Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 20514

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

Fourth Semester

Electrical and Electronics Engineering

EE 8402 — TRANSMISSION AND DISTRIBUTION

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Why transmission lines are transposed? Mention the advantages of transposition of conductors?

2. Calculate the loop inductance per kilometer comprising two parallel conductors 1 m apart and 1cm diameter.

3. List the significance of SIL in transmission line.

4. Draw the phasor diagram to narrate the Ferranti effect.

5. Mention the causes for the failure of insulators.

6. How aeolian vibration occurs in transmission lines and mention the factors affecting it?

7. State the effects of unequal distribution of stress in a cable.

8. Why the potential distribution across the insulator string is not uniform?

9. Compare EHVAC and HVDC transmission system.

10. Classify the substations according to service.

PART B — (5 × 13 = 65 marks)

11. (a) Determine the expression for the capacitance per phase of a three-phase overhead transmission system when the conductors are symmetrically spaced. (13)

Or

(b) The three conductors of 3-phase overhead line are arranged in a horizontal plane with a spacing of 4 m between adjacent conductors. The diameter of each conductor is 2 cm. Determine the inductance per km per phase of the line assuming that the lines are transposed. (13)

12. (a) Explain the performance of Nominal T, π and End condenser method of medium transmission line. (13)

Or

(b) Draw the phasor diagram of a short transmission line and derive an expression for voltage regulation and transmission efficiency. (13)

13. (a) In a 33 kV overhead line, there are three units in a string of insulators. If the capacitance between each insulator pin and earth is 11% of self-capacitance of each insulator, find (i) the distribution of voltage over 3 insulators and (ii) string efficiency. (13)

Or

(b) Derive the expression for determining the voltage distribution in a string of suspension type insulator and calculate the string efficiency. (13)

14. (a) With neat diagram and equations, explain the methods of grading of cables. (13)

Or

(b) Classify the types of cable and derive the expression for the capacitance of a single core cable. (13)

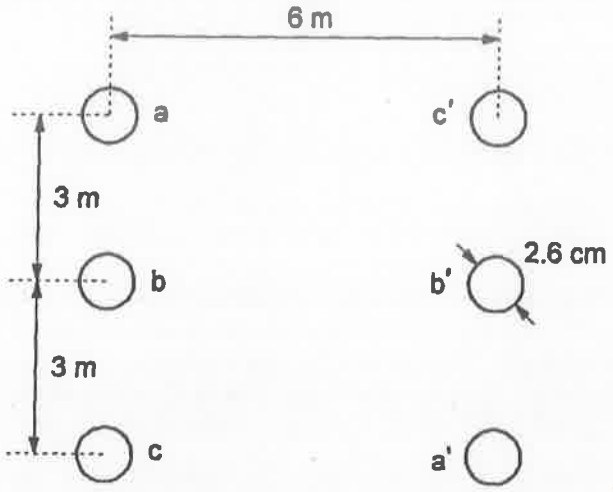
15. (a) With neat diagram, discuss the various methods of neutral grounding of a three-phase system. (13)

Or

(b) Explain the functions of various equipment of a transformer sub-station. (13)

PART C — (1 × 15 = 15 marks)

16. (a) The spacing of a double circuit 3-phase overhead line is represented in the figure shown below. The phase sequence is ABC and the line is completely transposed. The conductor radius in 1.3 cm. Find the inductance per phase per kilometer.



Or

(b) Draw and explain the structure of modern power system with typical voltage levels.

(b) A single phase distributor AB, one km long has resistance and reactance per conductor of 0.1 Ω and 0.15 Ω respectively. At the far end, the voltage $V_B = 200$ V and the current is 100 A at a p.f. of 0.8 lagging. At the mid-point M of the distributor, a current of 100 A is tapped at a p.f. of 0.6 lagging with reference to the voltage V_M at the mid-point.

Calculate :

(i) voltage at mid-point, V_M (7)

(ii) sending end voltage, V_A. (8)

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Question Paper Code : 80132

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Fourth Semester

Electrical and Electronics Engineering

EE 8402 — TRANSMISSION AND DISTRIBUTION

(Regulation 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the advantages of using bundled conductors?
2. List out the parameters affecting skin effect in transmission line.
3. What is the effect of leading load power factor on voltage regulation of a short transmission line?
4. What are the disadvantages of corona?
5. What are the types of line supports used in transmission and distribution systems?
6. What are the factors affecting the sag in a transmission line?
7. What are the desirable characteristics of insulating materials used in cables?
8. What are the sources of heat generation in an underground cable?
9. What are the limitations of Kelvin's law?
10. What are advantages of FACTS controllers?

PART B — (5 × 13 = 65 marks)

11. (a) Determine the inductance per km of a transposed double circuit 3-phase line shown in Figure 11(a) below. Each circuit of the line remains on its own side. The diameter of the conductor is 2.532 cm.

