NAME.....ADM.....CLASS.....

FORM 3 MID TERM EXAM -2024

PHYSICS

1. According to Bernovill's principle, how are the pressure and velocity of a fluid related. (1mk)

When velocity increases the pressure decreses

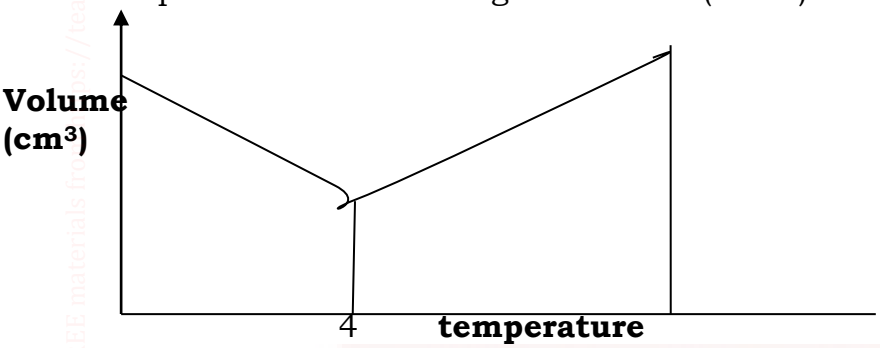
2. Explain why it is dangerous for a bus to carry standing passengers. (2mks)

The COG is raised. This makes bus unstable (likely to tupple)

3. Distinguish between mass and weight stating SI unit in each case. (2mks)

Mass is the quantity of matter in a substance is unit kilogram while weight is the pull of gravity on a body is unit Newton

4. Pure water at 0^0c is heated up to 10^0c sketch the graph of volume against temperature on the axes given below. (2mks)



5. State one reason why alcohol is preferred over mercury for use in cold regions. (1mk)

Alcohol has a lower freezing point as compared to mercury

6. Calculate the critical angle F or a material whose refractive index is 1.4. (2mks)

N = $^1/_{sin}$ **sin = $^1/_n$**

= ¼

Sin c = 0.7143

Sin c=

7. State two factors, which would affect the resistance of a metal conductor other than the temperature. (2mks)

Length of a conductor

Cross section area of a conductor

8. Efficiency of a machine is always less 100% explain. (2mks)

   i) Some energy is used to overcome friction

   ii) **Some energy is used to more movable parts of the machine**

9. a) State ohms law (2mks)

The current following through a conductor is directly proportional to the potential difference across it provided temperature and other physical conditions are kept constant.

   b) Differentiate between ohmic and non – ohmic cuntucm. (2mks)

   ohmic conductors are those which obey ohms law while non ohmic conductor are those that does not obey ohms law.

10. The figure below shows a uniform 50cm rod. It is balanced horizontally by a load of 4N on one end. Calculate the weight of the rod. (2mks)

Clockwise moment = anti – clockwise moment

W x S = 4 X 20

W= $^{80}/_5$ = <u>16N</u>

11. The figure below shows a pith ball in a container.

State and explain what would happens if air is blown over the mouth of the container. (2mks)

when air is blown over the mouth the container, the pressure above the mouth reduces hence atmospheric pressure pushes the pith ball upward.

12. A body whose initial velocity is $30ms^{-1}$ moves with a constant retardation of $3ms^{-2}$. Calculate the time taken for the body to come to rest. (2mks)

