



- a) What is difference between water tube and fire tube boiler? Explain with neat sketch any one water tube boiler. **07**
- b) Discuss briefly Otto cycle with the help of P-V diagram and derive an expression for the ideal efficiency of Otto cycle. **07**

**Q-5 Attempt all questions (14)**

- a) Write short note on gear drive. **04**
- b) Define the following with formula: **04**
- (i) Compression Ratio
  - (ii) Coefficient of Performance
  - (iii) Slip
  - (iv) Free Air Delivery
- c) Give the classification of Governing system. Explain with neat sketch Porter governor. **06**

**Q-6 Attempt all questions (14)**

- a) During testing of single cylinder two stroke oil engines, following data were obtained. **07**  
 Brake torque = 640 N-m, cylinder diameter = 21 cm, speed = 350 rpm, stroke = 28 cm, mean effective pressure = 5.6 bar, oil consumption = 8.16 kJ/hr, calorific value = 42705 kJ/kg. Determine:
- (i) mechanical efficiency
  - (ii) indicated thermal efficiency
  - (iii) brake thermal efficiency
  - (iv) specific fuel consumption.
- b) What is the function of a pump? Explain with neat sketch, working of centrifugal pump. **07**

**Q-7 Attempt all questions (14)**

- a) 1 kg of air at 7 bar pressure and 90° C temperature undergoes a non-flow polytropic process. The law of expansion is  $pV^{1.1} = \text{constant}$ . The pressure falls to 1.4 bar during the process. Calculate : (1) Final temperature (2) Work done (3) Change in internal energy (4) Heat exchange **07**  
 Take  $R = 287 \text{ J/kg K}$  and  $\gamma = 1.4$  for air.
- b) Explain with neat sketch construction and working of vane type compressor. **04**
- c) Differentiate between brake and clutch. Explain Band brake. **03**

**Q-8 Attempt all questions (14)**

- a) Classify various types of coupling and explain Oldham coupling with neat sketch. **07**
- b) Explain in detail vapor compression refrigeration system with sketch. **07**

