

l) A battery consisting of two cells, in series, each of emf E , is used to charge a capacitor, capacitance C .

- (i) What is the energy of the charged capacitor?
- (ii) How much energy has been lost?
- (iii) If the capacitor is charged in two stages, first with one cell and then with two cells, determine the energy lost. Comment on the result.

[8]

m) Two masses of 0.90 kg and 1.10 kg are hung vertically from identical springs on a common support each with force constant 39.48 Nm^{-1} . Both are released simultaneously from a position of maximum extension to describe simple harmonic motion. Calculate:

- (i) The frequencies of the two masses.
- (ii) The beat period and frequency.

[4]

n) The tangential frictional force produced by a band brake on a rotating metal drum of circumference 0.25 m is 20 N . The mass of the drum is 0.40 kg and its specific heat capacity is $0.35 \text{ kJ kg}^{-1}\text{K}^{-1}$. Calculate the number of complete revolutions required to increase its temperature by 5.0 K .

[3]

o) If the atmosphere is assumed to be composed of a layer of air of uniform density, 1.23 kg m^{-3} , calculate its height if it produces a pressure of $1.01 \times 10^5 \text{ Pa}$ at the Earth's surface.

[2]

End of Section 1