

GANPAT UNIVERSITY
B. TECH SEM- VI (MECHANICAL ENGINEERING)
CBCS REGULAR EXAMINATION – APRIL/JUNE - 2017
2ME604 Power Plant Engineering

TIME: 3 HRS

TOTAL MARKS: 60

Instructions: (1) This Question paper has two sections. Attempt each section in separate answer book.
 (2) Figures on right indicate marks.
 (3) Make suitable assumptions wherever necessary.
 (3) Use of steam table is allowed.

SECTION: I**Q.1 Attempt all**

- (A) Draw a neat named general layout of modern thermal power plant. State the function of feed water heaters, economizer, deaerator, steam turbine and electric generator. (05)
- (B) Draw a line diagram of a Benson boiler. State the main difficulties experienced in the La Mont boiler and how it is prevented? (05)

OR**Q.1 Attempt all**

- (A) Draw a neat layout of thermal power plant and make a list of site selection criteria for the same. (05)
- (B) Draw line diagram of Velox boiler. Indicate all part of it. How it different from the other type of high pressure boiler? (05)

Q.2 Attempt all

- (A) Explain working principal of fluidized bed boiler with necessary diagram. How Sulfur and Nitrogen emissions are controlled in fluidized bed boiler. (05)
- (B) Derive an expression for chimney height in order to obtain a draught of 'h' mm of water column if the boiler used 'm' kg of air / kg of fuel. Assume, surrounding air temperature as ' T_a ' and flue gas temperature as ' T_g ' in degree absolute. Also derive an expression for the condition of maximum discharge of flue gases through a chimney. (05)

OR**Q.2 Attempt all**

- (A) Explain the working of pressurized fluidized bed combustion boiler with help of neat sketch. (05)
- (B) (i) Distinguish between super heater, reheater and air preheater. (05)
 (ii) What is subcritical and supercritical boiler?
 (iii) Write name of different methods of controlling temperature of super-heated steam.

Q.3 Attempt any TWO.

- (A) (i) What is the function of stokers? Compare underfeed and overfeed stokers. (05)
 (ii) Enumerate different types of ash handling systems. Discuss the working of pneumatic ash handling system.
- (B) Explain the working of Electrostatic precipitator with neat sketch. (05)
- (C) Describe a neat line diagram of in-plant coal handling system and explain the equipment used at different stage. (05)

SECTION: II

Q.4 Attempt all

- (A) The following observations were made during a test on surface condenser. (05)
Barometer reading = 760 mm of Hg, condenser vacuum = 705 mm of Hg, Mean temperature of condensate = 35°C, Condensate collected = 2000 kg/h, Quantity of cooling water circulated = 60,000 kg/h, Rise in temperature of cooling water = 16°C, Hot well temperature = 28°C.
Determine ;(i) Vacuum efficiency (ii) Condenser efficiency (iii) Quality of steam entering the condenser and (iv) Mass of air present per m³ of condenser volume. Assume inlet temperature of water as 20°C.
- (B) Classify the steam condensers and describe the methods of obtaining maximum vacuum in condenser. (05)

OR

Q.4 Attempt all

- (A) The quantity of cooling water required per minute in tons if the rise in temperature of water is limited to 8°C. The quantity of steam entering the condenser is 0.9 dry and there is no under cooling in the condenser. Properties of steam at 30°C : (05)
Absolute Pressure = 0.04325 bar
Enthalpy of liquid $h_f = 125.8$ kJ/kg
Enthalpy of evaporation $h_{fg} = 2438.1$ kJ/kg
Specific volume = 32.8 m³/kg
- (B) List different impurities found in feed water and their effects on performance of thermal power plant (05)

Q.5 Attempt all

- (A) Explain with neat sketch construction and working of CANDU type reactor (05)
(B) Explain layout and working principal of combined cycle power plant (05)

OR

Q.5 Attempt all

- (A) What are fission fragment and fission product? Explain Fission Reaction with an example. (05)
(B) Explain advantages over conventional gas turbine and steam power plant (05)

Q.6 Attempt Any TWO.

- (A) Name major pollutants of thermal power plants and their effects on environment and mankind. (05)
(B) Discuss bad effects of acid rains. How acid rains are controlled? (05)
(C) Explain in detail Reverse Osmosis process for water treatment (05)

-----**END OF PAPER**-----