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BIMEE-029

DIPLOMA – VIEP – MECHANICAL ENGINEERING (DMEVI)

Term-End Examination

00045

December, 2014

BIMEE-029 : POWER PLANT ENGINEERING

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **five** questions. All questions carry equal marks. Use of Steam table, Mollier's chart and Scientific calculator is allowed.*

1. (a) Explain the important properties of coal and natural gas from the point of view of using it in a thermal power plant. 7

(b) Percentage analysis by mass of flue gas is 16·0% carbon dioxide, 0·95% carbon monoxide and 7·6% oxygen. If rest of it is nitrogen, determine the percentage volumetric analysis of the sample. 7

2. (a) With the help of a suitable block diagram, explain the various important components of a coal based thermal power plant. 7

(b) Discuss the various methods of increasing thermal efficiency of a Rankine cycle. 7

3. (a) Explain the main distinguishing features of fire tube and water tube boilers. Discuss the merits and demerits of each type. 7

(b) What are the functions of the following used in steam boilers : 7

(i) Blow off cock

(ii) Fusible plug

4. (a) With the help of a neat sketch, explain the construction and working of Benson boiler. 7

(b) What are the advantages of diesel engine power plants over coal-based thermal power plants ? List the important components of a diesel engine. 7

5. (a) Explain the various types of nozzles with their distinguishing features. 7

(b) Steam approaches a nozzle at a velocity of 250 m/s, pressure of 3·5 bar and dryness fraction of 0·95. If the isentropic expansion in the nozzle proceeds till the pressure at exit is 2·0 bar, determine the change in enthalpy and the dryness fraction of steam using Mollier's diagram. Also, calculate the exit velocity from the nozzle and the area of exit of the nozzle for a flow of 0·75 kg/sec. 7

6. (a) Discuss the merits and demerits of surface condensers and jet condensers. Which type of condenser is recommended for large plants ? 7

(b) Why are cooling towers required in thermal power plants ? Explain the working of cooling towers in a power plant. 7

7. (a) With a neat sketch, describe the various components of a hydraulic power plant. 7

(b) Explain the term compounding in steam turbines and discuss the various methods of compounding steam turbines. 7

8. Write short notes on any ***four*** of the following :

$$4 \times 3\frac{1}{2} = 14$$

(a) Reheat factor in steam turbines

(b) Nuclear fuels

(c) Indian thermal power plants, their locations and capacities

(d) Choking of nozzle

(e) Air pumps

(f) Losses in steam turbines