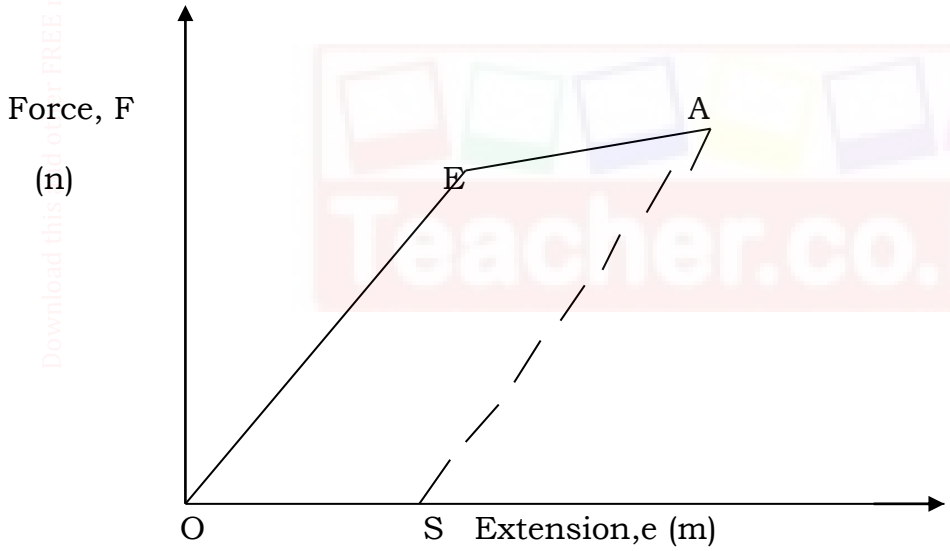
V = utat

O = 30 -3xt

$^{3t}/_{3} = {}^{30}/_{3}$

T = 105

13. In an experiment to determine how force and extension of a helical spring vary, the graph below was drawn from data obtained.



a) What do points A and E represents. (2mks)

A – Yield point

E – Elastic point

b) Name the type of deformation that occurs along E A

plastic deformation

SECTION B

14. The figure below shows a pulley system.
    i) What is the velocity of the system? (1mk)

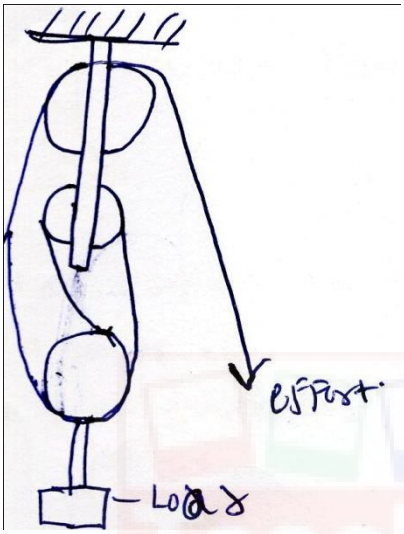
ii) Calculate the efficiency of the system. (4mks)

M.A = 400 / 250 = 2.667 **VR =M**

n = M.A / VR X 100

600 x 100%
2
=80%

iii) Draw a labeled diagram of a pulley system with a velocity ratio of 1.3 (2mks)



15. a)i) Distinguish between inelastic and elastic collision. (2mks)

elastic collision kinetic energy and momentum is conserved
inelastic collision – Kinetic energy not conserved while momentum is conserved.

iii) A particle A of mass, M, is moving with an initial velocity u, makes a head – on collision with another particle B of mass 2m, B being initially at rest. In terms of U, calculate the final velocity of A if the collision is perfectly inelastic. (3mks)

Initial moment = final momentum
$2M_B U_A + M_A U_A = 3MV$
$O + MU_A = 3MV$
=>3MV = 3u
$V = u/3mls^{-2}$
Or $0.33ums^{-1}$

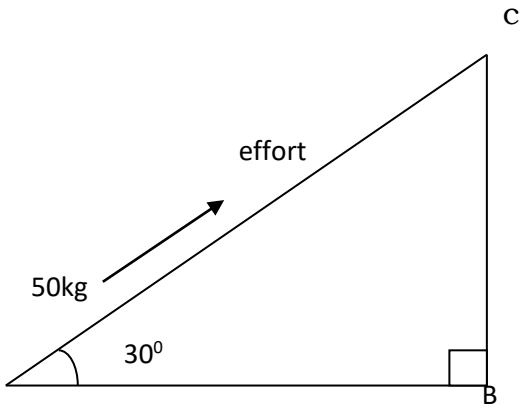
b) The diagram below shows a sphere moving in a viscous liquid in a tall measuring cylinder.

