

Fourth Semester B.E. Degree Examination, Dec.2024/Jan.2025
Power Generation and Economics

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With a relevant diagram, explain Hydrological cycle. (05 Marks)
- b. What are the points to be considered in deciding a site for Hydro electric power plants? Explain briefly. (08 Marks)
- c. A hydroelectric station operates under a mean head of 50 meter. The reservoir employed has a catchment area of 500 km². The average rainfall in this area is 150 cm per annum. Determine the capacity of the station for which it should be designed. Assume that 25% of the rainfall is lost due to evaporation, 7.5% of the head is lost in penstock, turbine efficiency as 85%, alternator efficiency as 95% and load factor as 60%. (07 Marks)

OR

- 2 a. With a neat sketch, explain the operation of pumped storage power plant. (06 Marks)
- b. Distinguish between the operation of pelton wheel turbine and Kaplan turbine. (08 Marks)
- c. How do you decide the size and number of generating units? Explain briefly. (06 Marks)

Module-2

- 3 a. Draw a neat sketch to show a general arrangement of a steam power plant. (08 Marks)
- b. What is the function of draught system in a steam power plant? Distinguish between Natural draught and Mechanical draught systems. (06 Marks)
- c. What is meant by fluidized bed combustion? Explain with help of a neat sketch. (06 Marks)

OR

- 4 a. Draw a schematic arrangement for a Diesel Power Plant. Explain briefly its operation. (10 Marks)
- b. What are the factors that should be considered while selecting a site for Gas turbine power plant? (06 Marks)
- c. Draw a schematic arrangement of a simple Gas turbine power plant. (04 Marks)

Module-3

- 5 a. Draw a neat sketch to show the basic components of a Nuclear reactor. Explain the function of Moderator and control rods used in a nuclear reactor. (08 Marks)
- b. Explain Nuclear chain reaction. (06 Marks)
- c. What is the importance of shielding in a Nuclear Power Plant? Explain briefly how it is done. (06 Marks)

OR

- 6 a. With a neat sketch, explain the operation of Boiling Water Reactor. (08 Marks)
 b. What methods are used for the disposal of nuclear waste material? (06 Marks)
 c. Explain the classification of Nuclear reactors. (06 Marks)

Module-4

- 7 a. Draw a neat diagram of single bus bar arrangement with bus – sectionalisation. Explain briefly. (10 Marks)
 b. Explain briefly the functions of the following :
 i) Current limiting reactor ii) Earthing switch. (06 Marks)
 c. What is the function of lightning arrestor? Explain briefly. (04 Marks)

OR

- 8 a. Explain the salient features of gas insulated substation. (08 Marks)
 b. What are the advantages and gas – insulated substations? (04 Marks)
 c. What is the necessity of grounding? Explain reactance grounding. (08 Marks)

Module-5

- 9 a. Explain Sinking Fund Method of the determination of depreciation. (08 Marks)
 b. Define : i) Load factor ii) Diversity factor iii) Average load. (06 Marks)
 c. A residential consumer has 10 lamps of 40 watt each connected at his premises. His demand is as follows :

From Midnight 12 to 5 AM – 40 W
 From 5 AM to 6 PM – No – load
 From 6 PM to 7 PM – 320 W
 From 7 PM to 9 PM – 360 W
 From 9 PM to 12 Midnight – 160 W.

Find i) Average load ii) Load factor iii) Energy consumption during the day. (06 Marks)

OR

- 10 a. What is Tariff? Explain briefly the factors affecting the framing of Tariff. (06 Marks)
 b. Explain briefly the various methods of improving the power factor. (08 Marks)
 c. Discuss briefly the various types of consumers. (06 Marks)

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