Ex/PG/ELE/PE/T/113E/2025

M.E. ELECTRICAL ENGINEERING FIRST YEAR FIRST SEMESTER EXAM 2025

SUBJECT: - POWER SYSTEM ANALYSIS

Full Marks: 100

Time: Three hours

No. of Questions	Answer any FIVE questions	Marks
(1)	Develop the power low equation in terms of nodal variables and hence formulate the load flow problem in Newton-Raphson method. Also, derive the expressions for the elements of the Jacobean matrix.	(10 +10)
(2)	Mention and justify the simplifying assumptions made in the development of Fast Decoupled load flow. Explain, how simultaneous convergence of active and reactive power equations is ensured in the Fast Decoupled load flow algorithm.	(10 +10)
(3)	Under what circumstances conventional Newton Raphson load flow may fail to converge? How the Optimum multiplier may be used to improve the convergence? Also, discuss how the Optimum multiplier may be used to find a second solution of the load flow problem.	(5+8+7)
(4)	How the Optimum Power flow is different from an ordinary power flow? Discuss about the objectives and control variables generally used in optimal power flow problem.	(5+10+5)
(5)	Why conventional load flows are not suitable for the purpose of contingency analysis? Explain how 'generation Shift factors' and line outage distribution factors may be used for contingency analysis.	(5+7+8)
(6)	Derive expression for bus voltages and line currents during faults in terms of bus impedance matrix and fault admittance matrix. Also, develop the fault admittance matrix for a line to ground fault at bus 'p' and convert it in Symmetrical component form.	(10+5+5)
(7)	Differentiate between voltage stability and angle stability problems in Power System. Define steady state, dynamic and transient stability problems. Discuss the steps to be used to solve the swing equation of a Synchronous generator connected to an infinite bus using numerical technique.	(4+6+10)