



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:IV
Class:SY	Program:B.Tech
Branch Code:ELE	Pattern:2023
Name of Course:Power System Engineering	Course Code:2306212
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 2 page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

Marks CO

Question No. 1

- 1a) Explain in brief (any two) 1. Block rate tariff. 2. Two-part tariff. 3. Maximum demand tariff. (6) CO1, CO2, CO3, CO5

Question No. 2

- 2a) List and explain any two following constraints on unit commitment: 1. spinning reserve, 2. thermal, and 3. hydro constraints. (6) CO1, CO2, CO3, CO5

Question No. 3

- 3a) Derive an expression for sag in a transmission line for: (8) CO1, CO3
(a) supports at equal level

OR

- 3b) What is grading of cables? Explain inter-sheath grading and capacitance grading methods used for reducing dielectric stress in high-voltage cables. (8) CO1, CO3
- 3c) A transmission line has a span of 120 m between level supports. The conductor has a cross-sectional area of 4 cm². The tension in the conductor is 1500 kg. If the specific gravity of the conductor material is 9.4 gm/cm³ and wind pressure is 1.8 kg/m length, calculate the sag. What is the vertical sag? (8) CO1, CO3

OR

- 3d) In a 33 kV overhead line there are three units in the string of insulators. If the capacitance between each insulator pin and earth is 12% of the self-capacitance of each insulator, determine the voltage distribution across each insulator and the string efficiency. (8) CO1, CO3

Question No. 4

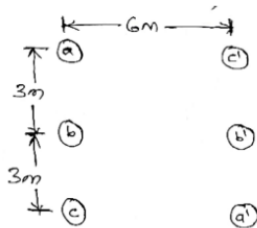
- 4a) Derive the expression for capacitance of a single phase two wire line (8) CO1, CO3

OR

- 4b) Discuss Skin effect, and proximity effect (8) CO1, CO3
- 4c) In a three-phase transmission line three conductors are arranged at the corners of a triangle with side lengths of 2.2 m, 2.7 m, and 5.0 m. Determine the inductance per kilometer of the line when the conductors are regularly transposed. The diameter of each conductor is 1.2 cm. (8) CO1, CO3

OR

- 4d) Figure shows the spacing of a double circuit 3 phase overhead line. The phase sequence is BCA. The line is completely transposed. Radius of conductor is 1.3cm. Find the inductance/phase/km (8) CO1, CO3



Question No. 5

- 5a) Discuss the generalized constants for short transmission line. (8) CO1, CO4

OR

- 5b) Classify the transmission lines in details based on length and voltage levels. (8) CO1, CO4
- 5c) Calculate the distance over which a load of 8,000 kW at a power factor of 0.9 (lagging) can be delivered by a three-phase transmission line. The conductors have a resistance of 0.85 ohms per kilometer. The voltage at the receiving end is set at 110 kV, and the allowable loss in the transmission line is 3.5%. (8) CO1, CO4

OR

- 5d) Determine power output and sending end power factor for a short 3 phase transmission line with an impedance of $5.6+j7.8$ ohm per phase has sending and receiving end voltages of 110kV & 100kV respectively for some receiving end load at a power factor of 0.85 lagging. (8) CO1, CO4

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