



### SECTION-B

2. Give the merits/demerits of Fire Tube Boilers and Water tube Boilers.
3. Describe the pressure and velocity variation in a impulse steam turbine.
4. What is meant by co-generation? How it is used in industries? Explain.
5. What is the effect of air leakage in a condenser? List methods to prevent this leakage.
6. Write a descriptive note on 'Cooling Towers'.

### SECTION-C

7. In a test on single cylinder four stroke cycle gas engine with explosion in every cycle, the gas consumption given by the meter was  $0.216 \text{ m}^3$  per minute, the pressure and temperature of the gas being 75 mm of water and  $17^\circ\text{C}$  reply. Air consumption was 2.84 kg/min, the temperature being  $17^\circ\text{C}$  and barometer reading 745 mm of mercury. The bore of engine being 250 mm and stroke 475 mm and *rpm* 240.

Find volumetric efficiency of the engine referred to volume of charge at NTP. Assume R for air as 287 Nm/kg.

8. The pressure under air baffle of a surface condenser is 52 mm of Hg. Temperature of the mixture leaving the cooler suction is  $25^\circ\text{C}$ . Assuming available water at  $15.5^\circ\text{C}$  and external water might lower the temperature further to  $20^\circ\text{C}$ . Explain the effect of this on the quality of vapour accompanying the air to the air pump suction.
9. The following data relates to a stage of an impulse reaction turbine : steam velocity coming out of the nozzle = 245 m/s, nozzle angle =  $20^\circ$ , blade mean speed = 145 m/s. speed of tree rotor = 300 *rpm*, blade height = 10 cm, specific volume of steam at nozzle outlet and blade outlet respectively  $3.45 \text{ m}^3/\text{kg}$  and  $3.95 \text{ m}^3/\text{kg}$ . Power developed by the turbine = 287 kW. Efficiency of the nozzle and blade combined = 90%. Carryover coefficient = 0.82. Find :

(i) The Heat drop in each stage,

(ii) Degree of reaction

(ii) Stage efficiency.