Roll No…….. **Total No. of Printed Pages: [01]**
Total No. of Questions: [09]

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 0.5μF. 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.