Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER– VII EXAMINATION – SUMMER 2026

Subject Code:3160915 Date:22-05-2026

Subject Name:Electrical Measurement and Measuring Instruments

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Describe different types of systematic errors.	**03**
	(b)	Explain various dynamic characteristics of a measurement system in brief.	**04**
	(c)	For a measuring system, explain these static characteristics: 1) Precision and Accuracy; 2) Sensitivity; 3) Linearity.	**07**
Q.2	**(a)**	Discuss in brief the working principle and materials for thermocouple.	**03**
	(b)	Give classification of transducers.	**04**
	(c)	Discuss the measurement of displacement using capacitive transducer.	**07**
		OR	
	(c)	Explain measurement of speed using hall effect transducer and variable reluctance transducer.	**07**
Q.3	**(a)**	Explain the role of shunts in extending the range of ammeters.	**03**
	(b)	Discuss application of strain gauge for pressure measurement.	**04**
	(c)	Explain construction and working principle of electrodynamometer type wattmeter.	**07**
		OR	
Q.3	**(a)**	1) Why moving iron instruments can be used with both a.c. and d.c.?	**02**
		2) Why the scale is non-uniform in moving iron instruments?	**01**
	(b)	Discuss position sensing using optical encoder.	**04**
	(c)	Explain construction and working principle of Single-phase induction type energy meter.	**07**
Q.4	**(a)**	Explain the basic working principle of power factor meter.	**03**
	(b)	Discuss use of Wheatstone Bridge for measurement of medium resistance.	**04**
	(c)	Draw relevant circuit and phasor diagrams and explain measurement of self inductance using Hay's Bridge.	**07**
		OR	
Q.4	**(a)**	Explain working principle of LCR meter.	**03**
	(b)	Discuss the difficulties encountered in measurement of high resistance.	**04**
	(c)	Draw relevant circuit and phasor diagrams and explain measurement of capacitance using Schering Bridge.	**07**

Q.5	**(a)**	Draw neat diagram showing essential parts of Megger.	**03**
	(b)	Discuss the role of instrument transformers in extending range of current and voltage measuring instruments.	**04**
	(c)	Enlist various types of DVM and explain any one in detail with the help of suitable block diagram.	**07**

OR

Q.5	**(a)**	Explain the construction and working of Clamp on meter.	**03**
	(b)	Draw the block diagram of digital multimeter and explain in brief.	**04**
	(c)	Draw & explain block diagram of Digital storage oscilloscope.	**07**

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Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI EXAMINATION – SUMMER 2025

Subject Code: 3160915 Date: 22-05-2025

Subject Name: Electrical Measurement and Measuring Instruments

Time: 10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Explain principle and construction of Thermocouple.	**03**
	(b)	Explain (i) Active and Passive transducers (ii) Transducers and Inverse transducers with suitable examples.	**04**
	(c)	State and Explain Static characteristics of measuring Instruments.	**07**
Q.2	**(a)**	State methods for measurements of low resistances. Explain any one in detail.	**03**
	(b)	Explain loss of charge method of measurement of high resistance.	**04**
	(c)	Explain measurement of unknown capacitance with the help of Schering bridge. Also draw phasor diagram.	**07**
		OR	
	(c)	Explain working of Kelvin's double bridge for measurement of low resistance with a neat diagram.	**07**
Q.3	**(a)**	Explain pressure sensing devices.	**03**
	(b)	Describe the various types of errors in the measurement system.	**04**
	(c)	Describe the working principle of Hall effect transducers. Also state its applications.	**07**
		OR	
Q.3	**(a)**	What are the criteria for selection of the transducer?	**03**
	(b)	Explain instrument range extended by Instrument Transformers.	**04**
	(c)	Describe constructions and operating principles of electrodynamometer type wattmeter.	**07**
Q.4	**(a)**	What is the basic working principle of moving iron instruments?	**03**
	(b)	Draw & explain construction of PMMC instruments.	**04**
	(c)	Explain measurement of unknown inductance with the help of Hay's bridge. Also draw phasor diagram.	**07**
		OR	
Q.4	**(a)**	What are the forces or torque required for the operation of the measuring Instruments?	**03**
	(b)	Explain instrument used for the measurement of power factor.	**04**
	(c)	Explain any one transducer used for measurement of Displacement.	**07**
Q.5	**(a)**	State transducers used for measurement of Capacitance. Explain any one.	**03**
	(b)	Explain Clamp on meter.	**04**
	(c)	Explain construction and working principle of Megger.	**07**
		OR	
Q.5	**(a)**	Draw circuit diagram of Maxwell's Inductance bridge.	**03**
	(b)	Explain different types of digital display.	**04**

