

**GOVERNMENT POLYTECHNIC KORAPUT  
DEPARTMENT OF ELECTRICAL ENGINEERING**

**Th3. ELECTRICAL MEASUREMENT & INSTRUMENTATION**

Name of the Course: Diploma in Electrical Engineering			
Faculty: S Biehiballi	Semester duration: 10/03/2022 to 10/06/2022		
Course code:		Semester	4 <sup>th</sup>
Total Period:	75 (60L + 15T)	Examination	3 hrs
Theory periods:	4P / week	Internal Assessment:	20
Tutorial:	1 P / week	End Semester Examination:	80
Maximum Marks:	100		

**VISION:**

To create competent & industry ready Electrical Diploma Engineers with professional and social values to meet future challenges.

**MISSION:**

- To prepare diploma holders through "qualitative competency based education system" to compete with national requirement along with core values.
- To produce dynamic Electrical Engineers to serve the society and industry.
- To develop leadership qualities, communication skills, critical thinking and attitude for lifelong learning.

**PROGRAM EDUCATIONAL OBJECTIVES:**

PEO1	Apply technical knowledge and skills learned in the field of Electrical Engineering to excel in Professional and/or higher education.
PEO2	To provide students an excellent academic environment and make them aware the needs of Society and Industry to become a successful Professional/Entrepreneur.
PEO3	To engage in lifelong learning, career enhancement to adopt emerging technologies

**COURSE OUTCOMES:**

CO1	Understand principles of operations of various measuring instruments for measurement of voltage, current, power, power factor, frequency etc.
CO2	Define transducers and classify them according to their working principles.
CO3	Describe operating principle of CRO and trace waveforms.
CO4	Recommend electrical instruments for their applications in real life.

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**TOPIC WISE DISTRIBUTION OF PERIODS**

Sl. No.	Topics	Periods
1.	Measuring instruments	05
2.	Analog ammeters and voltmeters	10
3.	Wattmeter and measurement of power	08
4.	Energy meters and measurement of energy	08
5.	Measurement of speed, frequency and power factor	07
6.	Measurement of Resistance, Inductance & Capacitance	08
7.	Sensors And Transducer	09
8.	Oscilloscope	05
<b>Total</b>		<b>60</b>

**LESSON PLAN**

Week	Day	Theory topic
1 <sup>st</sup>	1 <sup>st</sup>	<b>Measuring instruments:</b> Define Accuracy, precision, Errors, Resolutions Sensitivity and tolerance.
	2 <sup>nd</sup>	Classification of measuring instruments.
	3 <sup>rd</sup>	Explain Deflecting, controlling and damping arrangements in indicating type of instrument
	4 <sup>th</sup>	Calibration of instruments.
2 <sup>nd</sup>	1 <sup>st</sup>	Problem solving.
	2 <sup>nd</sup>	<b>Analog ammeters and voltmeters:</b> Describe Construction, principle of operation, errors, ranges merits and demeritsof: Moving Iron type instrument.
	3 <sup>rd</sup>	Describe Construction, principle of operation, errors, ranges merits and demeritsof: Moving Iron type instrument.
	4 <sup>th</sup>	Describe Construction, principle of operation, errors, ranges merits and demeritsof: Permanent Magnet Moving coil type instruments.
3 <sup>rd</sup>	1 <sup>st</sup>	Describe Construction, principle of operation, errors, ranges merits and demeritsof: Permanent Magnet Moving coil type instruments.
	2 <sup>nd</sup>	Describe Construction, principle of operation, errors, ranges merits and demeritsof: Dynamometer type instruments
	3 <sup>rd</sup>	Describe Construction, principle of operation, errors, ranges merits and demeritsof: Rectifier type instruments
	4 <sup>th</sup>	Describe Construction, principle of operation, errors, ranges merits and demeritsof: Induction type instruments
4 <sup>th</sup>	1 <sup>st</sup>	Extend the range of instruments by use of shunts and Multipliers.
	2 <sup>nd</sup>	Problem solving.
	3 <sup>rd</sup>	Problem solving.
	4 <sup>th</sup>	<b>Wattmeters and measurement of power:</b> Describe Construction, principle of working of Dynamometer type wattmeter. (LPF and UPF type)
5 <sup>th</sup>	1 <sup>st</sup>	Describe Construction, principle of working of Dynamometer type wattmeter. (LPF and UPF type)
	2 <sup>nd</sup>	Describe Construction, principle of working of Dynamometer type wattmeter. (LPF and UPF type)
	3 <sup>rd</sup>	The Errors in Dynamometer type wattmeter and methods of their correction.

