

Total No. of printed pages = 3

EE 131504 NR

Roll No. of candidate

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1/3/22 2021

B.Tech. 5th Semester End-Term Examination

EE + EEE

POWER SYSTEM - I

(New Regulation)

Full Marks - 70

Time - Three hours

The figures in the margin indicates full marks
for the questions.

Answer question No. 1 and any *four* from the rest.

1. Fill in the blanks : (10 × 1 = 10)
- Suspension type insulators are used for voltages beyond _____ (11kV, 33kV, 400V).
 - The d.c. resistance of a line conductor is _____ than it's a.c. resistance.
 - If the length of a cable is doubled, its capacitance is _____ (doubled, halved, quadrupled)
 - The line constants of a transmission line are _____ (uniformly distributed, lumped).
 - Effect of capacitance is negligible in _____ transmission line.
 - A metallic sheath is provided over the insulation to protect the cable from _____.
 - If the length of a cable increases, its insulation resistance _____.
 - Most of common faults occurred in overhead lines are _____ faults.
 - The most common system for secondary distribution is 3-phase _____ wire system.
 - The minimum dielectric stress in a cable is at _____ (conductor surface, lead sheath).

[Turn over

2. (a) What is skin effect? Why is it absent in the d.c. system? (2+1=3)
- (b) What do you understand by 'transposition' of transmission line? (2)
- (c) Derive an expression for the capacitance of a single phase overhead transmission line. (5)
- (d) The three conductors of a 3-phase line are arranged at the corners of a triangle of sides 2m, 2.5m, and 4.5m. Calculate the inductance per km of the line when the conductors are regularly transposed. The diameter of each conductor is 1.24cm. (5)
3. (a) Show how the regulation is determined for medium transmission lines using nominal T method. (5)
- (b) An overhead 3-phase transmission line delivers 5000 kW at 22kV at 0.8 p.f. lagging. The resistance and reactance of each conductor is 4Ω and 6Ω respectively. Determine (i) sending end voltage and (ii) percentage regulation. (6)
- (c) What is Ferranti effect? Define Surge Impedance Loading (SIL). (2+2)
4. (a) Define string efficiency. Explain various methods of improving string efficiency. (2+5)
- (b) Discuss the desirable properties of insulators. (3)
- (c) A 132kV transmission line has the following data:
 Weight of conductor = 680kg/km
 Length of span=260m
 Ultimate strength = 3100kg
 Safety factor= 2
- Calculate the height above ground at which the conductor should be supported. Ground clearance required is 10 metres. (5)
5. (a) What is corona? What are the factors which affect corona? (2+3)
- (b) A 3-phase, 220kV, 50Hz transmission line consists of 1.5cm radius conductor spaced 2 metres apart in equilateral formation. If the temperature is 40°C and atmospheric pressure is 76cm, calculate the corona loss per km of the line. Take $m_0 = 0.85$. (5)
- (c) Deduce an expression for the capacitance of a single-core cable. (5)
6. (a) How does a DC distribution differ from AC distribution? (5)
- (b) What are the various methods of voltage control in a power system? Explain. (10)

7. Write short notes on the following (any three):

(3 × 5)

- (a) Ring main distributor
- (b) Bundle Conductor
- (c) Flashover and puncture
- (d) Inter-sheath grading in cable
- (e) Tap-changing transformer.

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