Register No: _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

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

First Semester

Power System Engineering

PPST2411/PS4101 - Computer Aided Power System Analysis

Regulations – 2021 & 2024

Duration : 3 Hrs *Maximum : 100 Marks*

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

Q.No	*Questions*	*BLT*	*CO*	*Marks*
1.	Recall the concept of sparsity in matrices.	RE	1	2
2.	Tell the role of L and U matrices in Gaussian elimination.	RE	1	2
3.	Recall the key concepts behind the newton-raphson method for solving power flow equations.	RE	2	2
4.	Compare fast decoupled power flow method and its advantages over the traditional Newton-Raphson method.	UN	2	2
5.	Name two key advantages of using the Newton's method for solving OPF problems.	RE	3	2
6.	List the limitations of using linear programming (LP) methods in OPF analysis.	RE	3	2
7.	Define the bus impedance matrix (ZBUS) in power systems.	UN	4	2
8.	Compare the effectiveness of using sequence components versus the ZBUS method for fault analysis.	UN	4	2
9.	What is the basic principle behind numerical integration methods in power system analysis?	RE	5	2
10.	Identify two key factors that influence transient stability in a multi-machine system.	RE	5	2

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

Q.No		*Questions*	*BLT*	*CO*	*Marks*
11.	a	Evaluate the impact of optimal ordering schemes on the computational efficiency of solving large sparse systems and discuss at least two different schemes.	EV	1	13
		Or			
	b	Explore the significance of left and right factors in iterative methods for solving linear systems and how do these factors contribute to the convergence of the solution.	EV	1	13
12.	a	Analyze the steps involved in the Newton-Raphson method for solving power flow equations and discuss on the convergence criteria and the implications of poor convergence.	AN	2	13
		Or			
	b	Explore the calculation and application of sensitivity factors for P-V bus adjustments and how do these factors inform decision-making in power system operations.	AN	2	13

13.	a	Explain the various methods used for solving OPF, including the gradient method and Newton's method and discuss their applicability, convergence, and computational efficiency.	UN	3	13
		Or			
	b	Explain the security-constrained optimal power flow and discuss its importance in ensuring system reliability and the challenges associated with its implementation.	UN	3	13
14.	a	Derive the expression for the bus impedance matrix (ZBUS) considering mutual coupling in a single-phase system.	UN	4	13
		Or			
	b	Discuss the impact of unsymmetrical faults on the operation of power systems and the role of sequence components in mitigating these effects.	UN	4	13
15.	a	Using the Euler and Fourth order Runge-Kutta methods, simulate the dynamic response of a Single Machine Infinite Bus (SMIB) system subjected to a sudden change in mechanical power input and discuss the steps involved, compare the results obtained from both methods, and analyze their accuracy and stability.	AP	5	13
		Or			
	b	Discuss a detailed algorithm for simulating a multi machine system using the classical synchronous machine model.	AP	5	13

*PART – C (Marks 1*15 = 15)*

Q.No		*Questions*	*BLT*	*CO*	*Marks*
16.	a	Evaluate the differences between the real and polar forms of power flow equations, discussing their advantages and disadvantages in power system analysis.	EV	2	15
		Or			
	b	Evaluate the factors influencing transient stability in power systems and critically assess the role of numerical stability and implicit integration methods in enhancing the reliability of transient stability analysis.	EV	5	15