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6 <sup>th</sup>	4 <sup>th</sup>	The Errors in Dynamometer type wattmeter and methods of their correction.
	1 <sup>st</sup>	The Errors in Dynamometer type wattmeter and methods of their correction.
	2 <sup>nd</sup>	Discuss Induction type watt meters.
	3 <sup>rd</sup>	Previous year questions discussion.
7 <sup>th</sup>	4 <sup>th</sup>	<b>Energymeter and measurement of energy:</b> Introduction
	1 <sup>st</sup>	Single Phase Induction type Energy meters – construction.
	2 <sup>nd</sup>	Single Phase Induction type Energy meters – working principle.
	3 <sup>rd</sup>	Single Phase Induction type Energy meters – compensations.
	4 <sup>th</sup>	Single Phase Induction type Energy meters – adjustments.
8 <sup>th</sup>	1 <sup>st</sup>	Testing of Energy Meters.
	2 <sup>nd</sup>	Testing of Energy Meters.
	3 <sup>rd</sup>	Previous year questions discussion.
	4 <sup>th</sup>	<b>Measurement of speed, frequency and power factor:</b> Tachometers, types and working principles
9 <sup>th</sup>	1 <sup>st</sup>	Tachometers, types and working principles
	2 <sup>nd</sup>	Principle of operation and construction of Mechanical and Electrical resonance Type frequency meters.
	3 <sup>rd</sup>	Principle of operation and construction of Mechanical and Electrical resonance Type frequency meters.
	4 <sup>th</sup>	Principle of operation and working of Dynamometer type single phase power factor meter.
10 <sup>th</sup>	1 <sup>st</sup>	Principle of operation and working of Dynamometer type threephase power factor meter.
	2 <sup>nd</sup>	Previous year questions discussion.
	3 <sup>rd</sup>	<b>Measurement of resistance, inductance &amp; capacitance:</b> Classification of resistance. Measurement of low resistance by potentiometer method.
	4 <sup>th</sup>	Measurement of medium resistance by wheat Stone bridge method.
11 <sup>th</sup>	1 <sup>st</sup>	Measurement of high resistance by loss of charge method.
	2 <sup>nd</sup>	Construction, principle of operations of Megger
	3 <sup>rd</sup>	Earth tester for insulation resistance and earth resistance measurement respectively.
	4 <sup>th</sup>	Construction and principles of Multimeter. (Analog and Digital)
12 <sup>th</sup>	1 <sup>st</sup>	Measurement of inductance by Maxwell's Bridge method.
	2 <sup>nd</sup>	Measurement of capacitance by Schering Bridge method
	3 <sup>rd</sup>	<b>Sensors and Transducers:</b> Define Transducer, sensing element or detector element and transduction elements.
	4 <sup>th</sup>	Classify transducer. Give examples of various class of transducer.
13 <sup>th</sup>	1 <sup>st</sup>	Resistive transducer Linear and angular motion potentiometer.
	2 <sup>nd</sup>	Thermistor and Resistance thermometers. Wire Resistance Strain Gauges.
	3 <sup>rd</sup>	Inductive Transducer.
	4 <sup>th</sup>	Principle of linear variable differential Transformer (LVDT), Uses of LVDT.
14 <sup>th</sup>	1 <sup>st</sup>	Capacitive Transducer. General principle of capacitive transducer.
	2 <sup>nd</sup>	Variable area capacitive transducer. Change in distance between plate capacitive transducer.
	3 <sup>rd</sup>	Piezoelectric Transducer and Hall Effect Transducer with their applications.
	4 <sup>th</sup>	<b>Oscilloscope:</b> Principle of operation of CRT.
15 <sup>th</sup>	1 <sup>st</sup>	Principle of operation of Oscilloscope (with the help of block diagram).
	2 <sup>nd</sup>	Measurement of DC Voltage & current.
	3 <sup>rd</sup>	Measurement of AC Voltage & current.
	4 <sup>th</sup>	Measurement of phase & frequency.

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10/03/22

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