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GIET UNIVERSITY, GUNUPUR – 765022



B. Tech (Fourth Semester – Regular) Examinations, June – 2021

BPCEL4030 / BPCEE4030 – Electrical Power Transmission & Distribution

(Common to EE and EEE)

Time: 2 hrs

Maximum: 50 Marks

Answer ALL Questions

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions)

(1 x 10 = 10 Marks)

Q.1. Answer ALL questions

[CO#] [PO#]

- a. Two parallel plates are separated by a distance D charged by V volt. The field intensity E is given by, [CO1] PO 1
- (i) $V \times D$ (ii) V / D
- (iii) $V \times D^2$ (iv) V^2 / D
- b. Two infinite parallel metal plates are charged with equal surface charge density of the same polarity. The electric field in the gap between the plates is [CO1] PO 1
- (i) Same as that produced by one plate (ii) Double the field produced by one plate
- (iii) Zero (iv) Dependent on coordinates of field points
- c. Which of the following materials are not used for the transmission and distribution of electrical power? [CO2] PO 1
- (i) Copper (ii) Aluminum
- (iii) Steel (iv) Tungsten
- d. The phenomenon of rising in voltage at the receiving end of the open-circuited or lightly loaded line is called as [CO2] PO 1
- (i) Roman Effect (ii) Skin Effect
- (iii) Ferranti Effect (iv) Corona Effect
- e. The networks in which the R , L , C parameters are individually concentrated or lumped at discrete points in the circuit are called [CO3] PO 1
- (i) Distributed (ii) Lumped
- (iii) Parallel (iv) Paired
- f. Find the receiving impedance of a transmission line having a voltage of 24V and a conduction current of 1.2A is [CO3] PO 1
- (i) 20 (ii) 25.2
- (iii) 22.8 (iv) 28.8
- g. The power transmitted will be maximum when [CO3] PO 1
- (i) Reactance is high (ii) Sending end voltage is more
- (iii) Receiving end voltage is more (iv) Corona losses are minimum
- h. By which of the following methods string efficiency can be improved? [CO4] PO 1
- (i) Using a guard ring (ii) Grading the insulator
- (iii) Using long cross arm (iv) Any of the above
- i. Pin type insulator are mostly subjected to which type of mechanical stress? [CO4] PO 1
- (i) Twisting stress (ii) Compressive stress
- (iii) Tensile stress (iv) Both tensile and compressive stress

- j. Which of the following material is not used for overhead line insulators? [CO4] PO 1
- (i) Porcelain (ii) Glass
- (iii) Steatite (iv) PVC

PART – B: (Short Answer Questions)

(2 x 5 = 10 Marks)

Q.2. Answer ALL questions

[CO#] [PO#]

- a. A three phase transmission line has its conductor at the corners of an equilateral triangle with side 3m. The diameter of each conductor is 1.63cm. Examine the inductance per phase per km of the line. [CO1] PO 2
- b. What are the limitations of nominal T and π methods in transmission line problem? [CO2] PO 1
- c. How does A.C distribution differ from D.C distribution? [CO3] PO 1
- d. List types of insulators [CO3] PO 1
- e. What is the grading of underground cables? [CO4] PO 1

PART – C: (Long Answer Questions)

(6 x 5 = 30 Marks)

Answer ANY FIVE questions

Marks [CO#] [PO#]

3. Explain why the concept of self GMD is not applicable for capacitance calculation (6) [CO1] PO 1
4. Derive an expression for capacitance of a three phase overhead line for symmetrical spacing. (6) [CO1] PO 1
5. A 3-phase 50 Hz transmission line 100 km long delivers 20 MW at 0.9 p.f lagging and at 110 kV. The resistance and reactance of the line per phase per km are 0.2Ω and 0.4Ω respectively while capacitance admittance is 2.5×10^{-6} mho/km/phase. Calculate: (i) the current and voltage at the sending end (ii). Efficiency of transmission. Use nominal T method (6) [CO2] PO 2
6. Describe the procedure to develop the π equivalent circuit of a medium transmission line. (6) [CO2] PO 1
7. A transmission line has a span of 150 m between level supports. The cross sectional area of the conductor is 1.2 cm^2 and weighs 100 kg per 100 m. The breaking stress is 4220 kg/cm^2 . Calculate the factor safety if the sag of the line is 3.5 m. Assume a maximum wind pressure of 100 kg per sq. meter. (6) [CO3] PO 2
8. What is Kelvin's law for the design of feeders? Explain its limitation. (6) [CO3] PO 1
9. What is the need of earthing? Explain any one type of earthing for power system. (6) [CO4] PO 1
10. Show that maximum stress in a single core cable is $\frac{2V}{d \log_e D/d}$. (6) [CO4] PO 1

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