PVP 23

Code: 23EE3503

III B.Tech - I Semester - Regular Examinations - NOVEMBER 2025

POWER SYSTEMS - II
(ELECTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

BL – Blooms Level CO – Course Outcome

PART – A

		BL	CO
1.a)	Why bundle conductors are used in transmission lines? Justify.	L2	CO2
1.b)	What is the proximity effect in conductors?	L2	CO1
1.c)	Define Ferranti effect in transmission lines.	L2	CO1
1.d)	The capacitance and inductance per unit length of a line operating at 110 kV are 0.01 μF and 2 mH. Determine the surge impedance loading.	L3	CO2
1.e)	Give two examples of causes for travelling waves in power systems.	L2	CO4
1.f)	What is meant by surge propagation in transmission lines?	L2	CO4
1.g)	Write about visual critical voltage with reference to corona.	L2	CO4
1.h)	Why does corona cause radio interference?	L2	CO4
1.i)	What is the sag in the overhead line? Discuss the disadvantage in too small or too large sag in line.	L2	CO4
1.j)	Why suspension type insulators preferred for high voltage transmission?	L2	CO1

PART – B

			BL	CO	Max. Marks
UNIT-I					
2	a)	Derive the inductance of a three-phase symmetrical line with equilateral spacing.	L3	CO2	5 M
	b)	Explain briefly about the skin effect in a transmission line. How it will affect the resistance of the line?	L2	CO1	5 M
OR					
3	a)	Calculate the capacitance of 1-Φ transmission line 3.5 km long consisting of two parallel wires each 6 mm in diameter and 1.8 m apart the height of the conductor above the ground is 7.9 m.	L4	CO3	5 M
	b)	Derive the expression for inductance of unsymmetrical transposed 3-Φ transmission line.	L3	CO2	5 M
UNIT-II					
4	a)	What is nominal circuit? Find ABCD parameters of nominal-T based transmission lines.	L3	CO3	5 M
	b)	A 1-Φ 11 kV transmission line with a length of 15 km is to deliver 500 kVA at 0.85 p.f. lagging. The resistance of the line is 0.3 Ω/km and inductive reactance of 0.5 Ω/km. Calculate the efficiency and regulation of the short transmission line.	L4	CO3	5 M
OR					
5	a)	Define Surge Impedance Loading (SIL) and mention any three advantages of transmission line operating at SIL.	L2	CO1	5 M

	b)	Derive the efficiency and regulation of medium transmission line and draw the phasor diagram for nominal T-Configuration.	L3	CO2	5 M
		UNIT-III			
6	a)	Show that travelling waves moves with a velocity of light on overhead transmission lines.	L2	CO4	5 M
	b)	Derive reflection and refraction coefficient of a transmission line when receiving end is open circuited.	L3	CO5	5 M
		OR			
7	a)	Derive the expression for reflection and refraction coefficient of a transmission line ended with resistance.	L3	CO5	5 M
	b)	Differentiate between attenuation and distortion of surges in a transmission line. Discuss their significance in surge propagation analysis.	L2	CO5	5 M
		UNIT-IV			
8	a)	Explain how the corona forms in transmission lines and mention the advantages and disadvantages.	L2	CO4	5 M
	b)	A 3-phase transmission line has conductors 3 cm in diameter spaced equilaterally 1.5 m apart. If the dielectric strength of air (g_0) is 21.2 kV (rms) per cm, find the disruptive critical voltage for the line. Take air density factor $\delta = 0{\cdot}952$ and irregularity factor $m_o = 0{\cdot}9$.	L4	CO4	5 M

		OR			
9	a)	Explain the following terms with reference to corona: i) Critical disruptive voltage ii) Power loss due to corona	L2	CO4	5 M
	b)	Discuss the possible methods to reduce the corona in transmission lines.	L2	CO4	5 M
		UNIT-V			
10	a)	Define String efficiency. Explain various methods of improving string efficiency in brief.	L3	CO4	5 M
	b)	Each conductor of a three phase transmission line is suspended from a cross arm of a steel tower by a string of four suspension type disc insulators. The voltage across the second unit from top is 15 kV and across the third from top is 20 kV. Determine the voltage between the conductors.	L4	CO5	5 M
		OR			
11	a)	Show that in a string of suspension insulators, the disc nearest to the conductor has the highest voltage across it.	L3	CO5	5 M
	b)	Explain the procedure for calculating sag in a transmission line when the towers are of equal height.	L3	CO5	5 M