Register No : ___________________

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

M.E DEGREE END SEMESTER THEORY EXAMINATIONS, NOV /DEC 2024

Second Semester

Power Systems Engineering

PS4202 - Power System Dynamics

Regulations - 2021

Duration : 3 Hrs *Maximum : 100 Marks*

*PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)*

Q.No	Questions	BLT	CO	Marks
1.	List the components of the armature and field structure in a synchronous machine.	RE	1	2
2.	Recall the significance of the direct and quadrature axes in synchronous machine modeling.	UN	1	2
3.	Write the function of an excitation system in synchronous machines.	RE	2	2
4.	Illustrate the classical transfer function of a hydraulic turbine.	UN	2	2
5.	What is the importance of eigenvalues in the stability of dynamic systems?	RE	3	2
6.	Interpret the effect of field flux variation on system stability.	UN	3	2
7.	Name the main components of a thyristor excitation system with AVR.	RE	4	2
8.	Compare the roles of the AVR and the Power System Stabilizer (PSS) in stability enhancement.	UN	4	2
9.	Recall the purpose of a digital stabilizer.	RE	5	2
10.	Summarize the design elements required for effective excitation control.	UN	5	2

*PART – B (ANSWER ALL QUESTIONS) (Marks 5*13 = 65)*

Q.No		Questions	BLT	CO	Marks
11.	a	Explain the dq0 transformation and its physical interpretation in synchronous machine modeling.	AP	1	13
		Or			
	b	Demonstrate the computation of steady-state values in a synchronous machine using phasor relationships.	AP	1	13
12.	a	Interpret the modeling process for IEEE type ST1A (1992) excitation model components.	AP	2	13
		Or			
	b	Explain the purpose and block diagram of a governor with transient droop compensation for a hydraulic turbine.	AP	2	13
13.	a	Apply state-space representation and eigenvalue analysis to assess the stability of a dynamic system. Explain it with an example.	AP	3	13
		Or			
	b	Solve a stability analysis for a Single-Machine Infinite Bus (SMIB) configuration with a classical machine model, including a numerical example.	AP	3	13

14.	a	Construct the system state matrix for a two-machine system with synchronous machines modeled classically.	AP	4	13
		Or			
	b	Develop a block diagram for a power system with AVR and PSS, discussing how they affect synchronizing and damping torque.	AP	4	13
15.	a	Model a stabilizer based on the shaft speed signal (delta omega) and explain its role in stability enhancement.	AP	5	13
		Or			
	b	Utilize phase lead compensation in the design of excitation control for enhanced stability, including washout and stabilizer gain.	AP	5	13

PART – C (Marks 1*15 = 15)

Q.No		Questions	*BLT*	*CO*	*Marks*
16.	a	Obtain the mathematical model of, i. Single reheat tandem compounded type steam turbine (8) ii. Hydraulic turbine (7)	AP	2	15
		Or			
	b i	Plan the application of a Power System Stabilizer in a multi-machine system, illustrating with a two-machine system example.	AP	4	7
	ii	Explain the stabilizer limits and selection of PSS location.	AP	5	8