

CBCS SCHEME

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18EE43

Fourth Semester B.E. Degree Examination, June/July 2023 Transmission and Distribution

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With a neat sketch, explain typical alternating current power supply scheme. (06 Marks)
- b. Explain the importance of high voltage transmission on:
 - (i) Volume of conductor material
 - (ii) Transmission efficiency
 - (iii) Percentage of drop (06 Marks)
- c. Derive the expression for sag in an overhead line when supports are at unequal levels. (08 Marks)

OR

- 2 a. A overhead transmission line at a river crossing is supported from two towers at height of 40 m and 90 m above water level, the horizontal distance between the towers being 400 m. If the maximum allowable tension is 2000 kg. Find the clearance between the conductor and water at a point mid-way between the towers. (08 Marks)
- b. Derive the mathematical expression for voltages and efficiency in string of three insulators connected in series. (08 Marks)
- c. Write a note on lightning. (04 Marks)

Module-2

- 3 a. Explain: (i) Constants of a transmission line (ii) Skin effect (06 Marks)
- b. Two conductors of a single-phase line each of km diameter are arranged in a vertical plane with one conductor mounted 1 m above the other. A second identical line is mounted at the same height as the first and spaced horizontally 0.25 m apart from it. The two upper and the two lower conductors are connected in parallel. Determine the inductance per km of the resulting double circuit line. (08 Marks)
- c. Write a short note on Muthal GMD. (06 Marks)

OR

- 4 a. Explain the flux linkages in parallel current carrying conductors. (04 Marks)
- b. Derive the expression for inductance of a three phase symmetrically placed transmission line. (08 Marks)
- c. Derive the expression for capacitance of a single phase transmission line. (08 Marks)

Module-3

- 5 a. A 3 phase, 50 Hz, 150 km line has a resistance inductive reactance and capacitive shunt admittance of 0.1Ω , 0.5Ω and $3 \times 10^{-6} \text{ s}$ per km per phase. If the line delivers 50 MW at 110 KV and 0.8 p.f. lagging. Determine the sending end voltage and current. Assume a nominal π circuit for the line. (08 Marks)
- b. Derive an expression for sending end voltage and current for long transmission line using rigorous solution. (12 Marks)

OR

- 6 a. An overhead three phase short transmission line delivers 5000 KW at 22 KV at 0.8 power factor lagging. The resistance and reactance of each conductor is 4Ω and 6Ω respectively. Determine:
- Sending end voltage
 - Percentage regulation
 - Transmission efficiency
- (08 Marks)
- b. Discuss the nominal T method of medium transmission line with appropriate phasor diagram and hence obtain the expressions for regulations and ABCD constants for the same. (08 Marks)
- c. Two transmission lines having generalized circuit constants A_1, B_1, C_1, D_1 and A_2, B_2, C_2, D_2 are connected in series. Develop the expressions for the constants ABCD. (04 Marks)

Module-4

- 7 a. Explain the factors affecting corona. (04 Marks)
- b. A single-core cable has a conductor diameter of 1 cm and insulation thickness of 0.4 cm. If the specific resistance of insulation is $5 \times 10^{14} \Omega\text{cm}$. Calculate the insulation resistance for a 2 km length of the cable. (06 Marks)
- c. What are the methods of grading cables? Describe the potentials in capacitance grading. (10 Marks)

OR

- 8 a. Discuss the construction of underground cable. (06 Marks)
- b. Explain the comparison between underground and overhead lines. (08 Marks)
- c. List the advantages and disadvantages of corona. (06 Marks)

Module-5

- 9 a. What are the limitations in distribution systems? (06 Marks)
- b. Explain in detail the reliability aids. (10 Marks)
- c. Describe radial distribution system. (04 Marks)

OR

- 10 a. Explain A.C distributor with concentrated loads. (08 Marks)
- b. Explain 3-phase four wire star connected unbalanced loads for A.C. distribution system. (06 Marks)
- c. Explain the types of variations in power quality. (06 Marks)
