

(OLD COURSE)**QP Code : 14382****(3 Hours)****[Total Marks : 100**

- **Question No 1 is compulsory.**
- **Answer any four out of remaining six questions.**
- Assumptions made should be clearly stated .
- Assume suitable data wherever required, but justify the same.
- Use of Mollier Chart, Steam Table, permitted.

Q-1 Answer any **Four** Questions : [20]

- Distinguish between boiler mountings and accessories. What is the function of a fusible plug in boiler.
- Define volumetric efficiency of compressor and derive expression for the same.
- Distinguish between impulse and reaction turbine.
- Discuss with T-s diagram the effect of reheating in a gas turbine.
- Write a note on methods of air extraction in a condenser.
- Draw the heat balance sheet of a boiler and explain the major heat losses.

Q-2 a) A single stage , single acting air compressor has a bore of 20 cm and a stroke of 30 cm. The compressor runs at 600 rpm. The clearance volume is 4 % of swept volume and the index of expansion and compression is 1.3. The suction conditions are 0.97 bar , 27° C and the delivery pressure is 5.6 bar. The atmospheric conditions are at 1.01 bar and 17 ° C. Determine : [12]

- The volumetric efficiency
- The free air delivered in m^3 / min .
- The indicated power.

b) An engine uses n- butane (C_4H_{10}) as liquid fuel. It is supplied with 40% excess air. Both fuel and air enter at 1 atmosphere pressure and 298 K. The products of combustion leave at 600 K .Heat lost to the surroundings is 30 % of power.The engine develops 60 kW of power. Determine the mass flow rate of fuel in kg/hr.The following data is applicable : [8]

| Substance | h_f^0 (kJ/kgmole) | h_{298K} (kJ/kgmole) | h_{600K} (kJ/kgmole) |
|-----------------|------------------------|---------------------------|---------------------------|
| C_4H_{10} (l) | -126150 | 0 | - |
| O_2 (g) | 0 | 8624 | 18260 |
| N_2 (g) | 0 | 8660 | 17569 |
| CO_2 (g) | -241830 | 8769 | 22285 |
| H_2O (g) | -393520 | 9856 | 20402 |

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