POWER SYSTEM-II LAB

Equipment Details:

	ITEM DESCRITPION	QTY
01.	**Determination of Equivalent circuit of a 3 Winding Transformer:** *CONTROL PANEL:* Consists of a Panel Closed type with front Hylam sheet size 2ft ht x 4 ft wd x 200mm depth. with on board MCB, Power Indicators lamp ,BTI-30 terminals, Voltmeter(0-300V-2no),Ammeter(0-10A),UPF Wattmeter(500V/5A-2nos), LPF Wattmeter(500V/5A-01 no)	01
	3Ph, 3Winding 2.2KVA Transformer *(P-400V in Star. S-200V in Star, T-80V in Delta.)*	01
	3Ph. @10A Auto Transformer Closed Type	01
02.	Determination of sequence Impedances of a Cylindrical Rotor Synchronous Machine. CONTROL PANEL: Consists of a Panel Closed type with front Hylam sheet. Panel size 2ft ht x 4 ft wd x 200mm depth. With on board MCB, Power Indicators lamp, BTI-30 terminals, fuse Protection, DC3 Point Starter, Voltmeter(500VAC),Voltmeter(300VDC),Ammeter(20ADC-2no), Ammeter(5AAC), 1Ph.Variac@6A, and Excitation Unit.	01
	MACHINES:5HP DC Shunt Motor coupled to 3KW Alternator (Cylindrical Rotor Type,6 Terminal)	01
03.	Fault analysis of 3 phase Alternator(LG, LL, LLG, LLLG faults): CONTROL PANEL: Consists of a Panel Closed type with front Hylam sheet. Panel size 2ft ht x 4 ft wd x 200mm depth. with on board MCB, Power Indicators lamp ,BTI-30 terminals, 3 Point Starter, Voltmeter(500VAC), Voltmeter(300VDC),Ammeter(20ADC-2no), Ammeter(5AAC) ,1Ph.Variac@6A and Excitation Unit.	01
	MACHINES:5HP DC Shunt motor coupled to 3KW Alternator (Cylindrical Rotor Type,6 Terminal)	01
04.	Determination of Sub-transient reactance`s of Salient Pole Synchronous Machine : CONTROL PANEL: Consists of a Panel Closed type with front Hylam sheet. Panel size 2ft ht x 4 ft wd x 200mm depth. with on board MCB, Power Indicators lamp ,BTI-30 terminals, 3 Point Starter, Voltmeter(500VAC), Voltmeter(300VDC),Ammeter(20ADC-1no), Ammeter(5AAC) ,Phase sequence meter.	01
	MACHINES:5HP DC Shunt motor coupled to 3KW salient Pole Alternator	01
	3Ph. @10A Auto Transformer Closed Type	01
	Rheostate-390Ω/1.2A	01

05.	**Determination of Positive, Negative and zero sequence reactance of 3 ph Transformers using sequence current excitation fault calculation**: *CONTROL PANEL:* Consists of a Panel Closed type with front Hylam sheet. Panel size 2ft ht x 4 ft wd x 200mm depth. with on board MCB, Power Indicators lamp ,BTI-30 terminals, Voltmeter(0-500V-2no),Ammeter(0-5A-2no)	01
	3 Ph. 2KVA, 400V/200 V Star-Delta Transformer	01
	3Ph. @10A Auto Transformer Closed Type	01
06.	**Characteristics of IDMT Over Current Relay (Electro Mechanical Type):** *CONTROL PANEL:* Consists of a Panel Closed type with front Hylam sheet, Panel size 2ft ht x 4 ft wd x 200mm depth with on board MCB, Power Indicators lamp ,BTI-30 terminals, Electro Mechanical Type Relay-Alstom,1Ph.Variac@8A.Current Injecting Transformer@25A,Current controlling Choke@ 22A, Standard Class1 CT 20/5A,Ammeter(0-30A),CT-30/5A,Stopwatch, 4 Pole @16A Contactor with Push to ON and Push to OFF.	01
07.	**Characteristics of Percentage biased of Electro Magnetic differential Relay(Electro Mechanical Type):** *CONTROL PANEL:* Consists of a Panel Closed type with front Hylam sheet. Panel size 2ft ht x 4 ft wd x 200mm depth. with on board MCB, Power Indicators lamp ,BTI-30 terminals, Standard CT-10/5A-3nos, Standard CT-5/5A- 3nos,12Vto24V DC@5A,Ammeter(0-5A AC-7nos), Voltmeter (0 -500VAC-2nos), 4 Pole@16AContactor with Push to ON and push to OFF contacts,% biased of Electro Magnetic differential Relay*(*Alstom***).** Differential relay consists of operating coil and restraining coil in Electro Magnetic Relay. The differential relay is adjustable 20%, 30% and 40%.	01
	3Ph., @10A Auto Transformer Closed Type	01
	3Ph., 3KVA, 400V/200V Star/ Star Transformer	01
	3 Ph. Resistive Load Bank for % Biased Differential Sequence relay	01
08.	**Characteristics of UV/OV Static Relay(Static Type):** *CONTROL PANEL:* Consists of a Panel Closed type with front Hylam sheet, Panel size 2ft ht x 4 ft wd x 200mm depth with on board MCB, Power Indicators lamp ,BTI-30 terminals, Microprocessor based Static UV/OV Relay ***(L&T),***1Ph.Variac@6A,Transformer-230V/320V@50mA,Voltmeter(0- 400VAC), Digital Stopwatch, 4 Pole@16AContactor with Push to ON and Push to OFF	01
09.	**Characteristics of Static Negative Sequence Relay(Static):** *CONTROL PANEL:* Consists of a Panel Closed type with front Hylam sheet. Panel size 2ft ht x 4 ft wd x 200mm depth. with on board MCB, Power Indicators lamp ,BTI-30 terminals, Static Negative Sequence Relay ***(ALSTOM),*** 1Ph.Variac@8A-3nos, standard CT-5/5A-3nos,Voltmeter(0-500VAC-2no), Ammeter(0-10AAC -3nos),	01
	3 Ph., 1.5KVA, 400V/100V- Delta/Star Transformer	01
	3 Ph. Resistive Load Bank for Negative Sequence relay	01