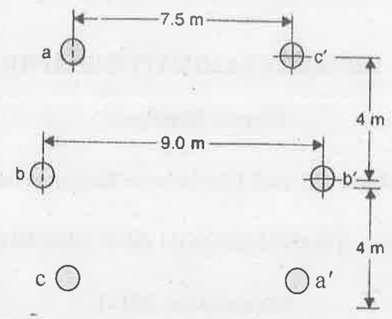


Figure 11(a)

Or

(b) A 3-phase, 50 Hz, 66 kV overhead line conductors are placed in a horizontal plane as shown in Figure 11(b) below. The conductor diameter is 1.25 cm. If the line length is 100 km, calculate :

(i) capacitance per phase,

(ii) charging current per phase, assuming complete transposition of the line.

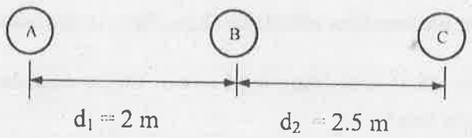


Figure 11(b)

12. (a) A 3-phase, 50 Hz transmission line 100 km long delivers 20 MW at 0.9 pf lagging and at 110 kV. The resistance and reactance of the line per phase per km are 0.2Ω and 0.4Ω respectively. The capacitive admittance is 2.5×10^{-6} siemen/km/phase. Calculate :

(i) the voltage at the sending end and

(ii) efficiency of transmission. Use nominal T method.

Or

(b) (i) A 275 kV transmission line has the following line constants:

$A = 0.85 \angle 5^\circ$ and $B = 200 \angle 75^\circ$

Determine the power at unity power factor that can be received if the voltage profile at each end is to be maintained at 275 kV. (7)

(ii) Discuss the factors affecting corona. (6)

13. (a) The towers of height 30 m and 90 m respectively support a transmission line conductor at water crossing. The horizontal distance between the towers is 500 m. If the tension in the conductor is 1600 kg, find the minimum clearance of the conductor and water and clearance mid-way between the supports. Weight of conductor is 1.5 kg/m. Bases of the towers can he considered to be at water level.

Or

(b) Each line of a 3-phase system is suspended by a string of 3 similar insulators. If the voltage across the line unit is 17.5 kV, calculate the line to neutral voltage. Assume that the shunt capacitance between each insulator and earth is 1/8th of the capacitance of the insulator itself Also find the string efficiency.

14. (a) A conductor of 1 cm diameter passes centrally through a porcelain cylinder of internal diameter 2 cm and external diameter 7 cm. The cylinder is surrounded by a tightly fitting metal sheath. The permittivity of porcelain is 5 and the peak voltage gradient in air must not exceed 34 kV/cm. Determine the maximum safe working voltage.

Or

(b) (i) A single-core cable has a conductor diameter of 1cm and insulation thickness of 0.4 cm. If the specific resistance of insulation is 5×10^{14} Ω-cm, calculate the insulation resistance for a 2 km length of the cable. (5)

(ii) What is meant by grading of cables? Explain any one method of grading. (8)

15. (a) What is a transformer sub-station? Discuss the role of major components in a transformer sub-station.

Or

(b) (i) What is neutral grounding? What are the advantages of neutral grounding? (6)

(ii) Explain the resistance grounding of the neutral point of a 3-phase system. (7)

PART C — (1 × 15 = 15 marks)

16. (a) A 2-wire d.c. ring distributor is 300 m long and is fed at 240 V at point A. At point B, 150 m from A, a load of 120 A is taken and at C, 100 m in the opposite direction, a load of 80 A is taken. If the resistance per 100 m of single conductor is 0.03Ω. find :

(i) current in each section of distributor

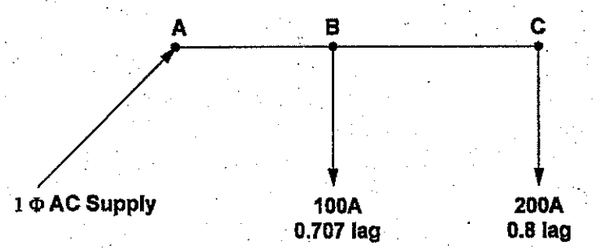
(ii) voltage at points B and C. (8+7)

Or

b) i) A single-phase A.C. distributor AB of 300 m long is fed from end A and is loaded as under :

100 A at 0.707 power factor lag 200 m from point A.

200 A at 0.8 power factor lag 300 m from point A. **(9)**



The load resistance and reactance of the distributor are 0.2 Ω and 0.1 Ω per km respectively. Calculate the total voltage drop in the distributor.

ii) List the various methods of voltage control in power distribution systems. **(4)**

PART – C **(1×15=15 Marks)**

16. a) i) A fluorescent lamp takes a current of 0.75 A when connected across a 240 V, 50 Hz AC supply. The power consumed by the lamp is 80 W. Calculate the value of the capacitance to be connected in parallel with the lamp to improve the power factor to a) unity and to b) 0.95 lagging. **(5)**

ii) The generalized circuit constants of a 3 phase, 220 kV rated voltage, medium length transmission line are A = D = 0.97 ∠0.6°, B = 60 ∠70° Ω, C = 0.001 ∠91° S. Determine the magnitude of line to line sending end voltage of the transmission line if the load at the receiving end is 100 MW at 220 kV with a power factor of 0.8 lagging. **(5)**

iii) An 800 kV transmission line is having per phase line inductance of 1 mH/km and per phase line capacitance of 6.25 nF/km. What is its ideal power transfer capability in MW, ignoring the length of the line ? **(5)**

