P.E.S. COLLEGE OF ENGINEERING

(AN AUTONOMOUS INSTITUTE)

CHH. SAMBHAJINAGAR-431002

Summer Examination – 2026

Course: F.Y.M. Tech. **Branch : EE (EPS)** **Semester : II**
Subject Code & Name : MTPESEPS201T & Power System Modelling & Simulation

Max Marks: 60 **Date: 29/06/2026** **Duration: 3 Hr.**

Instructions to the Students:

1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/CO)	Marks
Q. 1	**Solve Any one of the following.**		
A)	Explain the need for modeling in power system studies and discuss different areas of power system analysis. **Points** — **Marks** Introduction to power system modeling — 2 Need for modeling — 3 Different areas of power system analysis — 4 Advantages of modeling — 2 Conclusion — 1	**L2/CO1**	**12**
B)	Discuss the modeling of non-electrical components such as boiler, steam turbine, hydro turbine and governor system. Also explain transformer modeling. **Points** — **Marks** Boiler model explanation — 2 Steam turbine model — 2 Hydro turbine and governor system — 3 Auto-transformer modeling — 2 Tap-changing and phase shifting transformer — 2 Conclusion — 1	**L3/CO1**	**12**
Q.2	**Solve Any one of the following.**		
A)	Explain the synchronous machine model required for steady-state analysis. **Points** — **Marks** Introduction to synchronous machine modeling — 2 Need for steady-state model — 2 Assumptions in steady-state analysis — 2 Equivalent circuit/model representation — 3 Applications of steady-state model — 2	**L2/CO2**	**12**

	Conclusion 1		
B)	Discuss the development of dynamic models of synchronous machines using Park's transformation. **Points** **Marks** Need for dynamic studies 2 Concept of Park's transformation 3 Current linkage model 2 Flux linkage model 2 Linear simulation model 2 Conclusion 1	**L4/CO2**	**12**
Q. 3	**Solve Any one of the following.**		
A)	Explain the analysis of a synchronous machine connected to an infinite bus under steady-state conditions. **Points** **Marks** Introduction to infinite bus concept 2 Synchronous machine connection to infinite bus 3 Steady-state analysis 3 Power-angle characteristics 2 Applications 1 Conclusion 1	**L3/CO3**	**12**
B)	Explain effect of excitation control on stability of synchronous machine. **Marking Scheme:** • Excitation control concept – 4 marks • Effect on machine stability – 6 marks Proper explanation – 2 marks	**L4/CO3**	**12**
Q.4	**Solve Any one of the following.**		
A)	Explain excitation control systems and discuss excitation configurations and primitive excitation systems. **Points** **Marks** Introduction to excitation systems 2 Simplified excitation control 2 Excitation configurations 3 Primitive excitation systems 3 Applications and importance 1 Conclusion 1	**L3/CO4**	**12**
B)	Define voltage response ratio and exciter voltage ratings. Explain their significance in excitation systems. **Points** **Marks** Definition of voltage response ratio 3	**L3/CO4**	**12**

	Definition of exciter voltage ratings 3 Significance in excitation control 3 Practical applications 2 Conclusion 1		
Q. 5	**Solve Any one of the following.**		
A)	Explain excitation control systems using DC generator exciter, alternator-rectifier and alternator SCR systems. **Points** **Marks** DC generator exciter 3 Alternator-rectifier excitation system 3 Alternator SCR excitation system 3 Comparison and applications 2 Conclusion 1	**L2/CO5**	**12**
B)	Discuss the modeling of Static VAR Compensators (SVC) and load modeling in power systems. **Points** **Marks** Introduction to SVC 2 Modeling of SVC 4 Need for load modeling 2 Static and dynamic load models 3 Conclusion 1	**L4/CO5**	**12**
	***** End *****		