

B. Tech Degree VI Semester Examination April 2012

EE 601 POWER SYSTEM I (2006 Scheme)

Time : 3 Hours

Maximum Marks : 100

PART A

(Answer ALL questions)

(8 x 5 = 40)

- I. (a) What do you mean by Tariff? What are the objectives and requirements of a tariff?
- (b) List the factors which should be considered while designing a power plant.
- (c) A submarine cable is 4000 km long and has a conductor 5mm in diameter with gutta percha covering 5mm thick. Calculate the total capacitance of the cable, taking the relative permittivity of gutta-percha as 4.
- (d) Write a short note on line supports.
- (e) Explain briefly 3 phase, 4 wire system of distributing electrical power.
- (f) Give the comparison between overhead and underground distribution system.
- (g) In a three phase transmission line the conductors are placed at the corners of an equilateral triangle of each side 2.5m. If the radius of each conductor is 0.8cm, find the inductance per phase per km length of the line.
- (h) Write a short note on bundled conductors.

PART B

(4 x 15 = 60)

- II. (a) With neat diagram explain a hydroelectric powerplant. (10)
- (b) Define: (i) connected load (ii) load factor (5)
(iii) demand factor (iv) diversity factor

OR

- III. (a) Mention the methods used to control reactive power. Discuss the role of load factor on the cost of electrical energy. (8)
- (b) The output of a generating station is 500×10^6 KWh per year and average load factor is 0.7. If the annual fixed charges is ₹ 50/- per KW of installed plant and annual running charges are 5 per KWh, what is the cost per KWh of energy at the busbar? (7)

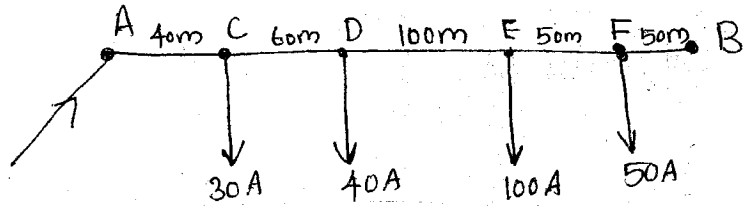
- IV. (a) What is corona and what are the factors affecting corona? (8)
- (b) An insulator string has three units each having a safe working voltage of 15 KV. The ratio of unit self capacitance to stray capacitance of earth is 10:1. Calculate: (i) The maximum safe working voltage (ii) The string efficiency (7)

OR

- V. (a) What do you mean by sag? What are the factors affecting sag? Derive an expression for sag when the supports are at equal levels. (8)
- (b) A transmission line has a span of 250m. Find the weight of the conductor per metre length if the sag, ultimate tensile strength and factor of safety are 1.5meters, 5758 Kg. and 2 respectively. (7)

(P.T.O)

- VI. (a) Explain a typical distribution system. Write a short note on ring distributor. (8)
- (b) Find the cross sectional area of the distributor shown. The distances are given in meters. (7)
- Take $\rho = 1.78 \times 10^{-8} \Omega\text{-m}$. The maximum drop is not to exceed 10V.
The conductor is fed from the point A.



OR

- VII. (a) State and explain Kelvin's law. Give the limitations of Kelvins law. (8)
- (b) The following data relate to a 2 wire feeder. Current carried through out the year = 220A. (7)
- The portion of capital cost which is proportional to X sectional area equal to ₹ 6/- per Kg of copper conductor. Cost of energy 6 paise per Kwh. Interest and depreciation charge is 10% per annum.
- Density of copper is 8.93 g/cm^3 . Specific resistance of copper is $1.8 \mu\Omega\text{cm}$.
- Find the most economical X section of the conductor in cm^2 .

- VIII. (a) What is ferranti effect? Explain it with the help of phasor diagram. (7)
- (b) An overhead 3 phase transmission line delivers 4000 KW at 11 KV at 0.8 power factor lagging. The resistance and reactance of earth conductor are 1.5Ω and 4Ω per phase respectively. Determine: (8)
- Sending end voltage
 - Percentage regulation
 - Transmission efficiency

OR

- IX. What do you mean by long transmission lines? Give A,B,C,D constants of long transmission lines by Rigorous method. (15)