(OR)

b) A three phase 50 Hz transmission line, 40 km long delivers 36 MW at 0.8 power factor lagging at 60 kV (Phase). The line constants per unit length of the conductor are R = 2.5 Ω, L = 0.1 H, C = 0.25 μF. Shunt leakage may be neglected. Determine the voltage, current, power factor at the sending end. And also determine the efficiency and regulation of the line. Use nominal T method. **(15)**

Reg. No. :

Question Paper Code : 90200

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Fourth Semester

Electrical and Electronics Engineering

EE8402 – TRANSMISSION AND DISTRIBUTION

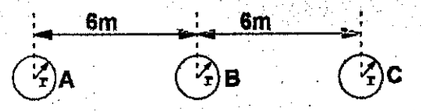
(Regulations 2017)

Time : Three Hours Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

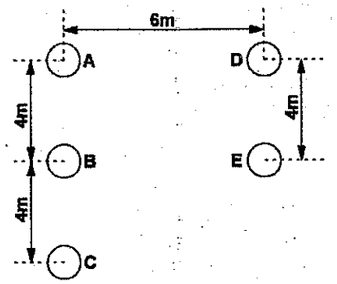
1. Explain briefly the skin and proximity effects.
2. A three phase 50 Hz transmission line consists of three equal conductors of radii 'r', placed in a horizontal plane, with spacing of 6 m between the middle and each of the outer conductors as shown in the figure. Determine the inductive reactance per phase per km of the transposed line if the radius of each conductor is 12.5 mm.



3. Explain about the physical interpretation of the long transmission line equations.
4. What is meant by characteristic impedance of a transmission line ?
5. What is string efficiency in a string of suspension type insulators ?
6. What are the main components of overhead transmission lines ?
7. What are the limitations of solid type cables ?
8. Calculate the capacitance and charging current of a single core cable used on a three phase, 66 kV system. The cable is 1 km long having a core diameter of 10 cm and an impregnated paper insulation of thickness 7 cm. The relative permittivity of the insulation may be taken as 4 and the supply at a frequency of 50 Hz.
9. Discuss the importance of voltage control in power systems.
10. What do you understand by induction regulators ?

PART – B **(5×13=65 Marks)**

11. a) A multi conductor single phase line has three conductors A, B and C each of diameter 40 mm for lead and two conductors, D and E of diameter 80 mm for return circuit as shown in the figure. Find the inductance per unit length on each side of the line and the total inductance of the line. **(13)**



(OR)

b) i) Derive the expression for line to line capacitance of a single phase two wire line and also find the capacitive reactance between one conductor to neutral. **(7)**

ii) A two-conductor single phase line operates at 50 Hz. The diameter of each conductor is 2 cm and are spaced 3 m apart, calculate : **(6)**

i) The capacitance of each conductor to neutral per km.

ii) Line to line capacitance.

iii) Capacitive susceptance to neutral per km.

12. a) A three-phase overhead line of length 8 km supplies 15000 kVA at 33 kV, 0.85 power factor lagging at the receiving end. Each line has R = 0.29 Ω per km and X = 0.65 Ω per km. Calculate

i) The voltage at the sending end,

ii) Power factor at the sending end,

iii) The regulation and

iv) The efficiency of the transmission line. **(13)**

(OR)

b) Explain the following : **(13)**

i) Theory of corona formation

ii) Factors affecting corona

iii) Disruptive critical voltage

iv) Visual critical voltage

v) Corona power loss.

13. a) i) In a 33 kV overhead line, there are three units in a string of insulators. If the capacitance between each insulator pin and earth is 11% of the self-capacitance of each insulator, find **(7)**

i) Distribution of voltage over three insulators and

ii) String efficiency.

ii) List and explain in brief about the various methods of improving string efficiency. **(6)**

(OR)

b) A transmission line has a span of 275 m between level supports. The conductor has an effective diameter of 1.96 cm and weighs 0.865 kg/m. Its ultimate strength is 8060 kg/m. If the conductor has an ice coating of radial thickness 1.27 cm and is subjected to wind pressure of 3.9 gm/cm^2 of projected area, calculate Sag for a safety factor of 2. Weight of ice is 0.91 gm/cm^3. **(13)**

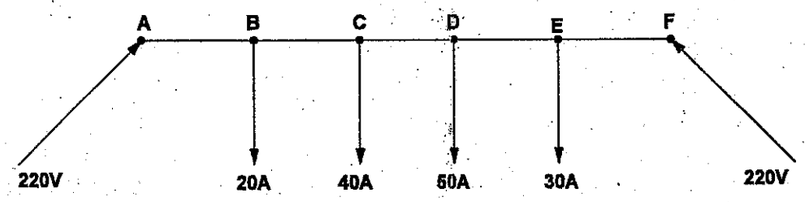
14. a) i) What is meant by grading of underground power cables ? List different classification of cables based on voltage level. **(6)**

ii) A single core, lead sheathed cable has a conductor of 10 mm diameter and two layers of different insulating materials each of 10 mm thick. The relative permittivities are 3 (inner) and 2.5 (outer). Calculate the potential gradient at the surface of the conductor when the potential difference between the conductor and the lead sheathing is 60 kV. **(7)**

(OR)

b) Explain how to measure the capacitance of single core and three core belted cables with neat diagram. **(13)**

15. a) A two wire street mains AF, 600 m long is fed from both ends at 220 V. Loads of 20 A, 40 A, 50 A and 30 A are tapped at distances of 100 m, 250 m, 400 m and 500 m from end A respectively. If the area of cross section of the distributor conductor is 1 cm^2. Find the voltage at point E. Take conductivity = 1.7×10^{-6} Ωcm. **(13)**



(OR)

Reg. No.

