

2016

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) If the work done in 1 second is, the power is 1 watt.
 - (ii) The points between nodes are vibrating with different
 - (iii) In the SI system the unit of the charge Q is
 - (iv) Diodes can be used as

2. Are the following statements **True** (or) **False**? (4 marks)
 - (i) The atmospheric pressure at the hilly regions is lower than that at the plains.
 - (ii) The wave intensity is directly proportional to the amplitude of the wave.
 - (iii) Electric lines of force are only imaginary lines.
 - (iv) A triode obeys Ohm's law.

3. What is meant by elasticity? (4 marks)

A machine with a velocity ratio of 10 requires 800J of work to raise a load of 300N through a vertical distance of 200cm. Find the efficiency of the machine.

4. What are the carriers of charge in metals and in semiconductors? (4 marks)

What are the atomic number and mass number of a nucleus with 11 protons and 12 neutrons?

5. How much heat per second is conducted through a wooden wall of area 30m^2 and thickness 0.05m if the temperature inside is 25°C and the temperature outside is -8°C ? The thermal conductivity of wood is $8.37 \times 10^{-2} \text{Js}^{-1}\text{m}^{-1}\text{K}^{-1}$. (4 marks)

6. Define one diopter (1 D). (4 marks)

Draw ray diagram to show how the virtual image can be formed by a convex lens.

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7. What is meant by a uniform electric field? (4 marks)
Draw the electric lines of force around a single negative charge.
8. If the ratio of the resistances of a tungsten wire at 70°C and 120°C is $3/4$ what (4 marks)
is the temperature coefficient of the wire?
9. Why can the transistor be regarded as a power amplifier? (4 marks)
- (OR)**
- The half- life of a radioactive element is two days. How much of it will be left (4 marks)
and how much will remain after 8 days?

SECTION (B)

(Answer any **FOUR** questions)

10. (a) Write down Archimedes' principle. What devices are used for measuring (8 marks)
density of liquids and atmospheric pressure?
Find the pressure on a diver who is at a depth of 450cm below the surface
of the water. ($P_{\text{atm}} = 1.01 \times 10^5 \text{Pa}$, density of water = 1000kgm^{-3} ,
 $g = 10 \text{ms}^{-2}$)
- (b) (i)What is thermal conductivity? Express its unit in the SI system. A (8 marks)
silver spoon and a wooden spoon are at room temperature . The silver
spoon feels cold when it is touched. Why?
(ii)At room temperature (20°C), what is the fundamental frequency of a
closed organ pipe? The pipe is 33cm long. Velocity of sound in air is
 340ms^{-1} .
11. (a) What is meant by refraction? If c_1 is the velocity of light coming from the (8 marks)
sun and c_2 is that coming from an electric lamp, then $c_1 > c_2$. Is it correct
statement? Why?
The wavelength of a ray of light in air is $5 \times 10^{-7} \text{m}$. With what velocity will
that ray pass through glass whose refractive index is 1.5? Find the
wavelength of that ray in glass.(velocity of light = $3 \times 10^8 \text{ms}^{-1}$, $n_{\text{air}} = 1$)
- (b) State the properties of an image formed by a concave lens. (8 marks)
The image of an object which is 8 cm from a lens is formed on the same
side as the object. If the image is 8cm from the object, find the type of the
lens and its focal length. Also find the power of the lens.

12. (a) Define electrical power. Write down the units of electrical energy and electrical power. What device is used to prevent the electrical appliance in the circuit be seriously damaged? (8 marks)
- An electric circuit installed in a shop contains a 10A fuse and the voltage is 230V. Ten 100W electric lamps, two 150W refrigerators and two 200W washing machines are being used there. Can these appliances be used at the same time in that circuit? Find the cost of using all appliances for 10h if the electricity costs 20 kyats per unit.
- (b) Why is a compass needle placed near a current-carrying wire deflected? (8 marks)
- A 150V voltmeter has a resistance of $2 \times 10^4 \Omega$. When it is connected in series with a resistor across a 120V main line it reads 6V. What is the resistance of the resistor?
13. (a) Define capacitance and dielectric constant. 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)
- What potential difference must be applied across a $8 \mu\text{F}$ capacitor if it is to have an energy content of 1J? What is the charge on either plate?
- (b) What is resistivity of a conductor? Write down the unit of resistivity .Is resistivity a scalar quantity or a vector quantity? (8 marks)
- A wire of length 120m is made of silver of resistivity $1.62 \times 10^{-8} \Omega\text{m}$, and has a diameter of 3mm. Find the resistance of the wire. A second wire is made from the same mass of silver but has double the diameter. Find its resistance.
14. (a) What is semiconductor? Explain how a p-type semiconductor and an n-type semiconductor can be obtained. (8 marks)
- What are X-rays? Give two properties of X-rays. Do X-rays and gamma rays come out of the nucleus?
- (b) Draw the energy level diagram for an atom showing possible transitions. (8 marks)
- State Bohr's basic assumptions.
- Give two uses of gamma radiation.

15. (a) Draw the current-voltage characteristic curves for a junction diode and a triode. (8 marks)

Define an electric field intensity. Explain why the electric field intensity is zero everywhere inside a charged conductor.

- (b) Define electric potential and electric potential difference. Can electrons by themselves move from a point of higher electric potential to a point of lower electric potential. (8 marks)

A 6V battery is connected to two parallel metal plates. The distance between the two plates is 2 cm and the electric field intensity between them is 300 Vm^{-1} . If an electron is placed on the negatively charged plate what is the velocity of the electron when it strikes the positively charged plate? (charge of an electron = $1.6 \times 10^{-19} \text{ C}$, mass of an electron = $9.1 \times 10^{-31} \text{ kg}$)

(OR)

15. (a) State Snell's law. Suppose that an object is in medium X and the observer is in medium Y. If medium Y is denser than medium X, write down the refractive index of the medium in which the observer is situated. (8 marks)

A man hears a thunderclap 5s after seeing a lightening flash. Why? The velocity of sound in air is 340 ms^{-1} .

An image which is three times the size of an object is to be produced by a convex lens of focal length 30 cm on the same side as the object. How far is the object from the lens? Find the power of lens.

- (b) Why can the earth be regarded as a body having zero electric potential? (8 marks)
When the distance between two parallel plates having the charges of equal magnitude and opposite signs is reduced, what will happen to the potential difference between the plates?

Compare the amount of heat produced by each resistor when the 2Ω and 3Ω resistors are connected in series to a 9V battery and when they are connected in parallel to that battery. ($J = 4.2 \text{ Jcal}^{-1}$)
