

ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER IV – (REGULATIONS 2004)

EE 281 – TRANSMISSION AND DISTRIBUTION

Time:3 hrs

Max Marks:100

Answer **ALL** Questions

Part A – (10×2=20)

1. Mention any two advantages of HVDC system
2. How will you classify distribution system based on nature of current?
3. Distinguish between self and mutual GMD
4. What is meant by a stranded conductor?
5. Classify the transmission line based on its length.
6. Define efficiency of transmission line
7. Name any two insulators
8. What is mean by grading of cables?
9. Explain sag template
10. What are the factors affecting sag?

Part B – (5×16=80)

11. (i) What are the different types of feeders and distributors? Bring out their relative advantages and disadvantages. (8)
- (ii) A 2-wire DC distributor cable AB is 2.2 km long and supplies a load of 25 A, 50 A, 75 A at 0.4 km, 1 km and 1.6 km from the point A. Each conductor has a resistance of 0.05Ω/km. Calculate the potential difference at each point if potential difference of 400 V is maintained at point A. (8)
12. a. Derive the expression for calculating the internal and external flux linkages of a conductor carrying current. Use these expressions to derive the equation for the inductance of a single phase line. (16)

OR

- b. From the fundamentals, derive the expression for capacitance of three phase line with asymmetrical spacing. (16)
13. a. Starting from first principles deduce expressions for ABCD constants of a long line in terms of its parameters. Define propagation constant and characteristic impedance. (16)

OR

b. Deduce expressions for the sending end and receiving end power of a line in terms of voltages and ABCD constants. Show that the real power transferred is dependent on the power angle and the reactive power transferred is dependent on the voltage drop in the line. (16)

14. a. A suspension insulator with 6 discs has a uniform voltage distribution. Capacitance grading is used to give the uniform voltage distribution. Each pin to earth capacitance is C . Capacitance of the top most disc is $10C$. Find mutual capacitances of the remaining discs. (16)

OR

b. A 33 kV three phase underground feeder, 3.4 km long, uses three single core cables. Each cable has a conductor of 2.5 cm and the radial thickness of insulation is 0.6 cm. The relative permittivity of dielectric is 3.1. Find capacitance of the cable per phase, charging current per phase, total charging kVAR, dielectric loss per phase if the power factor of unloaded cable is 0.03 and maximum stress in the cable. (16)

15. a. Assuming that the shape of an overhead line can be approximated by a parabola, deduce expressions for calculating sag and conductor length. How can the effect of wind and ice loadings be taken into account? (16)

OR

b. (i) Explain about Peterson coil grounding (8)

(ii) Mention the electrical components present in substation and explain their functions. (8)