

Code: 20EE3503

**III B.Tech - I Semester – Regular / Supplementary Examinations  
NOVEMBER 2024**

**ELECTRICAL POWER GENERATION, TRANSMISSION  
AND DISTRIBUTION  
(ELECTRICAL & ELECTRONICS ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.

2. All parts of Question must be answered in one place.

BL – Blooms Level

CO – Course Outcome

			BL	CO	Max. Marks
<b>UNIT-I</b>					
1	a)	Illustrate the factors to be considered for selecting the site for Hydel power plant.	L3	CO2	5 M
	b)	With neat sketch explain the working of Hydel power plant.	L3	CO2	9 M
<b>OR</b>					
2	a)	Illustrate the factors to be considered for selecting the Location of Nuclear power plant.	L3	CO2	5 M
	b)	With neat sketch explain the working of Nuclear power plant.	L3	CO2	9 M
<b>UNIT-II</b>					
3	a)	Determine the capacitance of a 200km long 3-phase, 50Hz overhead transmission line with conductors each of diameter 4cm and spaced 2m apart at the corners of an equilateral triangle.	L3	CO3	7 M

	b)	Derive an expression for the inductance per phase for a 3-phase overhead transmission line when conductors are symmetrically placed.	L3	CO3	7 M
<b>OR</b>					
4	a)	Derive the expression for capacitance of a single-phase two wire line.	L3	CO3	7 M
	b)	A single phase transmission line has two parallel conductors 3m apart, the radius of each conductor being 1cm. Calculate the loop inductance per km length of the line if the material of the conductor is: i. Copper ii. Steel with relative permeability of 100.	L3	CO3	7 M
<b>UNIT-III</b>					
5	a)	Derive the expression for A, B, C, D parameters for long transmission lines (rigorous method).	L3	CO3	7 M
	b)	A 50Hz, 3-phase transmission line is 280 km long. It has a total series impedance of $(35 + j140)$ ohms and shunt admittance of $930 \times 10^{-6}$ siemen. It delivers 40,000 KW at 220KV with 90% p.f lagging. Find the Generalized Circuit Constants, Sending end voltage and current. By using medium line nominal - T method.	L4	CO4	7 M
<b>OR</b>					

6	a)	Derive the expressions for A, B, C, D parameters of a nominal- $\pi$ of a medium length transmission line. And also prove $AD-BC = 1$ for the same network.	L3	CO3	7 M
	b)	Illustrate the effect of Wind and ice loading on calculation of sag.	L3	CO3	7 M

#### UNIT-IV

7	a)	Explain various types of insulators with neat diagrams and compare them.	L3	CO5	7 M
	b)	Illustrate critical disruptive voltage.	L3	CO5	7 M

#### OR

8	a)	What do you understand by grading of insulators? Explain.	L3	CO5	7 M
	b)	Each line of a three phase system is suspended by a string of three identical insulators of self-capacitance of C farad. The shunt capacitance of connecting metal work of each insulator is 0.2C to earth and 0.1C to line. Calculate the string efficiency of the system and also calculate string efficiency if a guarding increases the capacitance to the line of metal work of the lowest insulator to 0.3C.	L3	CO3	7 M

### UNIT-V

9	Single phase distributor 2 km long supplies a load of 120A at 0.8 p.f. lagging at its far end and a load of 80A at 0.9 p.f. lagging at its mid point. Both power factors are referred to the voltages at the far end. The resistance and reactance per km (go and return) are $0.05\Omega$ and $0.1\Omega$ respectively. If the voltage at the far end is maintained at 230V, calculate: i. Voltage at the sending end ii. Phase angle between voltages at the two ends	L4	CO4	14 M
<b>OR</b>				
10	Explain the classification of DC distribution system and derive the voltage equations for Radial distributor with concentrated loading with feeding at one end and feeding at both the ends with unequal voltages.	L4	CO4	14 M