21/12/23 - AN.

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 70911

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023

Third/Sixth/Seventh Semester

Mechanical Engineering

ME 8792 – POWER PLANT ENGINEERING

(Common to Electrical and Electronics Engineering / Safety and Fire Engineering)

(Regulations 2017)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define draught with regard to a steam power plant.
2. State the function of a condenser in a thermal power plant.
3. Represent the Brayton cycle on p-v and T-s planes.
4. Mention the uniqueness of combined cycle system.
5. Which type of Uranium is used in a nuclear reactor–U^{235} or U^{238}? Justify.
6. Write down any one nuclear fission reaction.
7. What do you understand by the word 'dam' in a hydroelectric power plant?
8. What is bio-gas? How is it utilised for power generation?
9. _____ cost is higher in a hydroelectric power plant and _____ cost is higher in a thermal power plant.
10. List some types of power tariff.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Draw a typical layout of a thermal power plant and indicate the functioning of the various components. (9)

(ii) Define steam rate and heat rate. (2+2)

Or

(b) Explain the functioning of the following with a schematic diagram.

(i) Coal handling

(ii) Ash handling

(iii) Cooling tower (4+4+5)

12. (a) (i) Describe the working of an open cycle gas turbine power plant. Represent the power plant on a T-s/p-v plane. (8)

(ii) Briefly discuss about combined cycle system with a schematic. (5)

Or

(b) Draw a schematic and explain the layout of a Diesel based power plant. Also discuss the function of various components of a Diesel based power plant. (4+5+4)

13. (a) (i) List some safety measures followed in a nuclear reactor. (5)

(ii) How is a breeder type reactor special from a normal reactor? Elaborate. (5)

(iii) Mention some subsystems of a nuclear reactor. (3)

Or

(b) (i) Distinguish between boiling water and pressurised water reactors with a schematic. Which type is common in India? (7+2)

(ii) What is a CANDU type reactor? In what way is it different from a conventional nuclear reactor? (2+2)

14. (a) (i) Explain how electric power can be generated from a windmill. Also draw a neat sketch of the same. Also list the merits of wind power compared with power generation from conventional sources. (4+4+2)

(ii) Draw a schematic of a basic proton exchange membrane type fuel cell. (3)

Or

(b) (i) Explain how electric power can be generated using a solar panel. Explain with a relevant sketch. (4+4)

(ii) Draw a schematic diagram of a solar based thermal power plant. (5)

15. (a) (i) What is a load curve? Discuss its significance with a schematic diagram. (3+5)

(ii) Discuss on some pollution control techniques followed in a thermal plant. (5)

Or

(b) (i) Elaborate on the site selection criteria for a thermal and nuclear power plant. (4+5)

(ii) Brief about waste disposal in a nuclear power plant. (4)

PART C — (1 × 15 = 15 marks)

16. (a) What are cogeneration systems? List the merits of them. Elaborate any one type of cogeneration system in detail with a schematic diagram. (3+3+9)

Or

(b) (i) What are supercritical boilers? Mention their merits and demerits. (3+3)

(ii) Discuss briefly about different types of power tariff. (4)

(iii) Name some important load distribution parameters and mention their significance. (5)

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