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 — $(10 \times 2 = 20 \text{ marks})$

- 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 — $(5 \times 13 = 65 \text{ marks})$

- 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)

(ii) Coal handling (iii) 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. (3) (ii) How is a breeder type reactor special from a normal reactor? Elaborate. (iii) Mention some subsystems of a nuclear reactor. (5) (iii) How is a breeder type reactor special from a normal reactor? Elaborate. (6) (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. Or (b) (i) Explain how electric power can be generated using a solar panel. Explain with a relevant sketch. (ii) Draw a schematic diagram of a solar based thermal power plant. (5) (5) (6) (6) (7+2) (6) (6) (7+2) (7+2) (7+2) (7+2) (8) (9) (9) (10) (11) (12) (13) (14) (15) (15) (16) (17) (17) (18) (19) (19) (19) (19) (19) (19) (19) (19		(b)	Exp	ain the functioning of the following with a schematic diagram.		
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			` '	nlant (0)		
				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)