Code No: **R31023**      **R10**      Set No. 1

### III B.Tech I Semester Supplementary Examinations, May-2017
### POWER SYSTEMS-II
### (Electrical and Electronics Engineering)

**Time: 3 hours**                **Max. Marks: 75**

**Answer any FIVE Questions**
**All Questions carry equal marks**
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1  a)  What is bundled conductor and why is it used?

   b)  Calculate the capacitance per phase of a three-phase three-wire transposed system when the conductors are arranged at the corners of a triangle with sides measuring 1.0m, 1.5m, and 2.0m. Diameter of each conductor is 1.2 cm.

2  a)  What are the various parameters of a transmission line and how they are considered for different lines?

   b)  A three-phase, 50 Hz transmission line, 100 km long delivers 25 MW at 110kV and 0.85 p.f. lagging. The resistance and reactance of the lines per phase per km are 0.3 ohm and 0.5 ohm respectively while capacitance admittance is $2.5 \times 10^{-6}$ mho/km/ph. Calculate the efficiency of transmission. Use nominal $\pi$ method.

3  a)  Derive equations which represent the performance of a long transmission line with its electrical parameters uniformly distributed along its length.

   b)  A 3-phase transmission line, 200km long has the following constants:
       Resistance per phase per km =0.3 ohm
       Reactance per phase per km =0.4ohm
       Shunt admittance per phase per km $=1.9 \times 10^{-6}$ S
       Determine the sending end voltage and current by rigorous method when the line is delivered a load of 30MVA at 0.707 p.f lagging. The receiving end voltage is kept constant at 132kV.

4  a)  Describe the surge phenomena in EHV transmission lines.

   b)  A cable has an inner conductor of radius 0.75 cm inside a sheath of inner radius 2.5 cm. Find (i) the inductance per meter length (ii) capacitance per meter length, (iii) surge impedance, (iv) velocity of propagation, if the permittivity of insulation is 4.

5  a)  Explain the charging current in the transmission lines.

   b)  A single-phase overhead line has two conductors of diameter 1.5 cm with a spacing of 1.2 m between centers. If the dielectric strength of air is 21 kV/cm. Determine the line voltage for which corona will commence on the line. Derive the formula used.

6  a)  Deduce expressions for calculating sag and conductor length of an overhead line when the supports are at the same level?

   b)  An overhead line has the following data: span length 185 m, difference in levels of supports 6.5 m, conductor diameter 1.82 cm, weight per unit length of conductor 1.5kg/m, wind pressure 39 kg/m$^2$ of projected area. Maximum tensile strength of the conductor is 4250 kg/cm$^2$, factor of safety is 5. Calculate the length of the lower support.

7 a) What is string efficiency? Why is it necessary to have high string efficiency? How can it be achieved?

   b) A string of suspension insulators consists of three units. The capacitance between each pin and earth is 15% of the self-capacitance of the unit. If the maximum peak voltage per unit is not to exceed 35 kV, determine the greatest working voltage and the string efficiency.

8 a) Compare and explain the role of shunt and series capacitors in p.f. correction.

   b) A 400V, 50 cycles three phase line delivers 207 kW at 0.8 p.f.(lag). It is desired to bring the line p.f. to unity by installing shunt capacitors. Calculate the capacitance if they are    i) star connected ii) delta connected.

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