

Code: 9A02502

B.Tech III Year I Semester (R09) Supplementary Examinations June 2016

TRANSMISSION OF ELECTRIC POWER

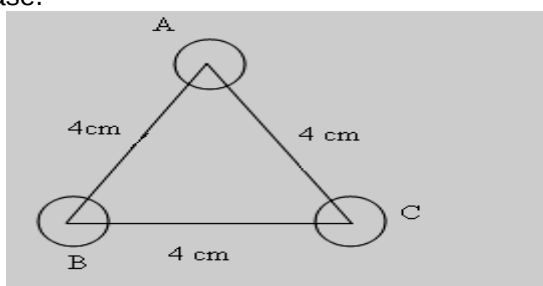
(Electrical and Electronics Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 What is the significance of transposition of the power lines?
A 3- ϕ transmission line has conductor diameter of 1.8 cm each, the conductor being spaced as shown in figure below. The loads are balanced & the line is transposed. Find the inductance of the line per km per phase.



- 2 A three phase 132 kV transmission line is connected to a 50 MW load at a p.f of 0.85 lagging. The line constants of 80 km long line are Z (series impedance of the line) = $96\angle 78^\circ$ ohms and Y (shunt admittance of the line) = $0.001\angle 90^\circ$ Siemens using nominal-T circuit representation calculate: (i) A, B, C, D constants of the line. (ii) Sending end voltage. (iii) Sending end current. (iv) Sending end power factor. (v) Efficiency of the transmission.
- 3 The following data refer to a 3-phase overhead transmission line:
Voltage between lines = 220 kV, Total series impedance per phase = $200\angle 80^\circ \Omega$, Total shunt admittance per phase = $0.0013\angle 90^\circ$ mhos, Load delivered = 100 MW at 0.8 p.f lagging. Using rigorous method determine the following: (i) Sending end voltage. (ii) Sending end current.
- 4 A surge of 200 kV traveling in a line of natural impedance 400 ohms arrives at a junction with two lines of impedances 500 ohms and 300 ohms respectively. Find the surge voltages and currents transmitted into each branch line. Also find the reflected surge voltage and current.
- 5 Write short notes on:
(a) Corona.
(b) Radio interference.
(c) Power loss due to corona.
- 6 Write short notes on:
(a) Static shielding.
(b) Suspension type insulator.
- 7 (a) Derive an expression for the Sag in a power conductor strung between the two towers at Unequal heights.
(b) An overhead line is erected across a span of 250 m on level supports. The conductor has a diameter of 1.42 cm and has a dead weight of 1.09 kg/m. The line is subjected to wind pressure of 37.8 kg/m² 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 kg/cm². One cubic meter of ice weighs 913.5 kg.
- 8 (a) Briefly explain about Capacitance grading of a cable.
(b) The capacitance per kilometer of a 3-phase belted cable is $0.18\mu\text{F}$ between two cores with the third core connected to sheath. Calculate the KVA taken by 20 km long cable when connected to 3-phase, 3300 V supply.