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December 2023

B.Tech. (EL) VIIth SEMESTER

Power Plant Engineering (ELOE-106)

Time : 3 Hours] [Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART–A

1. (a) Why super-heaters are used in steam power plants? CO1 (1.5)

(b) Discuss the importance of feed water treatment in a thermal power plant. CO1 (1.5)

(c) Define supercritical boilers and mention their advantages. CO1 (1.5)

(d) What are the working fluids in gas turbine power plants? CO2 (1.5)

(e) What is the function of pressurizer in PWR? CO3 (1.5)

(f) Name *three* moderators commonly used in the nuclear power reactor. CO3 (1.5)

(g) Mention the various advantages of wind power plants. CO4 (1.5)

(h) What are the components of tidal power plants? CO4 (1.5)

(i) Mention the objectives of the tariff. CO5 (1.5)

(i) Difference between demand and diversity factor. CO5 (1.5)

PART–B

2. (a) Discuss the role of a draught system in a thermal power plant. What are the different types of draught systems? Explain with suitable diagrams. CO1 (7.5)

(b) Describe the components and working of a Circulating Fluidized Bed Combustion (CFBC) Boiler with a suitable diagram. CO1 (7.5)

3. Describe the Brayton cycle in detail. Provide a P-V and T-s diagram for a typical Brayton cycle, and discuss the specific stages that occur during each process. Explain with suitable diagrams the various techniques for improving the thermal efficiency of the Brayton cycle. CO2 (15)

4. (a) Elaborately discuss the working principle and construction of the Fast Breeder Reactor and discuss its advantages and disadvantages. CO3 (7.5)

(b) Discuss the various factors to be considered while selecting the site for the nuclear power station. Discuss its advantages and disadvantages. CO3 (7.5)

5. (a) Describe the key components and working principles of a hydroelectric power plant. How are hydroelectric power plants classified? CO4 (7.5)

(b) Discuss the principles and.applications of geothermaL energy systems and their environmental impact. CO4 (7.5)

6. What is meant by load curve? What is its significance in power generation? CO5 (15)

A power station has to supply load as follows:

Time (hours)	0-6	6-12	12-14	14-18	18-24
Load (kW)	30	90	60	100	50

(i) Draw the load curve.

(ii) Draw the load duration curve.

(iii) Select suitable generating units to supply the load.

7. Write short notes on :

(a) Integrated Gasifier-based Combined Cycle (IGCC) system. CO2 (7.5)

(b) Pollution control technologies for coal-based power plants. CO5 (7.5)