor.

9. Describe the actions of **any two** types of common logic gates and draw their symbols. (4 marks)

SECTION (B)

(Answer any **FOUR** questions)

10. (a) Write down the relation between the pressure exerted by a liquid and the height of the liquid column and the density. (8 marks)
How much work is done when an object of $25\ kg$ mass is lifted by a machine to a height of $400\ cm$? What rate of work done does the machine lift the object to a $400\ cm$ height in $4\ s$?

(b) (i) How many different modes are there by which heat may be transferred from one place to another? What are they? Explain **any one** of them. (8 marks)

(ii) State the wave equation which applies to all forms of wave motion.
Find the third and fifth harmonics which will be formed in a closed organ pipe of length $0.6m$. At room temperature, the velocity of sound in air is $340\ ms^{-1}$.

11. (a) What is the refraction of light? Explain this phenomenon. (8 marks)
A ray of light from air is incident on a liquid surface at an angle of incidence $35°$ and the refractive index of the liquid is 1.25. Calculate the angle of refraction. Also calculate the critical angle between the liquid and air interfaces.

(b) An object of $4\ cm$ height is placed at a distance of $12\ cm$ from a convex lens of focal length $8\ cm$. Calculate the position and size of the image. Also describe the nature of the image and draw a ray diagram to show the formation of the image. (8 marks)

12. (a) Define the surface charge density. Write down its mathematical expression and SI unit. (8 marks)

Draw a diagram of the electric field between two parallel metal plates which have charges of equal magnitude but opposite signs.

By applying a potential difference of $10\ V$ across a conductor, a current of $1.5\ A$ passes through it. How much energy would be obtained from the current in $2\ min$?

(b) What is the best method of making a magnet? Explain how to make a permanent magnet. Give your answer with an appropriate illustration. (8 marks)

The repulsive force between two equal positive charges is $0.8\ N$ and the distance between them is $0.1\ m$. Find the value of each charge.

$(K = \frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 Nm^2C^{-2})$

13. (a) What is the resistivity of a conductor? State its equation and SI unit. (8 marks)

Calculate the magnitude of the electric field at a point that is located $15\ cm$ directly north of a point charge of $-15.0 \times 10^{-6}C$.

$(K = \frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 Nm^2C^{-2})$

Copy the diagrams given below and draw the charge distributions on the surfaces of the following two conductors.

(b) Which devices can be used to measure very small current? (8 marks)

Draw the connection of an ammeter in a circuit consisting of a resistor and a battery.

A wire of $100\ m$ length is made of copper of resistivity $1.72 \times 10^{-8}\Omega\, m$, and has a radius of $2\ mm$. Find the resistance of the wire. A second wire is also made of copper and of the same length as the first wire, but has half the radius. Find the resistance of the second wire.

14. (a) What is meant by "isotopes"? What are the most abundant radioactive isotopes of uranium? What is the most abundant isotope in the entire universe? (8 marks)

Write down **any four** advantages of transistors over vacuum tubes.

(b) Describe a security lock system. Also draw the security lock system, using logic gates and give its truth table. (8 marks)

15. (a) Write down the name of the rays which are emitted from radioactive materials. What is "activity"? Write down the practical SI unit for the activity. (8 marks)

Initially, at time $t = 0$, there was $1\,g$ of iodine-131. The half-life of iodine-131 is 8 days. Draw a graph to illustrate the exponential nature of radioactive decay for the iodine-131 which will be left after 24 days.

(b) State (i) electric potential (ii) the electric potential difference between two points. (8 marks)

What is the radius of an equipotential surface of $40\,V$ surrounding a point charge of $+2.0 \times 10^{-6} C$? How much work is done when the point charge is brought from one point to another on the equipotential surface?

$(K = \frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 Nm^2C^{-2})$

(OR)

15. (a) What is meant by the " elasticity and elastic limit"? Does Hooke's law hold true for very large forces? Why? (8 marks)

What is a principal focus? Why is it real?

An object is placed $2f$ cm from a convex lens of focal length f cm. Find the position of its image. Describe the nature of the image.

(b) Assuming that the amount of heat produced by the resistor R is H, derive an equation which represents Joule's law of electricity and heat. (8 marks)

Why do we use the $kilowatt\ (kW)$ instead of $watt\ (W)$ for the unit of electrical power (P) in pratice?

Four charges of $+1 \times 10^{-9}\,C$ each are located at the four corners of a square of side $1\,m$. Find the electric field intensity at the centre of the square.
