S.3 PHYSICS

2 HOURS

- The following constants may be useful to you;
  Acceleration due to gravity, g $= 10ms^{-2}$
  Speed of light in a vacuum $= 3.0 \times 10^{8}ms^{-1}$
  Density of water $= 1000kgm^{-3}$

1. a) (i) What is meant by the term ***diffusion***? (01)

   (ii)Explain what is observed when smoke enclosed in an illuminated transparent is viewed through a microscope. (02)

   (i) State what is observed in (a)(ii) when the cell is placed on ice blocks. Give a reason for your answer. (02)

   (b) Describe an experiment to determine the $thickness\ of\ an\ oil\ molecule$. (05)

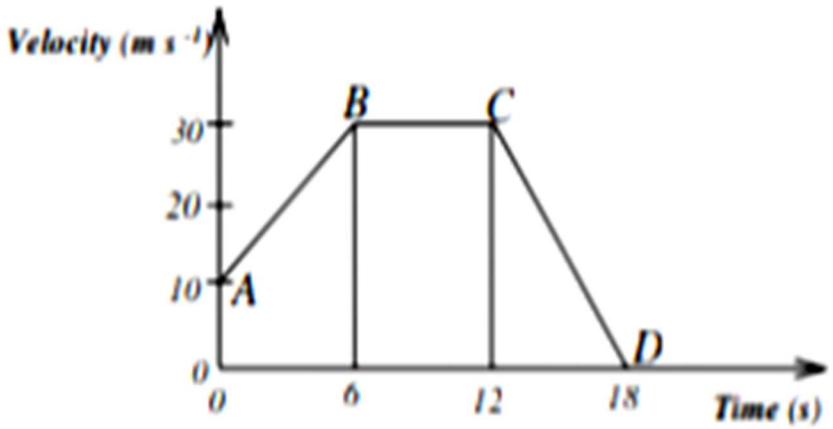
   (ii) State any assumption(s) made in (b)(i). (02)

   (c) (i) State ***Hooke's law***. (01)

   (ii) When a body of $\mathbf{50}kg$ stands at the end of spring board, it is depressed by $\mathbf{15}cm$. What would be the depression of the spring when a man of ***80kg*** stands at the end.

2. a) Differentiate between ***conduction*** and ***convection***. (02)
   (b) Describe an experiment which can be performed to show convection in liquids. (05)
   © (i) Draw a labeled diagram of a ***vacuum flask*** (03)
   (ii) Explain how a vacuum flask minimizes heat losses. (03)
   d) Why is a car radiator made of fins and painted black. (03)

3.

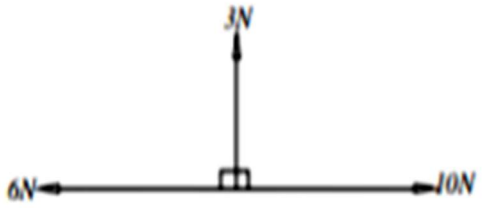


The diagram above represents a velocity-time graph of a body in motion.

(i) Describe the motion of the body. (03)

(ii) Calculate the total distance travelled. (03)

(b)



Forces of ***3N, 6N*** and ***10N*** act on a body of mass ***2kg***, initially at rest. Find the magnitude of the acceleration with which the body moves. (04)

(c) What is meant by

(i) ***velocity ratio of a machine*** (01)

(ii) ***pitch of a screw?*** (01)

d) A screw jack with a lever arm of $\mathbf{56}\boldsymbol{cm}$ and a pitch of $\mathbf{0.25}\boldsymbol{cm}$ is used to raise a load of $\mathbf{800}\boldsymbol{N}$. If the efficiency is $\mathbf{25}\%$

(i) Find the velocity ratio (03)

(ii) State the reason why the efficiency of the screw is less than 100%. (01)

4. (a) Define the following as applied to wave motion

(i) ***frequency*** (01)

(ii) ***wavelength*** (01)

(b) What are ***transverse waves*** (01)

(c) A radio station transmits signals at a frequency of $\mathbf{103.7}\boldsymbol{MHz}$. Find the wave length of signals and state any assumption made. (02)

(d) Draw a diagram to show the pattern for a straight water wave passing through a narrow slit. (02)

e) Describe an experiment to demonstrate that sound waves require material medium for their propagation. (06)

f) Explain how sound waves travel through air. (03)

5 (a) Define the following terms as applied to concave mirrors.

(i) Centre of curvature (01)

(ii) Principal axis (01)

(b) An object is placed $\mathbf{36}\boldsymbol{cm}$ in front of a concave mirror of radius of curvature $\mathbf{24}\boldsymbol{cm}$.

(i) Draw a scale ray diagram to show the formation of the image. (03)

(ii) Find the magnification (02)

(c) (i) State what is meant by ***rectilinear propagation of light***. (01)

(ii) Describe an experiment to demonstrate rectilinear propagation of light. (05)

(d) Explain the term $\boldsymbol{virtual\ image}$ as applied to plane mirrors. (03)