BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: B.Tech **SEMESTER : VII**
BRANCH: EEE **SESSION : MO/2025**

SUBJECT: EE441 COMPUTER-AIDED POWER SYSTEM ANALYSIS

TIME:02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	Draw the equivalent circuit diagram of a transformer and write the mathematical equations relating the primary and secondary voltages and currents.	[2]	1	1
Q.1(b)	Explain, with the help of a single-phase equivalent model of a three-phase transformer, how Y–Δ and Δ–Y connections produce a 30° phase shift between primary and secondary line-to-line voltages.	[3]	1	2
Q.2(a)	Explain the purpose of tap-changing transformers in power systems. Also, list and briefly describe the types of tap-changing transformers	[2]	1	2
Q.2(b)	Describe in detail the working of a regulating transformer for voltage magnitude control and phase angle control, and explain with the help of phasor diagrams.	[3]	1	2
Q.3(a)	What is the purpose of the Gauss-Seidel method, and what input data is required to perform it?	[2]	2	2
Q.3(b)	What is meant by the sparsity of a matrix? Given a 4×4 Y-bus matrix with 12 non-zero elements, calculate its sparsity.	[3]	2	3
Q.4(a)	Write a note on system modelling of transformers.	[2]	1	1
Q.4(b)	What is the role of the Jacobian matrix in load flow analysis?	[3]	2	2
Q.5(a)	Write the properties of the Y-bus matrix.	[2]	2	1
Q.5(b)	Compare Gauss–Seidel, Newton–Raphson, and Fast Decoupled methods for load flow.	[3]	2	4

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