Paper Code: EE-501	**Roll No.**									

B.Tech.
FIFTH SEMESTER EXAMINATION, 2016-17
ELEMENTS OF POWER SYSTEM

[Time: 3 Hours] [Max. Marks: 100]

Note: Attempt ALL questions. Assume suitable data, if required. All question carry equal marks.

1. Attempt any **FOUR** parts of the following:- **(5x4=20)**

(a) Draw the Layout of the Power Supply Network, and also briefly describe its components with working voltages
(b) Explain Kelvin's Law
(c) Explain briefly Transmission lines, Bus Bars, Circuit Breaker and Isolator.
(d) Explain skin effect and proximity effect.
(e) What are different types of systems? Compare between 3 phase 3 wire and 3 phase 4 wire system.

2. Attempt any **TWO** parts of the following:- **(10x2=20)**

(a) Briefly explain about Surge Impedance Loading. Obtain mathematical model of the medium transmission line using nominal T method.
(b) Derive the expression for calculating the internal and external flux linkages of conductor carrying current. Hence deduce an expression for the total inductance of a single phase line
(c) Briefly explain the effect of earth on the capacitance of conductors. A three phase 50Hz line consists of three conductors each of diameter 21mm.The spacing between the conductors is as follows:
A-B=3m, B-C=5m, C-A=3.6m
Find the capacitance and capacitive reactance per km of the line .If the line operates at 132 kV, find the charging current per km, and the reactive volt-amperes generated by the line per km.

3. Attempt any **TWO** parts of the following:- **(10x2=20)**

(a) Explain briefly:
(i) Phenomenon of Corona loss, factors affecting them along with the methods to reduce corona loss.
(ii) Critical and visual disruptive voltages

(b) Explain inductive interference between power and communication lines with the help of Electromagnetic and electrostatic effects.

(c) Find the voltage distribution and string efficiency of a three unit suspension insulator string if the capacitances of the link pins to earth and to the line are respectively 20% and 10% of the Self Capacitance of each unit. If the guard ring increases the capacitance to the line of lower link pin to 35% of the self-capacitance of each unit, find the redistribution of voltage and string efficiency.

4. Attempt any **TWO** parts of the following:- **(10x2=20)**

(a) Derive expressions for sag and tension in a power conductor strung between two supports at equal heights taking into account the wind and ice loading also.

(b) Why cables are graded? Explain various methods of grading of cables and their limitations

(c) A single core lead covered cable is to be designed for 66 kV to earth. The conductor radius is 10mm and its insulating materials A, B and C have relative permittivity of 5,4 and 3 respectively and corresponding maximum stresses of 3.8,2.6 and 2.0 kV/mm(rms) respectively. Find the minimum diameter of the lead sheath

5. Attempt any **TWO** parts of the following:- **(10x2=20)**

(a) Explain mono-polar link, bipolar link and homo polar link of HVDC system.

(b) What is the need of grounding the neutral? Describe briefly the various grounding techniques.

(c) What are the basic needs of HVDC transmission over EHV AC? Also discuss the advantages and disadvantages of HVDC transmission systems. What are the limitations of EHV AC transmission systems?

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