Question Paper Code : 57317

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Fourth Semester

Electrical and Electronics Engineering

EE 6402 – TRANSMISSION AND DISTRIBUTION

(Regulations 2013)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. What are the advantages of high voltage power transmission ?
2. What are the objectives of FACTS ?
3. Define transposition of lines.
4. What is corona ?
5. Define Ferranti effect.
6. Mention the significance of surge impedance loading.
7. What are the tests performed on the insulators ?
8. Classify the cables used for three phase service.
9. Define sag.
10. What is meant by stringing chart ?

PART – B (5 × 16 = 80 Marks)

11. (a) (i) Explain the structure of electric power system. **(8)**

(ii) A two wire dc ring main distributor ABCDEA is fed at point A with 230V supply. The resistances of go and return conductors of each section AB, BC, CD, DE, AE are 0.1 ohm. The main supplies the loads of 10A at B, 20A at C, 10A at D, 30A at E. Find the voltage at each load point. **(8)**

OR

(b) (i) Explain the different types of FACTS controllers. **(8)**

(ii) Explain the different HVDC links. **(8)**

12. (a) Derive the expression for the capacitance of a three phase transmission line with unsymmetrical spacing. **(16)**

OR

(b) Determine the inductance per km of a double circuit 3Φ line as shown in Fig. Q. 12 (b). The transmission line is transposed within each circuit and each circuit remains on its own side. The diameter of each conductor is 15mm. **(16)**

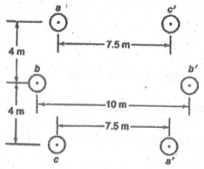


Fig. Q. 12 (b)

13. (a) A 3Φ, 50Hz, 100 km line has the following constants. Resistance/phase/km = 0.153 ohm, inductance/phase /km = 1.21mH, capacitance/phase / km = 0.00958 μF. If the line supplies a load of 20MW at 0.9 pf lagging at 110 kV at the receiving end calculate sending end current, sending end power factor, regulation and transmission efficiency using nominal T method. **(16)**

OR

(b) The constants of a three phase line are A = 0.9∟2° and B = 140∟70° ohms per phase. The line delivers 60 MVA at 132 kV and 0.8 pf lagging. Draw power circle diagrams and find (a) sending end voltage and power angle (b) the maximum power which the line can deliver with the above values of sending and receiving end voltages (c) the sending end power and power factor (d) line losses. **(16)**

14. (a) (i) Briefly explain the different methods to improve string efficiency of suspension type insulators. **(8)**

(ii) A three unit insulator string is fitted with a guard ring. The capacitances of the link pins to metal work and guard ring can be assumed to be a 15% and 5% of the capacitance of each unit. Determine voltage distribution and string efficiency. **(8)**

OR

(b) Explain the methods of grading of cables with neat diagrams and equations. **(16)**

15. (a) A transmission line has a span of 275 m betweeen level supports. The conductor has an effective diameter of 1.96 cm and weighs 0.865 kg/m. If the conductor has ice coating of radial thickness 1.27 cm and is subjected to a wind pressure of 3.9 gm/sq.cm of projected area. The ultimate strength of the conductor is 8060 kg.Calculate the sag if the factor of safety is 2 and weight of 1 c.c of ice is 0.91 gm. **(16)**

OR

(b) Explain the methods of neutral grounding. **(16)**

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 71773

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Fourth Semester

Electrical and Electronics Engineering

EE 6402 — TRANSMISSION AND DISTRIBUTION

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Mention the transmission voltages that are followed in Tamil Nadu.
2. What is ring main system?
3. State skin effect in transmission lines. Mention its effect on the resistance of the line.
4. State different types of overhead conductors.
5. What is Ferranti effect?
6. Write down the significance of SIL on transmission line.
7. Specify the different types of insulators.
8. What are the two different methods of grading of cables?
9. Enlist any two factors that affect sag in the transmission line.
10. Write down the types of grounding.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the structure of electric power system in detail.

Or

(b) (i) Compare the overhead and underground distribution system. (8)

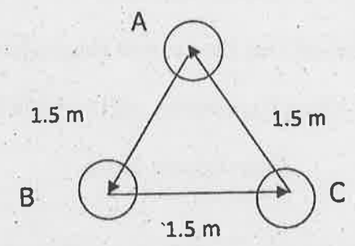
(ii) State the advantages of Interconnected system. (5)

12. (a) Explain the factors affecting corona loss and methods of reducing corona loss.

