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**Hi-Tech Institute of Engineering & Technology**  
**DEPARTMENT OF ELECTRICAL ENGINEERING**  
**Course-B.TECH(EE)- 3<sup>rd</sup> YEAR**  
**PAPER SET-2 -2023-24**

**Subject Code: KEE501**  
**Faculty Name: OMKAR SINGH KARDAM**

**Subject Name: POWER SYSTEM-1**

**Time: 3: 00 Hours**

**Total Marks: 100**

**Note: 1. Attempt all Sections. If require any missing data; then choose suitably.**

**SECTION-A**

**Q.N.1. Attempt all parts in brief.**

**2x10 =20**

(a)	List the key features of primary and secondary distribution systems in the power system.	2	CO1
(b)	Explain diversity factor in power systems.	2	CO2
(c)	What will be the effect of line capacitance for lagging load in the medium transmission line.	2	CO2
(d)	Why the line capacitance is neglected in short transmission lines.	2	CO2
(e)	Explain the effect on sag of transmission line if the height of tower is increased?	2	CO3
(f)	Explain the factors affecting sag of an overhead transmission line.	2	CO3
(g)	Classify various type of supports used in power transmission lines.	2	CO3
(h)	Describe the uses and advantages of bundled conductors.	2	CO4
(i)	Summarize why metallic sheath is provided in underground cables.	2	CO5
(j)	List the different types of insulating materials used in underground cables.	2	CO5

**SECTION-B**

**Q.N.2. Attempt any three of the following:**

**3X10 =30**

(a)	Derive the expression of voltage distribution in 3 insulator stings.	10	CO3
(b)	What is the single line diagram of power system from generating Station to utilization level?	10	CO2
(c)	Derive the expression of inductance of single-phase line.	10	CO4
(d)	Find the capacitance of single-phase line 40 KM long consisting of two parallel wires each 5mm in diameter and 1.5 m apart. Determine the capacitance of the same line taking into account the effect of ground. The height of the conductors above the ground is 7 meters.	10	CO4
(e)	Describe the selection of the cables and the capacitance grading.	10	CO3

**SECTION-C**

**Q.N.3. Attempt any one part of the following:**

1x10 =10

(a)	A 3-phase, 50Hz overhead transmission line 100 Km long has the following parameters: Resistance/Km/Phase = $0.1 \Omega$ , Inductive reactance/Km/Phase = $0.2 \Omega$ , Capacitive susceptance/Km/Phase = $0.04 \times$ Siemen. Determine i). A,B,C,D constants, ii). the sending end voltage & current when supplying a balance load of 10,000 kW, at 66 kV, 0.8 p.f lagging. Use nominal T method.	10	CO2
(b)	Explain Hydroelectric power plant in detail. Draw its layout.	10	CO1

**Q.N.4. Attempt any one part of the following:**

1x10 =10

(a)	Show that the inductance of a bundle conductor line is less than that of the line with one conductor per phase with mathematical expression.	10	CO4
(b)	Explain the methods of increasing string efficiency of suspension insulators.	10	CO3

**Q.N.5. Attempt any one part of the following:**

1x10 =10

(a)	Derive the expression for sending end voltage and current in terms of receiving end voltage and current for the transmission line represented by nominal $\pi$ section of medium transmission line and Draw its phasor diagram.	10	CO2
(b)	Explain the calculation procedure of maximum sag of a transmission line at equal supports including wind pressure loading.	10	CO5

**Q.N.6. Attempt any one part of the following:**

1x10 =10

(a)	Derive an expression for the capacitance per unit length of a 3-phase line completely transposed.	1 0	CO 4
(b)	Describe the Inductance calculation procedure of three-phase double-circuit line with Symmetrical spacing (hexagonal).	1 0	CO 4

**Q.N.7. Attempt any one part of the following:**

1x10 =10

(a)	<p>Three phase double circuit line is arranged as shown in below figure:</p> <p>the conductors are transposed. the radius of each conductors 0.75 cm. Find the inductance/ phase/km.</p>	10	CO4
(b)	Explain with a neat sketch, the construction of a 3-core belted type cable.	10	CO5