S.6 physics P.1 REVISION QUESTIONS (10th JULY 2020)

Use, where necessary:

Gravitation acceleration,	g	$= 9.81$ ms^{-2}
Stefan's constant,	σ	$= 5.7 \times 10^{-8}$ Wm^{-2} K^{-4}
Speed of light in a vacuum, c		$= 3.0 \times 10^{8}$ms^{-1}
Thermal conductivity of aluminium		$= 210$Wm^{-1} K^{-1}
Specific heat capacity of copper		$= 400$J kg^{-1} K^{-1}
Specific heat capacity of water		$= 4200$J kg^{-1} K^{-1}
Avogadro's number N$_A$		$= 6.02 \times 10^{23}$ mol^{-1}
Density of water		$= 1000$ kgm^{-3}

1. (a) (i) What is meant by *uniform velocity*?   (1mk)
      (ii) Sketch the displacement-time graph for a uniformly accelerated body   (1mk)
      (iii) What is a projectile?   (1mk)
      (iv) Derive the equation of uniformly accelerated motion that relates displacement, time,
velocity and acceleration.   (3mks)

   (b) A projectile is fired horizontally from the top of a cliff 200 m high. The projectile lands
1000 m from the bottom of the cliff.
Find the:
      (i) initial speed of the projectile   (4mks)
      (ii) velocity of the projectile just before it hits the ground.   (6mks)

   (c) Describe an experiment to locate the centre of gravity of a plane sheet of material having an
irregular shape   (4mks)
2. (a) (i) State the laws of solid friction.   (3mks)
       (ii) Describe an experiment to determine the coefficient of static friction between a block
and a given surface.   (4mks)

   (b) The diagram below shows a mass m fixed to one end of a horizontal spring and resting on
a very rough horizontal surface. The other end of the spring is fixed to a point in a wall
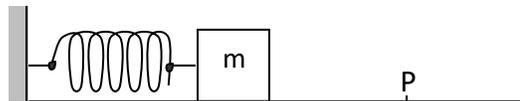
m is now pulled to a point P and then released.
      (i) Explain the behaviour of m when it is released.   (2mks)
      (ii) State the energy changes that occur in the system from the time m is released. (2mks)

(c) A rope BC is fixed between end B of a uniform rod AB and a point C in a rough vertical wall. The rod rests in limiting equilibrium with its end A in contact with the wall, where A is vertically below C and it makes an angle of 60° with the wall
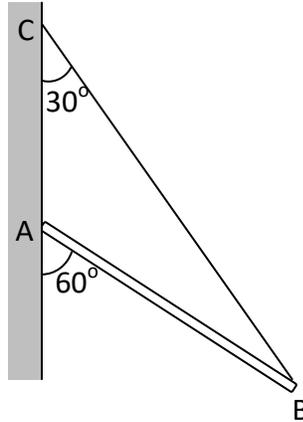
If the rope makes an angle of 30° with the wall and the weight of the rod is 20 N, find:

     (i) the tension in the rope   (4mks)

     (ii) the coefficient of friction between the rod and the wall   (4mks)

6. (a) (i) State Wien's and Stefan's laws of black body radiation.   (2mks)

         (ii) Explain how a perfectly black body can be approximated in reality?   (4mks)

         (iii) Describe an experiment to compare surfaces as absorbers of radiation.   (4mks)

  (b) The energy intensity received by a spherical planet from a star is 1.4×10^3 W m^{-2}. The star is of radius 7.0×10^5 km and is 1.4×10^8 km from the planet from the planet.

     (i) Calculate the surface temperature of the star.   (4mks)

     (ii) State any assumptions you have made in (b)(i) above.   (1mk)

  (c) (i) What is *convection*?   (1mk)

         (ii) Explain the occurrence of land and sea breezes.   (4mks)

END