Or

(b) (i) Explain the advantages of bundled conductors when used for overhead lines. (4)

(ii) Determine the inductance of a 3 phase line operating at 50 Hz and the conductors are arranged as shown below. The conductor diameter is 0.7 cm. (9)



13. (a) What are the different methods available for Voltage Control and explain any one method.

Or

(b) (i) Explain the meaning of performance of lines. (5)

(ii) A single phase 50 Hz generator Supplies an inductive load of 6 MW at 0.8 pf lagging by means of an overhead line 15 km long. The line resistance and inductance are 0.02 ohm/km and 0.85 mH/km. The voltage at the receiving end is 11 kV. Determine the sending end voltage and voltage regulation. (8)

14. (a) What are the different types of testing of Insulators? Explain any one method.

Or

(b) Write short notes on :

(i) Properties of insulation material Used for cable. (5)

(ii) The Capacitance per kilometer of a 3 phase belted core cable is 0.2 micro farad/km between two cores with the third core connected to sheath. Calculate the kVA. The supply voltage is 6.6 kV and 30 km long. (8)

15. (a) Describe the different types of Substation layouts and list few advantages of GIS.

Or

(b) Explain the key points to be considered for tower spotting. Also list the basic types of tower based on circuits used.

PART C — (1 × 15 = 15 marks)

16. (a) A 400 V, 3 phase 4 wire service mains Supplies a star connected load. The resistance of each line is 0.1 ohm and that of the neutral 0.2 ohm. The load impedances are $Z_R = (6 + j9)$, $Z_y = 8$ ohms and $Z_B = (6 - j8)$. Calculate the voltage across each load impedance and current in the neutral. Phase sequence RYB.

Or

(b) Explain your understanding about transmission of Power and distribution of power.

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Reg. No. :

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Question Paper Code : 41000

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Fourth Semester
Electrical and Electronics Engineering
EE6402 – TRANSMISSION AND DISTRIBUTION
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. What are the advantages of FACTS controllers ?
2. What are the advantages of an interconnected system ?
3. What is meant by proximity effect ?
4. What are the methods adopted to reduce corona loss ?
5. What is Ferranti effect ?
6. What is surge impedance loading ?
7. State the advantages of suspension type insulators.
8. What are main requirements of the insulating materials used for cable ?
9. What is sag template ?
10. What is gas insulated substation ?

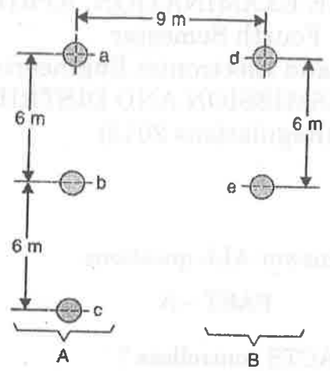
PART – B (5×13=65 Marks)

11. a) Draw and explain the structure of modern power system with typical voltage levels.

(OR)

b) Discuss the advantages of HVDC transmission over HVAC transmission in detail.

12. a) Determine the inductance of a single phase transmission line consisting of three conductors of 2.5 mm radii in the 'go' conductor and two conductors of 5 mm radii in the, return, conductor. The configuration of the line is as shown in Figure below.



(OR)

b) A three-phase, 50 Hz, 132 kV overhead transmission line has conductors placed in a horizontal plane 4 m apart. Conductor diameter is 2 cm. If the line length is 100 km, calculate the charging current per phase assuming complete transposition.

13. a) Determine the efficiency and regulation of a 3-phase, 100 km, 50 Hz transmission line delivering 20 MW at a.p.f. of 0.8 lagging and 66 kV to a balanced load. The conductors are of copper, each having resistance 0.1 ohm per km, inductance 0.1117 H per km and capacitance 0.9954 μF per km. Neglect leakage and use nominal-π method.

(OR)

b) Derive the expression for voltage and current at any point 'x' from the receiving end of a long transmission line.

14. a) In a 33 kV overhead line, three are there units in the string of insulators. If the capacitance between each insulator pin and earth is 11% of self-capacitance of each insulator, find the distribution of voltage over 3 insulators and string efficiency.

(OR)

b) i) Derive the expression for the capacitance of a single-core cable. **(8)**

ii) A single core cable has a conductor diameter of 1 cm and internal sheath diameter of 1.8 cm. If impregnated paper of relative permittivity 4 is used as the insulation, calculate the capacitance for 1 km length of the cable. **(5)**

15. a) A transmission line conductor having a dia of 19.5 mm weights 0.85 kg/m. The span is 275 metres. The wind pressure is 39 kg/m^2 of projected area with ice coating of 13 mm. The ultimate stregnth of the conductor is 8000 kg. Calculate the maximum sag if the factor of safety is 2 and ice weighs 910 kg/m^3.

(OR)

b) Explain the following neutral grounding methods.

i) Solid grounding. **(6)**

ii) Resistance grounding. **(7)**

PART – C **(1×15=15 Marks)**

16. a) A 2-wire d.c. street mains AB, 600 m long is fed from both ends at 220 V. Loads of 20 A, 40 A, 50 A and 30 A are tapped at distances of 100 m, 250 m, 400 m and 500 m from the end A respectively. If the area of X-section of distributor conductor is 1 square centimeter, find the minimum consumer voltage. Take $\rho = 1.7 \times 10^{-6}$ ohm-cm.

