

**GANPAT UNIVERSITY**  
**B. Tech. Semester VI Mechanical Engineering**  
**Regular Examination May – June 2014**  
**Power Plant Engineering (2ME 604)**

Time: 3 Hours

Total Marks : 70

- Instruction:** 1 All questions are compulsory  
 2 Figure to the right indicates full marks  
 3 Use steam table and mollier chart if necessary.

**Section - I**

- Que. – 1** a Discuss in detail about corrosion and deposition in boilers. 6  
 b In a condenser test, the following observations were made : 6  
 Vacuum = 715 mm of Hg, Barometer = 765 mm of Hg , Mean temp. of condensation = 34°C, Hot well temp. = 29°C, Inlet temp. of cooling water = 15°C, Outlet temp. of cooling water = 25°C. Determine a) Undercooling efficiency b) Undercooling of condensate c) Condenser efficiency

OR

- Que. – 1** a What do you mean by Supercharged Boiler? Discuss in detail about any Supercharged Boiler with neat sketch. 6  
 b Exhaust steam having a quality of 0.9 enters at a surface condenser pressure of 0.13 bar and comes out as a water at 45° C. The circulating water enters at 25° C and leaves at 40° C. Estimate quantity of circulating water and condenser efficiency if  $M_s = 10^3 \text{ k.g/hr}$  6
- Que. – 2** a Describe in detail about the various methods of feed water treatment. 6  
 b Explain in detail about various sources and effects of air leakage into the condenser. 5

OR

- Que. – 2** a Describe balanced draught system with the help of pressure distribution diagram. 6  
 b Give the comparison of natural draft and mechanical draft cooling tower. 5
- Que. – 3** In a combined cycle plant, air is supplied at a rate of 2000 tons/hr and temperature 293K. The air pressure ratio is 7:1. The inlet pressure to compressor and outlet pressure from the turbine is 1 bar. The max. temperature is limited to 1000°C in brayton cycle. The steam is to be generated at 50 bar and 500° C by using supplementary fuel which increases the the temp. of gas used for steam generation by 1200°C and condenser pressure is 0.01 bar. Calculate a) Total power generated b) Overall  $\eta$  c) Mass of fuel used/hr. Take  $\eta_c = 80\%$ ,  $\eta_t = 85\%$ ,  $C_{pa} = 1 \text{ kJ/kg-K}$ ,  $\gamma_a = 1.4$ ,  $C_{pg} = 1.1 \text{ kJ/kg-K}$ ,  $\gamma_g = 1.33$ , C.V = 45000 kJ/kg. Stack temp. = 200° C. Neglect the power required to run the compressor 12

Section - II

- Q-4 **Attempt all**
- (a) Discuss modes of transportation for out plant coal handling. (6)
  - (b) Draw the line diagram for in plant coal handling. (6)
- OR
- Q-4 **Attempt all**
- (a) Classification of modern ash-handling system and discuss it. (6)
  - (b) Cyclone burner for pulverize fuel firing system. (6)
- Q-5 **Attempt all**
- (a) Discuss over & under firing methods. (6)
  - (b) Discuss Travelling grate type fuel firing stoker. (5)
- OR
- Q-5 **Attempt all**
- (a) Classification of coal firing methods. (5)
  - (b) Describe the unit system for pulverize fuel firing. (6)
- Q-6 **Attempt all**
- (a) Pressurized water reactor. (4)
  - (b) Single stoker & multi stoker firing for under feed firing system. (4)
  - (c) Electrostatic precipitators. (4)

END OF PAPER

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