

Power Plant Engineering (315374)

MSBTE Diploma · K-Scheme · Model Question Paper — Set A

Time: 3 Hours**Max. Marks: 70****Instructions:**

1. All questions are compulsory.
2. Answer each next main question on a new page.
3. Illustrate your answers with neat sketches wherever necessary.
4. Figures to the right indicate full marks.
5. Assume suitable data, if necessary.
6. Use of non-programmable electronic pocket calculator is permissible.
7. Mobile phone, pager and any other electronic communication devices are not permissible in the examination hall.

Q.1 Attempt any FIVE of the following:**10**

- a) Classify power plants on the basis of the source of energy used.
- b) Define calorific value of a fuel. Differentiate between higher calorific value and lower calorific value.
- c) Name any four main components of a gas turbine power plant.
- d) Name the Indian and the international regulatory agencies for nuclear power plants.
- e) Define: (i) Load factor (ii) Diversity factor.
- f) State any four commercial uses of fly ash.
- g) Write the full forms of PAT, MTEE, EEFP and FEEED under NMEEE.

Q.2 Attempt any THREE of the following:**12**

- a) Explain the factors to be considered while selecting the site for a steam power plant.
- b) Explain the construction and working of an electrostatic precipitator with a neat sketch.
- c) State the need of waste heat recovery in thermal power plants. List the opportunities of waste heat recovery.
- d) State any four advantages and four disadvantages of nuclear power plants.

Q.3 Attempt any THREE of the following:**12**

- a) Explain with a neat sketch the working of a closed cycle gas turbine power plant.
- b) Explain pulverization of coal using a ball mill with a neat sketch.
- c) State the objectives of feed water treatment. Write the importance of total hardness, pH and TDS of boiler feed water.
- d) Explain fixed cost and operating cost of a power station.

Q.4 Attempt any THREE of the following:**12**

- a) Draw a schematic diagram of a modern coal-fired steam power plant and name its four main circuits.
- b) Compare Boiling Water Reactor (BWR) and Pressurised Water Reactor (PWR) on any four points.
- c) Explain the Perform, Achieve and Trade (PAT) scheme under NMEEE.
- d) Draw a schematic diagram of the three-element boiler feed water control system and state its importance.
- e) A power station has an installed capacity of 120 MW and a maximum demand of 90 MW. It generates 480×10^6 kWh per year and runs for 8000 hours in the year. Calculate: (i) annual load factor (ii) plant capacity factor (iii) plant use factor (iv) reserve capacity.

Q.5 Attempt any TWO of the following:**12**

- a) Explain with a neat sketch the construction and working of a bubbling fluidized bed combustion (FBC) boiler. State the types of FBC boilers.
- b) State the different types of nuclear reactors. Explain the working of a Boiling Water Reactor (BWR) with a neat sketch.
- c) The daily load on a power station is: 0–6 h: 30 MW; 6–10 h: 50 MW; 10–14 h: 70 MW; 14–18 h: 60 MW; 18–22 h: 90 MW; 22–24 h: 40 MW. Draw the load curve and find: (i) energy generated per day (ii) average load (iii) load factor. If the installed capacity is 120 MW, find the plant capacity factor and reserve capacity.

Q.6 Attempt any TWO of the following:**12**

- a) Draw a neat line diagram of coal handling in a thermal power plant (out-plant and in-plant) and explain each stage.
- b) Explain cogeneration in a sugar industry using a bagasse-fired boiler with a neat sketch.
- c) A 60 MW steam power station has a maximum demand of 50 MW and an annual load factor of 65 %. The capital cost is ₹ 300 crore; interest and depreciation together are 10 % per annum. Fixed operation and maintenance cost is ₹ 12 crore per year and fuel cost is ₹ 2.60 per kWh. Calculate the cost of generation per kWh.

Note: This is a **model question paper prepared by Ananda Technologies** only for practice and exam preparation, based on the pattern of previous MSBTE question papers and the K-scheme syllabus. It is **not an official MSBTE paper**, and it does **not** mean that these questions will come in the exam. Answers follow standard textbook points; marks shown are indicative. Free for students — anandatechnologies.in