NAME: …… ADM NO: …….

CLASS:…… DATE: ……

SIGNATURE: …….

232/1
PHYSICS
PAPER 1
FORM THREE (3)
JUNE/JULY
TIME: 2 HOURS

MARKING SCHEME

INSTRUCTIONS:

- Write your name, Adm no., class, signature and date of examination in the spaces provided at the top of the page.
- Answer all the questions in the spaces provided after each question.
- All numerical answers should be expressed in decimal notations.
- You may use electronic calculators and tables.

1. The figure below shows a spherical ball placed between 2 wooden blocks and a meter rule.

What is the volume of the ball? (3 mks)

5.8 – 4.5 = 1.3

$\frac{1.3}{2} = 0.65$

$V = 4/3 \times 22/7 \times 0.65^2$

$= 1.151cm^3$. Ans

2. A solid weighs 16.5N on the surface of the moon. The force of gravity on the moon is 1.7N/kg. Determine the mass of the solid. (2 mks)

$M = \frac{W}{g}$

$M = \frac{16.5}{1.7}$

= 9.706KG Ans

3. $30cm^3$ of a liquid X was added to $70cm^3$ of water and the resulting mixture had a volume slightly less than $100cm^3$, explain the observation. (2 mks)

This is because some of the particles of liquid X are able to fit in between water particles.

4. Explain how heat loss by;
   (i) Radiation is minimised in a vacuum flask. (1 mk)

   - Silvered inner walls

   (ii) Conduction is minimized in a vacuum flask. (1 mk)

   - Presence of a double wall with a vacuum in between.

5. The figure below shows part of a scale of vernier caliper. Given that the device has a zero error of –0.02 and has been used to measure the diameter of a ball.

   What is the radius of the ball? (2 mks)

   Diameter = 7.44 + 0.02
   = 7.46
   Radius = 3.73cm

6. A pipe of radius 6mm is connected to another pipe of radius 9mm. If water flows in the wider pipe at 2m/s, what is the speed in the narrower pipe? (3 mks)

   $\mathbf{A_1V_1 = A_2V_2}$
   $\mathbf{36 \times V_1 = 81 \times 2}$
   $\mathbf{V_1 = \frac{4.5m/s}{3}}$

7. The springs below are identical and have negligible weight. The extension produced on the system of springs is 20cm.

Determine the constant of each spring. (4 mks)

For parallel springs extension

$$\frac{40N}{2k}$$

For single spring, extension

$$= \frac{20N}{K}$$

Total extension $= \frac{40N}{2k} + \frac{20N}{k}$

$$= 20cm$$

$$\frac{(40 + 40N)}{2k} = 20cm$$

$$\frac{80}{2k} = 20cm$$

$$K = \left(\frac{\underline{80N}}{20 \times 2cm}\right)$$

$$= 2N/cm$$

Or 0.02N/m

8. An air bubble of volume $0.5cm^3$ when released from the bottom of a lake rises to the surface of the lake.

   (i) Explain why the bubble rises. (2 mks)

   The bubble rises up since the density of air is less than that of water.

   (ii) Calculate the volume of the bubble at the surface of the lake given that the lake is 92.7m deep and the atmospheric pressure is equivalent to 10.3m of water pressure. (4 mks)

   - Vol of air bubble @ bottom = V1 and @ top = V_2

   - Pressure acting on bubble at the surface

   = 10.3m of water pressure

   - Pressure acting on bubble @ bottom

   = P1 = 10.3 + 92.7

   = 103.0m of water pressure

   From Boyle's law

   $P_1V_1 = P2V_2$

   $103.0 \times 0.5 = 10.3\ V_2$

   $V = \frac{(103 \times 0.5)}{10.3}$

   $= \underline{5cm^3}$ **Ans**

(b) What assumption have you made in arriving at your answer? (2 mks)

- The temperature of the lake and that of the air bubble is constant.

