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+ marking guide

535/2

Physics

Paper 2

June 2013

Duration: 1 hour 45 minutes

END OF YEAR EXAMINATIONS
S.3 PHYSICS
PAPER 2

Instructions: Attempt any four questions in this paper

Where necessary assume that $g = 10\text{ms}^{-2}$

Speed of Sound in air is 330ms^{-1}

Speed of electromagnetic waves $3 \times 10^8\text{ms}^{-1}$

1. a) State Newton's laws of motion. (3 marks)
- b) A car accelerates uniformly from rest for 30s with an acceleration of 2ms^{-2} .
It then travels at a constant speed for 1.5 minutes before being decelerated uniformly to rest in a further 10s. (2 marks)
- i) Sketch a velocity – time graph of the motion and find:
ii) the maximum speed of the car (1 mark)
iii) the total distance traveled. (2 marks)
iv) the average speed for the whole journey. (2 marks)
- c) i) Define momentum of a body (1 mark)
ii) State the law of conservation of momentum. (1 mark)
- d) A bullet of mass 6g travelling at 120ms^{-1} penetrates deep into a fixed target and is brought to rest in 0.01s. Find;
i) how deep the bullet moves into the target (2 marks)
ii) the force exerted on the bullet (2 marks)
2. (a) (i) Define pressure (1 mark)
- (ii) A U-tube manometer is partly filled with water. When a student blows hard into one arm, the level of water on that side goes down by 22.3cm while the level of water in the other arm rises by the same length. Determine the total pressure exerted on the water if atmospheric pressure is $1.0 \times 10^5\text{Nm}^{-2}$. (3 marks)
- (b) Explain what happens when copper II sulphate crystals are introduced at the bottom of two beakers, one containing cold water and the other containing warm water. (3 marks)
- (c)(i) State Archimedes' principle. (1 mark)

(ii) A block of metal weighs $10N$ and has a volume of $1.2 \times 10^{-4} m^3$. The block is suspended from a spring balance while it is completely immersed in a liquid of density $1.2 \times 10^3 kgm^{-3}$.

Find the reading on the spring balance.

(4 marks)

(d) Describe an experiment to demonstrate the existence of surface tension.

(4 marks)

3. a. Define centre curvature of a Concave mirror.

(1 mark)

b. Explain why a parabolic mirror is preferred to a concave mirror as a car head Lamp.

(3 marks)

c. Explain one disadvantages of using a plane mirror as a driving mirror.

(3 marks)

d.i) An object $2cm$ high is placed $40cm$ away from a diverging lens of focal length $20cm$. By construction determine the position and size of the image.

(5 marks)

ii) Calculate the power of a concave lens of focal length $20cm$.

(2 marks)

e). State two applications of a concave mirror.

(2 mark)

4. (a) Using a well labelled diagram explain the terms;

(i) Critical angle

(ii) Total internal reflection.

(4marks)

(b) State one application of total internal reflection.

(1 mark)

(c) Describe an experiment to determine the refractive index of a material of glass block.

(07 marks)

(d) The diagram in figure 3 below shows a ray of light falling normally on the curved face of a semi-circular block at X; meeting the opposite face at an angle of incidence of 30° at O, and emerging into air at an angle of 40° .



