Code No: **RT41025** **R13** **Set No. 1**

IV B.Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018

INSTRUMENTATION

(Common to Electrical and Electronics Engineering and Mechanical Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
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PART–A *(22 Marks)*

1. a) How are Instrumental Errors different from gross Errors? Explain. [4]
   b) Differentiate between active and passive transducers. [4]
   c) Define the following terms.
   (i) Guage Pressure (ii) Absolute Pressure (iii) Differential Pressure [4]
   d) State the advantages of a DVM over an analog meter. [3]
   e) State the advantages of using a probe. [3]
   f) Define Wave analyzer. List different types of wave analyzers. [4]

PART–B *(3x16 = 48 Marks)*

2. a) The expected value of the voltage across a resistor is 80 V. However the measurement gives a value of 79 V. Calculate (i) absolute error, (ii) % error (iii) Relative accuracy and (iv) % of accuracy. [8]
   b) What do you understand by dynamic characteristics of an Instrument? Define Speed of response, Fidelity, Lag, Dynamic Error. [8]

3. a) Define Strain guage and guage factor. Describe the operation and construction of strain guage. State its limitations. [8]
   b) Define Thermocouple. List various types of thermocouples. With neat diagram explain the operation of Thermocouple. [8]

4. a) Explain the measurement of linear displacement through capacitive transducer. [8]
   b) Explain how a load cell is employed to measure static and dynamic forces. [8]

5. a) What is meant by Voltmeter sensitivity? Explain its relevance in circuit applications. [8]
   b) Explain how a PMMC can be used as a basic voltmeter. [8]

6. a) Explain how frequency can be measured by a CRO using lissajous figures. [8]
   b) Explain with a diagram how frequency can be measured using spot wheel method and gear wheel method. [8]

7. Explain how Q-meter can be used to measure the following.
   (i) dc resistance of a coil
   (ii) Stray Capacitance
   (iii) Impedance of a circuit
   (iv) Characteristics impedance of a transmission line [16]

Code No: **RT41025** **R13** **Set No. 2**

IV B.Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018

INSTRUMENTATION

(Common to Electrical and Electronics Engineering and Mechanical Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
*****

PART–A *(22 Marks)*

1. a) The following values are obtained from the measurements of the value of a resistor: 147.2, 147.4, 147.9, 147.1, 147.5, 147.6, 147.4, 147.6, 147.5. Calculate (i) Arithmetic mean (ii) Average deviation and (iii) Standard Deviation [4]
   b) Define transducer. Explain the difference between primary sensors and transducers with the help of examples. [4]
   c) Define Pressure. What are different methods of Pressure measurement? [4]
   d) State the advantages of a dual slope DVM over a ramp type DVM. [4]
   e) Define intensity, focus, and astigmatism. [3]
   f) What are the applications of Wave analyzer? [3]

PART–B *(3x16 = 48 Marks)*

2. a) Explain gross errors and systematic errors in detail. How can it be minimized? [8]
   b) With relevant diagrams explain the concept of Sampled data pulse modulation. [8]

3. a) Explain with the help of a diagram and characteristics the operation of LVDT. [8]
   b) Explain the method of measuring displacement using LVDT. State the advantages and disadvantages of LVDT. [8]

4. Describe the principle of operation of a pressure transducer employing each of the following principles:
   (i) Resistive transducer (ii) Inductive transducer [16]

5. a) How a basic D' Arsonal movement is converted into multirange voltmeter? Explain it using neat diagram. [8]
   b) A 3 ½ digit of DVM has an accuracy of ± 0.5 percent of reading ± 1 digit.
   (i) What is the possible error in volt, when the instrument is reading 5.00 V on the 10 V range.
   (ii) What is the possible error in volt, when reading 0.1 V on the 10 V range. [8]

6. a) Discuss the features of CRT. [8]
   b) Draw the block diagram of sampling oscilloscope and explain its functional operations and give various waveforms at each block. [8]

7. a) Explain with a diagram the operation of a frequency selective wave analyzer. [8]
   b) With neat sketches explain the concept of Harmonic distortion analyzer. [8]

Code No: **RT41025** **R13** **Set No. 3**

IV B.Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018

INSTRUMENTATION

(Common to Electrical and Electronics Engineering and Mechanical Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
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PART–A *(22 Marks)*

1. a) List different types of Errors. [3]
   b) What do you understand by electrical transducers? State the advantages of an Electrical transducer. [4]
   c) What are the main elements of velocity transducer? [4]
   d) Name the types of instruments used for making voltmeter and ammeter. [3]
   e) List the major components of a CRT. [4]
   f) Define Distortion. Define harmonics and the term 'total harmonic distortion'. [4]

PART–B *(3x16 = 48 Marks)*

2. a) What do you understand by static characteristics? List the different types of static characteristics. Define the terms: Instrument, accuracy, precision, Resolution, sensitivity and errors. [8]
   b) With relevant diagrams explain the concept pulse code modulation. [8]

3. a) Explain with diagram the functions of a resistive transducer. [8]
   b) Explain with a diagram the operation of a piezo-electric transducer. [8]

4. a) Draw the experimental setup of measuring force using piezo- electric crystal. [8]
   b) Show with an example how the capacitive transducer has excellent frequency response. [8]

5. a) Explain with a neat block diagram of a dual slope digital voltmeter. [8]
   b) Explain with neat diagram the operation of a Microprocessor based DVM. State the advantages of a microprocessor based DVM. [8]

6. a) Draw the basic block diagram of an oscilloscope and explain the functions of each block. [8]
   b) State the various applications of an oscilloscope. [8]

7. a) Explain with help of a block diagram the operation of a spectrum analyzer. [8]
   b) Explain with a diagram the working of a vector impedance meter. [8]

Code No: **RT41025** **R13** **Set No. 4**

IV B.Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018

INSTRUMENTATION

(Common to Electrical and Electronics Engineering and Mechanical Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
*****

PART–A *(22 Marks)*

1. a) What do you mean by a Standard? What is the significance of standard? [4]
   b) List the factors to be considered while selecting a transducer. [4]
   c) What are the uses of Piezo- electric transducers? [4]
   d) State the effects of using a voltmeter of low sensitivity. [3]
   e) Compare Dual beam and Dual Trace CRO. [4]
   f) State the applications of a spectrum analyzer [3]

PART–B *(3x16 = 48 Marks)*

2. a) What are the different types of errors that occur during measurement? Explain each. [8]
   b) Draw the block diagram of the measuring system and explain the function of each stage of this system. [8]

3. a) Explain the working principle of Thermistors. [8]
   b) Describe different types of Thermistor. State advantages and disadvantages of Thermistors and state the various applications of a thermistor. [8]

4. Explain with the help of a diagram the method of measurements of displacement using change in self inductance due to
   (i) Change in number of turns
   (ii) Change in permeability
   (iii) Change in reluctance [16]

5. a) Explain the operating principle of a Ramp type DVM. [8]
   b) List out some important features like operating and performance characteristics of digital voltmeter. [8]

6. a) State the standard specifications of a simple CRO. [8]
   b) Draw the block diagram of a basic horizontal amplifier and explain it. [8]

7. a) Describe with a diagram the operation of a heterodyne wave analyzer. [8]
   b) Differentiate Wave analyzer and harmonic distortion analyzer. [8]