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BIMEE-029

00284

DIPLOMA IN MECHANICAL ENGINEERING (DMEVI)

Term-End Examination

June, 2014

BIMEE-029 : POWER PLANT ENGINEERING

Time : 3 hours *Maximum Marks : 70*

Note : *(i)* *Answer **any five** questions.*

(ii) *All questions carry **equal** marks.*

(iii) *Use of steam table is **permitted***

(iv) *Use of scientific calculator is **permitted.***

1. (a) What is meant by proximate analysis of coal ? Explain the procedure to carry out proximate analysis of coal. 7

(b) Volumetric analysis of a sample of flue gas is 10.5% CO_2, 0.5% CO, 8.0% O_2 and rest is nitrogen (N_2). Calculate gravimetric composition. 7

2. (a) Explain in detail, how efficiency of Rankine cycle can be improved in regenerative feed heating system. **2x7=14**

(b) In a thermal power plant, working on Rankine cycle, dry saturated steam at 150 bar enters a turbine and comes out of it at 1.0 bar. Calculate cycle efficiency.

3. (a) How boilers are classified ? Give example of each classification. Briefly discuss the differences between externally fired and internally fired steam boilers. **2x7=14**

(b) With the help of a neat sketch, explain Cochran Boiler. What are its special features ?

4. (a) Explain what is understood by the term "Boiler draught" ? What are the various systems for producing draught in boilers ?

(b) What are the important parts of diesel power plants ? Briefly explain lubricating system of a diesel power plant. **2x7=14**

5. (a) Explain the equation of continuity applied between inlet section and any other section down stream for a convergent-divergent nozzle. **2x7=14**

(b) What is critical pressure ratio ? How does it limit the mass flow rate through nozzle ?

6. (a) Discuss main functions of condenser in a steam power plant. Explain the working of any one type of surface condenser. **2x7=14**

(b) A jet condenser is to maintain a vacuum of 61 cm of Hg condensing 20,000 kg of steam per hour, the temperature of the cooling water being 25°C. Estimate minimum quantity of cooling water required per minute if 1700 kJ has to be extracted from each kg of steam. Also estimate dryness fraction of steam entering the condenser.

7. (a) How hydraulic turbines are classified ? With the help of a neat sketch, explain general layout of a hydraulic power plant.

(b) Explain pressure compounded impulse steam turbine showing pressure and velocity variations along the axis. **2x7=14**

8. Write short notes on **any four** of the followings : **4x3.5=14**

(a) Gaseous fuels used in thermal power plants

(b) Subsonic and supersonic nozzles

(c) Constructional features of turbine blades

(d) Waste disposal in nuclear power plants

(e) Indian hydro power plants, their capacities and locations

(f) Cooling towers