22EEH	O108	ADVANCED POWER SYSTEM PROT	FECTION	SEME	SEMESTER			
PRERE	OUISTI	ES	CATEGORY	PEC	C	redit	3	
Power systems protection Hours/Week						P	TH	
						0	3	
Course (Objectiv	es:						
1. Ur	derstand	the concepts of advances in power system protect	tion					
2. Ar	nalyze di	gital protection of power system equipments						
3. De	sign of p	protection relays						
UNIT I						0	9	
Introduct	ion - Bl	ock diagram of numerical relay - Sampling theore	em - Correlation v	with a ret	ference	e wave -	Leas	
Error Squ	uared (L	ES) technique - Digital filtering and numerical over	er- Current protecti	ion.				
UNIT II		DIGITAL PROTECTION OF TRANSMISSI	ON LINE	9	0	0	9	
Introduct	ion - Pro	otection scheme of transmission line – Distance rel		ve relav	s - Dig	ital prot	ection	
		on fundamental signal - Hardware design - Softwa						
transmiss	sion line	based upon traveling wave phenomenon - New rel	laving scheme usi	ng amplii	tude co	ompariso	n.	
		based upon traveling wave phenomenon - New rel TTAL PROTECTION OF SYNCHRONOUS G						
transmiss UNIT II	I DIG	Based upon traveling wave phenomenon - New rel ITAL PROTECTION OF SYNCHRONOUS G INSFORMER		ng amplit 9	$\begin{bmatrix} 1 \\ 0 \end{bmatrix}$		n. 9	
UNIT II	I DIG TRA	ITAL PROTECTION OF SYNCHRONOUS G	GENERATOR &	9	0	0	9	
UNIT II	I DIG TRA	TTAL PROTECTION OF SYNCHRONOUS G ANSFORMER aults in synchronous generator - Protection so	ENERATOR & chemes for Synch	9 nronous	0 Gener	0 ator - I	9 Digita	
UNIT II Introduct protectio	I DIG TRA tion - F n of Sy	ATAL PROTECTION OF SYNCHRONOUS G ANSFORMER aults in synchronous generator - Protection so nchronous Generator - Faults in a Transformer	ENERATOR & chemes for Synch	9 nronous	0 Gener	0 ator - I	9 Digita	
UNIT II Introduct protectio	I DIG TRA tion - F n of Sy	TTAL PROTECTION OF SYNCHRONOUS G ANSFORMER aults in synchronous generator - Protection so	ENERATOR & chemes for Synch	9 nronous	0 Gener	0 ator - I	9 Digita	
UNIT II Introduct protectio	I DIG TRA tion - F n of Sy rotection	ATAL PROTECTION OF SYNCHRONOUS G ANSFORMER aults in synchronous generator - Protection so nchronous Generator - Faults in a Transformer	GENERATOR & chemes for Synch - Schemes used	9 nronous for Trans	0 Gener sforme	0 ator - I er Protec	9 Digita	
UNIT II Introduct protectio Digital P	I DIG TRA tion - F n of Sy rotection	ATAL PROTECTION OF SYNCHRONOUS G ANSFORMER Faults in synchronous generator - Protection so nchronous Generator - Faults in a Transformer n of Transformer.	GENERATOR & chemes for Synch - Schemes used	9 nronous	0 Gener	0 ator - I	9 Digita	
UNIT II Introduct protectio Digital P UNIT IV	I DIG TRA ion - F n of Sy rotection	ATAL PROTECTION OF SYNCHRONOUS G ANSFORMER Faults in synchronous generator - Protection so nchronous Generator - Faults in a Transformer of Transformer. DISTANCE AND OVERCURRENT RELAY CO-ORDINATION	SENERATOR & chemes for Synch - Schemes used : SETTING AND	9 nronous for Trans 9	0 Gener sforme	0 ator - I er Protec 0	9 Digita etion 9	
UNIT II Introduct protectio Digital P UNIT IV Directior	I DIG TRA ion - F n of Sy rotection	TAL PROTECTION OF SYNCHRONOUS G ANSFORMER aults in synchronous generator - Protection so nchronous Generator - Faults in a Transformer n of Transformer. DISTANCE AND OVERCURRENT RELAY	SENERATOR & chemes for Synch - Schemes used : SETTING AND ulti-Zone distance	9 for Trans 9 relay - I	0 Gener sforme 0 Distanc	0 ator - I er Protec 0 er relay s	9 Digita etion 9 settin	
