

MASTER OF ELECTRICAL ENGINEERING EXAMINATION2nd Semester, 2017**SUBJECT: - POWER SYSTEM ANALYSIS**

Time: Three hours

Full Marks: 100

		Answer any Five Questions	Marks
1)	a)	Explain the physical significance of the elements of the Bus impedance matrix of a power network.	(6)
	b)	Discuss the building up algorithm of Bus impedance matrix when a link is added with the network.	(14)
2)	a)	Derive expressions for the fault current and post fault bus voltages for a fault at bus p in terms of the bus impedance matrix and fault admittance matrix.	(10)
	b)	Develop the fault admittance matrix of the faulted bus for a double line fault if the fault impedance related to each phase is z_f .	(10)
3)	a)	Starting from the power flow equations for active and reactive power formulate the load flow problem using Newton-Raphson method.	(7)
	b)	With the help of a flowchart, explain the solution algorithm of the Newton-Raphson load flow.	(13)
4)	a)	Define the Optimum Power flow problem. Identify the control and controlled variables of the Optimum power flow problem.	(7)
	b)	Explain, how Gradient technique may be employed to solve the Optimum Power flow problem.	(13)
5)	a)	Explain the method to be followed for monitoring the security of a power system.	(4)
	b)	Why is AC load flow generally not suitable for this purpose?	(4)
	c)	How the method based on linear sensitivity analysis may be used for contingency analysis?	(12)
6)	a)	With the help of a suitable example, explain how capacity outage probabilities may be determined for the generators of a power system.	(10)
	b)	Explain, how the load data of a power system may be combined with the generation data to determine the loss of load index for the system.	(10)
7)	a)	Two 100 MW generators are having identical forced outage characteristics of $\lambda = 0.003$ /day and $r_f = 1.02$ days. What is the duration and frequency of occurrence of overlapping forced outages? What is the mean duration and frequency of 200 MW capability? Symbols have their usual meanings.	6+6

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	b)	Explain, how active power contingencies may be ranked using the method of performance index.	8
8	a)	Derive the constant Jacobian matrix of Fast Decoupled load flow from the Jacobian of the Newton_Raphson Pwer flow.	10
	b)	Discuss the method of Optimum multiplier to improve the convergence of the Newton-Raphson power flow.	10