Academic Year : **2018 – 2019**
Designation : **Assistant Professor**
Department : **Electrical And Electronics Engineering**
Year/Semester : **II rd Year/II nd semester**
Subject : **Power System – 1**

Unit-1

1. A) Explain the factors to be considered for the selection of the site for a thermal power station.
   b) Explain the functions of Cooling tower and condenser with respect to a thermal power station.

2. Draw the complete schematic diagram of a coal fired thermal power plant. Label each Component. Discuss briefly the function of each component.

3. a) Describe the functions of economizer and super heater in a thermal power plant.
   b) Write the importance of electrostatic precipitator.

4 a) Describe briefly various components in modern thermal power station with neat flow diagram.
b) What are the functions of an economizer?

5 a) Write about condenser of a thermal power station
b) What is feed water? What are the problems associated due to impurities in feed water? How they can be eliminated

6. Draw the general layout of the thermal power station and discuss each component in detail.

Unit-2

1. a) Describe the fast breeder reactor with neat sketch? Discuss its merits. (9M)
   b) Discuss about the nuclear waste disposal mechanism in a nuclear power plant. (7M)
2. a) Describe with the help of a neat sketch, construction and working of a boiling water reactor (9M)
   b) Explain the factors considered for location of a nuclear power plant. (7M)
3. a) With the help of a neat diagram explain the working principle of a fast breeder reactor used in a nuclear power plant.(9M)
   b) Enumerate and explain essential components of a nuclear reactor. (7M)
4. a) With the help of neat diagram, describe the working of pressurized water reactor. . (9M)
   b) Explain the radiation hazards and shielding in nuclear power plants. (7M)
5. a) With the help of a neat diagram explain the working principle of a fast breeder reactor used in a nuclear power plant.
   b) Explain the radiation hazards and shielding in nuclear power plants.
6. a) Discuss the boiling water reactor, mentioning its merits and demerits?
   b) Explain the following terms with reference to nuclear plant

i) Moderator, ii) Heavy water and iii) control rods

Unit-3

1. Explain, in detail the radial and ring main distribution systems. Discuss the characteristics of each system. Also explain the design features of each system

2 a) What are the advantages of doubly fed distributor over singly fed distributor?
b) A two-wire DC distributor cable 1000mts long is loaded with 0.5A/ meter. Resistance of each conductor is 0.05 Ω /Km. Calculate the maximum voltage drop, if the distributor is fed from both ends with equal voltages of 220V. What is the minimum voltage and where it occurs.

3. a) A 250 m, two-wire DC distributor fed from one end is loaded uniformly at the rate of 0.16A/meter. The resistance of each conductor is 0.0002 Ω /meter. Find the voltage necessary at fed point to maintain 250V 1) at the far end 2) at the mid-point of the distributor.
b) What is the importance of load power factor in AC distribution?

4. a) Give the classification of distribution systems and compare AC and DC distribution systems.
b) A two-wire DC distributor AB is 300m long. The end A is fed at 205V and end B at 200V. The distributor is uniformly loaded at 0.15A/m length and concentrated loads of 50A, 60A and 40A at point distance 75, 175,225 meters respectively from the end A. The resistance of each conductor is 0.15 Ω /Km. Calculate i) the point of minimum potential ii) the currents fed at ends A&B.

5. a) A two-wire DC distributor AB is 300m long. The end A is fed at 205V and end B at 200V. The distributor is uniformly loaded at 0.15A/m length and concentrated loads of 50A, 60A and 40A at point distance 75, 175,225 meters respectively from the end A. The resistance of each conductor is 0.15 Ω /Km. Calculate i) the point of minimum potential ii) the currents fed at ends A&B.
b) Draw the single line diagram of radial distribution system

6. a) Derive an expression for the voltage drop for a uniformly loaded distributor fed at one end.
b) What are the characteristics of ring main distribution system

Unit-4

1. a) What are the merits and demerits of GIS over air insulated substations.
b) What are the various types of bus bar arrangements in the substation? Discuss double bar system.

