

Reg. No. :

Question Paper Code : 90872

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Third / Seventh Semester

Mechanical Engineering

ME 8792 – POWER PLANT ENGINEERING

(Common to Electrical and Electronics Engineering)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the reasons for internal irreversibility in Rankine cycle.
2. Why draft system needed for boiler furnace?
3. List the advantages and disadvantages of diesel power plant.
4. What are the major components of a gas turbine power plant?
5. What is meant by breeding ratio?
6. What are the properties of a good coolant for nuclear power plant?
7. Classify the hydraulic turbines based on direction of flow of water in the runner.
8. List the categories of geothermal sources.
9. How to reduce power generation cost?
10. Define tariff for electrical energy.

PART B — (5 × 13 = 65 marks)

11. (a) Draw the layout of modern coal power plant and discuss the main circuits in detail.

Or

- (b) Discuss the various stages involved in the fuel handling system from coal delivery to furnace in a steam power plant.

12. (a) Explain the need and working principle of combined cycle power plant.

Or

- (b) What are the essential functions of a fuel injection system in a diesel power plant and explain their types with neat sketches?

13. (a) With neat sketches explain the working principle of PWR and BWR plants.

Or

- (b) Why CANDU type reactors are economical? Explain the working principle, advantages and disadvantages of CANDU type reactor.

14. (a) Draw the layout of hydro-electric power plant and discuss the working principle, main components, advantages and disadvantages.

Or

- (b) Discuss the construction and working of solar cell.

15. (a) Explain the various methods used to calculate the depreciation cost of the power system.

Or

- (b) Discuss any two regenerative systems for removal of sulphur dioxide from thermal power plant.

PART C — (1 × 15 = 15 marks)

16. (a) It is proposed to supply a load with a maximum demand of 100MW and a load factor of 0.4. Choice made from nuclear, hydro - electric and steam power plants. Recommend a power plant based on minimum overall cost per kWh. Assume 365 days a year.

Cost	Nuclear power plant	Hydro-electric power plant	Steam power plant
Capital per kW installed	Rs. 6,000	Rs. 4,320	Rs. 2,160
Interest rate	10%	10%	12%
Depreciation	10%	8%	12%
Operation cost per kWh	12 paise	6 paise	18 paise
Transmission and distribution cost per kWh	0.24 paise	0.96 paise	0.24 paise

Or

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(b) The yearly duration curve of a certain plant can be considered as a straight line from 300 MW to 80 MW. Power is supplied with one generating unit of 200 MW capacity and two units of 100 MW capacity each. Determine the following.

- | | |
|------------------------|-----|
| (i) Installed capacity | (3) |
| (ii) Load factor | (3) |
| (iii) Plant factor | (3) |
| (iv) Maximum load, and | (3) |
| (v) Utilization factor | (3) |

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