

Code: 9A02502

R9

B.Tech III Year I Semester (R09) Supplementary Examinations, May 2013

TRANSMISSION OF ELECTRIC POWER

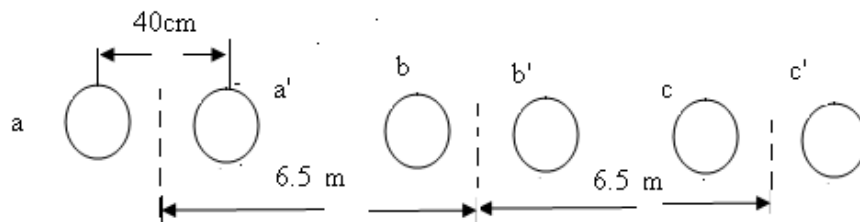
(Electrical and Electronics Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Derive the expression for capacitance of a three-phase line by considering the effect of earth. Why for all practical purposes the effect of earth on the capacitance can be neglected?
- (b) Determine the inductance per km per phase of a single circuit 460 KV line using two bundle conductors per phase as shown in the figure. The diameter of each conductor is 5.0 cm. Neglect the effect of transposition.



- 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 resistances and reactance are 0.18Ω and 0.36Ω respectively. Determine the voltage regulation if the load power factor is: (i) 0.8 lagging. (ii) 0.8 leading.
- 3 A 50 Hz 3-phase transmission line is 280 km long. It has a total series impedance of $(35 + j140)$ ohms and a shunt admittance of 930×10^{-6} mho. It delivers 40 MW at 220 KV with 90% power factor lagging. Determine the following for a long line.
- (i) Sending end voltage. (ii) Voltage regulation.
(iii) Transmission efficiency. (iv) A, B, C, D constants.
- 4 (a) Show that a traveling wave moves with a velocity of light on the overhead line.
- (b) A 3- Φ transmission line has conductors 1.5 cm in diameter spaced 1m apart in equilateral formation. The resistance and leakage are negligible. Find the natural impedance of the line.

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- 5 (a) What is corona? How it helps the environment?
(b) In a 3-phase overhead line, the conductors have an overall diameter of 3.0 cm each and are arranged in delta formation. Assuming a critical disruptive voltage of 250 KV between lines and an air density factor of 0.9 and irregularity factor $m_0 = 0.95$, find the minimum spacing between conductors allowable, assume fair weather conditions.
- 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 Write short notes on:
(a) Stringing charts.
(b) Sag-templates.
(c) Effect of wind and ice loading on calculation of sag.
- 8 A single core 66 KV cable working on 3-phase system has a conductor diameter of 2 cm and a sheath of inside diameter 5.3 cm. If two inter sheaths are introduced in such a way that the stress varies between the same maximum and minimum in the three layers. Find:
(i) Positions of intersheaths.
(ii) Voltage on the intersheaths.
(iii) Maximum and minimum stresses.