(OR)

b) A single phase distributor 'AB' 300 m long supplies a load of 200 A at 0.8 pf lagging at its far end 'B' and a load of 100 A at 0.0707 pf lagging at 200 m from sending end point A. Both pf are referred to the voltage at the far end. The total resistance and reactance per km (go and return) of the distributor is 0.2 ohm and 0.1 ohm. Calculate the total voltage drop in the distributor.

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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 52953

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2019.

Fourth Semester

Electrical and Electronics Engineering

EE 6402 — TRANSMISSION AND DISTRIBUTION

(Regulations 2013)

(Common to PTEE 6402 — Transmission and Distribution for B.E. (Part-Time) for Fourth Semester — Electrical and Electronics Engineering — Regulations 2014)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define feeder and distributor.

2. State the applications of HVDC transmission.

3. Define transposition of lines.

4. What is corona?

5. What is Ferranti effect?

6. Write down the significance of SIL on transmission line.

7. What is the purpose of insulator?

8. What is the main purpose of armouring in cables?

9. What is meant by tower spotting?

10. What is meant by sag template?

PART B — (5 × 13 = 65 marks)

11. (a) Explain the structure of electric power system in detail.

Or

(b) (i) Compare the overhead and underground distribution system. (8)

(ii) State the advantages of Interconnected system. (5)

12. (a) Derive an expression for loop inductance of a single phase transmission system.

Or

(b) Derive from first principles the capacitance per km to neutral of a three phase overhead transmission line with unsymmetrical spacing of conductors assuming transposition.

13. (a) A 3ϕ, 50 Hz, 100 km line has the following constants. Resistance/phase/km = 0.153 ohm, inductance/phase/km = 1.21 mH, capacitance/phase/km = 0.00958 μF. If the line supplies a load of 20 MW at 0.9 pf lagging at 110 kV at the receiving end, calculate sending end current, sending end power factor, regulation and transmission efficiency using nominal T method.

Or

(b) The constants of a three phase line are $A = 0.9\angle 2^\circ$ and $B = 140\angle 70^\circ$ ohms per phase. The line delivers 60 MVA at 132 kV and 0.8 pf lagging. Draw power circle diagram and find (i) sending end voltage and power angle (ii) the maximum power which the line can deliver with the above values of sending and receiving end voltages (iii) the sending end power and power factor (iv) line losses.

14. (a) (i) Explain different types of insulators. (5)

(ii) A string of five insulator units has mutual capacitance equal to 10 times the pin to earth capacitance, find voltage distribution across various units as the per cent of the total voltage across the string and string efficiency. (8)

Or

(b) A 2 km long 3 core, 3ϕ cable has capacitance 0.5 μF/km between two conductors bunched with sheath and the third conductor. The capacitance between the conductors is also measured when bunched together and the sheath and found to be 0.75 μF/km. Determine

(i) Capacitance between phases

(ii) Capacitance between the conductor and the sheath

(iii) Effective per phase capacitance

(iv) Capacitance between two conductors connecting a third conductor to the sheath

(v) Charging current if the supply voltage is 11 kV, 50 Hz.

15. (a) Write short notes on :

(i) Sub mains (4)

(ii) Stepped and tapered mains (5)

(iii) Grounding grids. (4)

Or

(b) Explain the following :

(i) Neutral grounding (7)

(ii) Resistance grounding. (6)

PART C — (1 × 15 = 15 marks)

16. (a) A 400 V, 3 phase 4 wire service mains supplies a star connected load. The resistance of each line is 0.1 ohm and that of the neutral 0.2 ohm. The load impedances are $Z_R = (6 + j9)$, $Z_y = 8$ ohms and $Z_B = (6 - j8)$. Calculate the voltage across each load impedance and current in the neutral. Phase sequence RYB.

Or

(b) Explain your understanding about transmission of power and distribution of power.

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EEE

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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 80374

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Fourth Semester

Electrical and Electronics Engineering

EE 6402 — TRANSMISSION AND DISTRIBUTION

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define feeder and distributor.

2. State the applications of HVDC transmission.

3. What are the advantages of using bundled conductors?

4. What is skin effect?

5. State the condition for maximum power delivered and draw the power angle diagram.

6. Mention the various methods of voltage control in transmission lines.

7. What are the methods of improving string efficiency in line insulators?

8. Mention any four insulating materials used for underground cables.

9. What are the factors affecting sag in a transmission line?

10. What is the need for earthing?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the effect of high voltage on volume of copper and on efficiency. (8)

(ii) Derive suitable expressions to determine the voltage drop and power loss in an uniformly loaded distributor of length '1' fed at both ends with equal voltages. (8)

Or

(b) (i) Make a comparison between EHVAC and HVDC system based on economics. (8)

(ii) Explain the different HVDC links. (8)

12. (a) (i) Derive the expression for inductance of a three phase transmission line with unsymmetrical spacing. (8)

