

Enrollment No.....



Faculty of Engineering

End Sem (Even) Examination May-2022

EE6CW02 Advance Power System Theory

Programme: Ph.D.

Branch/Specialisation: EE

(Course Work)

Duration: 3 Hrs.**Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

- Q.1 i. What approximate percentage of buses in the power system are generator buses? **1**
 (a) 5 % (b) 25 % (c) 70 % (d) 10 %
- ii. Power flow equations are- **1**
 (a) Linear algebraic (b) Non-Linear algebraic
 (c) Linear Differential (d) Non-Linear Differential
- iii. The meaning of N-1 line outage is- **1**
 (a) Outage of one line (b) Outage of two lines
 (c) Outage of two transformers (d) Outage of two breakers
- iv. Real power rescheduling calculations is possible with the help of- **1**
 (a) Quantum factor (b) GSDF
 (c) Power factor (d) None of these
- v. The possible way to study thousands of possible outages is- **1**
 (a) Load flow (b) State estimation
 (c) Linear sensitivity factor (d) None of these
- vi. One of the major functions of power system security is- **1**
 (a) System monitoring (b) system dilution
 (c) System firing (d) None of these
- vii. Voltage stability is basically a problem related to- **1**
 (a) Generator stability (b) Load stability
 (c) Transformer stability (d) None of these
- viii. Which of the following leads to voltage instability? **1**
 (a) Transfer of reactive power (b) Transfer of active power
 (c) Transfer of complex power (d) Transfer of apparent power

P.T.O.

- ix. A series system has 10 components each having failure rate 0.1/yr. **1**
 The system failure rate is-
 (a) 1 (b) 2 (c) 3 (d) 4
- x. A generator has failure rate 0.01/yr. and repair rate 10/yr. **1**
 respectively. FOR will be-
 (a) 0.0001 (b) 0.001 (c) 0.01 (d) 0.1

- Q.2 i. Define the load flow problem. **2**
 ii. Explain and classify regulating transformers. **3**
 iii. Write in detail about the DC load flow procedure. **5**
 OR iv. Develop the Y bus matrix for 3-bus, 3-line systems where each transmission line having reactance $j0.2$ (p.u). **5**
- Q.3 i. Derive the general relationship for sensitivity analysis. **4**
 ii. Define and formulate for Generation Shift Distribution Factor (GSDF). **6**
 OR iii. Define and develop the expression for Compensated Shift Factor (CSF). **6**
- Q.4 i. What do you mean by power system security? Explain it. **3**
 ii. Describe different security levels with appropriate flowchart. **7**
 OR iii. Derive for the pre-contingency corrective rescheduling using linear programming. **7**
- Q.5 i. Write any four differences between voltage stability and synchronous stability. **4**
 ii. Comment on the effects of series and shunt compensation on voltage stability. Support the answer with suitable equations. **6**
 OR iii. Describe and derive for voltage stability assessment using the PV curve. **6**
- Q.6 Attempt any two: **5**
 i. Define failure rate and repair rate in detail. **5**
 ii. Explain capacity outage probability table with example. **5**
 iii. Explain loss of load probability calculations with example. **5**

Scheme of Marking



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Note: The Paper Setter should provide the answer wise splitting of the marks in the scheme below.

Q.1	i)	d) 10 %	1
	ii)	b) Non-Linear algebraic	1
	iii)	a) Outage of one line	1
	iv)	b) GSDF	1
	v)	c) Linear sensitivity factor	1
	vi)	a) System monitoring	1
	vii)	b) Load stability	1
	viii)	a) Transfer of reactive power	1
	ix)	a) 1	1
	x)	b) 0.001	1
Q.2	i.	load flow problem illustration	2
	ii.	Explain and classify	1,2
	iii.	DC load flow explanation, equations	2,3
	OR iv.	Y Bus method, result	3,2
Q.3	i.	general relationship approach, final relation	2,2
	ii.	Define and formulate	2,4
	OR iii.	Define and develop the expression	2,4
Q.4	i.	power system security explanation	3
	ii.	Flowchart, 5 different security levels explanation	2,5
	OR iii.	pre-contingency corrective rescheduling, linear programming.	2,5
Q.5	i.	Four differences	1x4

	ii.	effects of series, shunt compensation	3,3
OR	iii.	Describe and derive	2,4
Q.6			
	i.	failure rate and repair rate	2.5,2.5
	ii.	Capacity outage probability table, example	3,2
	iii.	LOLP, example	3,2
