(Time: 3 Hours) **[Total Marks: 80]**

Note **(1) Question No.1 is compulsory**
(2) Attempt any three from the remaining
(3) Assume suitable data if necessary

1 **A**ttempt any **four** questions. 20
(a) What is Ferranti effect of transmission line?
(b) Explain skin effect and factors affecting skin effect of transmission line.
(c) What is per unit system? Discuss its advantages.
(d) Explain Voltage regulation and Efficiency of transmission line.
(e) Explain various insulators used in transmission line.

2 (a) Derive expression of impedance in per unit for change of base (Zp.u.new). 10
(b) A 3 phase 50 Hz, 150 km long transmission line has the following constants : Inductance /phase /km = 1.2 mH, Resistance/phase/km = 0.15 Ω, Capacitance /phase/km = 0.0096 µf. The line supplies a load of 50 Mw at 0.8p.f. lagging as a line voltage of 132 kV at the receiving end. Using nominal π method, determine Sending end line voltage, Sending end line current, Sending end power factor, % regulation and % efficiency 10

3 (a) Derive the expression for the flux linkage due to internal and external flux in a single conductor. 10
(b) Derive the capacitance of single phase transmission line. 10

4 (a) Explain the type of the cable and methods of laying cables. 10
(b) Explain the effect of earth on the capacitance of overhead transmission line and derive the line capacitance with earth effect. 10

5 (a) Derive the expression for voltage regulation and efficiency of transmission line using nominal T model medium transmission line 10
(b) State all methods of neutral earthing and explain them in detail with the help of circuit diagram and phasor diagrams. 10

6 (a) Derive the string efficiency of a suspension insulator using 5 insulator disks. 10
(b) Derive the A, B, C, D constants for the medium transmission line represented by nominal Pi-section. 10

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