

Roll No.

Total No. of Pages : 02

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B.Tech. (Civil Engg / Computer Science & Engg.) (Sem.-6)

POWER SYSTEMS

Subject Code : OEE-204-18

M.Code : 79325

Date of Examination : 15-07-22

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a) Draw a single line diagram of a typical AC power supply scheme.
- b) What is the economical transmission voltage?
- c) How a stranded conductor is different from the solid conductor?
- d) What are the different types of the supporting structures for the overhead lines?
- e) Differentiate Geometrical Mean Distance (G.M.D.) and Geometrical Mean Radius (G.M.R.).
- f) What is the effect of the earth on the capacitance of conductors?
- g) Derive an expression for the inductance of single phase two wire line.
- h) How to calculate the insulation resistance of single core cable?
- i) What is the necessity of the neutral grounding?
- j) What are the causes of failure of underground Cables?

SECTION-B

2. A DC 3-wire system is to be converted into a 3-phase, 4-wire system by adding a fourth wire equal in cross-section to each outer of the DC system. If the percentage power loss and voltage at the consumer's terminals are to be the same in the two cases, find the extra power at unity power factor that can be supplied by the AC system. Assume loads to be balanced.
3. A 2-conductor cable 2 km long is required to supply a constant current of 300 A throughout the year. The cost of the cable including installation is Rs. $(30 * a + 30)$ where 'a' is the area of the cross section of the conductor in cm^2 . The cost of energy is 20 Paise per kWh and the interest and depreciation charges amount to 10%. Calculate the most economical conductor size. Assume resistance of conductor material to be $1.73 \mu\Omega\text{-cm}$.
4. In a 33kV overhead line, there are three units in the string of insulators. If the capacitance between the each insulator pin and the earth is 10% of the self-capacitance of each insulator, find :
 - a) The distribution of voltage over three insulators and
 - b) String efficiency.
5. A transmission line has a span of 200 m between level supports. The conductor has an effective diameter of 1.86 cm and weighs 0.765 kg/m. Its ultimate strength is 8040kg. If the conductor has ice coating of radial thickness of 1.17 cm and subjected to a wind pressure of 3.6 gm/cm^2 of the projected area, calculate sag. Assume a safety factor of 2 and weight of 1 cubic cm of ice is 0.91 gm.
6. With the help of a neat sketch, discuss the importance of an earthing transformer? Why it is required? How it is connected?

SECTION-C

7. Derive an expression for line to neutral capacitance for a 3-phase overhead transmission line when the conductors are (a) symmetrically placed (b) unsymmetrically placed but transposed.
8. What are the limitations of the solid type cables? How are these overcome in pressure cables? Draw a neat sketch of oil filled cables and explain the working of oil filled cables.
9. Write a note on :
 - a) Inductance per phase for a three phase transmission line
 - b) Capacitance of 3 core cables

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.