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10EE53

Fifth Semester B.E. Degree Examination, June/July 2019
Transmission and Distribution

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – A

1 a. With the help of circuit diagram, explain the following :
   (i) Feeder
   (ii) Distributor
   (iii) Service Mains. **(06 Marks)**

b. With the help of single line diagram, explain power system scheme and indicate standard voltages. **(06 Marks)**

c. Show that increase in transmission voltage of a transmission line results in
   (i) Increased efficiency
   (ii) Reduced weight of conductor
   (iii) Reduced line drop. **(08 Marks)**

2 a. Define Sag. Mention the factors affecting the Sag. **(04 Marks)**

b. Derive an expression for Sag in freely suspended conductor when the supports are at equal level. **(08 Marks)**

c. The towers of height 30m, and 90m respectively support a transmission line conductor at water crossing. The horizontal distance between the towers is 500m. If the tension in the conductor is 1600kg, calculate the minimum clearance of the conductor and water, weight of the conductor is 1.5 kg/m Bases of towers can be considered to be at water level. **(08 Marks)**

3 a. Why Insulators are used with overhead lines? Discuss the desirable properties of insulators and name the types of insulators. **(07 Marks)**

b. A string of 5 insulators is connected across a 100kV line. If the capacitance of each disc to earth is 0.1 times of the capacitance of the insulator, calculate :
   (i) the distribution of voltage on the insulator discs
   (ii) string efficiency. **(08 Marks)**

c. Write a short note on testing of insulators. **(05 Marks)**

4 a. State and explain factors affecting corona and corona loss. **(08 Marks)**

b. What is grading of cables? Briefly explain various methods of grading. **(08 Marks)**

c. A concentric cable has a core diameter of 0.8cm. The sheath diameter is 3.2cn. If the cable is testing with a voltage of 33kV, calculate the minimum and maximum stress in the insulation. **(04 Marks)**

PART – B

5 a. Obtain an expression for inductance of three – phase transmission line with unsymmetrical spacing between conductors. **(10 Marks)**

b. Fig Q5(b) shows the spacing of a double circuit 3-phase over head line. The phase sequence is ABC and the line is completely transposed. The conductor radius is 1.3cm; Find the inductance per phase per km.

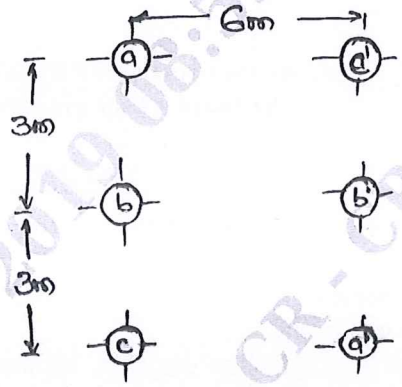

Fig Q5(b) **(10 Marks)**

6 a. Derive an expression for capacitance per phase of three phase double circuit with unsymmetrical spacing transposed. **(08 Marks)**

b. Find the capacitance of a single phase line 40km long consisting of two parallel wires each 5mm dia and 1.5m apart. Determine the capacitance of the line taking into account the effect of ground. The height of conductors above the ground is 7m. **(06 Marks)**

c. Explain the terms self GMD and mutual GMD. **(06 Marks)**

7 a. Derive an expression for transmission efficiency and voltage regulation for medium transmission line using nominal – T method. Draw relevant phasor diagram. **(08 Marks)**

b. A 3-phase, 50Hz, 100km long transmission line has following line constants :

Resistance/ph/km = 0.1Ω, Reactance/ph/km = 0.5Ω , Suspectance/ph/km = 10×10^{-6} ℧.

If the line supplies the load of 20MW at 0.9p.f lagging at 66kV at the receiving end, using nominal π method calculate :

(i) Sending end p.f (ii) Regulation and (iii) transmission efficiency. **(12 Marks)**

8 a. Explain with diagram different types of DC distribution and mention their merit and demerits. **(10 Marks)**

b. A DC 2-wire distributor AB is 500m long and is fed at both ends at 240V. The distributor is loaded as shown in Fig Q8(b). The resistance of the distributor (go and return) is 0.001Ω per meter. Calculate :

i) The point of minimum voltage

ii) Value of this voltage.

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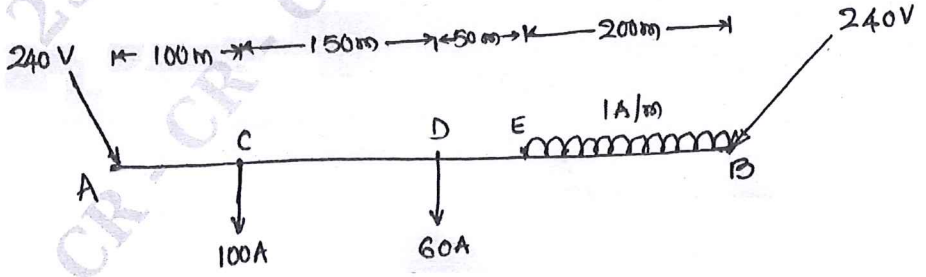

Fig Q8(b) **(10 Marks)**