

Government Polytechnic Nayagarh

Semester: 4th Diploma (Electrical Engineering)

Session: 2021-22 Subject:

Measurement and Instrumentation, (Theory)

Branch: Electrical Engineering

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Course Objective: This is the foundation course to all the major branches. This subject will focus upon principles, the techniques to study, analysis and solve the behavior of all types of electrical circuits.

Weeks	Period No.	Topics to be Covered
Chapter-1		
Week-1	1	Define Accuracy, precision, Errors, Resolutions Sensitivity and tolerance.
	2	Classifications of instruments
	3	Explain Deflecting, controlling in indicating type of instruments .
	4	Damping arrangements in indicating type of instruments, Calibration of instruments.
Chapter-2		
Week-2	5	PMMC method of V/I .AC/DC .Measurement; why suitable for DC?
	6	Construction, principle of operation, errors, ranges merits and demerits
	7	MI type instrument of V/I - AC/DC Measurement;
Week-3	8	why suitable for AC/ DC both.Errors in Measurement of AC variables
	9	Dynamometer type instruments, construction
	10	Operation of dynamometer type instrument and mathematical analysis.
	11	use of above methods as an ammeter, as avoltmeter
Week-4	12	Rectifier type instruments , principle of operation, errors, ranges merits and demerits
	13	Induction type instruments
	14	Extend the range of instruments by use of shunts and Multipliers.
Chapter-3		
Week-5	15	Electrodynamometer type wattmeter ,why suitable for AC/ DC both.
	16	LPF wattmeter , construction and analysis
	17	UPF wattmeter ,construction and analysis
	18	The Errors in Dynamometer type wattmeter
Week-6	19	Methods of their correction
	20	Discuss Induction type watt meters
	21	Construction, Working principle of watt meter
	22	Torque Equation of watt meter
Chapter-4		
Week-7	23	Errors in measurement; Introduction to Energy meter
	24	Energy meter: Basic principle
	25	Single Phase Induction type Energy meters
	26	construction, working principle of single phase induction meter
Week-8	27	compensation & adjustments of single phase induction meter.
	28	Testing of Energy Meters.
	29	Calibration of wattmeter, energy meter
	30	Measurement of active and reactive powers in balanced and unbalanced systems.
Chapter-5		
Week-9	31	Basic concept of Tachometers. Types and working principles of tachometer.
	32	Principle of operation and block digram
	33	Definition of frequency meter. Type of frequency meter

	34	Principle of operation and construction of Mechanical
Week-10	35	Principle of operation and construction of Electrical
	36	Principle of operation and working of Dynamometer type single phase .
	37	Principle of operation and working of Dynamometer type three phase power factor meters.
	38	Mathematical analysis of both type of power factor meter.
Chapter-6		
Week-11	39	Measurement of low resistance by potentiometer method
	40	Measurement of medium resistance by wheat Stone bridge method.
	41	Measurement of high resistance by loss of charge method.
	42	Construction, principle of operations of Megger
Week-12	43	Construction, principle of operations of Earth tester for insulation resistance and earth resistance measurement respectively
	44	Construction and principles of Multimeter.
	45	Measurement of inductance by Maxewell's Bridge method
	46	Measurement of capacitance by Schering Bridge method
Week-13	47	Phasor diagram of Schering Bridge method
	Chapter-7	
	48	Define Transducer, sensing element or detector element and transduction elements
	49	Classify transducer. Give examples of various class of transducer
Week-14	50	Linear and angular motion potentiometer
	51	Thermistor and Resistance thermometers
	52	Wire Resistance Strain Gauges
	53	Principle of linear variable differential Transformer (LVDT) ,Uses of LVDT.
Week-15	54	General principle of capacitive transducer.
	55	Variable area capacitive transducer
	56	Change in distance between plate capacitive transducer
	57	Piezo electric Transducer with their applications
	58	Hall Effect Transducer with their applications
Chapter-8		
Week-16	59	Principle of operation of Cathode Ray Tube.
	60	Principle of operation of Oscilloscope (with help of block diagram).
	61	Measurement of DC Voltage & current
	62	Measurement of AC Voltage, current, phase & frequency

Text Book

1. A.K. Sawhney: "A Course in Electrical and Electronic Measurements and Instrumentation", 18th Edition, Dhanpat Rai Publications, 2001.

Reference Book

1. Albert D.Helfrick and William D.Cooper "Modern Electronic Instrumentation and Measurement Techniques", Prentice Hall of India, 2007.
 2. Copper D, "Electronic Instrumentation and Measurement Techniques", II Edition, PHI, 1978. 3. James W. Dally, William F. Riley, Kenneth G. McConnell, "Instrumentation for Engineering Measurements", 2nd Edition, John Wiley, 2003.

Signature of faculty

Signature of HOD

