

**II B.Tech II Semester Supplementary Examinations, Aug/Sep 2008**  
**POWER SYSTEMS-I**  
**(Electrical & Electronic Engineering)**

**Time: 3 hours**

**Max Marks: 80**

**Answer any FIVE Questions**  
**All Questions carry equal marks**

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1. (a) Mention the different sources of Energy in India. [8]  
(b) What are the merits and demerits of Hydro-Electric power plants? [8]
2. (a) What are the methods for arresting ash from flue gasses? Explain any one method in detail. [8]  
(b) Discuss the natural and forced draughts and list out the difference between them. [8]
3. (a) Define Half life period. Derive the expression for half life period. Mention the significance of it. [10]  
(b) Discuss various factors which affect the selection of site for a nuclear power plant. [6]
4. Explain the following with neat diagrams: [8+8=16]  
(a) AC 3 phase 3 wire distribution system  
(b) AC 3 phase 4 wire system
5. (a) Explain the classification of sub-stations. [8]  
(b) Explain the advantages of outdoor sub-station as compared to the indoor sub-station [8]
6. (a) Discuss the important points to be taken into consideration while selecting the size and number of units. [6]  
(b) Discuss the various methods of determining the depreciation of the equipment. [10]
7. Determine the inductance per phase per km of a double circuit 3-phase line. The radius of each conductor is 20mm and the conductors are placed on the circumference of an imaginary circle of radius 7m forming a regular hexagonal figure. [16]
8. (a) A 3 phase 50km long single circuit 66Kv, 50 Hz transposed overhead line has horizontal spacing with 3 meters between adjacent conductors and 6 meters between outer conductor. The conductor diameter is 2 cm. Find the capacitive admittance and the charging current per phase when the line is energized at 66 KV. [8]  
(b) Explain the method of images for finding the capacitance of transmission line with ground. [8]

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1. (a) With a neat sketch, explain the schematic arrangement of Hydro-electric power plant. [8]  
(b) Write short notes on: - [3+2+3=8]
  - i. Evaporation
  - ii. Pondage
  - iii. Precipitation
2. (a) What is the use of an electron precipitator along with the modern boilers? Explain its working. [8]  
(b) What is 'feed water '? What are the problems due to impurities in feed water? How they can be eliminated? [8]
3. (a) Mention the advantages and disadvantages of Nuclear power plants. [8]  
(b) Name the different types of radiants. Explain any two of them in detail? [8]
4. A single phase line (ABC) of length 2.0 Km having resistance and reactance (go and return) as 0.06 and 0.1 ohms/Km. A is the feeding point, B is the mid point of the line taking a load of 100 A at 0.8 lead and C is the far end taking a load of 100A at Upf. The voltage at the 'C' is 220V. Find the voltage at the sending and the phase angle difference between the voltages of two ends. If [8+8=16]
  - (a) Power factors of the loads are with reference to far end voltage
  - (b) Power factors of the loads are with reference to the voltages at the load points.
5. (a) Explain the classification of sub-stations. [8]  
(b) Explain the advantages of outdoor sub-station as compared to the indoor sub-station [8]
6. (a) Discuss the important points to be taken into consideration while selecting the size and number of units. [8]  
(b) Give the basis for expressing the cost of electrical energy as  $(a + b \cdot kW + c \cdot kWh)$  and explain the factors on which a, b and c depend. [8]
7. The three conductors of a 3-phase line are arranged in a horizontal plane and 4 meters apart. The diameter of each conductor is 2 cm. Determine the inductance per km of each line. What will be inductance per km of each line if the lines are transposed? Why it is necessary to transpose lines? [16]

8. (a) Derive from basic considerations an expression for the capacitance and charging current per km length of a single phase line made up of two solid round conductors of radius  $r$  meters and spaced at  $D$  meters. Neglect the effect of ground. [10]
- (b) Determine the capacitance per km of a pair of parallel conductors 1.5cm in dia and spaced informing 65 cm apart in air. Also find charging current per km 1cm if line is working at 110KV. [6]

