c. What do you understand by the terms Critical velocity and Weightlessness. (1.5+1.5)

Q.5 a. What is Carnot Engine? Explain its all working steps, graphical sketch and also calculate its efficiency. Why do we say that Carnot cycle is reversible? (06)

b. Prove Boyle's law and Charles' law on the basis of kinetic theory of gases. (04)

c. Find the average speed of Oxygen molecule in the air at ST.P. (03)

Q.6 a. What is Doppler's Effect? Discuss the following cases of Doppler's effect when: (1+5)

(i) Both Observer and Source are at rest

(ii) Observer moves towards stationary Source

(iii) Observer moves away from stationary Source

(iv) Source moves towards the stationary Observer

(v) Spurce moves away from the stationary Observer

b. What are beats? Explain it with the help of example as well as graphically. Also mention some of its uses. (04)

c. A stationary wave is established in a string which is 120 cm long and fixed at both ends. The string vibrates in four segments at a frequency of 120 Hz. Determine its wavelength and the fundamental frequency. (03)