Total No. of Questions—12]

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S.E. (Electrical) (First Semester) EXAMINATION, 2010

POWER PLANT ENGINEERING

(2008 COURSE)

Time : Three Hours

Maximum Marks : 100

N.B. :— (*i*) Answer *three* questions from each Section.

   (*ii*) Use separate answer-book for each Section.

   (*iii*) Use of steam tables, Mollier charts and electronic calculators is allowed.

   (*iv*) Assume suitable data, if necessary.

SECTION I
(Unit 1)

1. (*a*) Explain with neat sketch pulverised bed combustion system. [8]

   (*b*) Define :
   (*i*) HCV of fuel
   (*ii*) Stoichiometric A : F ratio
   (*iii*) Actual A : F ratio. [6]

   (*c*) Differentiate between mass fraction and mole fraction. [4]

Or

2. (*a*) In a Rankine cycle, the steam at inlet to turbine is saturated at a pressure of 35 bar and the exhaust pressure is 0.2 bar. Mass flow rate is 9.5 kg/sec. Determine :
   (*i*) Pump work

P.T.O.

(*ii*) Turbine work

(*iii*) Rankine efficiency

(*iv*) Condenser heat flow

(*v*) Dryness at the end of expansion. [10]

(*b*) Name the apparatus used for measurement of C.V. of gaseous fuels and discuss its working with the help of neat sketch. [8]

Unit 2

3. (*a*) How boilers are classified ? Compare the fire tube boiler and water tube boiler. [6]

(*b*) Explain with neat sketch working of Jet Condenser. [6]

(*c*) Explain with a neat sketch working of air preheater. [4]

Or

4. (*a*) What is boiler draught ? Explain natural and artificial draught with sketches. [6]

(*b*) Explain any *three* methods of coal transferring with neat sketches. [6]

(*c*) Explain with neat sketch Pneumatic Ash Handling System. [4]

Unit 3

5. (*a*) Draw the schematic layout of hydroelectric power plant and discuss the functions of each components and operation of plant. [8]

(*b*) Explain working of surge tank and give its classification with neat sketch. [8]

Or

6. (*a*) Explain different methods of governing mechanisms of a Francis Turbine. [6]

(*b*) What is Hydrograph ? Explain with a neat sketch. [4]

(*c*) What is spillway ? Discuss various types of spillways in brief. [6]

SECTION II

Unit 4

7. (*a*) Explain BWR with a neat sketch. [6]

(*b*) Discuss the site selection criteria for Nuclear power plants and explain Nuclear Fission. [6]

(*c*) Explain with neat sketch wet sump lubrication system. [6]

Or

8. (*a*) Explain CANDU reactor power plant. [6]

(*b*) State advantages and disadvantages of Diesel Power plant. State the applications of Diesel Power plants. [6]

(*c*) Write a short note on 'Nuclear Waste Disposal'. [6]

Unit 5

9. (*a*) Compare Gas turbine with I.C. Engine. [6]

(*b*) Discuss the operation of intercoolers and regenerators used in gas turbine with a neat sketch. [6]

(*c*) Explain fuels for gas turbine power plants. [4]

10. (*a*)   Write a short note on materials used for different parts of a gas turbine. [8]

(*b*)   Explain prospects and development of non-conventional power plants in India. [4]

(*c*)   Write a short note on tidal power generation. [4]

Unit 6

10. (*a*)   Discuss the various fixed charges and running charges which are used for calculation of cost of electrical energy. [8]

(*b*)   What are base load and peak load plants ? Explain the methods by which economic load sharing between base load and peak load plants can be determined. [8]

Or

12. (*a*)   Find the cost of power generation per kWh for the following data :

Capacity of plant – 150 MW

Capital cost = Rs. 25,000 per kW installed

Interest and depreciation = 10% on capital

Fuel consumption = 1.5 kg/kWh

Fuel cost = Rs. 400 per tonne

Salaries, wages and maintenance = Rs. 150×10^6 per year

Max. demand = 120 MW

Load factor = 50%. [8]

(*b*)   Explain :

(*i*)   Input-output curve

(*ii*)   Heat rate and incremental rate curve. [8]