

**B.Tech. - VIEP - MECHANICAL ENGINEERING
(BTMEVI)**

Term-End Examination

June, 2016

00360

BIME-017 : POWER PLANT ENGINEERING

Time : 3 hours

Maximum Marks : 70

Note : Answer any five questions. All questions carry equal marks. Steam tables are permitted. Use of scientific calculator is permitted. Assume any suitable missing data.

1. (a) What are the various factors considered for selecting a thermal power plant site ? 7
- (b) What is the importance of thermal power plants in the national power sector ? 7
2. (a) Explain the construction and working of a boiler water reactor used in a nuclear power plant with a neat sketch. 9
- (b) What are the advantages and disadvantages of boiling water reactor over pressurized heavy water reactor ? 5

3. (a) How are hydraulic turbines classified ? Define and explain the working principle of Pelton turbine used in hydro power plants. 7
- (b) Describe the working of a constant pressure open-cycle gas turbine plant with a neat sketch. 7
4. (a) Explain the working of LaMont boiler with a neat sketch. 9
- (b) Describe 'superheat control' by excess air method with the help of a neat sketch. 5
5. (a) A gas turbine takes in air at 101 kN/m^2 and 15°C . The air is compressed to a pressure of 606 kN/m^2 and then passed through a regenerative heat exchanger of effectiveness 0.65. The air is then passed through the combustion chamber where its temperature is increased to 870°C by the combustion of fuel. The gases enter a turbine and are expanded to 101 kN/m^2 pressure. Assuming a compressor efficiency of 85% and turbine efficiency of 80%, determine the following for air flow rate of 4 kg/s : 10
- (i) The power output of the plant
- (ii) Exhaust temperature from heat exchanger
- (iii) Thermal efficiency of the plant
- (b) What is 'Mechanical drought' ? Explain. 4

6. (a) What are the different methods of fuel injection used in diesel plants ? Which method is commonly used in big diesel plants and why ? 7
- (b) A medium capacity storage type hydroelectric power plant covers 1200 sq km area. The annual rainfall in catchment area is 160 cm². The head available at the power plant site is 360 metres. Assuming 25% of the rainfall is lost in evaporation and percolation, find the average power developed by the power plant and maximum demand. Take overall efficiency of the plant as 75% and load factor as 0.5. 7
7. (a) Explain how waste disposal is carried out in a nuclear power plant. 7
- (b) Explain hazardous pollutants of a coal based thermal power plant. How are they controlled ? 7
8. Write short notes on any *two* of the following : 7+7=14
- (a) Draft tubes used in reaction turbines
- (b) Minor and Major losses in hydro power plants
- (c) Shrink and Swell in a Boiler system
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