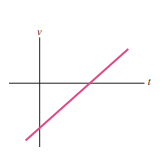
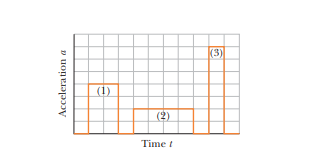
**Question Bank**

****1. Fig below, gives the velocity of a particle moving on an x axis. What are (i) the initial and (ii) the final directions of travel? (iii) Does the particle stop momentarily? (iv) Is the acceleration positive or negative? (v) Is it constant or varying?

2. Fig: below shows that a particle moving along an x axis undergoes three periods of acceleration. Without written computation, rank the acceleration periods according to the increases they produce in the particle’s velocity, greatest first.

3. Vector A has a negative x component 3.00 units in length and a positive y component 2.00 units in length. (a)Determine an expression for **A** in unit–vector notation. (b) Determine the magnitude and direction of **A**. (c) What vector **B** when added to **A** gives a resultant vector with no x component and a negative y component 4.00 units in length?

4.When two objects having masses **M=3m** and **m** are hung vertically over a frictionless pulley of negligible mass, determine the magnitude of the acceleration of the two objects and the tension in the lightweight cord.

5. Show that for a projectile motion the maximum range covered is equal to four times of its maximum height attained. (Rmax=4H)

6. Determine whether or not the following quantities can be in the same direction for a simple harmonic oscillator: (a) position and velocity, (b) velocity and acceleration, (c) position and acceleration.

7. A block–spring system undergoes simple harmonic motion with amplitude *A.* Does the total energy change if the mass is doubled but the amplitude is not changed? Do the kinetic and potential energies depend on the mass?

8. A simple pendulum is suspended from the ceiling of a stationary elevator, and the period is determined. Describe the changes, if any, in the period when the elevator (a) accelerates upward, (b) accelerates downward, and (c) moves with constant velocity.

9. In an engine, a piston oscillates with simple harmonic motion so that its position varies according to the expression

*X=* (5.00 cm)Cos(2*t +π*/6)

where *x* is in centimeters and *t* is in seconds. At *t* =0, find (a) the position of the piston, (b) its velocity, and (c) its acceleration. (d) Find the period and amplitude of the motion.

10. The position of a particle is given by the expression *x=* (4.00 m)cos(3.00*π t +π*), where *x* is in meters and *t* is in seconds. Determine (a) the frequency and period of the motion, (b) the amplitude of the motion, (c) the phase constant, and (d) the position of the particle at *t* = 0.250 s.

11. Show that the time rate of change of mechanical energy for a damped, undriven oscillator is given by *= bv*2 and hence is always negative. Proceed as follows: Differentiate the expression for the mechanical energy of an oscillator **E= mv2 +  Kx2** and use Equation = -kx-bv.

12. Two wires A and B of circular cross section are made of the same metal and have equal lengths, but the resistance of wire A is three times greater than that of wire B. What is the ratio of their cross-sectional areas? How do their radii compare?

13. Do all conductors obey Ohm’s law? Give an example to justify your answer?

14. The quantity of charge q (in coulombs) that has passed through a surface of area 2.00 cm2 varies with time according to the equation q = 4t3 + 5t + 6, where t is in seconds. (a) What is the instantaneous current through the surface at t = 1.00 s? (b) What is the value of the current density?

15. If the total charge inside a closed surface is known but the distribution of the charge is unspecified, can you use Gauss’s law to find the electric field? Explain.

16. A spherical Gaussian surface surrounds a point charge “q”. Describe what happens to the total flux through the surface if:

(A) The charge is tripled(B) The radius of the sphere is doubled(C) The surface is changed to a cube

(D) The charge is moved to another location inside the surface.

17. A coil consists of 200 turns of wire. Each turn is a square of side 18 cm, and a uniform magnetic field directed perpendicular to the plane of the coil is turned on. If the field changes linearly from 0 to 0.50 T in 0.80 s, what is the magnitude of the induced EMF in the coil while the field is changing?

18. Whenever a charged particle enters into a uniform magnetic field it is deflected from its path. Using this concept describe the working of a mass spectrometer with its proper diagram and expression. (Consider a positively charged particle and direction of B into the page).

19. Show that the product of permittivity of free space and permeability of free space is equal to reciprocal of speed of light in air.

20. If the potential difference across a capacitor is doubled, by what factor does the energy stored change?

21. A certain capacitor is charged to a potential difference *V*. If you wish to increase its stored energy by 10%, by what percentage should you increase *V?*

22. A parallel plate capacitor has circular plates of 8.22cm radius and 1.31mm separation (a) calculate the capacitance (b) what charge will appear on the plates if a potential difference of 116V is applied?

23. A resistor is constructed of a carbon rod that has a uniform cross-sectional area of 5.00 mm2. When a potential difference of 15.0 V is applied across the ends of the rod, the rod carries a current of

1. x10-3 A. Find, (a) the resistance of the rod and (b) the rod’s length.

24. An electron has an initial **velocity** of (**12.0 + 15.0**) **km/s** and the constant **acceleration** of (**2.0 x 1012** **m/s2)** in a region in which uniform electric and magnetic field are present.

If B = (400µT) . Find the electric field E. (me = 9.11)

25.Two lightbulbs both operate from 120 V. One has a power of 25 W and the other 100 W. Which bulb has higher resistance? Which bulb carries more current?

26.A rectangular copper strip 1.5 cm wide and 0.10 cm thick carries a current of 5.0 A. Find the Hall voltage for a 1.2-T magnetic field applied in a direction perpendicular to the strip.

27.A proton moves perpendicular to a uniform magnetic field B at 1.00 x 107 m/s and experiences an acceleration of 2.00x 1013 m/s2 in the +x direction when its velocity is in the +z direction. Determine the magnitude and direction of the field.

28. A velocity selector consists of electric and magnetic fields described by the expressions E = E and

B = B, with B =15.0 mT. Find the value of E such that a 750-eV electron moving along the positive x axis is undeflected.

29. How many capacitors, each of 8µF and 250V are required to form a composite capacitor of 2µF and 1000V?

30. Two wires A and B of circular cross section are made of the same metal and have equal lengths, but the resistance of wire A is three times greater than that of wire B. What is the ratio of their cross-sectional areas? How do their radii compare?

31. What are ferro, dia, paramagnets and their limitations?

32. Show the variations of the electric field with respect to the distance for a spherical charged conductor with the help of graphs.

Note: Review your worksheets problems as well and don’t forget to go through graphs.

Good Luck