

PHYSICS FORM THREE

END TERM II EXAM

TIME 2 ½ HRS

NAME _____ CLASS _____ ADM _____

Instructions

- a) Write your name, class and admission number in the spaces provided.
- b) This paper consists of two sections: A and B.
- c) Answer all questions in the spaces provided.
- d) All working must be clearly shown.
- e) Non-programmable silent electronic calculator may be used.



Section	Questions	Maximum score	Candidate's score
A	1 – 16	50	
B	17	07	
	18	13	
	19	10	
	20	13	
	21	07	
TOTAL		100	

SECTION A (50 MARKS)

1. State what optics as a branch of physics deals with. (1mk)

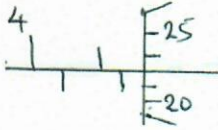
Light ✓

2. (a) A burette reads 10ml, determine final reading if 20 drops each 0.25ml are added. (2mks)

$$20 \times 0.25 = 5\text{ml} \quad \checkmark$$

$$10 - 5 = 5\text{ml} \quad \checkmark$$

(b) State the reading of the micrometre screw gauge below. (2mks)



5.50 ✓

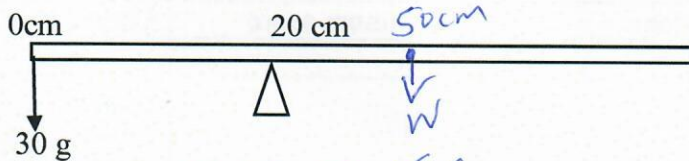
0.22

5.72mm ✓

3. (a) State two factors that affect surface tension. (2mks)

- Temperature ✓
- Impurities ✓

(b) Calculate the weight of the half metre rule below. (3mks)



$$0.3 \times 0.2 = 0.3w \quad \checkmark \checkmark$$

$$W = 0.2\text{N} \quad \checkmark$$

4. State what is observed in smoke cell experiment. (1mk)

Bright specks moving randomly ✓

5. (a) Explain why thermometers have a thin bulb (1mk)

Sensitivity / accuracy ✓

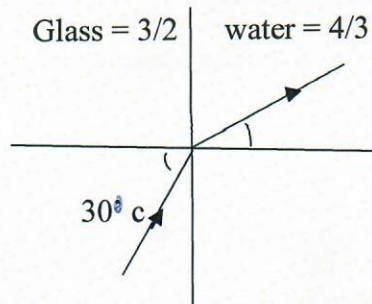
(b) A faulty thermometer reads 10°C in melting ice and 90°C in steam. Calculate its reading at 30°C . (3mks)

$$(0.8 \times 30) + 10 = 34^{\circ}\text{C} \quad \checkmark$$

6. (a) Determine the angle of inclination of two mirrors to give 8 images. (3mks)

$$\frac{360}{\theta} - 1 = 8 \quad \theta = \frac{360}{9} = 40^\circ$$

- (b) Determine angle r in the figure below. (3mks)



$$3/2 \sin 30^\circ = 4/3 \sin r$$

$$0.75 = 4/3 \sin r$$

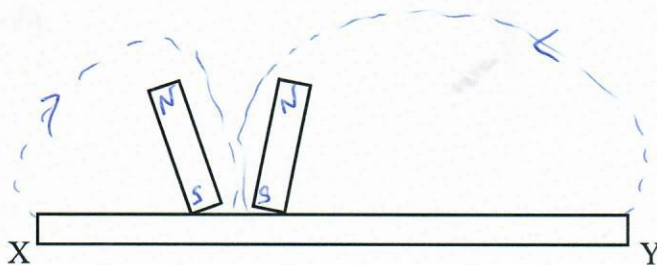
$$\sin r = 0.5625$$

$$R = 34.23^\circ$$

7. A battery is rated 50 Ah, determine the current supplied in 150 minutes. (3mks)

$$I = \frac{50 \text{ Ah}}{2.5 \text{ h}} = 20 \text{ A}$$

8. (a) Identify poles at X and Y in the figure below. (2mks)



$$X = N$$

$$Y = N$$

- (b) State the Fleming's left hand rule (1mk)

When the first three fingers of the left hand are held mutually at right angles with the first finger pointing the field, second finger pointing current then the thumb points to motion.