10.	**Performance and Testing of 3Ph.Transformer Protection.** *CONTROL PANEL:* Consists of a Panel Closed type with front Hylam sheet. Panel size 2ft ht x 4 ft wd x 200mm depth, , with on board MCB, Power Indicators lamp ,BTI-30 terminals, Over Current-2no,Earth Fault Relay-1no (Electro Mechanical type),Standard CT-10/2A- 3nos,Ammeter(0-5AAC-4nos), Voltmeter(0-500VAC-2no). Input supply will be taken from any one of the Alternators.	01
	3 Ph. Resistive Load Bank for Generator/3Ph.Transformer Protection relay	01
	3 Ph., 1.5KVA, 400V/100V Delta/Star Transformer	01
	3Ph., @10A Auto Transformer Closed Type	01
11.	**Performance and Testing of Transmission line** **Model 220KV/ 400Km Model.** *CONTROL PANEL:* A) Determine Efficiency and Regulation of 3 phase Transmission Line model . B) Fault analysis (LL,LG, LLL) of Transmission lines. C) Determination of ABCD Parameters of short, medium and long lines. Consists of a Panel Closed type with front Hylam sheet. Panel size 2ft ht x 8 ft wd x 200mm depth. with on board MCB, Power Indicators lamp ,BTI-30 terminals, Inductor value:0.006mH/km Capacitor value: .025 mfd/ Km, Voltmeter(0-500VAC-2nos), Ammeter(0-10AAC-2nos), Wattmeter(500V/10A-4nos). LPF Wattmeter is required to conduct ABCD Parameters.	01
	3Ph.@10A Auto Transformer Closed Type	01
	3 Ph.@ 5A Resistive Load Bank,6 steps	01
12.	**Differential Protection on Single Phase Transformer(Electro Mechanical):** *CONTROL PANEL:* Consists of a Panel Closed type with front Hylam sheet. Panel size 2ft ht x 4 ft wd x 200mm depth, with on board MCB, Power Indicators lamp ,BTI-30 terminals, Electro Mechanical Type Relay- Alstom ,1Ph.Variac@10, Standard CT 10/5A,Standard CT 10/5A, Voltmeter(0-500VAC-2nos), Ammeter(0-20AAC-4nos).	01
	1Ph. 2KVA, 230V/150V Transformer	01
	1Ph. Resistive Load Bank for Differential Protection on 1Ph.Transformer relay	01
13.	**Generator Protection – Merz price protection scheme study panel**: 5 Hp 3 phase induction motor coupled to 3.5 KVA, 3Φ/415V alternator setup, AC drive -3ph. @ 5 hp for AC motor, Schnider make Multifunction numerical Relay Model P 127with associated meters and controls.	01
14.	**Feeder protection scheme – fault study panel: -** The protection panel consists of 4 zone feeder simulated using aircore inductors. 4 nos overload / Earth fault relays.	01
15.	RECTIFIER UNIT: AC INPUT 3phase, 440V, DC OUTPUT 220V, 100A,(Static Model)	01

List of experiments:

1. Determination of Equivalent circuit of a 3-windingtransformer.
2. Determination of sequence impedances of a cylindrical rotor synchronous machine.
3. Fault Analysis of a 3phaseAlternator, (LG, LL, LLG, LLLG faults).
4. Determination of Sub-transient reactance`s of Salient Pole Synchronous Machine.
5. Determination of Positive, Negative and zero sequence reactance of 3 ph Transformers.
6. IDMT Characteristics of Over Current Relay
7. Characteristics of Percentage biased of Static/Electro Magnetic differential Relay
8. Characteristics of Static Relay UV/OV 7052B/7053B.
9. Characteristics of Static Negative Sequence Relay 7055B.
10. Performance and Testing of Generator/Transformer Protection System.
11. Performance and Testing of Transmission line Model 220KV/ 400Km.
12. Differential Protection on Single Phase Transformer.