535/2
PHYSICS THEORY
Paper 2
Dec 2020
2 ½ hours

JINJA JOINT EXAMINATIONS BOARD

Uganda Certificate of Education

MOCK EXAMINATIONS DECEMBER 2020

PHYSICS

(Paper 2)

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

Answer any **five** *questions.*

Any additional question(s) answered will **not** *be marked*

Mathematical tables and silent non-programmable calculators maybe used.

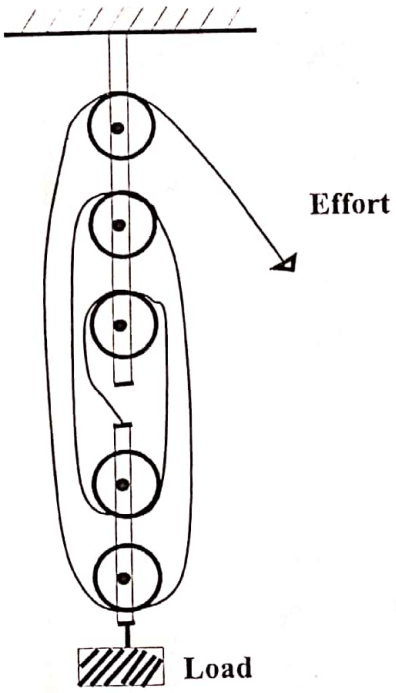
These values of physical quantities may be useful to you.

Acceleration due gravity, g	=	10 m s^{-2}
Specific heat capacity of water	=	4200 J kg^{-1} K^{-1}
Specific heat capacity of ice	=	2100 J kg^{-1} K^{-1}.
Specific latent heat of vaporization of water	=	2,260,000 J kg^{-1}
Specific latent heat of fusion of water	=	340,000 J kg^{-1}
Speed of sound in air	=	330 m s^{-1}
Density of water	=	1000 kg m^{-3}

1 (a) (i) What is a machine? (1 mark)

(ii) Define the terms mechanical advantage and velocity ratio (2 marks)

(b)



The diagram shows a pulley system used to raise a load.

(i) What is the velocity ratio of the system? (1 mark)

(ii) Find the distance moved by the load if the effort moves down by 5m. (2 marks)

(iii) Calculate the effort required to raise a load of 1000N if the mechanical advantage of the system is 4. (2marks)

(iv) Calculate the efficiency of the system. (2 marks)

(c) (i) Define the term a force. (1 mark)

(ii) A mass of 2kg at rest is acted on by two forces of 5N and 12N at right angles.

Find the acceleration of the body. (3 marks)

(iii) Calculate the velocity of the mass in (c) (ii) above after 10 seconds. (2 marks)

2. (a) Define the joule (1 mark)

(b) (i) What is meant by the term linear momentum? (1 mark)

(ii) State the law of conservation of linear momentum. (1 mark)

(c) A bullet of mass 20g is fired into a block of wood of mass 400g lying on a smooth horizontal surface. If the bullet and the wood move together with a speed of $20ms^{-1}$, calculate;

(i) the speed with which the bullet hits the wood. (4 marks)

(ii) the loss in kinetic energy. (6 marks)

(d) State the energy changes involved in (c) above. (3 marks)

3. (a) Define the term pressure and state its SI Units. (2 marks)

(b) With the aid of a labelled diagram, describe how a lift pump works. (5 marks)

(c) A box of mass 10kg and dimensions 20cm x 40cm x 60cm is placed on the ground. Calculate the maximum pressure on the ground by the box. (4 marks)

(d) (i) State Hooke's law. (1 mark)

(ii) When a boy of mass 50kgs stands at the end of a spring board, it is depressed by 15cm. What would be the depression of the spring board when a man of mass 80kgs stands at the end? (4 marks)

4. (a) Define the following as applied to wave motion:

(i) frequency (1 mark)

(ii) wave length (1 mark)

(ii) amplitude (1 mark)

(b) (i) Distinguish between longitudinal and transverse waves. (2 marks)

(ii) Write down the equation relating the speed, V; the wave length, λ; and the frequency, f; of a wave. (1 mark)

(iii) A radiostation transmits signals at a frequency of 103.7 MHz.

Find the wave length of the signals. (2 marks)

(c) Sketch a diagram to show the pattern for straight water waves passing through a narrow slit. (2 marks)

(d) Describe an experiment to demonstrate that sound waves require a material medium for their propagation. (6 marks)

5. (a) What is an equation of state for a gas? (1 mark)

(b) (i) With the aid of a sketch graph, describe how absolute zero of temperature can be defined. (3 marks)

(ii) Use the kinetic theory of gases to explain the existence of absolute zero of temperature, (4 marks)

(c) A volume of $2500cm^3$ of hydrogen gas is collected at 67°C and a pressure of 730mmHg. Calculate the volume of the gas at s.t.p (4 marks)

(d) Smoke is confined in a smoke cell and observed through a microscope. Explain what is observed when the temperature of the smoke cell is raised. (4 marks)

6. (a) (i) What is a magnet? (1 mark)

(ii) What are poles of a magnet? (1 mark)

(iii) distinguish between angle of dip (inclination) and angle of declination (2 marks)

(b) Two bar magnets are placed on the ground with their Northpoles facing each other. Sketch the magnetic field between them and use it to define the neutral point in a magnetic field. (2 marks)

(c) Explain how a steel bar can be magnetized by single touch method. (4 marks)

(d) With the aid of a labeled diagram describe how a simple a.c generator works. (6 marks)

7. (a) Draw sketch graphs of p.d V, against current I for the following

(i) a metal wire (1 mark)

(ii) An electrolyte (1 mark)

(ii) A semiconductor (1 mark)

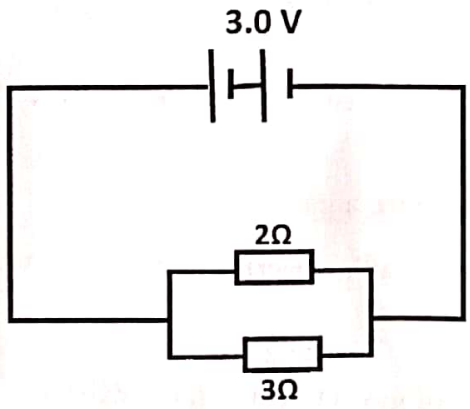
(b) Explain the difference between a voltmeter and an ammeter in terms of;

(i) construction (2 marks)

(ii) use (2 marks)

(c) Explain how each of the physical factors of a solid conductor affects the resistance. (3 marks)

(d)



Two cells each of 1.5V and negligible internal resistance are connected in series across two resistors of 2Ω and 3Ω as shown above. Calculate the current

(i) Supplied by the cells, (3 marks)

(ii) That passes through the 3Ω resistor (3 marks)

8. (a) What is meant by thermionic emission? (1 mark)

(b) (i) Name the three main parts of a cathode ray oscilloscope (CRO). (3 marks)

(ii) Describe the functions of each component of the CRO (6 marks)

(iii) State two uses of a CRO (2 marks)

(c) State the conditions under which electrons can be used to generate X- rays. (3 marks)

(d) Give one medical use of xrays. (1 mark)

End