UNIT II Introduct protectio Digital P UNIT IV Direction - Co-ord	I DIG TRA ion - F n of Sy rotection al instantiation	ATAL PROTECTION OF SYNCHRONOUS G ANSFORMER aults in synchronous generator - Protection so nchronous Generator - Faults in a Transformer of Transformer. DISTANCE AND OVERCURRENT RELAY CO-ORDINATION ntaneous IDMT over current relay - Directional m	SENERATOR & chemes for Synch - Schemes used : SETTING AND ulti-Zone distance nt relays - Compu	9 for Trans 9 relay - I uter grap	0 Gener sforme 0 Distanc	0 ator - I er Protec 0 ce relay s isplay -	9 Digita tion 9 settin Man	
UNIT II Introduct protectio Digital P UNIT IV Direction - Co-ord	I DIG TRA ion - F n of Sy rotection al instantiation	ATAL PROTECTION OF SYNCHRONOUS G ANSFORMER Faults in synchronous generator - Protection so nchronous Generator - Faults in a Transformer n of Transformer. DISTANCE AND OVERCURRENT RELAY CO-ORDINATION Intaneous IDMT over current relay - Directional million of distance relays - Co-ordination of over current	SENERATOR & chemes for Synch - Schemes used : SETTING AND ulti-Zone distance nt relays - Compu	9 for Trans 9 relay - I uter grap	0 Gener sforme 0 Distanc	0 ator - I er Protec 0 ce relay s isplay -	9 Digita tion 9 settin Man	
UNIT II Introduct protectio Digital P UNIT IV Direction - Co-ord	I DIG TRA ion - F n of Sy rotection al instantiation	ATAL PROTECTION OF SYNCHRONOUS G ANSFORMER Faults in synchronous generator - Protection so nchronous Generator - Faults in a Transformer n of Transformer. DISTANCE AND OVERCURRENT RELAY CO-ORDINATION Intaneous IDMT over current relay - Directional million of distance relays - Co-ordination of over current	SENERATOR & chemes for Synch - Schemes used : SETTING AND ulti-Zone distance nt relays - Compu- rer system - Applic	9 for Trans 9 relay - I uter grap ation of e	0 Gener sforme 0 Distanc phics d compu	0 ator - I er Protec 0 ee relay s isplay - ter graph	9 Digita etion 9 settin Mar nics.	
UNIT II Introduct protectio Digital P UNIT IV Directior - Co-ord machine	I DIG TRA ion - F n of Sy rotection al instantiation	AITAL PROTECTION OF SYNCHRONOUS G ANSFORMER Faults in synchronous generator - Protection so Inchronous Generator - Faults in a Transformer In of Transformer. DISTANCE AND OVERCURRENT RELAY CO-ORDINATION Intaneous IDMT over current relay - Directional must of distance relays - Co-ordination of over current esubsystem - Integrated operation of national power	SENERATOR & chemes for Synch - Schemes used : SETTING AND ulti-Zone distance nt relays - Compu- rer system - Applic	9 for Trans 9 relay - I uter grap	0 Gener sforme 0 Distanc	0 ator - I er Protec 0 ce relay s isplay -	9 Digita etion 9 settin Mar	
UNIT II Introduct protectio Digital P UNIT IV Directior - Co-ord machine UNIT V	I DIG TRA ion - F n of Sy rotection nal instan ination of interface	ANSFORMER aults in synchronous generator - Protection some chronous Generator - Faults in a Transformer of Transformer. DISTANCE AND OVERCURRENT RELAY CO-ORDINATION Intaneous IDMT over current relay - Directional must of distance relays - Co-ordination of over current e subsystem - Integrated operation of national pow PC APPLICATIONS FOR DESIGNING PRO	SENERATOR & chemes for Syncl - Schemes used : SETTING AND ulti-Zone distance nt relays - Compu- rer system - Applic DTECTIVE	9 for Trans 9 relay - I uter grap ation of o	0 Gener sforme 0 Distanc hics d compu	0 ator - I er Protec 0 er relay s isplay - ter graph 0	9 Digitation 9 settin Marnics. 9	
