

B.E. / B. Tech. (Full Time) DEGREE END SEMESTER EXAMINATION, APRIL/ MAY 2012

MECHANICAL ENGINEERING BRANCH

SEVENTH SEMESTER

**ME 9401 – POWER PLANT ENGINEERING**

**(REGULATIONS 2008)**

16

Time: 3 hr

Max Mark: 100

Answer ALL questions

**Part A – (10 × 2 = 20 marks)**

1. How can the capacity of a steam power plant be determined?
2. What are the limitations of MHD - steam power plant?
3. What are the three distinct zones of combustion in a CFB furnace?
4. Why is a liquid metal coolant the preferred coolant in a fast breeder reactor?
5. Why are the mini and micro-hydel plants important?
6. What is photovoltaic energy conversion?
7. What are the advantages of pyrometers?
8. Why is power generation by the gas turbines attractive these days?
9. What do you mean by diversity factor?
10. What are the elements, which contribute to the cost of electricity?

**Part B – (5 × 16 = 80 marks)**

11. a. The following load is to be supplied by a power station:

Load (MW) :	30	90	60	100	50
Time (Hours) :	0-6	6-12	12-14	14-18	18-24

- i. Draw the load curve
- ii. Draw the load duration curve
- iii. Choose the suitable generating units to supply the load
- iv. Calculate the load factor
- v. Calculate plant capacity factor

(4+3+3+3+3)

12. a. i. Derive the expression for the overall efficiency of two cyclic coupled plants for the following condition, when

i. the plants are coupled in series

ii. the plants are coupled in parallel. (8+8)

(OR)

b. i. What are the factors to be taken into consideration for the selection of a hydroelectric power plant? (6)

ii. Explain the working of a hydroelectric power plant with a neat flow diagram showing the essential elements. (10)

13. a. i. Explain in detail the working of liquid metal fast breeder reactor with a neat diagram. (12)

ii. What are the three stages in India's nuclear power programme? (4)

(OR)

b. Explain the working of PBFBC and PCFBC with a schematic diagram. (8+8)

14. a. Explain the flat plate and concentrating solar collectors utilizing solar energy in Rankine cycle operation for electricity generation. (16)

(OR)

b. i. What are the drawbacks of utilizing ocean wave energy in generating electricity? (6)

ii. Explain the working of geothermal power plant using hydrothermal system with a neat diagram. (10)

15. a. i. Explain with a help of a neat diagram, the construction and working of a radiation pyrometer. (8)

ii. Describe the working of optical pyrometer with the help of a neat sketch. (8)

(OR)

b. i. Explain the working of paramagnetic oxygen analyzer with a neat sketch. (8)

ii. Explain the commonly used procedure for measuring CO<sub>2</sub> in the gases. (8)