

- (ix) What is the least speed at which an aeroplane can execute a vertical loop of 1 km radius so that there will be no tendency for the pilot to fall at the highest point.
- (x) Water flows downhill through a closed vertical funnel. The flow speed at the top is 12 cm/s, the flow speed at the bottom is twice the speed at the top. If the funnel is 40cm long and the pressure at the top is  $1 \times 10^5 \text{ N/m}^2$ , what is the pressure at the bottom?

### **SECTION-C (Marks 21)**

#### **(Chapters 7 to 11)**

**Q.3 Answer any SEVEN parts. All parts carry equal marks. ( $7 \times 3 = 21$ )**

- (i) Name two characteristics of simple harmonic motion. Does Frequency depend on amplitude for harmonic oscillators? Also name some common phenomenon in which resonance plays an important role.
- (ii) Define simple pendulum. What are the drawbacks of simple pendulum? Can simple pendulum experiment be done inside a satellite?
- (iii) A pipe has length one meter, determine the frequencies of the fundamental and first two harmonics:
- If the pipe is open at its both ends
  - If the pipe is closed at its both ends
- (iv) Define Doppler's Effect. And also write its few applications.