



Physics

- (a) Explain simple harmonic motion and explain its characteristics.

(b) Two simple harmonic vibrations acting at right angles to each other have their time periods in the ration 1:2 . The phase difference between the two vibrations is $\frac{\pi}{2}$. Show that the resultant curve is a parabola.

(c) Show that the limiting values of Poisson's ratio (σ) lie between -1 and + 0.5
- (a) Mention any two applications of Doppler effect.

(b) What is the velocity of sound in gas in which two waves of lengths 1 metre and 0.991 metre produce 3 beats/sec. ?

(c) At what temperature will the velocity of sound in air become double of its value of 0°C ?
- (a) Explain what you mean by reversible and irreversible processes. Give one example for each process.

(b) Prove that entropy increases in all irreversible processes.

(c) calculate the entropy change that an ideal gas undergoes in a reversible isothermal expansion from volume V_i to volume V_f .
- (a) the distance between the plates of a parallel capacitor is d. A metal plate of thickness $d/2$ is placed between the plates. What will be its effect on the capacitance?

(b) The radius of the earth is 6400 KM. What is its capacitance?

(c) Show that when tow equal condensers are connected in parallel, then the system has four times the capacity of that obtained when the condensers are joined in series.
- (a) the electric potential of the earth is assumed to be zero. Why?

(b) Eight charged drops of water each of radius 1 mm and having a charge of 10^{-10} coulomb combine to form a bigger drop. Determine the potential of the bigger drop.

(c) Two cells of emf 1.5 V and 2.0 V respectively and of internal resistance 1.0Ω and 2.0Ω respectively are connected in parallel with an external resistance of 5.0Ω as shown in the following figure. Calculate the current in each branch of the network.

1.5 V, 1Ω

2 V, 2Ω

5Ω

- (a) Draw the magnetic lines of force due to the combined field of the earth and a bar magnet whose South Pole is pointing North. Locate null points.



Physics

- (b) A bar magnet of length $2l$ and magnetic moment M is suspended freely in a uniform magnetic field of intensity H . Find the amount of work done to deflect the magnet through an angle θ from the direction of the field.
- (c) The period of oscillation of a suspended thin cylindrical magnet is 4 secs. It is broken into exactly two halves. Find the period of oscillation of each half when freely suspended.
7. (a) Explain the terms
(i) Seebeck effect (ii) Peltier effect (iii) Neutral temperature and (iv) Inversion temperature in thermo – electricity.
(b) What is a thermo-electric diagram and what are its uses ?
(c) Mention some applications of thermocouples.
8. (a) State and explain Faraday's laws of electrolysis.
(b) Mention the applications of electrolysis.
(c) How many electrons flow per second through an electric bulb rated 220 V, 100 Watts ?
9. (a) State the conditions required to obtain permanent interference pattern.
(b) What happens to the interference pattern when the entire arrangement of double slit experiment is dipped in water ?
(c) A ray of white light passes through a prism whose refracting angle is 10° at approximately minimum deviation. If the refractive index of glass is 1.514 for red light and 1.0532 for violet light, find the angular dispersion produced by the prism.
10. (a) The slopes of anode and mutual characteristics of a valve are 0.02 mA/volt and 1.0 mA/volt respectively. Find the amplification factor of the valve.
(b) Work out the value of packing density in the case of a simple cubic crystal.
(c) What is photoelectric effect ?