

Motilal Nehru National Institute of Technology Allahabad
Electrical Engineering Department
End Semester Examinations 2017-18
B.Tech-Power Plant Engineering
Subject Code: EE-1607

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Maximum Marks: 60

Time: 3.0 Hr.

Note: Attempt all section. First question of each section is compulsory and attempt three questions out of four questions in each section.

Section (A)

- 1(a) A 100 MW steam station uses coal of calorific value 6400 kcal/kg. Thermal efficiency of the station is 30% and electrical efficiency is 92%. Calculate the coal consumption per hour when the station is delivering its full rated output. (5)
- 1(b) Give the layout of a modern steam power plant and explain all components in briefly. (5)
- 1(c) Give the comparison of steam power plant, hydro-electric power plant, diesel power plant and nuclear power plant on the basis of operating cost, initial cost, efficiency, maintenance cost and availability of source of power. (5)
- 1(d) A diesel power station has fuel consumption of 0.28 kg per kWh, the calorific value of fuel being 10,000 kcal/kg. Determine (i) the overall efficiency, and (ii) efficiency of the engine if alternator efficiency is 95%. (5)

Section (B)

- 2(a) An atomic power reactor can deliver 300 MW. If due to fission of each atom of ${}_{92}\text{U}^{235}$, the energy released is 200 MeV, calculate the mass of uranium fissioned per hour. (5)
- 2(b) Discuss the factors which go in favour of nuclear power plant as compared to other types of power plants and also discuss the various factors which must be considered while selecting a site for nuclear power plant. (2.5+2.5)
- 2(c) Explain with a neat sketch the various parts of a nuclear reactor and explain the merits and demerits of nuclear power plant. (3+2)
- 2(d) Write a short notes on following (2+1+2)
- (i) Moderator
 - (ii) Uranium Fission
 - (iii) Radioactivity

Section (C)

3(a) It has been estimated that a minimum run off of approximately $94 \text{ m}^3/\text{sec}$ will be available at a hydraulic project with a head of 39 m. Determine (i) firm capacity (ii) yearly gross output. Assume the efficiency of the plant to be 80%. (2.5+2.5)

3(b) Draw a neat schematic diagram of a hydro-electric plant and explain the functions of various components in brief. (5)

3(c) Draw the layout of diesel power plant and also explain the operation of each part of diesel power plant. (5)

3(d) Draw and explain the types of water turbine according to nature of water head. (5)

Section (D)

4(a) A generating station has a maximum demand of 25MW, a load factor of 60%, a plant capacity factor of 50% and a plant use factor of 72%. Find (2+1+2)

(i) the reserve capacity of the plant

(ii) the daily energy produced and

(iii) Maximum energy that could be produced daily if the plant while running as per schedule, were fully loaded.

4(b) The maximum (peak) load on a thermal power plant of 60 mW capacity is 50 mW at an annual load factor of 50%. The loads having maximum demands of 25 mW, 20 mW, 8 mW and, 5 mW are connected to the power station. (5)

Determine:

(a) Average load on power station

(b) Energy generated per year

(c) Demand factor

(d) Diversity factor.

4(c) What are different methods for pollution control. (5)

4(d) Explain in brief the different types of traffic with supporting diagram and formula. (5)