Code No: **RT42042** **R13** **Set No. 1**

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2019

ELECTRONIC MEASUREMENTS & INSTRUMENTATION

(Electronics and Communications 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) A set of independent current measurements were recorded as 10.03, 10.10, 10.11 and 10.08 A calculate the range of an error. [4]
   b) Mention the different types of distortion. [3]
   c) What will happen when sweep signal is applied to horizontal plates of CRO? [4]
   d) Obtain an expression for series Q meter circuit. [4]
   e) What is a Transducer? Give the classification of transducers. [3]
   f) Draw the block diagram of Digital Data Acquisition System. [4]

PART–B *(3x16 = 48 Marks)*

2. a) What are the dynamic characteristics of measurement systems? Explain. [8]
   b) Draw the Thermocouple type RF ammeter and explain its operation. [8]

3. a) Describe briefly about Harmonic distortion analyzer. [8]
   b) What are the various applications of Digital Fourier Analyzers? [8]

4. a) Explain digital storage oscilloscope with schematic block diagram and state its Applications. [8]
   b) Illustrate why is triggering circuit provided in a CRO? [8]

5. a) Draw the Wien Bridge and derive the expression for the frequency of excitation Signal at balance. [8]
   b) A 1000 Hz bridge has the following constants:
   Arm AB: R=1 kΩ in parallel with C=0.25 μF
   Arm BC: R=1 kΩ in series with C=0.25 μF
   Arm CB: L=50 mH in series with R=200Ω
   Arm DA: Unknown
   Find the constants of arm DA to balance the bridge. Express the result as a pure R in series with a pure C or L, and as a pure R in parallel with a pure C or L. [8]

6. a) Explain the working of Electrical Resistance Thermometer. Also explain four lead method of measuring resistance. [8]
   b) Explain how the piezoelectric transducer can be used to measure force and pressure. [8]

7. a) With neat sketch explain the measurements of proximity. [8]
   b) With neat sketch explain the measurements of humidity and moisture. [8]

Code No: **RT42042** **R13** **Set No. 2**

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2019

ELECTRONIC MEASUREMENTS & INSTRUMENTATION

(Electronics and Communications 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) Define the terms Precision and Resolution of an instrument. [4]
   b) Deduce the difference between a wave analyzer and a harmonic distortion analyzer. [3]
   c) What is the comparison between analog and digital storage oscilloscope? [4]
   d) Distinguish between AC Bridges and DC Bridges. [4]
   e) Discuss about Piezo-electric sensors. [3]
   f) Write short notes on interfacing of transducers with DAS. [4]

PART–B *(3x16 = 48 Marks)*

2. a) Define the following
   (i) Response (ii) Fidelity (iii) Lag (iv) Dynamic error [8]
   b) Draw the circuit diagram of Ohmmeters series type, and shunt type and explain its operation in detail. [8]

3. a) Describe the circuits and working of wave analyzers used for audio frequency and megahertz range. [8]
   b) Describe briefly about Total harmonic distortion. [8]

4. a) Draw the circuit diagram of delay line circuit and explain its operation. [8]
   b) Develop an expression for deflection D in CRO, which is the deflection of the electron beam. [8]

5. a) Analyze Q meter? Explain about its application. [8]
   b) A circuit having an effective capacitance of 160pF is tuned to a frequency of 1.2MHz. In this the current falls to 70.7% of its resonant value when the frequency of an emf of constant magnitude injected in series with the circuit deviates from the resonant frequency by 6KHz. Calculate the Q factor and effective resistance by 6KHz. [8]

6. a) Explain the operation of LVDT. Explain it's merits demerits and applications. [8]
   b) An ac LVDT has the following data:
   Input = 6.3 V, Output = 5.2 V, range ± 0.5 in. Determine
   (i) Calculate the output voltage vs Core position for a core moment going from + 0.45 in. to – 0.30 in.
   (ii) The output voltage when the core is -0.25 in. from the centre [8]