UNIT II Introduct protectio Digital P UNIT IV Directior - Co-ord machine UNIT V Types of	I DIG TRA ion - F n of Sy rotection al instan ination of interface	ATAL PROTECTION OF SYNCHRONOUS G ANSFORMER aults in synchronous generator - Protection sc nchronous Generator - Faults in a Transformer n of Transformer. DISTANCE AND OVERCURRENT RELAY CO-ORDINATION ntaneous IDMT over current relay - Directional mitor of distance relays - Co-ordination of over current e subsystem - Integrated operation of national pow PC APPLICATIONS FOR DESIGNING PRO RELAYING SCHEME	SENERATOR & chemes for Synch - Schemes used : SETTING AND ulti-Zone distance nt relays - Compu- rer system - Applic OTECTIVE C studies - PC base	9 rronous for Trans 9 relay - I uter grap ation of of 9 ed integra	0 Gener sforme 0 Distanc hics d compu 0 ated sc	0 ator - I er Protec 0 ee relay s isplay - ter graph 0 oftware f	9 Digita ttion 9 eettin Mar nics. 9	
UNIT II Introduct protectio Digital P UNIT IV Directior - Co-ord machine UNIT V Types of studies -	I DIG TRA ion - F n of Sy rotection mal instar ination of interface	ITAL PROTECTION OF SYNCHRONOUS G ANSFORMER 'aults in synchronous generator - Protection sc nchronous Generator - Faults in a Transformer n of Transformer. DISTANCE AND OVERCURRENT RELAY CO-ORDINATION ntaneous IDMT over current relay - Directional mitor of distance relays - Co-ordination of over current e subsystem - Integrated operation of national pow PC APPLICATIONS FOR DESIGNING PRO RELAYING SCHEME Assumptions - Development of algorithm for SC	SENERATOR & chemes for Synch - Schemes used : SETTING AND ulti-Zone distance nt relays - Compu- rer system - Applic OTECTIVE C studies - PC base	9 rronous for Trans 9 relay - I uter grap ation of of 9 ed integra	0 Gener sforme 0 Distanc hics d compu 0 ated sc	0 ator - I er Protec 0 ee relay s isplay - ter graph 0 oftware f	9 Digita ttion 9 eettin Mar nics. 9	

Text H	Books:							
1.	L. P. Singh, "Digital Protection - Protective Relaying from Electromechanical to Microprocessor", New							
1.	Age International Ltd., New Delhi, Second Edition, 2006							
2.	S. R. Bhide, "Digital Power System Protection", Prentice Hall of India Pvt. Ltd., New Delhi, 2014							
3.	Paithankar and Bhide, "Fundamentals of Power System Protection", Prentice Hall of India Pvt. Ltd., New							
5.	Delhi, second edition, 2010.							
Refere	ence Books:							
1.	Paithankar, "Transmission Network Protection", Marcel & Dekker, New York, 1998							
2.	Stanley Horowitz, "Protective Relaying for Power System II", John Wiley & Sons, 2008.							
E-Ref	erence							
1	https://nptel.ac.in/courses/108101039							

Course C	Jute	comes:	Bloom's Taxonomy				
Upon con	nple	etion of this course, the students will be able to:	Mapped				
CO1	:	To understand the numeric protection	L2: Understanding				
CO2	:	To design the digital protection of transmission line	L1: Applying				
CO3	:	To design the digital protection of synchronous generator	L4: Analysing				
CO4	:	To design the digital protection relays	L5: Evaluating				
CO5	:	To study the pc based digital protection relays	L2: Understanding				

COs/	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PS	PS	PS
POs	1	2	3	4	5	6	7	8	9	10	11	12	01	02	03
CO1	1	1	1	1	1	1	1	1			1		1	1	1
CO2	1	3	3	2	2	1	2	1	1		1		1	1	1
CO3	1	2	2	2	2	1	2	1	1		1		1	1	1
CO4	1	3	2	2	2	1	2	1	1		1		1	1	1
CO5	1	2	3	2	2	1	2	1	1		1		1	1	1
Avg	1	2.2	2.2	1.8	1.8	1	1.8	1	1	0	1	0	1	1	1