UCE PREPARATORY PHYSICS QUESTIONS 2017
535/2 SET 3

TIME: 2HOURS 15 MINUTES

INSTRUCTIONS

- Attempt **any five questions**.
- Any additional question(s) answered will not be marked
- Mathematical tables and silent non- programmable calculators may be used.
- These values of physical quantities may be useful to you,

  Acceleration due to gravity = $10ms^{-2}$

  Specific heat capacity of water = $4200Jkg^{-1}K^{-1}$

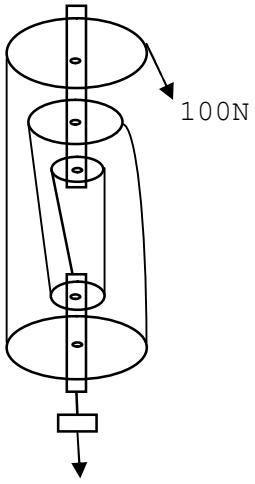
  Specific heat capacity of copper = $400Jkg^{-1}K^{-1}$

  Specific heat capacity of ice = $2100Jkg^{-1}K^{-1}$

  Density of water = $1000kgm^{-3}$

1. (a) (i) Define a pulley (01mark)

(ii)



The diagram above shows a block and tackle pulley system of efficiency 80%. It is used to raise a load through a height of 20m with an effort of 100N. Find the energy wasted. (05marks)

(iii) State **one** application of the above pulley (01mark)

(b) (i) Define a force (01mark)

(ii) State **two** ways of increasing frictional force (02marks)

(c) (i) Define terminal velocity (01mark)

(ii) State any **two** factors that affect the a mount of viscous force (02marks)

(iii) Explain why a sky diver falling through air eventually moves with a constant velocity (03marks)

2. (a) (i) What is concrete? (01mark)
(ii) State **two** reasons why concrete is a good building material (02marks)
(iii) Explain why the lower part of a tall building is made of reinforced concrete (03marks)
(b) (i) Define capillarity (01mark)
(ii) State **two** applications of capillarity (01mark)

(c) (i) Describe an experiment to estimate the size of a molecule. State **one** assumption mode (05marks)

(ii) A drop of olive oil of volume $0.1mm^3$is poured on the surface of clean water. It spreads out completely into a patch of area $10000mm^2$. Estimate the number of molecules in the given volume. (03marks)

3. (a) (i) distinguish between melting point and boiling point of a substance (02marks)
(ii) Explain why ice floats on water instead of sinking (02marks)
(iii) Describe an experiment to demonstrate the effect of pressure on melting point of a substance. (05marks)

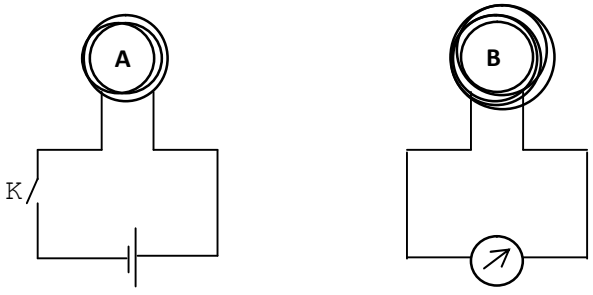
(b) (i) Define specific heat capacity of a substance (01mark)
(ii)The cooling system of an engine uses water that circulates at the rate of 5kg per minute. The engine raises the temperature of the water to 90^0C and the radiator cools the water to 30^0C. Calculate the power wasted as heat in the engine (04marks)

(c) Explain what makes water a good coolant in car engines. (02marks)

4. (a) (i) Distinguish between self induction and mutual induction (02marks)
(ii) Describe the construction and working of the a.c transformer (05marks)

(b) A transformer designed to step down voltage from 240V to 12V has 200 turns in the secondary coil and it is 80% efficient. Find the current in the primary coil when the secondary coil is connected to a 16Ω bulb (05marks)

(c)(i)



This diagram above shows 2 coils **A** and **B** placed near each other. **A** is connected to a cell and **B** is connected to a galvanometer. Describe and explain what is observed when the switch K is closed and left closed (03marks)

(ii) What is the effect of inserting a bunch of soft iron rods in the coils on observation above? (01mark)

5. (a) Describe a simple model of an atom (04marks)

(b) (i) Distinguish between nuclear fission and nuclear fusion. (02marks)
(ii) Give **one** example of where each occurs (02marks)

(c) Define the following terms as applied to atoms.
(i) Atomic number (ii) Isotopes of an element (02marks)

(c) Give **two** differences between alpha and beta particles (02marks)

(d) The mass of a radioactive substance decays to $\left(\frac{1}{16}\right)^{\text{th}}$ of its original mass after 16 days. Find its half life. (04marks)

6. (a) What is meant by the following terms
(i) Nodes (ii) Antinodes (02marks)

(b) Describe an experiment to determine the end correction of a closed tube in a region of known speed of sound (04marks)

(c) (i) Define reverberation (01mark)
(ii) Explain how reverberation is minimized in a hall (02marks)
(iii) Give **one** nuisance of reverberation (01mark)

(d) Define the following terms

(i) Pitch (ii) loudness (02marks)

(e) The range of frequencies used in telecommunications varies from 1.0×10^6Hz to 2.0×10^7Hz. Determine the shortest wave length in this range. (04marks)
(Speed of the waves is $3 \times 10^8 ms^{-1}$)

7. (a) Define the following terms
(i) Linear magnification (01mark)
(ii) Centre of curvature of a concave mirror (01mark)

(b) (i) Describe an experiment to locate the center of curvature of a concave mirror using an illuminated object. (04marks)
(ii) State **two** uses of a concave mirror (02marks)
(iii) An object is placed 3cm in front of a convex mirror of radius of curvature 18cm. Find the position, nature and magnification of the image formed. (06marks)

(c) (i) Define a parabolic mirror (01mark)

(ii) State **one** use of a parabolic mirror (01mark)

8. (a) Define the following terms

(i) A volt (01mark)

(ii) The electromotive force of a cell. (01mark)

(b) A kettle connected to a 240V takes 5 minutes to heat 2kg of water from 20^0C to 100^0C. (specific heat capacity of water = $4200 Jkg^{-1}K^{-1}$)

(i) Find the current that flows in its element when the kettle is working (04marks)

(ii) Find the resistance of the element (03marks)

(iii) State **any** assumption in the calculations above (02marks)

(c) (i) Define electrostatic induction (01mark)

(ii) Describe with diagrams, how to charge two metal spheres oppositely by induction (04marks)

END