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Total No. of Printed Pages: [01]

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B. Tech. (EE) (Semester – 6th)
POWER SYSTEMS-I (TRANSMISSION & DISTRIBUTION)
Subject Code: BELE1623
Paper ID: [111519]

Time: 03 Hours

Maximum Marks: 60

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A

(2 marks each)

Q1. Attempt the following:

- a) Explain the growth of power system in India.
- b) What is the function of cross-arms?
- c) What do you mean by proximity effect in transmission line?
- d) What is meant by receiving-end power circle diagram?
- e) Define self and mutual G.M.D.
- f) What are the factors affecting the sag in a transmission line?
- g) What is modified Kelvin's law?
- h) What are the main requirements of insulating materials used for underground cables?
- i) What is meant by 'ground fault' in cables?
- j) List the factors govern the performance of a transmission line for efficient performance.

Section – B

(5 marks each)

- Q2. A Single-phase transmission line delivers power of 1 MVA at a power factor of 0.71 lagging, 22kV, 50Hz. The loop resistance is 15ohm, the loop inductance is 0.2H and the capacitance 0.5 μ F. Find (i) the voltage, (ii) the current, (iii) the power factor at the sending end. Using nominal π - method, (iv) If the sending- end voltage be maintained unaltered, to what value will be receiving end voltage rise on no load?
- Q3. Determine the inductance per phase per km of a double circuit 3-phase lines. The radius of each conductor is 20 mm and the conductors are placed on the circumference of an imaginary circle of 7 m forming a regular hexagonal figure.
- Q4. What is Ferranti Effect? Explain it with the help of phasor diagram.
- Q5. Deduce the expression for the capacitance of a single core cable per km length.
- Q6. Deduce an expression for the sag of a transmission line supported by towers of different heights at the ends.

Section – C

(10 marks each)

- Q7. Explain Kelvin's law for obtaining the size of the conductors for transmission. Deduce its limitations.
- Q8. An overhead line widths stranded copper conductors is supported on two poles 200m apart having a difference in level of 10 metres. The conductor diameter is 2 cm and weighs 2.3 kg per metre length. Calculate the sag at the lower support under the conditions if wind provides a pressure of 57.5 kg per square metre of the projected area and a factor of safety is 4. The maximum tensile strength of copper is 4,200 kg per square cm.
- Q9. List the insulating materials based on the classification on the basis of their physical and chemical structure. Discuss the Ceramics, its characterization based on the values of permittivity (ϵ_r) and classification of ceramics along with their applications.