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 rate of doing work is defined as ....
   (ii)   Nodes and antinodes are present in .... waves.
   (iii) Electric potential is a .... quantity.
   (iv)   Whenever a particle penetrates and changes a nucleus, this is called a
          .... reaction.

2. Are the following statements **True** (or) **False**?   (4 marks)
   (i)   Velocity ratio of a machine has no unit.
   (ii)   The number of beat per second is called beat frequency.
   (iii) A surface drown through the points at the same pressure is called an
          equipotential surface.
   (iv)   Gamma rays can penetrate deep into the body and kill living cells.

3. What is machine?   (4 marks)
   A water pump is pumping up water from a well which is 100 m deep.
   What is the power output of the pump if it pumps up water at the rate of
   20 kg min^{-1}? (g = 9.8 ms^{-2})

4. What is a fuse?   (4 marks)
   If a 70 W electric lamp is connected to a 210 V mains line, find the current in
   the lamp.

5. If the rate of energy radiation from a black body of area 300 cm^2 is 107 W, find   (4 marks)
   the temperature of that black body. (σ = 5.685 × 10^{-8} W m^{-1} K^{-4})

6. Define critical angle.   (4 marks)
   Draw the formation of image by a totally reflecting prism.

7. Draw lines of force around two charges.   (4 marks)
   What is a capacitor?
   Define capacitance of a capacitor.

8. A current of 3A flows through a conductor when potential different between its   (4 marks)
   ends is 12 V. If the potential different is reduced to 8 V, how much does the
   value of current drop?

9. Which elements are easily absorbed by the body?   (4 marks)
   Which element is produced when uranium-238 is bombarded by neutrons?
   Which element is a strong gamma emitter?

<div align="center">(OR)</div>

What are the advantages of transistors over the vacuum tubes? (Transistors that
help you to be better or more successful than vacuum diodes.)

<div align="center">

SECTION (B)
(Answer any **FOUR** questions)

</div>

10. (a)   Write down Pascal's law.   (8 marks)
           Write down Archimedes' principle.
           The total pressure at the bottom of a tank is 6 atm. To what height has
           the water been filled in the tank? (The density of water is 1000 kg m^{-3})
           (g = 9.8 ms^{-2})

    (b)   (i)What is total emissive power?   (8 marks)
             Express the equation of Stephan – Boltzmann's law.
             Can heat be measured in kilocalories?
            (ii) If the mass of a string of 1 m length is 0.4 g and its tension is 36 N,
               find the fundamental (the lowest) frequency of the string.

11. (a)   State the laws of refraction?   (8 marks)
           Is the wavelength of yellow light shorter than that of orange light?
           A rays of light in water has a wavelength of 4.42×10^{-7} m. What are the
           wavelength and velocity of that ray while passing through ice?
           (n_w=1.33, n_{ice}=1.31, c = 3×10^8 m s^{-1})

    (b)   What is a lens? Define the power of a lens.   (8 marks)
           An image, which is five times the size of an object, is to be produce by
           a convex lens of power +5D on the same side as the object. How far
           should the object be placed from the lens?

12. (a) State Coulomb's law in words or in symbols.   (8 marks)
What is an electric line of force?
Two charges, - 20 × 10⁻⁶C and +5.0 × 10⁻⁶Care 3 m apart.
Where is the electric field intensity in their vicinity equal to zero?

   (b) What is the unit of electric potential?   (8 marks)
Is the unit Watt the same as joule per coulomb?
Two point charges of +4.0×10⁻⁸ C and – 3.0×10⁻⁸ C are 2 m apart.
Find the electric potential at P midway between the two charges.
Find the work done in bringing a charge +3.0×10⁻⁹ C from infinity to P.
$(\frac{1}{4\pi\epsilon_o} = 9 \times 10^9 \text{ N m}^2\text{C}^{-2})$

13. (a) What are the uses of capacitors?   (8 marks)
Express the sub – multiple units of farad are used for practical purpose.
Does a capacitor store electrical energy?
A 45 μ F capacitor is needed, but only 10 μ F capacitors are available.
How should a minimum number of 10 μ F capacitors be connected so
that the combination has a capacitance of 45 μ F? Explain.

   (b) What is a voltmeter?   (8 marks)
What devices are used to measure very small currents?
Two batteries each having an e.m.f of 10 V and internal resistance of
4 Ω are connected *in series and in parallel.* Find the current in each
case when the batteries are connected to a 2 Ω resistor.

14. (a) What is vacuum diode?   (8 marks)
What is p-n junction diode?
Show how four NAND gates can be connected to form as a NOR
gate. Construct a stage – by – stage truth table to confirm its actions?

   (b) What is radioactivity?   (8 marks)
Define the half-life of a radioactive substance.
What are radioisotopes?
Draw the Thomson's atom.
Draw the Alpha scattering according to Thomson's and Rutherford's
atomic models.

15. (a) Give one isotope is consisting in natural uranium.   (8 marks)
    Is the following statement true or false?
    If an object gains energy, it mass decreases; if it loses energy, it mass
    increases.
    Draw the structure of lithium atom.
    Draw the transistors or their symbols.
    What is rectifier?
    What is transistor?

    (b) What is electrical power?   (8 marks)
    What is the unit of electrical power?
    Is mechanical energy converted into electrical energy in generator?
    Does the electric stove convert electrical energy into heat energy?
    An electric lamp of 30 Ω connected to a 240V mains line is used for
    50 min. Find the amount of electrical energy dissipated in the lamp.
    Find the cost of using it if electricity costs 50 kyats per unit.

(OR)

15. (a) What is total internal reflection?   (8 marks)
    Can the total internal reflection take place for all angles of incidence?
    Is the critical angle of glass smaller than that of diamond?
    Choose the correct answer from the following.
    When a pencil 10 cm long is placed vertically 100 cm from the lens of
    focal length +50 cm, the image is (i) erect and 5 cm tall (ii) inverted and
    5 cm tall (iii) erect and 10 cm tall (iv) inverted and 10 cm tall. Why?

    (b) State Fleming's left-hand rule.   (8 marks)
    Is magnetic field intensity a vector quantity?
    Write down the name of one device which uses the electromagnet.
    A moving-coil galvanometer of resistance 20 Ω 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 a current
    of 1 A and a potential different of 100 V?