EE-501

Roll No. | | | | | | | | | | |

B.Tech

(SEM V) ODD SEMESTER THEORY EXAMINATION, 2015-16

ELEMENTS OF POWER SYSTEM (EE-501)

Time: 3 Hours *Maximum Marks: 100*

Note: *Attempt all questions.*

Q.1. *Attempt any **FOUR** parts of the following.* **5x4=20**

a) Draw and explain the single line diagram of the power system.
b) Write short notes on :
Transmission lines, Bus Bars, Circuit Breaker.
c) Explain Kelvin's economy Law and derive the conditions for most economical cross sectional area of the conductor.
d) Explain skin effect and proximity effect.
e) What are different type of systems? Compare between 3 phase 3 wire and 3 phase 4 wire system.
f) Briefly explain Ferranti Effect?

Q.2. *Attempt any **TWO** parts of the following.* **10x2=20**

a) Deduce an expression for the total inductance of a single phase line.

b) 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.
c) Obtain mathematical model of the medium transmission line using nominal T method.
Explain Surge impedance loading.

Q.3. *Attempt any **TWO** parts of the following.* **10x2=20**

a) 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.
b) 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.
c) Explain briefly:
    1. Phenomenon of Corona loss, factors affecting them along with the methods to reduce corona loss.
    2. Critical and visual disruptive voltages

Q.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) Explain capacitance grading of cables used in power systemand briefly explain why cables are graded?
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 permittivities 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

Q.5. *Attempt any **TWO** parts of the following.* **10x2=20**

a) Explain advantage of Neutral grounding and Peterson Coil grounding.
b) 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?
c) Explain monopolar link, bipolar link and homopolar link of HVDC system
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