GANPAT UNIVERSITY

B. Tech. Semester: VI Mechanical Engineering

Regular CBCS Examination April - June 2016

2ME604 Power Plant Engineering

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)   What is advantage of unit train for out plant coal handling? And also   [6]
discuss coal transportation by railway and sea or river way.

(b)   A steam turbine develops 2500 kW when the steam is supplied at 10   [6]
bars and 260°C. The vacuum in the condenser is maintained at 65 cm
of Hg. The barometer reads 75.2 cm of Hg. The rise in temperature
of cooling water is limited to 15°C. The temperature of the
condensate coming out of condenser is 40°C.
Neglecting all losses in the system and assuming the expansion through
the turbine is isentropic, find

(a) Specific steam consumption of the plant,

(b) Thermal efficiency of the plant, and

(c) Quantity of cooling water circulated through the condenser
per hour.

Assume there is no leakage in condenser.

OR

Que. – 1   (a)   Discuss in detail about jet condenser.   [6]

(b)   Explain various factors affecting the site selection for thermal power   [6]
plant.

Que. – 2   (a)   What are the advantages and dis-advantages of pulverized fuel firing   [6]
system over the stoker firing system?

(b)   Describe central or bin system for pulverized fuel firing with neat   [5]
sketch.

OR

Que. – 2   (a)   Write short note on spreader type stoker.   [6]

(b)   Discuss coal preparation plant in detail for in plant coal handling.   [5]

Que. – 3 (a) A combined cycle power plant consists of a gas turbine unit and a steam [1..] turbine unit, the exhaust gas from the gas turbine is supplied to the steam generator at which further supply of fuel is burned in the gas. The pressure ratio for the gas turbine is 8:1 and the inlet air temperature is 15°C. The maximum cycle temperature is limited to 800°C.

Flue gas temperature in furnace = 800°C.C.V. of the fuel = 40 x 10³ kJ/kg, chimney gas temperature = 200°C, steam supply condition to the turbine = 60 bar and 500°C, condenser pressure = 0.05 bar.

The total power output of the combined plant is 190 MW. Assuming ideal cycle for both the units, calculate (a) thermal efficiency of the combined plant (b) power generated in each unit of the cycle. (c) Mass of fuel supplied in tons per hour.

Take C_{pa} = 1kj/kg-k, γ_a = 1.4, C_{pg} = 1.1 kJ/kg-K γ_g=1.33.

Neglect the fuel mass.

Section – II

Que. – 4 (a) Discuss in detail about loeffler Boiler with neat sketch. [6]

(b) Discuss balanced draught system with neat schematic diagram. [6]

OR

Que. – 4 (a) List out the major advantages of high pressure boilers in modern [6] thermal power plant.

(b) What do you understand by word draught? How draughts are [6] classified? Discuss merits and demerits of forced draught over induce draught.

Que. – 5 (a) Describe hyperbolic cooling tower with neat sketch. [5]

(b) What is corrosion? Explain the importance of pH value to control the [6] corrosion phenomenon.

OR

Que. – 5 (a) Explain with neat sketch about CANDU Reactor. [5]

(b) Explain the working of induced draught cooling tower with neat sketch. [6]

Que. – 6 (a) What is use of air preheater in boiler? Discuss acidic corrosion in air [6] preheater and its prevention.

(b) What are the different methods used to control SO_2 in flue gases? [6] Explain any two.

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