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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# 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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# 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:<br>(i) Primary and Secondary transducers<br>(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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# 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 :<br>(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.<br>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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