U = upthrust force
V= viscous frag
W = weight of the ball

i) Show on the diagram the force acting on the sphere. (3mks)

ii) Sketch a graph showing the variation of velocity with time. Show on the graph the terminal velocity. VT. (2mks)

16. A man uses the inclined plane to lift a 50kg load through a vertical height of 4.0M. the inclined plane makes an angle of 30^0 with the horizontal. If the efficiency of the incline plane is 72%, calculate;



a) Determine the velocity. (2mks)

VR $= {}^{1}/_{\sin 30}$

$= {}^{1}/_{0.5}$

=2

b) The effort needed to move the load up the inclined plane at a constant velocity.(3mks)

M.A = efficieny x VR

$= {}^{72}/_{100}$ X 2

=1.44

Effort = Load

M.A

= 50 X 10 (load = mg_

1.44 = 347.2N

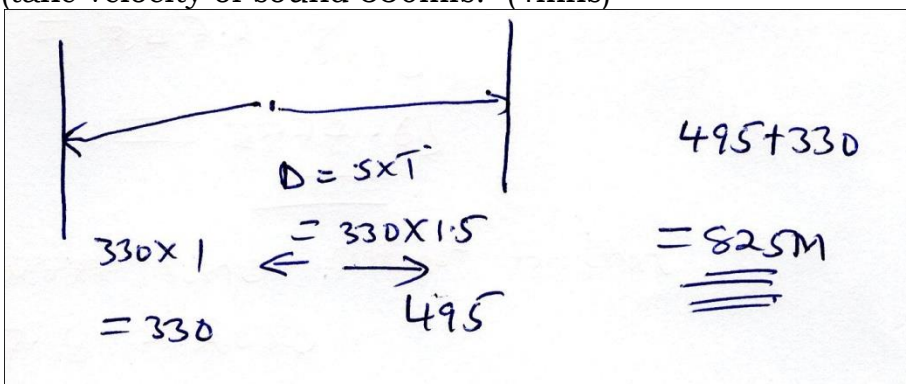
17. a) State any two factors that affect the speed of sound. (2mks)

Temperature

Wind

humidity

b)A policeman standing between two high walls fires a gun. He hears the first echo after 3 seconds and the next 2 seconds later. What is the distance between the wall? (take velocity of sound 330mls. (4mks)



c) An oil trop forms a circular patch of area 5 x10 $^{-3}$ m^2 . if the oil drop has a volume of 9x10^{-12} m^2, estimate the diameter of the oil molecules. (3mks)

$$^{V}/_{area} = \frac{9 \times 10^{-12}}{5 \times 10^{-3}}$$

1.8 x 10^{9}m

d)i) Define the term temperature and state its SI unit. (2mks)

is the degree of coldness and hotness of abod SI unit Kelvin

ii) State three properties of mercury as a thermometric liquid over other liquid. (3mks)

Is visible

expands uniform

wide range of temperature

e) The work done against friction in raising the load through the height of 4.0m (take g = 10NKg^{-1}). (4mks)

Work done against friction = work input − work output.

Work output = mgh

= 50 × 10 × 4

= 2000 J

Work input = effort × distance moved by effort

= 347.2 × AC

= 347.2 × 4 / sin 30

= 2777.6 J

Therefy work done against friction

= 2777.6 − 2000

= 777.6 J

2 In the circuit below, determine.

(i) The total resistance between A and B. (2MKS)

$R_c = R_1 + R_2$

$= (3+6)\Omega = 9\Omega$

(ii) Total effective resistance in the circuit (2MKS)

$\frac{1}{R_T} = \frac{1}{R_c} + \frac{1}{R_3} = \frac{1}{9} + \frac{1}{9} = \frac{2}{9}$

$R_T = \frac{9}{2} = 4.5\Omega$

(iii) total current in ~~circuit~~ the circuit. (2MKS)

$I = \frac{V}{R_T} = \frac{12}{4.5}$

$= 2.667A$