

III B. Tech I Semester Supplementary Examinations, October/November - 2018

POWER SYSTEMS-II

(Electrical and Electronics Engineering)

Time: 3 hours

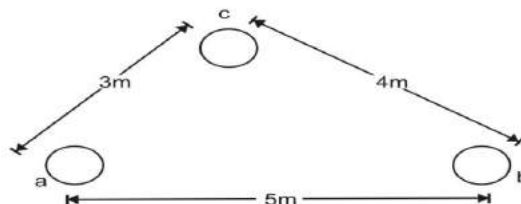
Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answering the question in **Part-A** is compulsory3. Answer any **THREE** Questions from **Part-B****PART -A**

- 1 a) What are the merits of bundled conductors? [3M]
- b) Classify the transmission lines based on the operating voltages? [4M]
- c) Define surge impedance? Give the significance of SIL [4M]
- d) What are the differences between single frequency and double frequency transients in power systems? [4M]
- e) Discuss why the Ferranti effect is observed on a lightly loaded line? [4M]
- f) What are the various factors that are affecting the sag in the transmission lines? [3M]

PART -B

- 2 a) Derive the expression for the capacitance of a 3 phase over head line with un symmetrical spacing? [8M]
- b) Determine the inductance of each phase of a three-phase, 50Hz transmission line which has conductors of 2.0cm diameter. The distance between the three-phases are (i) 5 m between a and b, (ii) 4m between b and c and (iii) 3m between c and a as shown in below Figure. Assume that the phase conductors are transposed regularly. [8M]



- 3 A 3 phase 100km transmission line is delivering 150MW, 0.81 power factor lagging at 132kV. Each conductor is having resistance of 0.1 ohm/km and reactance of 0.3 ohms/km and admittance of 3×10^{-6} mho/km. If the load is balanced and leakage is neglected calculate the sending end voltage, sending end power factor, efficiency and regulation of the line by using nominal 'T' and nominal ' π ' representations? [16M]
- 4 a) Derive the transmission line constants by using complex angle method? [8M]
- b) A long transmission line which has resistance = 50 ohm, inductive reactance = 220 ohm and shunt admittance = 0.0025 S. Determine (i) sending end voltage, (ii) sending end current, (iii) sending end power factor and (iv) efficiency when the line is transmitting 40MVA at 0.85 p.f lagging at 220kV. [8M]

- 5 a) A cable has a conductor of radius 0.74 cm and a sheath of inner radius 2.5 cm. Find inductance per meter length, capacitance per meter length, surge impedance and velocity of propagation of transmitted wave? The permittivity of the insulation is 4. [8M]
- b) A surge of voltage 110kV is travelled by the line of surge impedance 500 ohms and reaches the junction of the line with two branch lines. The surge impedances of branch lines are 455 ohms and 55 ohms respectively. Find the transmitted voltage and currents, reflected voltage and currents? [8M]
- 6 a) What are various properties of corona and derive the expression for power loss due to corona? [8M]
- b) A 3-phase synchronous motor is connected in parallel with a load of 700 kW at 0.8 p.f. lagging. The synchronous motor has a total load of 125 kW and its excitation is so adjusted that the overall power factor becomes 0.9 lagging. Determine the kVA input to the motor and its power factor. Neglect motor losses [8M]
- 7 a) Explain the effect of ice loading and wind pressure on sag of a transmission line? [8M]
- b) Explain in detail about the pin type insulator with neat diagram and discuss its advantages, disadvantages? [8M]