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1. (a) What are the factors, which should be considered while selecting a site for a hydro-electric power plant? [6]  
(b) Write short notes on [4+3+3=10]
  - i. PRECIPITATION
  - ii. STORAGE
  - iii. PONDAGE
2. (a) What are the methods for arresting ash from flue gasses? Explain any one method in detail. [8]  
(b) Discuss the natural and forced draughts and list out the difference between them. [8]
3. (a) Mention the advantages and disadvantages of Nuclear power plants. [8]  
(b) Name the different types of radiants. Explain any two of them in detail? [8]
4. A single phase line (ABC) of length 2.0 Km having resistance and reactance (go and return) as 0.06 and 0.1 ohms/Km. A is the feeding point, B is the mid point of the line taking a load of 100 A at 0.8 lead and C is the far end taking a load of 100A at Upf. The voltage at the 'C' is 220V. Find the voltage at the sending and the phase angle difference between the voltages of two ends. If [8+8=16]
  - (a) Power factors of the loads are with reference to far end voltage
  - (b) Power factors of the loads are with reference to the voltages at the load points.
5. (a) Explain the classification of sub-stations. [8]  
(b) Explain the advantages of outdoor sub-station as compared to the indoor sub-station [8]
6. (a) What do you understand by [6]
  - i. base load and
  - ii. peak load of a power station?  
(b) A power station has a daily load cycle as under: 260 MW for 6 hour; 200 MW for 8 hour; 160 MW for 4 hour; 100 MW for 6 hour. If the power station is equipped with 4 sets of 75 MW each, calculate
  - i. daily load factor
  - ii. capacity factor and

iii. daily requirement of fuel if the calorific value of oil used were of 10,000 kcal/kg and the average heat rate of station were 2860 kcal/kWh.

[10]

7. The three conductors of a 3-phase line are arranged in a horizontal plane and 4 meters apart. The diameter of each conductor is 2 cm. Determine the inductance per km of each line. What will be inductance per km of each line if the lines are transposed? Why it is necessary to transpose lines? [16]

8. (a) Derive from basic considerations an expression for the capacitance and charging current per km length of a single phase line made up of two solid round conductors of radius  $r$  meters and spaced at  $D$  meters. Neglect the effect of ground. [10]

(b) Determine the capacitance per km of a pair of parallel conductors 1.5cm in dia and spaced informing 65 cm apart in air. Also find charging current per km 1cm if line is working at 110KV. [6]

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1. (a) Mention the different sources of Energy in India. [8]  
(b) What are the merits and demerits of Hydro-Electric power plants? [8]
2. (a) Briefly describe the classification of steam turbines. [10]  
(b) Write short notes on Economizer. [6]
3. (a) Define Half life period. Derive the expression for half life period. Mention the significance of it. [10]  
(b) Discuss various factors which affect the selection of site for a nuclear power plant. [6]
4. (a) How do you solve the single phase AC distribution system in which the power factors of the load currents are referred with respect to receiving end voltage. [6]  
(b) A single phase ac distributor AB 300 metres long is fed from end A and is loaded as follows:
  - i. 100 A at 0.707 power factor lagging 200 metres from point A.
  - ii. 200 A at 0.8 power factor lagging 300 metres from point A. The total resistance and reactance of the distributor is 0.2 ohms and 0.1 ohms per kilometer. Calculate the total voltage drop in the distributor. The load power factors are referred to the voltage at the far end. [10]
5. (a) Explain the classification of sub-stations. [8]  
(b) Explain the advantages of outdoor sub-station as compared to the indoor sub-station [8]
6. (a) Discuss the important points to be taken into consideration while selecting the size and number of units. [8]  
(b) Give the basis for expressing the cost of electrical energy as  $(a + b \cdot kW + c \cdot kWh)$  and explain the factors on which a, b and c depend. [8]
7. (a) A conductor is composed of several identical strands, each having radius r. Find the factor by which 'r' should be multiplied to find self G.M.D of the conductor. [8]  
(b) Find the inductance of a single phase overhead line 10km long. The line has 2 conductors each of 1.5cm diameter and spaced 2 meters apart. Calculate the reactance of the loop of both the conductors at 50 Hz. [8]

8. (a) A 3 phase 50km long single circuit 66Kv, 50 Hz transposed overhead line has horizontal spacing with 3 meters between adjacent conductors and 6 meters between outer conductor. The conductor diameter is 2 cm. Find the capacitive admittance and the charging current per phase when the line is energized at 66 KV. [8]
- (b) Explain the method of images for finding the capacitance of transmission line with ground. [8]

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