9. State the type of equilibrium in the figure below. (1mk)

Unstable



10. A concave mirror forms an erect image 30cm from the mirror. If the object distance is 10cm, determine its focal length. (3mks)

$$f = \frac{-300}{-20} = 15\text{cm} \quad \text{or} \quad \frac{1}{f} = \frac{1}{10} - \frac{1}{30} = \frac{3-1}{30} = \frac{2}{30}$$

$$f = 15\text{cm} \quad \checkmark$$

any

11. (a) Differentiate between progressive and standing waves. (1mk)

Progressive transfer energy while standing vibrate at fixed points.

- (b) Indicate the reflected wave in the figure below. (2mks)



12. Calculate the height of a sunken ship if its echo is heard after 1 second instead of 1.5 seconds for sound travelling at 1500m/s. (3mks)

$$d_1 = 1500 \times 1.5 = 2250\text{m} \quad \checkmark \quad 1500 \times (1.5 - 1) = 750\text{m} \quad \checkmark$$

$$d_2 = 1500 \times 1 = 1500\text{m} \quad \checkmark$$

$$\text{height} = 750\text{m} \quad \checkmark$$

13. Determine the time taken by 7500g of fluid of mass 5kg/s to flow from one point to another. (3mks)

$$s = \frac{7.5}{t} \quad \checkmark \quad t = \frac{7.5}{5} = 1.5 \text{ seconds} \quad \checkmark$$

14. (a) A ball of mass 0.5kg is kicked horizontally from top of a building. If it takes 6 seconds to strike the ground, determine the height of the building. (3mks)

$$H = \frac{1}{2} \times 10 \times 36 \quad \checkmark$$

$$= 180\text{m} \quad \checkmark$$

- (b) Differentiate between elastic and inelastic collisions. (1mk)

In elastic both momentum and kinetic are reserved while in inelastic only momentum is conserved but kinetic energy is lost

15. A bulb is rated 100W.240V

(a) What does 100W.240V mean? (1mk)

Bulb converts 100J of electrical energy to heat and light energy per second when connected to 240v main supply

(b) Determine its resistance. (2mks)

$$R = \frac{v^2}{p} = \frac{240^2}{100} = 576 \Omega \text{ or } I = \frac{100}{240} = R = \frac{240 \times 240}{100} = 576 \Omega \text{ or } p = I^2 R$$

$$R = \frac{100}{100^2} \times 240^2 = 576 \Omega$$

16. The volume of a bubble at the base of a container of depth 28cm is 4cm³. Determine the volume of a bubble at 8cm deep. (3mks)

$$28 \times 4 = 8V$$

$$V = \frac{28 \times 4}{8} = 14 \text{cm}^3$$

SECTION B(50 mks)

17. (a) State Pascal's principle. (1mk)

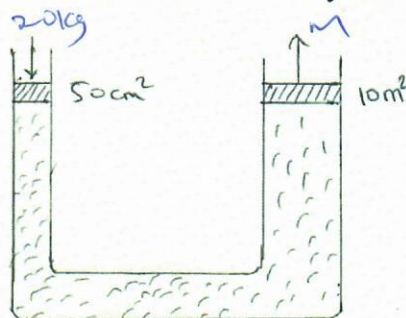
Pressure applied at one position is transmitted equally to all other parts of an enclosed fluid.