(c) Describe the principle of working and block diagram of a digital storage oscilloscope **07**

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Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2024

Subject Code:3160915 Date:17-05-2024

Subject Name:Electrical Measurement and Measuring Instruments

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define 1) Sensitivity 2) Drift 3) Precision.	**03**
	(b)	Explain advantages of electrical transducer.	**04**
	(c)	Draw a functional block diagram of the measurement system. Also explain the function of each block in brief.	**07**
Q.2	**(a)**	Enlist pressure sensitive primary devices. Explain any one in brief.	**03**
	(b)	Explain working principle of strain gauge.	**04**
	(c)	Describe the working principle, construction and operation of R.T.D. Draw it's characteristics.	**07**
		OR	
	(c)	Define transducer & give classification of transducers on different basis.	**07**
Q.3	**(a)**	List out drawback of Shunt and Multiplier.	**03**
	(b)	Describe the constructional detail of a PMMC instrument with the help of diagram.	**04**
	(c)	State and explain the methods of extension of range of Voltmeter.	**07**
		OR	
Q.3	**(a)**	Explain construction and working of Instrument transformers.	**03**
	(b)	Describe the constructional detail of a moving iron instrument with the help of diagram.	**04**
	(c)	Explain construction and working of Induction type single phase energy meter. Derive it's torque equation.	**07**
		.	
Q.4	**(a)**	Enlist different methods of measurement for low, medium and high resistances.	**03**
	(b)	Explain the loss of charge method for measurements of insulation resistance.	**04**
	(c)	How the effect of contact resistance and resistance of the connecting leads are eliminated using kelvin's double bridge? Explain with neat diagram.	**07**
		OR	

Q.4	**(a)**	Enlist different bridges used for the measurement of inductance.	**03**
	(b)	Draw neat diagram of Schering Bridge, derive the equations of balance.	**04**
	(c)	Explain Maxwell's inductance-capacitance bridge for measurement of inductance. Derive bridge balance equation. Also draw phasor diagram.	**07**
Q.5	**(a)**	What is clamp on meter? Write its applications.	**03**
	(b)	Explain measurement of capacitance with the help of De Sauty's Bridge.	**04**
	(c)	Explain block diagram of Digital Storage Oscilloscope .Enlist its applications.	**07**

OR

Q.5	**(a)**	Give comparison of Analog and Digital multimeter.	**03**
	(b)	Explain measurement of resistance with the help of Wheatstone Bridge.	**04**
	(c)	Describe the construction, working and application of megger with suitable diagram.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2023

