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B.E DEGREE EXAMINATIONS: NOVEMBER 2009

Fifth Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U07EE502 Transmission and Distribution

Time: Three hours **Maximum Marks: 100**

Answer ALL the Questions:-

PART A (10 x 1 = 10 Marks)

1 A conductor is composed of 2 identical copper strands each having radius R and distance D, the self GDM of the conductor will be

a. $\sqrt{(r'D)}$ b) $\sqrt[3]{(r'D)}$ c) $\sqrt[4]{(r'D)}$

2 The method of images originally suggested by Lord Kelvin is used for

a. The calculation of inductance

b. The calculation of capacitance

c. Effect of earth on line capacitance

3 The receiving end voltage for capacitance under no load condition is

a) Less than the sending end voltage

b) More than the sending end voltage

c) Equal to the sending end voltage

4 At NTP the breakdown strength of aim is,

a) 30kV rms/cm b) 30kV peak/cm c) 30kV rms/m

5 A string insulator has 4 units. The voltage across the bottom most unit is 30% of the total voltage. Its string efficiency is

a) 30% b) 60% c) 75% d) 83.30%

6 The electrostatic stress in a single core a belted cable is

a. Same throughout the insulation layer.

b. Minimum at conductor surface and maximum at the sheath

c. Maximum at conductor surface and maximum at the sheath

7 The purpose of bus coupler in the substation is

a. To connect two buses

b. To isolate the two buses

c. To make grounding

8 Under ordinary conditions of soil, _____ electrode is used for earthing

a. copper b. copper clad c. aluminum

9 The ring main distributor with inter connector is advantageous because

a. It compensates the excessive voltage drop

b. It reduces the conductor loss.

c. It increases the power generation

10 HVDC transmission system operates on _____ voltage.

a)500kV b) 1500kV c) 2000Kv

PART B (10 x 2 = 20 Marks)

11 What are the constituents of power system?

12 What is the advantage of stranded conductor?

13 Define voltage regulation of transmission line

14 Define corona.

15 What is the purpose of guard ring?

16 What is grading in cable.

17 What is the role of circuit breaker in power system

18 Mention any two type of neutral earthing

19 What is stepped main?

20 Mention any two advantages of HVDC transmission.

PART C (5 x 14 = 70 Marks)

21.a i) Derive the expression for the inductance of three phase single transmission line with unsymmetrical spacing to circuit

ii) A 3 phase transmission line 100 km long has its conductors of 0.6cm diameter spaced at the corners of an equilateral triangle of 100cm side. Find the inductance phase.

(OR)

b i) Derive the expression for the capacitance of single phase transmission line including the effect of earth

ii) Briefly discuss about the inductive interference of power line circuit with communication circuit. Deduce a suitable scheme to overcome this interference.

a A symmetrical 132kV line delivers a load of 40MW at 0.8 pf lagging. Calculate with the help of circle diagram

(i) The sending end voltage.

(ii) The MVRA capacity of the synchronous condenser needed if the sending end voltage is increased to 180kV.

Assume line constants as A=0.9 $\angle 5°$ B=100 $\angle 70°$ C= 0.0006$\angle 188°$.

(OR)

b i) A 100km long single phase transmission line has the following parameters

Resistance/km= 0.25 Ω

Reactance/km= 0.8Ω

susceptance/km= 14×10^{-6} mho

Receiving end line voltage =66 kV

The line is delivering 15MW at 0.8pf lagging. Determine sending end current, sending end voltage, regulation and power factor. Use nominal π method.

23 a i) With the suitable sketch, explain about pin type and suspension type insulator. (07)

ii) A string of 6 insulators unit has self capacitance equal to 10 times the pin to earth capacitance. Calculate the string efficiency. (07)

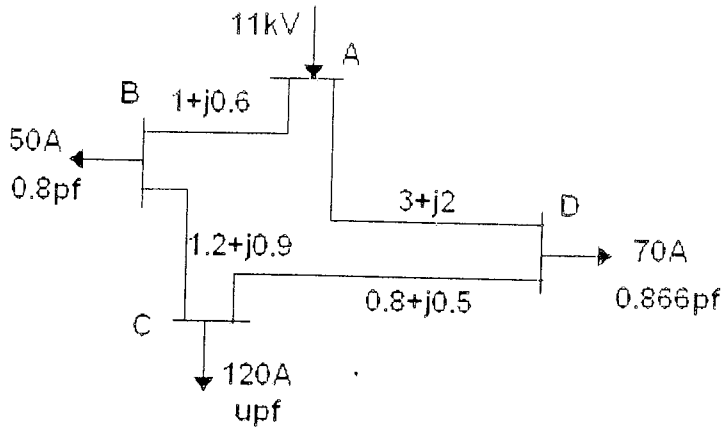
(OR)

b A single core lead sheathed cable is to be designed for 66kV to earth. Its conductor radius is 0.5cm. It is graded with three materials having relative permittivity of 4, 2.5 and 4 with maximum permissible stresses of 50, 30 and 40 kV/cm respectively. Determine the minimal internal diameter of the lead sheath. Discuss the arrangement of the insulating material

24 a What is the advantage of earthed neutral system? Discuss about any three grounding system.

(OR)

b A 3 phase ring main ABCD, fed at 11kV is loaded at points B,C,D as shown in figure.



Calculate the currents in various section and voltages at B,C and D.

25 a Explain the following connection schemes of distribution systems

i) Radial system.

ii) Interconnected system.

(OR)

b i) What are the different kinds of DC links? Draw the relevant diagrams?

ii) With a neat schematic, explain the principle of HVDC system operation.

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