2 a) Draw the single line diagram of a GIS and explain.
b) Explain with a neat lay out diagram of main and transfer bus bar system. (8M+8M)

3 a) What is the difference between indoor and outdoor substations? What are the factors which are to be considered for a selection of a site of a substation.
b) Explain the installation and maintenance of gas insulated substation (9M+7M)

4. a) What are the various types of bus bar arrangements in the substations? Explain sectionalized single bus bar arrangement with suitable diagrams.

b) Explain the constructional aspects of gas insulated substation.

5. a) Compare Air insulated and gas insulated substations.
b) Explain with a neat lay out diagram of main and transfer bus bar system

6 a) Explain the factors to be considered when selecting a location for a substation
b) List the merits and demerits of indoor substations over outdoor substations.

Unit-5

1. a) Derive the expression for electrostatic stress in a single core cable.
b) A single core cable has a conductor diameter of 2.5 cm and a sheath of inside diameter 6cm.Calculate the maximum stress. It is desired to reduce the maximum stress by using two inters heaths. Determine their best position, the maximum stress and the voltage on each. Consider the System voltage as 3phase 66 kV.

2. a) Derive the expression for electrostatic stress in a single core cable. Where does maximum stress occur and where is it minimum and why?
b) A single core cable has a conductor diameter of 2.5 cm and a sheath of inside diameter 6cm.Calculate the maximum stress. It is desired to reduce the maximum stress by using two inters heaths. Determine their best position, the maximum stress and the voltage on each. Consider the System voltage as 3phase 66 kV.

3 a) Derive the expression for capacitance of a single core cable.
b) Calculate the capacitance and charging current of a single core cable used on a 3-phase, 66KV system. The cable is 1Km long having a core diameter of 10cm and an impregnated paper insulation of thickness 7cm. The relative permittivity of the insulation may be taken as 4 and the supply frequency as 50Hz.

4. a) Derive the equation for calculating the insulation resistance of a single core cable.
b) The insulation resistance of a single core cable is 495M Ω/Km. If the core diameter is 2.5cm and resistivity of insulation is 4.5 X 1014 Ω -cm. Find the insulation thickness.

5 a) A single core, 33kV cable has a conductor diameter of 3.4 cm and a sheath of inside diameter 6.2 cm. The cable has an inner layer of 1.5 cm thick of rubber of dielectric constant 5.1 and rest impregnated refer of dielectric constant 3.2. Find the maximum stresses in the rubber and in the paper.
b) Explain the purpose of using inter sheaths in a cable.

6. Explain classification of cables and discuss their general construction with neat sketch. (15M)

Unit-6

1. a) Write short note on: i) Two-part tariff ii) Power factor tariff
   b) Define diversity factor and plant capacity factor.

2. Explain various types of tariffs with relative advantages and disadvantages?

3. a) What do you understand by the load curve? What information's are conveyed by a load curve?
   b) What is meant by three-part tariff?

4 a) The annual load duration for of a certain power station cab be considered as a straight line from 20MW to 4MW to meet this load, three turbine-generator units, two rated at 10MW each and one rated at 5MW are installed. Determine i) Installed capacity ii) plant factor iii) units generated per annum iv) load factor and v) utilization factor.
   b) Explain two-part tariff system.

5. a) Explain the terms load factor and diversity factor and discuss their effect on the cost of generation of electrical energy.
   b) A 1000MW power station delivers 1000 MW for 2 hours, 500 MW for 6 hours and is shut down for the rest of each day. It is also shut down for maintenance for 60 days annually. Calculate its annual load factor.

6. a) Define the following with respect to the economic aspects power generation
i) Connected load ii) Load factor iii) Plant capacity factor
   b) A 2000 MW power station delivers 2000 MW for 3 hours, 600 MW for 7 hours and is shutdown for the rest of each day. It is also shut down for maintenance for 70 days annually. Calculate its annual load factor.