Subject Code:3160915 Date:06-07-2023

Subject Name:Electrical Measurement and Measuring Instruments

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	What is measurement? Describe different methods of measurement.	**03**
	(b)	Define errors in measurement and explain its types.	**04**
	(c)	Explain in detail working principle and construction of LVDT with detailed diagram.	**07**
Q.2	**(a)**	Classify Transducer in detail.	**03**
	(b)	Differentiate between the following transducer with suitable examples: (i) Primary and Secondary transducers (ii) Analog and Digital transducers	**04**
	(c)	Define gauge factor of a strain gauge. Derive the expression for the gauge factor.	**07**
		OR	
	(c)	Explain the construction of Thermocouple and its characteristics for various materials.	**07**
Q.3	**(a)**	Why secondary of current transformer should not be open, when primary is energized?	**03**
	(b)	How the range of dc voltmeter can be extended? Derive the expression to calculate multiplier resistance.	**04**
	(c)	Explain construction and working principle of Single-phase induction type energy meter.	**07**
		OR	
Q.3	**(a)**	Explain working principle of Weston frequency meter.	**03**
	(b)	Draw & explain construction of PMMC instrument.	**04**
	(c)	Explain construction and working principle of electrodynamometer type wattmeter.	**07**
Q.4	**(a)**	Draw and explain circuit diagram of Maxwell's bridge.	**03**
	(b)	Explain construction and working of Q - meter.	**04**
	(c)	Draw the circuit of a Kelvin's Double Bridge used for measurement of low resistance. Derive the condition for balance.	**07**
		OR	
Q.4	**(a)**	Draw and explain circuit diagram of Schering bridge.	**03**
	(b)	Draw circuit of Owen's bridge. Write its applications.	**04**
	(c)	Explain measurement of unknown inductance with the help of Hay's bridge. Also draw phasor diagram.	**07**
Q.5	**(a)**	Write a short note on: Digital recorders.	**03**
	(b)	Compare Analog & digital multimeter.	**04**
	(c)	Draw & explain block diagram of Digital storage oscilloscope. State its applications.	**07**

OR

Q.5	**(a)**	Explain the construction and working of Clamp on meter.	**03**
	(b)	Discuss the loss of charge method for high resistance measurement.	**04**
	(c)	Explain construction and working principle of Megger.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2022

Subject Code:3160915 Date:03/06/2022

Subject Name:Electrical Measurement and Measuring Instruments

Time:10:30 AM TO 01:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	What do you understand by static and dynamic characteristics of a measuring instrument ?	**03**
	(b)	Define the following terms : (1) True value (2) Threshold (3) Sensitivity (4) Zero drift	**04**
	(c)	Explain in detail working principle and construction of LVDT.	**07**
Q.2	**(a)**	Differentiate between statistical and random errors.	**03**
	(b)	A capacitive transducer with its plate separation of 0.05mm under static conditions has a capacitance of 5 X 10^{-12} F. Determine axial displacement, which causes change of capacitance of 0.75 X 10^{-12} F.	**04**
	(c)	Explain seebeck effect. Describe construction of thermocouple in detail with different materials used for the same.	**07**
		OR	
	(c)	Define Gauge factor. Derive its expression.	**07**
Q.3	**(a)**	Define sensor, transducer & actuator.	**03**
	(b)	Describe use of instrument transformers in the extension of range of measuring instruments.	**04**
	(c)	Explain working principle and construction of Piezoelectric transducer.	**07**
		OR	
Q.3	**(a)**	A 250 : 5, CT is used along with an ammeter. If ammeter reading is 3.6 Amp, find out the line current.	**03**
	(b)	Explain why CT secondary should not be open ?	**04**
	(c)	Explain construction and working principle of I-phase induction type energy meter.	**07**
Q.4	**(a)**	Draw & explain construction of PMMC instrument.	**03**
	(b)	Explain working principle of Hall effect transducer.	**04**
	(c)	Draw circuit of Kelvin's double bridge method used for measurement of low resistance. Derive the condition for balance.	**07**
		OR	
Q.4	**(a)**	Explain various controls of power scope.	**03**
	(b)	Draw circuit of Owen's bridge. Write its applications	**04**
	(c)	Draw & explain block diagram of Digital storage oscilloscope.	**07**
Q.5	**(a)**	Write a brief note on Megger.	**03**
	(b)	Compare Analog & digital multimeter.	**04**
	(c)	Explain construction and working of Q - meter.	**07**

OR

Q.5	**(a)**	What is clamp on meter ? Write its applications.	**03**
	(b)	Discuss the loss of charge method for high resistance measurement.	**04**
	(c)	Explain Maxwell's inductance capacitance bridge with connection diagram and phasor diagram also state balance condition for the same.	**07**

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