2017
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) Hooke's law relates to the elastic behaviour of ..... .
   (ii) Ocean waves can transform the ..... of coast lines.
   (iii) Light ..... are used to examine the objects which are difficult to see.
   (iv) The rate of decay is unaffected by ..... .

2. Are the following statements **True** (or) **False**? (4 marks)
   (i) Pressure at any point inside a liquid is the same in all directions.
   (ii) Sound with very low intensities can be dangerous.
   (iii) The velocity of light is an important physical constant.
   (iv) Isotopes of a single element have the different chemical properties.

3. Define velocity ratio. (4 marks)
   The power output of the motor of a crane is 2000 W. With what speed can the machine lift a 500 kg load? ($g=10\ m\ s^{-2}$)

4. What is meant by thermionic emission? (4 marks)
   Draw the transistor biasing circuits for the p-n-p and n-p-n transistors.

5. An animal has a skin temperature of 33°C=306K and is in a room where the walls are at temperature 29°C=302K. If the emissivity is 1 and the body surface area is 1 m^2 , find the rate of heat loss due to radiation.($\sigma=5.685\times10^{-8}\ W\ m^{-2}\ K^{-4}$) (4 marks)

6. Draw a ray diagram of the image formed by a convex lens when the object is beyond 2F.State the properties of the image for this case. (4 marks)

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7. What is meant by a non-uniform electric field? (4 marks)
Draw the directions of the Coulomb's force between two unlike charges.

8. A body whose mass is 2×10^{-6} kg carries a charge $+10^{-6}$C. If the body is suspended in equilibrium at a point above the ground by an electric field, find the magnitude of the electric field.($g=10\ m\ s^{-2}$) (4 marks)

9. Describe some difficulties of Rutherford's atomic model. (4 marks)

(OR)

What is a positive hole? What is the difference between a positive hole and an electron? Give names of two atoms which can be used to form an n- type semiconductor. (4 marks)

SECTION (B)

(Answer any **FOUR** questions)

10. (a) Why is it easier to float in the sea than in a swimming pool? (8 marks)
The density of lead block is 11.5 g cm^{-3} and it is floating in mercury of density 13.6 g cm^{-3}.What portion of the lead block is immersed in mercury? What force is needed to press the block to immerse it totally if the mass of the lead block is 4 kg? ($g=10\ m\ s^{-2}$)

(b) (i) Define heat convection and radiation. How does a blanket wrapped round your body keep you warm on a cold day? (8 marks)
(ii)The highest and lowest frequency strings of a piano are tuned to fundamentals of f_H=4186 Hz and f_L=32.8Hz. Their lengths are 0.05 m and 2 m respectively. If the tension in these two strings is the same, compare the masses per unit length of the two strings.

11. (a) Why is the smaller the velocity of light in a medium, the greater its refractive index? (8 marks)
When a ray of light is incident on the surface of a glass slab, both reflection and refraction of light take place. If the angle of incidence of the ray is 30° and the refractive index of glass is 1.54, find the angle between the reflected ray and the refractive ray. Also find the critical angle for the glass slab.

(b) How far must the object be placed from a concave lens of focal length 10 cm to obtain an image 7.5 cm from the lens? Draw a ray diagram to show the formation of the image. Find the magnification. (8 marks)

12. (a) What is a parallel-plate capacitor? In which connection of the capacitors is the potential difference of each capacitor the same? When the distance between the two parallel plates of a capacitor is doubled, by what percent does its capacitance change? Calculate. (8 marks)

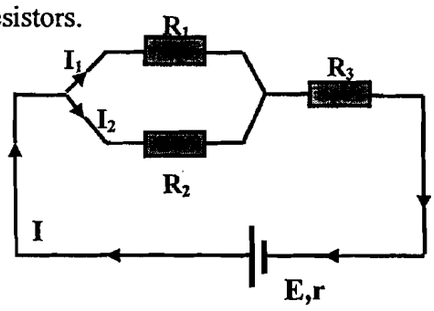
A parallel-plate capacitor has a capacitance of 5 μF when air is between its plats and 30 μF when this space is filled with a sheet of glass. Find the dielectric constant of glass.

(b) Express Joule's Law of electricity and heat in mathematical form. Explain the symbols used. Write down practical unit of electrical energy. (8 marks)

An electric stove of 1200 W is connected to a 240 V mains line.(i)Find its resistance.(ii)Find the current flowing through it.(iii) Find the number of calories produced in one second by it. ($J=4.2\ J\ cal^{-1}$)

13. (a) What is a resistor? Describe types of resistors. (8 marks)

Find the current flowing through each resistor and the potential difference across the 1 Ω resistor in the given circuit. ($R_1=4\Omega$, $R_2=6\Omega$, $R_3=1\Omega$, $E=12V$, $r=0.6\Omega$)



(b) What is an equipotential surface? Give an example. (8 marks)

Explain how work is done in carrying a unit positive charge from a point of higher electric potential to a point of lower electric potential.

Two parallel metal plates are 4 cm apart.If the force on an electron between the plates is 0.5×10^{-14} N, what is the potential difference between them?(the charge of electron = 1.6×10^{-19} C)

14. (a) Distinguish between half-wave and full-wave rectification. If a piece of either an n-type or a p-type semiconductor were placed in a battery circuit, would there be conduction in each case? Explain. What if the polarity were reversed? Describe the actions of universal logic gates. (8 marks)

(b) Give two types of X-rays. How are X-rays produced? How do X-rays and gamma rays similar? Draw X-rays tube and label its parts. (8 marks)

15. (a) State the properties of beta rays. (8 marks)
What is the difference between the e.m.f. of a battery and the potential difference across its terminals?
Draw a diagram to represent the uniform electric field and equal potential surface between two metal parallel plates having charges of equal magnitude but opposite sign?

(b) Why can a current-carrying solenoid be considered as a magnet? (8 marks)
When an ammeter is connected in parallel with a current-carrying resistor it reads 5 A. When the ammeter and a 20 Ω resistor are joined in series and the combination is connected in parallel with the first resistor the ammeter reads 3 A. What is the potential difference across the first resistor?

(OR)

15. (a) Give two types of convex lens. Explain the statement: "the refractive index of glass is 1.5" (8 marks)
A ray of light in air enters a prism having an angle 60° from one surface and emerges into the air from the other surface. If the emergent ray lies in the surface of prism find the angle of incidence. The refractive index of glass is 1.5.

(b) What is an electromagnet? (8 marks)
Two charges of +2 μ C and -6 μ C are 6 m apart. Find the electric field intensity at the point **P** midway between them.
$(K = \frac{1}{4\pi\varepsilon_0} = 9 \times 10^9\ Nm^2C^{-2})$
