2015

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 strain produced is proportional to the ..... .
   (ii) Sound waves in air are ..... waves.
   (iii) The insulating materials are also called ..... .
   (iv) Beta rays consist of ..... .

2. Are the following statements **True** (or) **False**? (4 marks)
   (i) Energy and power have the same units.
   (ii) The second harmonic frequency is second overtone in open organ pipe.
   (iii) Capacitors are used in radio and television.
   (iv) A neutron is composed of elementary particles called quarks.

3. Define efficiency of a machine. A water pump is pumping up water from a well which is 250 m deep. How much work must be done by the pump to raise 1 kg of water? ($g = 10\ ms^{-2}$) (4 marks)

4. State Joule's law of electricity and heat in words. A 4A fuse is used in a circuit which contains a source of 240 V. Find the maximum power which can be consumed. (4 marks)

5. The sun is radiating energy at a rate of 65.5 MWm^{-2}. Assuming that the sun is emitting energy as a black body, find the temperature of surface of the sun. Is heat transmitted from the sun to the earth?($\sigma = 5.685 \times 10^{-8}\ Wm^{-2}K^{-4}$) (4 marks)

6. What is meant by refraction of light? (4 marks)
   Draw the diagram to illustrate the total internal reflection.

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7. Draw the electric lines of force around two unlike charges. Are the electric lines of force real or imaginary lines? Do they intersect each other? (4 marks)

8. If the points A and B are at distance of 0.6 m and 1.2 m respectively from the charge $+5\times 10^{-6}$C, find the electric potential difference between them. (4 marks)

$(\frac{1}{4\pi\varepsilon_0} = 9\times10^9\ \text{Nm}^2\text{C}^{-2})$

9. What is a vacuum diode? (4 marks)
Why do people use crystal diodes instead of vacuum diodes nowadays?

(OR)

Give two uses of X- rays. (4 marks)

Why are the two elements $^{17}_{8}O$ and $^{16}_{8}O$ called the oxygen isotopes?

SECTION (B)

(Answer any **FOUR** questions)

10. (a) What is a manometer? What is buoyancy? Mention two simple applications of atmospheric pressure in our daily life. (8 marks)
The density of sea water is 1025 kgm^{-3}. How many times is the pressure at the depth of 3 km under the sea surface greater than the atmospheric pressure? ($g = 10\ ms^{-2}$, $P_{atm} = 1.01\times10^5$ Pa)

(b) (i) What is meant by heat conduction? Describe one example for heat conduction process. Why does the person wear woollen sweater in cold season? (8 marks)

(ii) The distance between two successive nodes of stationary waves produced in a stretched string is 0.4 m. Find the wavelength of that stationary wave. If the frequency is 100 Hz, what is the velocity of the wave in the string?

11. (a) What is a thin prism? What is meant by dispersion of light? (8 marks)
Why can the bending of light not be seen although the bending of water waves can be seen? The refractive index of a liquid is 1.3 and that of glass is 1.5. If a ray of angle of incidence 32° enters from liquid to glass, find the angle of refraction.

(b) What is magnification? What is the major difference between real and virtual images? The image of an object which is 10 cm from a lens is formed on the same side as the object. If the image is 10 cm from the object, find the focal length of the lens. (8 marks)

12. (a) What is an electric current? What are three main effects produced by a current? Give one example for each effect. A current of 3A flows through a conductor of resistance 20 Ω for 5 min. How much charge will pass through a cross-sectional area of the conductor? How many electrons will pass through that area? ($e = 1.6 \times 10^{-19} C$) (8 marks)

(b) What electrical device is a capacitor? When an insulating material is inserted between the conductors of a capacitor in a vacuum, does its capacitance increase or decrease? Three capacitors of capacitances 3 μF, 12 μF and 15 μF are connected in series with 120 V battery. What is the charge and the potential difference on each capacitor? (8 marks)

13. (a) State Fleming's left-hand rule. Does voltmeter have a low or high resistance? A 150 V voltmeter has a resistance of 20000Ω. When it is connected in series with a resistor across a 125 V mains line it reads 5 V. What is the resistance of the resistor? (8 marks)

(b) Define electrical power. Why are the electrical fuses used in electric circuit? When electric stove is connected to a 220 V mains line it draws a current of 6 A. The electric stove is used for 15 min. Find the amount of heat produced by it and electric energy.($J = 4.2\ Jcal^{-1}$) (8 marks)

14. (a) What is electronic circuit? Name three groups of electronic circuit. Describe the function of half-wave and full-wave rectifier. What are cathode rays? How can it be known that cathode rays are electrically charged particles? (8 marks)

(b) What are the two properties of alpha rays? What are radioisotopes? Give two radioactive substances in nature. Draw the diagram of a circular orbit for an electron in H-atom and production of X-rays on this model. (8 marks)

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Describe the construction of a triode. When does a triode behave like a diode? Does a triode obey Ohm's law? (8

Draw the symbols for five common logic gates.

State Coulomb's law in words as well as in symbols. What is the difference between Newton's gravitational law and Coulomb's law? (8

Two charges of $+2.0\times10^{-12}$C and -4.0×10^{-12}C are 6.0 m apart in air . Determine the electric potential midway between them.

($K = 9\times10^{9}\,Nm^{2}C^{-2}$)

(OR)

Define principal focus and focal length of a concave lens. Is this focus real or virtual? Why? (8

How far should a magnifying glass of focal length 12 cm be held from an object to produce an erect image three times larger?

How many fundamental forces are there in nature? What are they? (8

Why is the surface of a charged conducting sphere an equipotential surface?

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 $1.72\times10^{-8}\Omega$ m and that of silver is $1.62\times10^{-8}\Omega$ m.