Paper Id: | 120515 | **Roll No:** | | | | | | | | | | | | |

B.TECH
(SEM V) THEORY EXAMINATION 2019-20
ELEMENTS OF POWER SYSTEM

Time: 3 Hours   *Total Marks: 100*

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1.   Attempt *all* questions in brief.   **2 x 10 = 20**

a.	Explain briefly Bus-bars?
b.	Name transmission line parameters.
c.	Explain 3-wire dc system.
d.	Why receiving end voltage appears high compared to sending end voltage in case of lightly loaded transmission lines?
e.	What is corona power loss?
f.	What are the causes of failure of insulators?
g.	What is the effect of temperature on sag and tension?
h.	What is the mechanism of breakdown of an underground cable?
i.	Where do we use grounding transformers?
j.	What are advantages of HV AC transmission?

SECTION B

2.   Attempt any *three* of the following: **10x3=30**

a.	Explain briefly skin effect and proximity effect in reference to over head lines.
b.	Explain surge impedance loading with respect to an overhead transmission line. Show that $Z_C = (Z_{OC} Z_{SC})^{1/2}$.
c.	A string of n suspension insulators is to be fitted with a guard ring. If the pin to earth capacitance is all equal to C, derive the general expression for the line to pin capacitor in terms of n. C and P (number of pins). So as to give uniform voltage distribution over the string.
d.	What are the commonly used insulating materials for underground cables? Describe with a neat sketch, the construction of a 3- core belted type cable.
e.	Explain the factors, which are considered during designing a transmission line? Also explain how ground wire selection is done.

SECTION C

3.   Attempt any *one* part of the following: **10x1=10**

a.	Find the ratio of volume of copper required to transmit a given power over a given distance by Overhead system using (i) DC two wire system (ii) 1-phase 2 wire system
b.	Determine the best current density in amperes/mm^2 for a three phase overhead line. The line is in use for 3600 hours per year and if the conductor costs Rs. 3.0 / kg. It has a specific resistance of 1.73 x 10^{-8} Ω-m and weighs 6200 kg / m3.cost of energy is 12 paise / unit. Interest and depreciation is 10 % of conductor cost.

4.   Attempt any *one* part of the following: **10x1=10**

a.	A two conductor, single phase line operates at 60 Hz. The diameter of each conductor is 5 cm and is spaced 3 m apart: calculate (i) the capacitance of each conductor to neutral per Km (ii) line to line capacitance (iii) capacitive susceptance to neutral per km.
b.	Calculate the inductance of a three phase symmetrically spaced line.

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5.   **Attempt any *one* part of the following:**   **10x1=10**

a.	Explain the phenomenon of corona formation and factors affecting, reducing corona. What is visual critical voltage?
b.	A 3-phase, 220 KV, 50 Hz transmission line consists of 1.5 cm radius conductor spaced 2 meters apart in equilateral triangular formation. If the temerature is 40^0C and atmosphere pressure is 76 cm. Calculate the corona loss per km of the line. Take $m_0 = 0.85$

6.   **Attempt any *one* part of the following:**   **10x1=10**

a.	Why do the vibrations get generated in conductors? How are they damped? A 132 KV transmission line has the following data: Weight of conductor = 660 kg/km; Length of span = 260 m, Ultimate strength = 3100 kg; safety factor =2, calculate the height above ground at which the conductor should be supported. Ground clearance required is 15 m.
b.	What is grading of cable? Why is it necessary? Explain Capacitance grading with suitable circuit diagram.

7.   **Attempt any *one* part of the following:**   **10x1=10**

a.	What are advantages of HV DC transmission? Discuss various types of HVDC links.
b.	With the help of the phasor diagram and mathematical equations, Explain the method and advantages of resonant grounding.