

Code: R7310203

R7

B.Tech III Year I Semester (R07) Supplementary Examinations, May 2013

**POWER SYSTEMS - II**

(Electrical and Electronics Engineering)

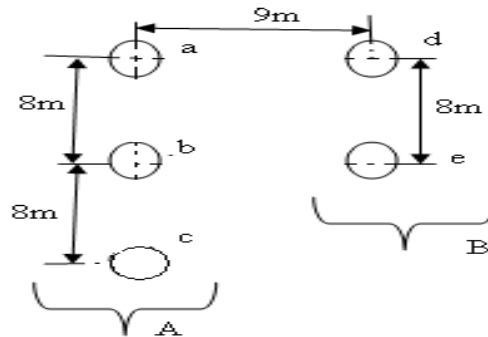
Time: 3 hours

Max Marks: 80

Answer any FIVE questions  
All questions carry equal marks

\*\*\*\*\*

- 1 (a) Derive the expression for the inductance of a 3- $\phi$  double circuit flat vertical spacing configuration.
- (b) Determine the inductance of a 1- $\phi$  transmission line consisting of three conductors of 3.5 mm radii in the 'go' conductor and two conductors of 5 mm radii in the return conductor. The configuration of line is as shown in the figure.



- 2 (a) Differentiate between short and medium transmission lines
- (b) A single phase overhead transmission line is delivering 600 KVA load at 2 KV. Its resistance and reactance are  $0.18 \Omega$  and  $0.36 \Omega$  respectively. Determine the voltage regulation if the load power factor is: (i) 0.8 lagging. (ii) 0.8 leading
- 3 A 220 KV 3-phase long transmission line has impedance per phase of  $(60 + j200) \Omega$  and an admittance of  $(0 + j0.0015) \text{ mho}$ . Determine:
- (i) The sending end voltage.
- (ii) The sending end current when the receiving end current is 200 amperes at 0.95 pf lagging.
- 4 (a) What is traveling wave? Explain the development of such a wave on an over head transmission line.
- (b) A surge of 100 KV traveling in a line of natural impedance 600 ohms arrives at a junction with two lines of impedances 800 ohms and 200 ohms respectively. Find the surge voltages and currents transmitted into each branch line.

Contd. in Page 2

Code: R7310203

R7
----

- 5 (a) State and explain the factors that effect the corona loss.
- (b) A 3-phase, 220 KV, 50 Hz transmission line consists of 1.9 cm radius conductor spaced 2.3 meters apart in equilateral triangular formation. If the temperature is  $40^{\circ}\text{C}$  and atmospheric pressure is 76 cm of mercury, calculate the corona loss per km of the line. Take  $m_0$  is 0.85 and also assume the required data.
- 6 (a) Explain the construction and operation of pin type insulator.
- (b) A string of four suspension type insulators is connected across 285 KV line. The self-capacitance of each unit is equal to 5 times pin to earth capacitance. Calculate: (i) the potential across each unit. (ii) the string efficiency
- 7 (a) Write down the applications of sag-templates.
- (b) An overhead line is erected across a span of 300 m on level supports. The conductor has a diameter of 1.45 cm and has a dead weight of 1.1 kg/m. The line is subjected to wind pressure of  $37.8 \text{ kg/m}^2$  of the projected area. The radial thickness of ice is 1.25 cm. Calculate the sag.
- (i) In an inclined direction
- (ii) In vertical direction.
- Assume maximum working stress  $1050 \text{ kg/cm}^2$ . One cubic meter of ice weighs 913.5 kg.
- 8 (a) Describe with a neat sketch, the construction of a single core cable. Discuss the limitations of such a cable.
- (b) The insulation resistance of the single core one-kilo meter length cable is 495 mega ohms per km. If the core diameter is 2.5 cm and resistivity of insulation is  $4.5 \times 10^{14} \Omega\text{-cm}$ , find the insulation thickness.

\*\*\*\*\*