Unit - V

5. a) What are the requirements of a distribution system?

   b) Draw layout of a substation.

   c) State Kelvin's law and explain why in practice the law is usually not strictly observed.

   d) A two conductor cable 1 km long, is required to supply a constant load of 180A throughout the year. The cost of cable is Rs (120a + 60) per meter, where 'a' is the area of cross-section of the conductor in cm^2. The cost of energy is 20 P per kwh and interest and depreciation charges amount to 10 percent. Specific resistivity of copper is 1.84μΩ/cm. Find the most economical cross-section of the cable.

OR

A 440V, 50Hz, 3-phase supply has delta connected load having 50Ω between R and Y, 159 mH between Y and B and 15.9 μf between B and R. Find.

i) The line currents for the sequence RYB.

ii) The value of star-connected balanced resistor for the same power.

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Roll No .....

EX - 505

B.E. V Semester

Examination, December 2015

Power System - I

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each questions are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

Unit - I

1. a) Name the principle types of conventional and Non-conventional power plants.

   b) What is the significance of load curve?

   c) Discuss the problems associated with modern large interconnected power system.

   d) The yearly duration curve of a certain plant can be considered as a straight line from 300MW to 80 MW. Power is supplied with one generating unit of 200MW capacity and two units of 100MW capacity each. Determine:

   i) Installed capacity

   ii) Load factor

   iii) Plant factor

   iv) Utilization factor

   v) Maximum demand

OR

A power station has to supply load as follow:

Time (in hours)	0-6	6-12	12-14	14-18	18-24
Load (MW)	45	135	90	150	75

i) Draw the load curve.
ii) Calculate load factor
iii) Calculate plant capacity factor

Unit - II

2. a) What do you mean by transposition of conductor?
   b) What is Ferranti effect?
   c) Distinguish between AC and DC resistance of conductor. Why the two differ?
   d) i) What are bundled conductors? What is the basic difference between a bundle conductor and a composite conductor?
   ii) A single phase transmission line has two parallel conductors, each of 1.2cm diameter and 2.5 meters apart. Calculate the loop inductance per km length of the line if the material of the conductor is copper.

OR

A 33kV, 3-phase underground cable 5km long, uses three single core cables. Each of the conductors has a diameter of 3cm and the radial thickness of 0.5cm. The relative permittivity of the dielectric is 2.5. Determine dielectric loss per phase if the power factor of the unloaded cable is 0.02.

Unit - III

3. a) What are the various systems of power transmission?
   b) Enumerate various methods of voltage control in a transmission system.
   c) What are the power circle diagram? How are they useful?

   d) A three phase, 50Hz, overhead transmission line 100km long has the following constants:

Resistance/km = 0.3Ω; Reactance/ km = 1.0Ω;

Susceptance/ km = 6×10^{-6} ℧.

The line voltage at the receiving end is 132 kV. The transmission line is delivering 50MVA at 0.85 power factor lagging at the receiving end. Calculate:

i) Voltage regulation
ii) Transmission efficiency

OR

Explain the physical significance of the generalised ABCD constants of a transmission line? Determine these constants for a medium transmission line with nominal-T configuration? Draw neatly corresponding vector diagram.

Unit - IV

4. a) What is stringing chart? What is its utility?
   b) How are the transmission line insulators classified?
   c) Discuss various methods by which the voltage across the units can be equalised.
   d) The following data refer to a transmission line: length of span = 250m; Effective diameter of the conductor = 1.88cm; Weight of the conductor = 0.87 kg/m run; Ultimate strength = 8100 kg; Radial thickness of ice coating on the conductor = 1.2cm; Wind pressure = 38 kg/m^2 of projected area; F.O.S. = 2; Density of ice = 913 kg/m^3; Calculate sag.

OR

Write short notes on the following:

i) Causes of failure of insulators
ii) Vibration dampers