

2018

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. Fill in the blanks. (4 marks)
 - (i) The effect of current is used in electric iron.
 - (ii) The velocity ratio is usually much greater than
 - (iii) In the total reflecting prism of the light is reflected.
 - (iv) Pure have equal numbers of electrons and positive holes.
2. Are the following statements **True** (or) **False**? (4 marks)
 - (i) If the hydrometer floats higher, it indicates that the liquid has a higher density.
 - (ii) The electric field intensity at a point in space is equal in magnitude to the electric charge there.
 - (iii) All optical phenomena can be explained by Huygens' wave theory.
 - (iv) Boron and cadmium are neutron absorbers.
3. Which is more advantageous: to pay wages according to the amount of work done or according to power? (4 marks)

A water pump is pumping up water from a well which is 200 m deep. What is the power output of the pump if it pumps up water at rate of 10 kg min^{-1} ?
4. What is a thin prism? A narrow beam of white light is incident upon a triangular glass prism. Draw a clear diagram to illustrate what is meant by deviation. (4 marks)
5. An electron is accelerated to 10^8 m s^{-2} by an electric field. What is the direction and magnitude of the field? (charge of an electron = $1.6 \times 10^{-19} \text{ C}$) (4 marks)
6. Draw a circuit, consisting of an AND gate, a resistor and an LED to investigate the output the AND gate. When A is at logic 1 and at B is at logic 0, will the LED light up? (4 marks)

[P.T.O]

7. State the differences between an ammeter and a voltmeter. (4 marks)
Illustrate by means of labelled diagram for the third harmonics in an organ pipe closed at one end.
8. The filament of an 100 W electric bulb is made of tungsten. The emissivity of tungsten is 0.3 and its length is 0.2 m. Find the diameter of the filament if its temperature is 3000 K when the bulb is switched on. (4 marks)
($\sigma = 5.685 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-4}$)
9. What is a tracer? Give two uses of radioactive tracers. (4 marks)
Why is it important to use radioactive tracers with short half-lives?
- (OR)
- What is nuclear reactor? What are the essential components of the nuclear reactor? What must be done to maintain the chain reaction in a nuclear reactor? (4 marks)

SECTION (B)

(Answer any **FOUR** questions)

10. (a) What is buoyancy? An ocean-liner was loaded at the port of Yangon. Would the ocean-liner sink deeper or not when it reached the ocean? (8 marks)
A 30 kg balloon is filled with 100 m^3 hydrogen. What force is needed to hold the balloon to prevent it from rising up? ($g = 10 \text{ ms}^{-2}$, density of hydrogen is 0.09 kg m^{-3} and that of air is 1.29 kg m^{-3})
- (b) (i) What is thermal conductivity? If a person wearing ordinary clothes travels out into space, the liquid in the body will boil. Why? Explain how a space suit can prevent this effect. (8 marks)
- (ii) Find the fundamental frequency of a tube of length 4.5 m and diameter 2.5 cm. Velocity of sound in air is 340 ms^{-1} .
11. (a) How many fundamental forces are in nature? What are they? Which of them are long range forces and which one is stronger? (8 marks)
Calculate the values of two equal charges if they repel one another with a force of 0.1 N when situated 50 cm apart in a liquid whose permittivity is 10 times that of vacuum. ($K = 9 \times 10^9 \text{ Nm}^2\text{C}^{-2}$)
- (b) Draw circuit diagrams to illustrate the heating effect and chemical effect. (8 marks)
A battery has an e.m.f. of 6 V and an internal resistance of 0.5Ω . How many batteries are necessary to pass a current of 1 A through a 22Ω resistor in an electric circuit?

12. (a) Show that the refractive index of medium y with respect to medium x is equal to the reciprocal of the sine of the critical angle. (8 marks)
 (i) Find the critical angle of a liquid of refractive index 1.32. (ii) Find the refractive index of diamond of critical angle $24^\circ 27'$.
- (b) An object is placed 30 cm from a convex lens of focal length 10 cm. Find the position of its image and the magnification. Draw a ray diagram to show the formation of the image. (8 marks)
13. (a) Define capacitance of a capacitor. The plates of a parallel-plate capacitor of capacitance C are brought together to a third of their original separation. What is the new capacitance? (8 marks)
 The area of each plate of a parallel-plate capacitor is 2 m^2 and the distance between two plates is 4 mm. If the potential difference between the plates is 12 000 V and the dielectric constant of the material inserted between them is 3, find (i) the capacitance of the parallel-plate capacitor and (ii) the energy stored by the capacitor. ($\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$)
- (b) What do you understand by electric potential energy? Define electric potential. What is the practical unit of electric potential? Why is electric potential a scalar quantity? (8 marks)
 The electric potential and the magnitude of the electric field intensity at a point at some distance from a point charge are 300 V and 100 N C^{-1} respectively. (i) How far is the point from the charge? (ii) What is the magnitude of the charge?
14. (a) Explain the term activity of a radioactive sample. What is its SI unit? In practice, larger units are used. What are they? Express a unit of activity, still being used today. (8 marks)
 Does the rate of decay of a radioactive sample change with time? Does this rate depend on temperature?
- (b) Draw a reverse and forward biased circuits of a p-n junction diode and the I-V graph. Give short description of these circuits. (8 marks)

15. (a) What is a semiconductor? Give examples. Why does a semiconductor has poor conductivity at normal temperature? How can you do to increase its conductivity? (8 marks)

A moving-coil galvanometer of resistance $20\ \Omega$ gives a full-scale deflection when a current of 5 mA passes through it. What modification must be made to it so that it will give a full-scale deflection for (i) a current of 1 A and (ii) a potential difference of 100 V?

- (b) Define an electric field. Explain why the electric field intensity is zero everywhere inside a charged conductor. (8 marks)

What is the difference between the electric lines of force which represent a non-uniform electric field and those which represent a uniform electric field? Illustrate your answers with diagrams.

(OR)

15. (a) Under what condition can a body float in a liquid? Show that the ratio of the densities is equal to the ratio of the volume of the immersed portion to the volume of the whole body. (8 marks)

When an object is placed 12 cm from a convex lens a real image formed is three times the size of the object. If a real image which is four times the size of the object is required, how far must the object be moved?

- (b) Using Ohm's law define the resistance of a conductor. What is "resistivity" of a conductor? Write down the unit of resistivity. (8 marks)

A copper wire and a silver wire have the same length and the same potential difference across their ends. If the currents through the wires are the same, find the ratio of the radii of the wires. The resistivity of copper is $1.72 \times 10^{-8}\ \Omega\text{m}$ and that of silver is $1.62 \times 10^{-8}\ \Omega\text{m}$.
