Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2026

First Semester

M.E. Power Systems Engineering

PPST2411-COMPUTER AIDED POWER SYSTEM ANALYSIS

Regulations - 2024

Duration: 3 Hrs. ***Maximum: 100 Marks***

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

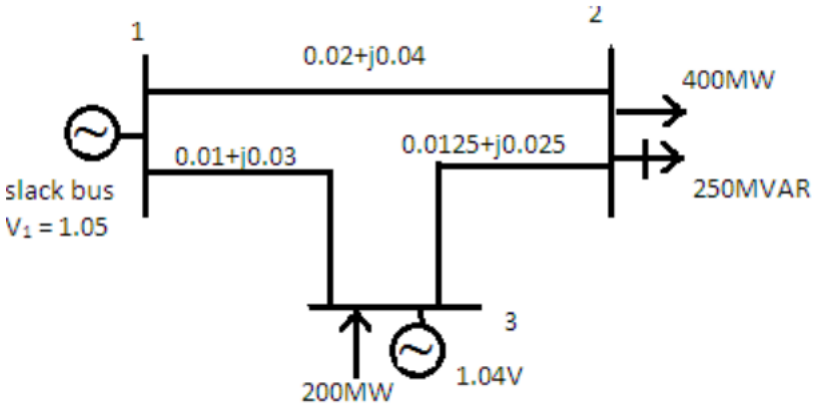
Q.No	*Questions*	*BLT*	*CO*	*Marks*
1.	Prepare the list of advantages and disadvantages of sparse matrix in power systems.	L1	1	2
2.	Use Gaussian elimination to solve the following linear system 5x +4y – z =0 10y –3z =11 z = 3	L2	1	2
3.	List the significance of PV bus.	L1	2	2
4.	At a particular bus in a power system the load complex power aggregates to (100+j50) MVA and the generator complex power to (150-j75) MVA. Calculate the bus complex power.	L2	2	2
5.	Give the application of Optimal Power Flow (OPF).	L1	3	2
6.	Define bus incremental cost.	L1	3	2
7.	Classify the various types of faults.	L2	4	2
8.	Infer Why zero sequence impedance of a transmission line is more than its sequence impedance.	L2	4	2
9.	List the method of improving the transient stability limit of a power system.	L1	5	2
10.	Differentiate: Explicit and Implicit methods of numerical integration.	L2	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No			*Questions*	*BLT*	*CO*	*Marks*
11.	a		Analyze the effects of optimal ordering schemes for preserving sparsity with the help of graphical illustration considering a four –bus system. How will you observe the sparsity by writing the mismatch equation for a four-bus system?	L4	1	16
			Or			
	b	i	Solve the following equations using bi-factorization method. Give also the factor matrices. $2I_1 + 10I_2 + I_3 = 1$ $10I_1 + 3I_2 = 1$	L4	1	8
		ii	Identify the L and U triangular factors of the symmetric matrix. $\begin{bmatrix} 2 & 1 & 3 \\ 1 & 5 & 4 \\ 3 & 4 & 7 \end{bmatrix}$	L4	1	8
12.	a		Develop the solution of power flow problem using Newton's method. Draw the detailed flow chart of power flow analysis using Newton Raphson method with PV buses also.	L3	2	16

Or

	b	Figure shows the one-line diagram of a simple three bus system with generation at bus 1. The magnitude of voltage at bus 1 is adjusted to 1.05 p.u. The scheduled loads at buses 2 and 3 are given in the diagram. Line impedances are marked in p.u on a 100MVA base and the line charging susceptances are neglected. Using the Fast decoupled load flow method calculate the phasor values of the voltages at load buses 2 and 3(PQ buses) accurate to decimal places at the end of first iteration.	L3	2	16



13.	a	Formulate the LPOPF problem for the data given below $F_1(P_1)=600+6P_1+0.002P1^2$. 70<=P1<=250MW $F_2(P_2)=220+7.3P_2+0.003P_2^2$. 70<=P2<=135MW $F_3(P_3)=100+8P_3+0.004P_3^2$. 70<=P3=<160MW Three straight line segments with break points as below Unit 1: Break Points at 70,130,180,250MW Unit 2: Break Points at 55,76,95,135MW Unit 3: Break Points at 70,80,120,160MW	L4	3	16

Or

	b	Solve the constrained problem up to the second iteration using the interior point method Maximize: $Z = 3X_1+X_2$ Subject to: $X_1+X_2 \leq 4$ Assume initial starting point [1,2] and take α =0.7;ε =0.1;γ = 0.8	L4	3	16
14.	a	A synchronous generator and synchronous motor each rated 30MVA 13.2KV and both have sub transient reactance of 20% and the line reactance of 125 on a base of machine ratings. The motor is drawing 25MW at 0.85 p.f leading. The terminal voltage is 12KV when a three phase short circuit fault occurs at motor terminals. Determine the sub transient current in generator motor and at fault point.	L3	4	16

Or

	b	Formulate the equation for fault current in terms of phase quantities for a single line to ground fault at bus “p” in a power system, with fault impedance Z_f. Also draw the sequence network connection.	L3	4	16
15.	a	Enumerate the basic assumptions commonly made in transient stability studies. Describe the step by step algorithm for solving stability analysis of multi machine system using classical synchronous generator model.	L2	5	16

Or

	b	Explain Eulers method with neat flow chart and necessary equation for a multi machine system.	L2	5	16

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