

**2019 SAMPLE QUESTION**  
**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 significances.**

**SECTION (A)**

(Answer **ALL** questions)

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

(i) The ..... in hydraulic press is exerted equally in the liquid in all directions.

(A. pressure, B. force, C. weight)

(ii) The ..... carry negative charge.

(A. positrons, B. electrons, C. neutrons)

(iii) The unit used to measure electric current is .....

(A. ampere (A), B. volt (V), C. farad (F))

(iv) A concave lens is .....

(A. converging, B. diverging, C. neither of these)

2. Match the followings. (4 marks)

(i) The rate of doing work	A. form of energy
(ii) NAND gate	B. newton per coulomb ( $NC^{-1}$ )
(iii) volt per metre ( $Vm^{-1}$ )	C. universal gate
(iv) Light	D. power

3. Compare the atmospheric pressures and forces acting on a man and a child who are standing side by side. (4 marks)

4. Twenty students of skin temperature  $33^{\circ}C$  and body surface area  $1.5m^2$  each are sitting in a class-room of temperature  $25^{\circ}C$ . Calculate the heat gain of the class-room due to convection. (Assume  $q = 1.7 \times 10^{-3} Wm^{-2} K^{-1}$ ) (4 marks)

5. What is meant by critical angle? (4 marks)  
Draw a clear diagram to illustrate the total internal reflection.

6. Three capacitors of capacitances  $3\mu F$ ,  $10\mu F$  and  $15\mu F$  are connected in series with  $100V$  battery. What is the charge and the potential difference on each capacitor? (4 marks)

7. State any two differences between Newton's gravitational law and Coulomb's law. (4 marks)  
Draw the diagram of a vibrating string fixed at both ends and vibrating in one long segment.
8. Why do people use transistors instead of vacuum tubes? (4 marks)
9. What is meant by "Radon has a half-life of 3.82 days"? (4 marks)  
How are X-rays and gamma rays similar?

### SECTION (B)

(Answer any **FOUR** questions)

10. (a) Write down Pascal's law. Mention one of the uses of this law. (8 marks)  
A hydraulic (water power) press consists of 1 cm and 5 cm diameter pistons. What force must be applied on the small piston so that the large piston will be able to raise 10 N load?
- (b) (i) What is thermal conductivity? (8 marks)  
What do you understand by thermal conductivity of copper is  $0.40 \text{ kWm}^{-1}\text{K}^{-1}$ ?
- (ii) The wave velocity in the highest frequency violin string is  $435 \text{ ms}^{-1}$ , and its length  $l$  is 0.22 m. If a violin player lightly touches the string at a point which is at a distance  $\frac{1}{4}$  from one end, a node is formed at that point. What is the lowest frequency that can now be produced by the string?
11. (a) Why can the bending of light not be easily seen although the bending of water waves can be seen? (8 marks)  
When the ray of light is incident on the surface of a transparent slab, both reflection and refraction of light take place. If the angle of incidence of the ray is  $40^\circ$  and the angle between the refracted ray and the reflected ray is  $120^\circ$ , find the refractive index of the transparent slab.
- (b) Draw the ray diagram for the image formed by the concave lens and state the properties of this image. (8 marks)  
An image, which is three times the size of an object, is to be produced by a convex lens of power +5 D on the other side of the lens with respect to the object. How far should the object be placed from the lens?

12. (a) If the electric field intensity at a point in an electric field is zero, is the electric potential at that point necessarily zero? Explain. (8 marks)

The electric potential difference between two parallel metal plates which are  $0.5\text{ cm}$  apart is  $0.5 \times 10^3\text{ V}$ . Find the force on a proton located between the plates. ( $e = 1.6 \times 10^{-19}\text{ C}$ )

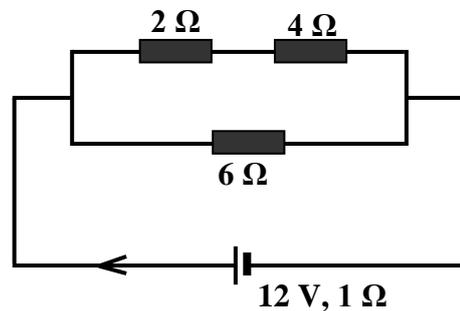
- (b) Using Ohm's law define the resistance of a conductor. When the length of a wire is halved and its diameter is doubled, how would the resistance of the wire change? Which of the following resistances can be obtained by connecting a  $4\ \Omega$  resistor with a  $12\ \Omega$  resistor? Explain your answer with an appropriate illustrations and calculations. (8 marks)

(i)  $1\ \Omega$  (ii)  $3\ \Omega$  (iii)  $9\ \Omega$  (iv)  $12\ \Omega$  (v)  $16\ \Omega$

13. (a) Why is a compass needle placed near a current-carrying wire deflected? Who first observed this effect? (8 marks)

A moving-coil galvanometer of resistance  $20\ \Omega$  gives a full-scale deflection when a current of  $10\text{ mA}$  passes through it. What modification must be made to it so that it will give a full-scale deflection for (i) a current of  $1\text{ A}$  and (ii) a potential difference of  $100\text{ V}$ ?

- (b) Define electrical power. Write down the unit of electrical power. (8 marks)  
Find the rate of production of heat by the  $2\ \Omega$ ,  $4\ \Omega$  and  $6\ \Omega$  resistors respectively in the circuit diagram shown below. [EMF of battery is  $12\text{ V}$  and its internal resistance is  $1\ \text{ohm}$ ]



14. (a) State Bohr's basic assumptions. Why does an electron moving around the nucleus not fall into the nucleus? What is meant by a chain reaction? (8 marks)

How is a chain reaction maintained in a reactor?

- (b) Describe the constructions of a vacuum diode and a p-n junction diode. (8 marks)  
Does the vacuum diode obey Ohm's law? Give your answer with an appropriate illustration.

15. (a) Define convection and radiation. Why is the weather fair at the base of mountain ranges, at the seacoast and lakes? (8 marks)

The temperature of the filament is  $3000\text{ K}$  when the bulb is switched on.

The diameter of the filament is  $0.1\text{ mm}$  and it is made of metal of emissivity  $0.3$ . If the emissive power is  $40\text{ W}$  find the length of the filament. ( $\sigma = 5.685 \times 10^{-8}\text{ Wm}^{-2}\text{K}^{-4}$ )

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

What is a lightning conductor? Give two reasons why a lightning conductor is made of copper rather than iron.

Two charges,  $+20 \times 10^{-6}\text{ C}$  and  $+8 \times 10^{-6}\text{ C}$ , are  $2\text{ m}$  apart. Where is the electric field intensity in their vicinity equal to zero? Is the electric potential zero there?

(OR)

15. (a) What are radioisotopes? Why does Cobalt-60 use in radiotherapy? Distinguish between half-wave and full-wave rectifications. (8 marks)

- (b) (i) What electrical device is a capacitor? (ii) When an insulating material is inserted between the conductors of a capacitor in a vacuum, does its capacitance increase or decrease? Explain. (8 marks)

A parallel-plate capacitor of capacitance  $10\ \mu\text{F}$  is given a charge of  $20\ \mu\text{C}$  and then disconnected from the circuit. How much work is required to pull apart the plates of this capacitor to twice their original separation? Give a simple explanation why is this work needed.