4 **(a)** **(i)** State, in terms of force, the condition necessary for an object to move in a circular path at constant speed.

……

……

…… [1]

(ii) Explain why this object is accelerating. State the direction of the acceleration.

……

……

…… [2]

(b) A satellite moves in a circular orbit around the Earth at a constant speed of 3700 m s^{-1}.

The mass of the Earth is 6.0×10^{24} kg.

(i) Calculate the radius of this orbit. Show your working clearly.

radius = …….. m [3]

(ii) State and explain if the satellite is a geostationary satellite.

……

…… [2]

(iii) The mass of the satellite is 2.0 kg. Determine the total energy of this satellite.

Show your working clearly.

total energy = …….. J [3]

(c) In order to move the satellite in **(b)** into a new smaller orbit, a decelerating force is applied for a brief period of time.

(i) Suggest how the decelerating force could be applied.

……

…… [1]

(ii) State and explain the effect on the kinetic energy of the satellite when the satellite moves in this new smaller orbit.

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[Total: 14]