Seat No.:		Q. Paper Code: FTC-A-009	SET	A

Fabtech Technical Campus, College of Engineering & Research, Sangola

(An Autonomous Institute)

Electrical Engineering

Academic Year: -2025-26, Semester-I

POWER SYSTEM MODELLING (25PEE11172)

Regular End Semester Examination Winter 2025-26 [Dec./Jan]

Class:	F. Y. M. Tech.	**Day & Date:**	Saturday, 03/01/2026
Duration:	03 Hrs.	**Max. Marks:**	60 Marks
Time:	11:00 AM TO 02:00 PM		

Instructions:

1) All Questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat diagram wherever necessary.
4) Make suitable assumptions if necessary and state it clearly.
5) Use of non-programmable calculator is allowed.

Q. No.	Questions	Marks	CO	BL
Q. 1	**Attempt any two of the following**	**12**		
1	Explain the need for modelling of power system components. Discuss different areas of power system analysis where accurate models are essential.	**6**	1	2
2	Develop a mathematical model of a steam turbine–governor system and explain its dynamic characteristics.	**6**	1	3
3	Explain the modelling of a hydro-turbine and governor system, highlighting the effect of water starting time on system stability.	**6**	1	2
Q. 2	**Attempt any two of the following**	**12**		
1	Explain the need for synchronous machine modelling for steady-state and dynamic power system studies.	**6**	2	2
2	Develop the steady-state model of a synchronous machine in the d–q reference frame.	**6**	2	3
3	Derive the dynamic model of a synchronous machine considering rotor circuits and stator transients.	**6**	2	4

Q. 3	**Attempt any two of the following**	**12**		
1	Explain the concept of an infinite bus and its significance in power system studies.	**6**	3	2
2	Derive the steady-state equations of a synchronous machine connected to an infinite bus.	**6**	3	3
3	Explain the power-angle characteristics of a synchronous machine connected to an infinite bus.	**6**	3	4
Q. 4	**Attempt any two of the following**	**12**		
1	Explain the simplified view of excitation control and its role in power system stability.	**6**	4	2
2	Describe different excitation system configurations used in synchronous generators.	**6**	4	2
3	Explain primitive excitation systems and define voltage response ratio and exciter voltage ratings.	**6**	4	2
Q. 5	**Attempt any two of the following**	**12**		
1	Explain the modelling of transmission lines for short, medium, and long line representations.	**6**	5	2
2	Derive the π-model of a transmission line and explain its applicability.	**6**	5	3
3	Explain the need for reactive power compensation and the role of Static VARCompensators (SVC).	**6**	5	2