

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

Term-End Examination

June, 2019

00651

BIME-017 : POWER PLANT ENGINEERING

Time : 3 hours

Maximum Marks : 70

*Note : Answer any **five** questions. Use of scientific calculator is permitted. Assume missing data suitably, if any.*

1. (a) Discuss the advantages and disadvantages of gas turbine power plants over diesel and thermal power plants.
- (b) Enumerate and explain briefly, various methods of reducing thermal pollution. 7+7
2. (a) What do you understand by the term tariff ? Enumerate various types of tariff and explain any two of them.

- (b) A 60 MW power station has an annual peak load of 50 MW. The power station supplies loads having maximum demands of 20 MW, 17 MW, 10 MW, and 9 MW. The annual load factor is 0.45. Find : 7+7
- (i) Average load
 - (ii) Energy supplied per year
 - (iii) Diversity factor
 - (iv) Demand factor
3. (a) Briefly explain any five mountings and any five accessories for a boiler used in thermal power plant.
- (b) During a 10-hour run from one station to another, a railway engine develops an average power of 1200 kW. If the engine is driven by an atomic power plant of 20% efficiency, how much U^{235} would be consumed on the run ? Each U^{235} atom on fission releases 180 MeV of energy. 7+7
4. (a) What is a moderator in nuclear reactor ? Explain the desirable properties of a good moderator.
- (b) What do you understand by the term "Boiler draught" ? What are the advantages of forced draught over natural draught ? 7+7

5. (a) Explain the working of a "Pelton turbine" with the help of a neat diagram.
- (b) A turbine develops 6620 kW under a head of 20 metres at 130 rpm. Calculate the specific speed of the turbine and state the type of the turbine. 7+7
6. (a) Why is supercharging necessary for diesel power plant ? What methods are used for supercharging the diesel engine ?
- (b) A gas turbine unit has a pressure ratio of 6 : 1 and maximum cycle temperature of 610°C. The isentropic efficiencies of the compressor and turbine are 0.80 and 0.82 respectively. Calculate the power output, in kilowatts, of an electric generator geared to the turbine when the air enters the compressor at 15°C at the rate of 16 kg/s. Take $C_p = 1.005$ kJ/kg K, and $\gamma = 1.4$ for the compression process, and take $C_p = 1.11$ kJ/kg K and $\gamma = 1.333$ for the expansion process. 7+7

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

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

- (a) Air Preheater
 - (b) Binary Vapour Cycle
 - (c) Wilcox Boiler
 - (d) Economiser
 - (e) Feed Water Treatment
 - (f) Steam Nozzle
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