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]

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

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**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]

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# R13

**IV B.Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018**
## INSTRUMENTATION
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*Answer ALL sub questions from Part-A*
*Answer any THREE questions from Part-B*
*****

## 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]

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*****

## 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]