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BIME-017

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

Term-End Examination

December, 2015

BIME-017 : POWER PLANT ENGINEERING

Time : 3 hours

Maximum Marks : 70

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

1. (a) Define primary and secondary energy sources with the help of a block diagram. Explain the layout of a thermal power plant. 7
- (b) Explain hydroelectric power generation with a block diagram. 7

2. (a) What are the different types of fuels ? Explain how coal is formed. 7
- (b) What do you mean by Nuclear Energy ? Explain Nuclear Fission and Nuclear Fusion with suitable examples. 7

3. (a) What are the main components of a steam turbine ? Explain each component with the help of a neat diagram. 7
- (b) Discuss the various losses occurring in a steam turbine during power generation. 7
4. (a) Discuss the relative advantages and disadvantages of closed cycle and open cycle gas turbine plants. 7
- (b) Calculate the efficiency and specific work output of a simple gas turbine plant operating on Brayton cycle. The maximum and minimum temperatures are 1000 K and 288 K respectively. The pressure ratio is 6. The isentropic efficiencies of the compressor and the turbine are 85 and 90 percent respectively. If the unit consumes 2 tonnes of oil per hour of C.V. 46,500 kJ/kg, determine the power generated. The mechanical efficiency is 90% and the generation efficiency is 85%. 7
5. (a) What is the function of a Boiler ? Explain the different types of water tube boilers. 7
- (b) A steam power station of 100 MW capacity uses coal of calorific value of 6400 kcal/kg. The thermal efficiency of the station is 30% and the electrical generation efficiency is 92%. Determine the coal required per hour when the plant is working at full load. 7

6. (a) Explain the operation of a fuel pump in a diesel power plant. How is the fuel supply regulated in a diesel engine power plant? 7
- (b) What are the cost elements of a thermal power plant? Explain briefly. 7
7. (a) What do you understand by thermal pollution? Explain the bad effects of thermal pollution. 7
- (b) The cost of a water softener plant used is ₹ 1,20,000 when newly installed. The life of the plant is considered as 12 years. The salvage value of the plant will be 8% of its cost when newly installed. The repair, maintenance and labour costs of the plant per year are ₹ 8,000. The cost of chemicals used per year is ₹ 5,000. Taking interest on sinking fund as 8%, find the annual cost of the plant. 7
8. Write short notes on any *two* of the following : $2 \times 7 = 14$
- (a) Cooling Towers
- (b) Water Treatment in Thermal Power Plants
- (c) Nuclear Power Reactor
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