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NEW SCHEME

Fifth Semester B.E. Degree Examination, July 2007
Electrical and Electronics Engineering
Electrical Power Transmission and Distribution

Time: 3 hrs. [Max. Marks:100

Note : ***Answer any FIVE full questions.***

1 a. Write and explain typical a.c. power supply scheme. **(05 Marks)**

b. Discuss the advantages of high transmission voltage and also calculate the volume of the conductor material required fro 1-ϕ, 2 wire a.c. system with one conductor earthed for overhead transmission system. **(10 Marks)**

c. Write the comparison between overhead and underground transmission system. **(05 Marks)**

2 a. Define sag and write the points, which affect sag calculation. **(06 Marks)**

b. Calculate the sag in overhead transmission line when the supports are at unequal level. **(06 Marks)**

c. 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 midway between the supports. Weight of conductor is 1.5 kg/m. Bases of the towers can be considered to be at water level. **(08 Marks)**

3 a. What is skin effect? Explain. **(04 Marks)**

b. Calculate the inductance of single phase two wire line starting from fundamentals. **(10 Marks)**

c. Calculate the capacitance of a 3-ϕ overhead transmission line with unsymmetrical spacing of a conductor. Assume lines are transposed. **(06 Marks)**

4 a. Write and explain the classification of overhead transmission lines. **(04 Marks)**

b. Calculate the efficiency and voltage regulation for medium transmission lines assuming nominal T-method. **(08 Marks)**

c. A 3-ϕ, 50 Hz overhead transmission line 100 km long has the following constants :

Resistance / km / ph = 0.1 Ω

Inductive reactance / km/ ph = 0.2 Ω

Capacitive susceptance / km / ph = 0.04×10^{-4} Siemen

Determine :

i) Sending end current

ii) Sending end voltage

iii) Sending end power factor

iv) Transmission efficiency

when supplying a balanced load of 10,000 kW at 66 kV, p.f 0.8 lag. Use nominal T method. **(08 Marks)**

5 a. Calculate the capacitance of a single core cable. **(06 Marks)**

b. What is meant by grading of cables? Explain capacitance grading. **(06 Marks)**

c. A single core lead sheathed cable has a conductor diameter of 3 cm, the diameter of the cable being 9 cm. The cable is graded by using two dielectrics of relative permitivity 5 and 4 respectively with corresponding safe stresses of 30 kV/cm and 20 kV/cm. Calculate the radial thickness of each insulation and the safe working voltage of the cable. **(08 Marks)**

6 a. How d.c. distributors are classified? Write the advantages of ring distributor over other types. **(05 Marks)**

b. Calculate the total voltage drop in uniformly loaded distributor, when it is fed at one end. **(05 Marks)**

c. A 2-wire d.c. distributor AB, 900 m long is fed at A at 400 V and loads of 50 A, 100 A, 150 A are tapped off from C, D and E which are at a distance of 200 m, 500 m and 800 m from point A respectively. The distributor is also loaded uniformly at the rate of 0.5 A/m. If the resistance of distributor per meter is 0.0001 Ω, calculate voltage at i) point B and ii) at point D. **(10 Marks)**

7 a. Define string efficiency and hence calculate the mathematical expression for it. **(08 Marks)**

b. Explain the methods of improving string efficiency. **(06 Marks)**

c. Each line of a 3-ϕ system is suspended by a string of 3 similar insulators. If the voltage across the line units is 17.5 kV, calculate the line to neutral voltage. Assume that the shunt capacitance between each insulator and earth is $1/8^{th}$ of the capacitance of the insulator itself. Also find the string efficiency. **(06 Marks)**

8 Write short notes on any four :

a. Factors affecting corona and methods of reducing corona effect

b. Comparison between overhead transmission lines and underground cables

c. Effect of ice loading and wind effect on sag of transmission line

d. Laying of underground cables

e. Transposition of overhead transmission lines. **(20 Marks)**

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