**PHYSICS PAPER 1 MARKING SCHEME-2021**

**SECTION A**

 🗸1

1. →*1 mark for 3 cm mark coinciding with*

*the zero of the vernier scale.*

 *→1 mark for the coincidence of the last*

 *division of the vernier*

1. Drum B stops first*. 1 mark for correct option*

This is because B has a lower centre of gravity compared to A and hence would

stop first. *1 mark.*

*(Give a mark for Inertia of the rod makes B to stop first)*

1. *W=mg*

 *500 N = m×10 N/kg* 🗸1

*m=50 kg*

*80 N =50 kg ×g*

*g= 80N/50kg*

 *= 1.6 N/kg* 🗸1

1.

$$\frac{Height of the tree}{Length of the shadow of the tree}=\frac{Height of the rule}{Length of the shadow of the rule}$$

 🗸1

$$\frac{Height of the tree}{3.2 m}=\frac{1 m}{2.4 m} $$

 🗸1

$$Height of the tree=\frac{1 m}{2.4 m}×3.2 m=1.33 m$$

 🗸1

1. A cools faster. 🗸1

Convectional currents develop in A which melts the ice faster and consequently cooling the water faster. 🗸1

1. **(i)

🗸1

 (ii) Gradient represents the work done on the gas. 🗸1

1. B is a better conductor of heat. 🗸1

This is because it contracted more due implying that it has a higher linear expansivity. 🗸1

1. This is due to the Bernoulli effect. When the gas tap is open, the gas jets out of the nozzle with high speed which leads to low pressure in the gas. 🗸1

The higher atmospheric pressure outside forces the air into the barrel. 🗸1

1. (a) This is the constant random motion of particles in a fluid as a result of continuous

bombardment from molecules of the surrounding medium. 🗸1

 (b) - Smoke is visible

 - Smoke is lighter/less dense 🗸1

1. For spring A; e*A* = $\frac{7N}{10 N/m}=0.7 m$ 🗸½

For e*BC*=$\frac{6 N}{2×10 N/m}=0.3 m$ 🗸½

 Total extension = 0.7 m + 0.3 m = 1.0 m 🗸1

1. This is due to the energy losses in the moving of the screw from one pitch to the other. 🗸1
2. Pgas + hρg =Pa

 Pgas = Pa – hρg 🗸1

 = 0.76 m ×13600 kg/m3×10 N/kg -0.02 m×13600 kg/m3 ×10 N/kg 🗸1

 = 103, 360 N/m2-2720 N/m2 = 100,640 N/m2 🗸1

**SECTION B**

1. (a) - Lowering the centre of gravity 🗸1
* Increasing the base area. 🗸1

 (b) F1d1=F2d2 🗸1

W×0.4 m = 5N × 0.2m 🗸1

 W = $\frac{1Nm}{0.4 m}=2.5 N$ 🗸1

1. (a) A floating object displaces its own weight of the fluid in which it floats. 🗸1

(b) The bar tilts anticlockwise/to the left. 🗸1

The air expands and increases in volume which increases the upthrust on the balloon lifting it up. 🗸1

(c) (i) The balloon would rise up due to the upthrust. 🗸1

The upthrust on the balloon would be higher than the weight of the balloon and its

 Contents hence making the balloon to rise. 🗸1

 (ii) Weight of the balloon and contents = (400 kg + 1200 m3×0.8 kg/m3) ×10 N/kg

 =13,600 N 🗸1

 Upthrust = weight of the fluid displaced

 = 1200 m3×1.3 kg/m3×10 N/kg =15,600N 🗸1

 T=U-W = 15,600N – 13, 600 N = 2000 N 🗸1

 (iii) F= ma 🗸1

 a=$\frac{F}{m}$ = $\frac{2000 N}{1360 kg}$ 🗸1

$ =1.47 m/s^{2}$ 🗸1

1. (a) f= 4Hz 🗸1

 ω =2πf 🗸1

 = 2π×4Hz = 25.1 rad/s 🗸1

(b) a= ω2r 🗸1

 = 25.12 rad2/s2 × 1 m = 630.01 m/s2 🗸1

 (c) T =m ω2r

 = 0.04 kg ×630.01 m/s2 🗸1

 = 25.2N

 (d) v = ωr 🗸1

 = 8π×1 m =25.13 m/s 🗸1

 (e) The centripetal force depends on the mass of the particles. 🗸1

 Since mud is denser than water, the mud requires greater centripetal force hence settles at

 the bottom and the water floats on top of the mud. 🗸1

 (f) (i) Gravitational force🗸1

 (ii) Friction🗸1

 (iii) part of the horizontal component of the lift force🗸1

1. (a) This is the quantity of heat required to change a unit mass of the material from liquid to

 vapour without change of temperature. 🗸1

 (b)(i) Q = mLf

 = 0.1 kg× 336000 J/kg 🗸1

 = 33600 J 🗸1

 (ii) Q = mcccΔθ + CΔθ 🗸1

 = 0.1 kg × 4200 J/kgK ×40K + 300 J/K × 40 K

 = 16800 J + 12000 J 🗸1

 = 28800 J 🗸1

 (iii) mLv+ mscwΔθw = 28800 J + 33600J 🗸1

 0.02 Lv + 0.02× 4200 J/kgK ×60K= 62400 J

 0.02 Lv =62400 J- 5040 J = 57360 J 🗸1

 Lv = 57360 J/0.02 kg

 = 2868000 J/kg 🗸1

 (c)(i) The wire exerts pressure on the ice lowering its melting point. 🗸1

 The ice refreezes when the pressure is withdrawn in a process called regelation. 🗸1

 (ii) The iron wire would cut through but a slower pace. 🗸1

 This is due to its lower thermal conductivity compared to copper. 🗸1

1. (i) f= 50 Hz

 T = 1/f = 1/50 = 0.02 s

 u = $\frac{0.01}{0.02}$ 🗸1

 $=0.5 m/s$ 🗸1

 (ii) v = $\frac{0.05}{0.04}$ 🗸1

 $=1.25 m/s$ 🗸1

 (iii) Total time = 0.09 s

 a = $\frac{v-u}{t}=\frac{1.25-0.5}{0.09}$ 🗸1

$ =8.33 m/s^{2}$ 🗸1

(b)(i) Inelastic collision is the type of collision in which the kinetic energy is not conserved but

 the momentum is conserved. 🗸1

 (ii) Inertia is the tendency of a body to resist change in its state of rest or motion. 🗸1

(c) Momentum before firing = momentum after firing

 Mgug+ mbub = mgvg+ mbvb 🗸1

 0 = 3.5 vg + 0.02 kg × 250 m/s

 vg = $-\frac{5 kgm/s}{3.5 kg}$ = - 1.43 m/s 🗸1

 Recoil velocity = 1.43 m/s 🗸1