9. A fixed mass of gas at constant pressure has a volume of $600cm^3$ at 0^oC. At what temperature will its volume be $1099cm^3$? (4 mks)

$V1 = 600cm^3$ **$T_1 = 0^oC = 273K$**

$V2 = 1099cm^3$ **$T_2 = ?$**

$V_1 \times T_2 = V_2 \times T_1$

$600T_2 + 1099 \times 273k$

$T2 = \frac{1099 \times 273k}{60cm}$

$\therefore T_2 =$

10. (a) State three uses of magnets. (3 mks)

- Making compass (any 3)
- In radio speakers, amplifiers, video tapes etc
- In hospitals to remove objects from eye/body
- Used in TVs generators, telephone receivers

(b) Define the following terms as used in Physics:-

(i) Magnetic materials. (2 mks)

- Are those that can gain magnetic qualities and acts as magnets e.g iron.

(ii) non-magnetic materials (2 mks)

- Are materials that cannot be magnetized e.g wood

(ii) neutral point. (2 mks)

- This is a point in a magnet where the magnetic power of attraction or repulsion is not experienced.

11. State three conditions for a body to be in equilibrium. (3 mks)

- Area of base
- Position of centre of gravity
- Forces on both side of pivot should be same

12. State four practical applications of friction. (4 mks)

- movement of bodies
- braking system
- lighting match stick
- writing or erasing blackboard
- skidding
- Lubrications (any four)

13. Use simple sketches of a cone to illustrate the three states of equilibrium and name. (6 mks)

14. (a) Give a reason why water is not suitable as a barometric liquid. (3 mks)

- Due to its anomalous expansion
- Has high b.p and low m.p
- It is uncompressible due to its state and delocalized electrons.

(b) Explain the application of (a) above. (3 mks)

- sea breeze
- ice bergs
- land breeze

15. Use domain theory of magnetism to explain how a magnet may lose its magnetism on heating and hammering. (4 mks)

- On heating a management, dipoles in their domains face one directs
- They dis-orient on heating further
- Hammering while in E-W direction distorts alignment of magnetic atoms
-Magnets are kept facing in N-S directions.

16. Explain the following observations:-

(i) A boy jumping from a high table tends to spread his legs. (1 mk)

- 10 maintain the centre of gravity.

(ii) Convex mirrors are not preferred for use as driving mirrors. (1 mk)

- Forms diminished images

(iii) Why convex mirrors are used as driving mirrors and in supermarkets. (1 mk)

- They have a wide field of view

17. (a) State three practical applications of c.o.g. (3 mks)

- Tripod stand
- Luggage buses
- Racing cars

(b) Name two factors that affect the c.o.g of a body giving a reason for each. (4 mks)

- Area of base – the greater the area the more the stable a body is.
- Position of c.o.g/the lower the c.o.g, the stable the body.

18. A car travelling at a speed of $72km^{-1}$ is uniformly retarded by application of brakes and comes to rest after 8 seconds if the car with its occupants has a mass of 1250kg. Calculate the:-

(a) breaking force. (2 mks)

F = ma and acceleration a = $\frac{v - u}{t}$

but u = 72km/h

= 20m/s

∴ a = $\frac{0 - 20}{8}$

= -2.5m/s

Hence 1250 x -2.5

= -3125N

(b) Work done in bring it to rest

W.d = ke lost by the car

= ½ mv^2 – ½ mu^2

= ½ x 1250 x 0^2 – ½ x 1250 x 20 x 20

= -2.5 x 10^5J

19. A block and tackle system is used to lift a mass of 200kg. If this machine has a velocity ratio of 5 and an efficiency of 80%;

(a) Sketch a possible arrangement of the pulleys, showing how the rope is wound.(2 mks)

(b) Calculate the effort applied. (Take g = 10N/kg)

Efficiency = $\frac{M.A}{V.R}$ x 100%

= $\frac{80}{100}$ = $\frac{M.A.}{5}$

M.A. = $\frac{80 \text{ X } 5}{100}$ = 4

But M.A = $\frac{L}{E}$ and L = Mg

K = 200 x 10

Hence, 4 = $\frac{200 \text{ x } 10}{4}$

= 500N