(ii) A 220 kV, 50 Hz, 200 km long transposed three phase line has its conductors on the corners of a triangle with sides 6 m, 6 m and 10 m. The conductor radius is 1.81 cm. Find the capacitance per phase per km of the line. (8)

Or

(b) Explain the formation of corona, critical voltages, corona loss, advantages, disadvantages and methods to reduce the effect of corona. (16)

13. (a) A 50 Hz, 3φ transmission 30 km long has a total series impedance of $(40 + j125)\Omega$ and shunt admittance of 10^{-3} mho. The load is 50 MW at 220 kV with 0.8 pf lag. Find the sending end voltage, current, power factor, efficiency and regulation using nominal π-method. (16)

Or

(b) Derive the expression for the real and reactive power flow through transmission lines. (16)

14. (a) (i) Explain different types of insulators. (8)

(ii) A string of five insulator units has mutual capacitance equal to 10 times the pin to earth capacitance, find voltage distribution across various units as the per cent of the total voltage across the string and string efficiency. (8)

Or

(b) A 2 km long 3 core, 3Φ cable has capacitance 0.5 μF/km between two conductors bunched with sheath and the third conductor. The capacitance between the conductors is also measured when bunched together and the sheath and found to be 0.75 μF/km. Determine

(i) Capacitance between phases

(ii) Capacitance between the conductor and the sheath

(iii) Effective per phase capacitance

(iv) Capacitance between two conductors connecting a third conductor to the sheath

(v) Charging current if the supply voltage is 11 kV, 50 Hz. (16)

15. (a) An OHL at a river crossing is supported from two towers of heights 30 m and 90 m above water level with the span of 300 m. The weight of the conductor is 1 kg/m and working tension is 2000 kg. Determine the clearance between the conductor and the water level midway between the towers. (16)

Or

(b) Explain the methods of neutral grounding. (16)

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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 50482

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017
Fourth Semester
Electrical and Electronics Engineering
EE6402 – TRANSMISSION AND DISTRIBUTION
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. What is interconnected system ?
2. What is the objectives of FACTS ?
3. Why the concept of self GMD is not applicable for capacitance calculation ?
4. What is transposition ? Why are transmission line transposed ?
5. How are transmission line classified ?
6. What is Ferranti effect ?
7. What is a belted-cable ?
8. What are the desirable properties of insulator ?
9. What are the major equipments of a substation ?
10. Give the significance of a stringing chart.

PART – B (5×13=65 Marks)

11. a) i) Draw and explain the structure of typical electrical power system with various voltage levels. (8)

ii) Draw and explain a simple model of UPFC. (5)

(OR)

b) i) Briefly discuss the technical advantageous of HVDC over HVAC transmission system. (8)

ii) Explain the applications of HVDC transmission system. (5)

12. a) Derive the expression for calculating the internal and external flux linkages for a conductor carrying current. Use these expressions to derive the equation for the inductance of a single-phase transmission line. **(13)**

(OR)

b) Derive an expression for capacitance of a three-phase unsymmetrically spaced overhead line. **(13)**

13. a) i) Draw the phasor diagram of a short transmission line and derive an expression for voltage regulation and transmission efficiency. **(7)**

ii) A three-phase transmission line having a series impedance of (20 + j30) Ω delivers 7 MW at 33 kV and 0.8 lagging power factor. Find the sending end voltage, regulation and power angle. Neglect shunt capacitance. **(6)**

(OR)

b) i) Deduce the expression for the sending end and receiving end power of a transmission line in terms of voltages and ABCD constants. **(7)**

ii) Briefly explain the procedure of drawing receiving end power circle diagram. **(6)**

14. a) With neat diagram, explain the various methods of grading of underground cables. **(13)**

(OR)

b) i) Discuss the constructional features of pin type insulators. **(7)**

ii) An insulator string consists of three units each having a safe working voltage of 15 kV. The ratio of self-capacitance to shunt capacitance is 6 : 1. Determine the line voltage and string efficiency. **(6)**

15. a) i) Prove that a transmission line conductor between two supports at equal heights takes the form of a catenary. **(7)**

ii) What is a sag-template ? Explain how this is useful for location of towers and stringing of power conductors. **(6)**

(OR)

b) Describe about the various methods of neutral grounding in detail. **(13)**

PART – C **(1×15=15 Marks)**

16. a) Derive the expression of capacitance of a bundled conductor.

(OR)

b) Discuss the methods of voltage control in transmission line.

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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 20455

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Fourth Semester

Electrical and Electronics Engineering

EE 6402 — TRANSMISSION AND DISTRIBUTION

(Regulations 2013)

(Common to PTEE 6402 – Transmission and Distribution for B.E. (Part-Time) – Fourth Semester – Electrical and Electronics Engineering, Regulations 2014)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the advantages of adopting EHV/UHV for transmission of AC electric power?

2. Why galvanized steel wire is not suitable for EHT lines for the purpose of transmitting large amounts of power over long distance?