7. a) With neat sketch explain the measurement of Velocity. [8]
   b) Explain the measurement of force using photoelectric Transducer. [8]

Code No: **RT42042** **R13** **Set No. 3**

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2019

ELECTRONIC MEASUREMENTS & INSTRUMENTATION

(Electronics and Communications 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) What are the different types of Digital Voltmeter? [4]
   b) Formulate an equation for the measured value of total harmonic distortion. [3]
   c) What are the standard specifications of CRO? [4]
   d) What precautions are required in using bridges? [4]
   e) Explain the construction of thermocouple. [3]
   f) Differentiate between a sensor and a Transducer. [4]

PART–B *(3x16 = 48 Marks)*

2. a) What are the different types of errors in measurement? Explain. [8]
   b) Describe the working of a series thermos couple type ammeter with schematic block Diagram. [8]

3. a) Define waveform analyzer and explain in detail about frequency selective type wave analyzer with block diagram. [8]
   b) What are the applications of a Spectrum analyzer? [8]

4. a) Draw the internal structure of CRT and list its functions. [8]
   b) Explain the frequency and phase measurement using Lissajous figures. [8]

5. a) Discuss in detail about the principle of Q meter. [8]
   b) In the case of a Schering Bridge, arm AC has R=4.7 kΩ; Arm CD has unknown elements. Arm BD has C=0.1 µF; Arm AB=4.7 kΩ is shunt with 1µF. Determine values of components is the arm CD. [8]

6. a) Explain about Thermistors and Sensistors for the measurement of Temperature. [8]
   b) A Thermistor has a temperature coefficient of resistance of -0.04 over a temperature range of 20^{o}C to 60^{o}C. Find the resistance of the thermistor at 35^{o}C if the resistance of the thermistor at 25^{o}C is 100 ohm. [8]

7. a) Briefly explain the working principles and measurement of force. [8]
   b) Explain the working of a Multi channel DAS with block diagram. [8]

Code No: **RT42042** **R13** **Set No. 4**

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2019

ELECTRONIC MEASUREMENTS & INSTRUMENTATION

(Electronics and Communications 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) Compare static and dynamic characteristics of measurement systems. [4]
   b) How does a wave analyzer functionally differ from a spectrum analyzer? [3]
   c) What are the features of CRT? [4]
   d) List the factors that cause error in Q meter. [4]
   e) Explain the characteristics of Thermistors. [3]
   f) Explain the characteristics of DAS. [4]

PART–B *(3x16 = 48 Marks)*

2. a) Define the following terms:
   (i) Linearity (ii) Sensitivity (iii) Repeatability (iv) Accuracy [8]
   b) A basic D' Arsonval moment with a full scale deflection of 50 μA and an internal resistance of 1800 Ω is available. It is to be converted into a 0-1 V, 0-5 V, 0-25 V and 0-225 V multi range voltmeter using individual multipliers for each range. Calculate the values of the individual resistors. [8]

3. a) Discuss the frequency range of different types of signal analyzers. [8]
   b) Sketch and explain in detail about the Spectrum analyzer. [8]

4. a) With block diagram and various waveforms at each block, Explain the operation of sampling oscilloscope [8]
   b) List the principle of secondary emission ratio. [8]

5. a) Explain Anderson bridge with vector diagram and also derives balance Equation. [8]
   b) How the unknown frequency is measured using Wein's bridge method? [8]

6. a) Explain how the piezoelectric transducer can be used to measure force and pressure. [8]
   b) Explain the working of bonded strain gauge for the measurement of force. [8]

7. a) With neat sketch explain the principle of operation of Displacement measurement. [8]
   b) A capacitive Transducer has a plate separation of 0.01mm. It's capacitance under static condition is 10pF.If the change in capacitance as displacement Transducer is accurately measured to be +1pF, Evaluate the displacement. [8]