(b) State two factors that affect pressure in fluids. (2mks)

Depth / height

Density

(c) Determine the mass m in the hydraulic lift below. (4mks)



$$\frac{f_1}{A_1} = \frac{f_2}{A_2}$$

$$F_2 = \frac{200 \times 10}{50 \times 10^{-4}} = 4.0 \times 10^5 \text{ N}$$

$$\text{Mass} = 4.0 \times 10^4 \text{ kg}$$

18. (a) State the basic law of electro statics. (1mk)

Like charges repel while unlike charges attract each other.

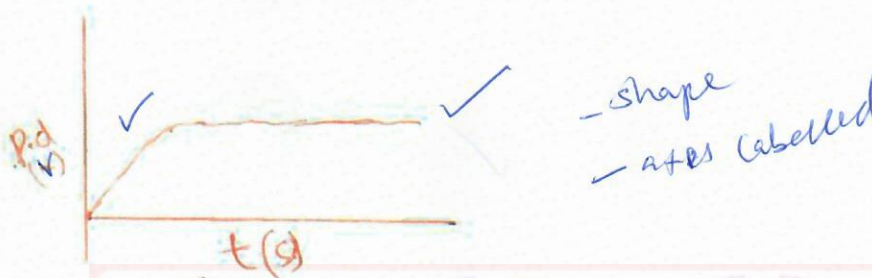
(b) State three factors that affect the capacitance of a parallel plate capacitor. (3mks)

Overlap area ✓

Separation distance ✓

Nature of dielectric ✓

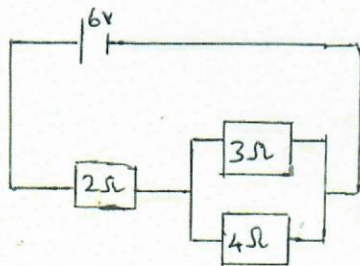
(c) Sketch a graph of p.d against time when charging a capacitor. (2mks)



(d) Determine the p.d of a capacitor when fully charged by 12V battery supplying 2.5A current. (1mk)

12 V ✓

(e) Use the circuit below to answer the following questions.



Determine:

(i) Effective resistance. (3mks)

$$\frac{12}{7} = 1.7143 \Omega \text{ or } \checkmark$$

$$RT = 3.7143 \Omega \checkmark$$

(ii) Current flowing through the 3ohms resistor. (3mks)

$$I = \frac{6}{3.7143} = 1.6154 \text{ A } \checkmark$$

$$\text{For } 3 \Omega I = \frac{4}{7} \times 1.6154 = 0.9231 \text{ A} / \text{ or } I = \frac{2.7692}{3} = 0.9231 \text{ A} \checkmark$$

19. (a) State Hooke's law.

(1mk)

For or elastic materials, extension is directly proportional to stretching force provided elastic limit is not exceeded. ✓

(b) A spring stretches to 24cm from 18 cm when 200g is hung, determine the spring constant. (3mks)

$$K = \frac{2}{6} = 0.3333\text{N/cm}$$

$$\text{Or } 33.33 \text{ N/m}$$

(c) Use the graph below to answer the following questions.



Determine:

(i) The spring constant.

(3mks)

$$K = \frac{4-0}{2-0} = 2\text{N/m}$$

(ii) Extensions for 8N

(3mks)

$$e = \frac{f}{k} = \frac{8}{2} = 4\text{m}$$

20. (a) Calculate the work done by using 4500g moved a distance of 1.2km. (2mks)

$$w.d = 45 \times 1200$$

$$= 54,000\text{J}$$

21. (a) Define heat capacity.

(1mk)

Quantity of heat required to raise the temperature of a given mass of substance by one kelvin.

(b) A heater rated 80W is immersed in 2kg block for 5 minutes. Determine;

(i) Energy supplied by the heater.

(3mks)

$$E = pt$$

$$= 80 \times 5 \times 60$$

$$= 24,000\text{j}$$

(II) Specific heat capacity of a block if the temperature changes from 25°C to 55°C

(3mks)

$$Q = mc\Delta\theta$$

$$c = \frac{24000}{2 \times 30}$$

$$c = 400\text{j/kgk}$$