3. What is skin effect?

4. Define proximity effect.

5. What is corona?

6. Why should the reactive power transfer in lines be minimized?

7. List the advantages of polythene insulators?

8. Why are insulators used with overhead lines?

9. Explain the term 'sag of a line'.

10. What is power circle diagram?

PART B — (5 × 13 = 65 marks)

11. (a) Explain the following of DC distributor

(i) Distributor fed at one end (5)

(ii) Distributor fed at both ends (4)

(iii) Distributor fed at the centre. (4)

Or

(b) Find the voltage drop on a DC distributor having concentrated loads supplied to both ends with

(i) equal voltages (7)

(ii) unequal voltages. (6)

12. (a) Derive the inductance of single - phase two wire line and three phase overhead line.

Or

(b) Derive the capacitance of a three-phase overhead line for Symmetrical Spacing and Unsymmetrical spacing.

13. (a) Derive voltage regulation, power factor and transmission efficiency of short transmission line with diagrams.

Or

(b) Derive the sending end current and voltage for a long transmission line with necessary diagram.

14. (a) What is grading of cables? Explain the following methods of grading of cables:

(i) Capacitance grading (7)

(ii) Intersheath grading (6)

Or

(b) Explain with the help of phasor diagram, the voltage control by synchronous condenser.

15. (a) Calculate sag and tension of a conductor when

(i) supports are at equal levels (7)

(ii) supports are at unequal levels. (6)

Analyze with, without the effect of ice loading and wind.

Or

(b) Explain the different cables used for three-Phase system.

PART C — (1 × 15 = 15 marks)

16. (a) A 33 kV, 50 Hz , 3-phase underground cable, 4 km long uses three single core cables. Each of the conductor has a diameter of 2.5 cm and the radial thickness of insulation is 0.5 cm. Determine (i) Capacitance of the cable/phase (ii) charging current/phase (iii) total charging kVAR. The relative permittivity of insulation is 3.

Or

(b) The insulation resistance of a single-core cable is 495 MΩ per km. If the core diameter is 2.5 cm and resistivity of insulation is 4.5×10^{14} Ω - cm, find the insulation thickness.

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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 91488

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Fourth Semester

Electrical and Electronics Engineering

EE 6402 – TRANSMISSION AND DISTRIBUTION

(Regulations 2013)

(Common to PTEE 6402 – Transmission and Distribution for B.E. (Part-Time) – Fourth Semester – Electrical and Electronics Engineering – (Regulations 2014))

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. List out the advantages of high voltage AC transmission.
2. Mention the demerits of HVDC transmission.
3. What is skin effect ?
4. What is proximity effect ?
5. Define transmission efficiency.
6. Define corona.
7. What is the necessity of grading an underground cable and write the methods of grading cables ?
8. List the four main insulating materials used in cables.
9. What is meant by Sag ?
10. What are the major equipments of a substation ?

PART – B **(5×13=65 Marks)**

11. a) In a.c. distribution calculations, calculate the power factor referred to receiving end voltage and power factors referred to respective load voltages.

(OR)

b) Find the voltage drop on a DC distributor having concentrated loads and uniform loads, supplied to both ends with i) equal voltages ii) unequal voltages.

12. a) Find the inductance of single phase two wire line and unsymmetrical spacing three phases overhead line.

(OR)

b) Derive the capacitance of a 3-phase overhead line for symmetrical spacing and unsymmetrical spacing.

13. a) Derive sending end current using end condenser method, Nominal T method and Nominal π method for medium transmission line.

(OR)

b) Derive the sending end current and voltage for a long transmission line with necessary diagram.

14. a) What is grading of cables ? Explain the following methods of grading of cables :

i) Capacitance grading.

ii) Intersheath grading. **(2+6+5)**

(OR)

b) Derive the equation for string efficiency 3-disc string and explain the methods to improve string efficiency.

15. a) Calculate sag and tension of a conductor when

i) supports are at equal levels. **(7)**

ii) supports are at unequal levels. **(6)**

Analyze with, without the effect of ice loading and wind.

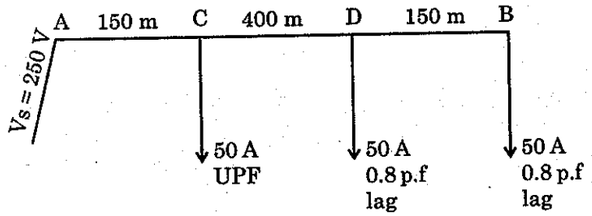
(OR)

b) i) Explain the AIS and GIS Substation Layout. **(7)**

ii) Tabulate the types of tower S/C and D/C for 132 Kv lines with their typical uses. **(6)**

PART – C **(1×15=15 Marks)**

16. a) A single phase AC distributor of 700 m length has total impedance $(0.022 + j0.42)\Omega$. It is fed at one end at 250 V. If the load distribution is as shown in following figure, calculate voltage at far end.



(OR)

b) i) 'A feeder is designed based on its current carrying capacity rather than voltage drop in it' – Justify. **(8)**

ii) A string of 4 insulators unit has the self capacitance equal to 5 times the pin-earth capacitance. Neglating of leakage, find (A) Voltage distribution from top to bottom insulator in percentage of the total voltage. (B) String efficiency. **(7)**

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