Code No: **R164102D** **R16** **Set No. 1**

IV B.Tech I Semester Regular Examinations, October/November - 2019
INSTRUMENTATION
(Electrical and Electronics 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 FOUR questions from Part-B
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PART–A *(14 Marks)*

1. a) List any three types of errors in measurement? [3]
   b) What are the applications of LVDT? [2]
   c) What are the two basic methods for measurement of vacuum? [3]
   d) Explain the significance of digital phase meter? [2]
   e) Why and where do we use an oscilloscope? [2]
   f) What is the purpose of a spectrum analyzer? [2]

PART–B *(4x14 = 56 Marks)*

2. a) Distinguish between systematic and random errors in measurement and how they are usually minimized? [7]
   b) Distinguish between periodic and aperiodic signal and give an example of each. [7]

3. a) Explain with a neat sketch the principle and operation of a strain gauge. Derive the expression for gauge factor. [7]
   b) A strain gauge has gauge factor of 4. If a strain gauge is attached to a metal bar that stretches from 0.25 m to 0.255 m when strained, what is the percentage change in resistance? If the unstrained value of gauge is 120 Ω, what is the resistance value of gauge after application of strain? [7]

4. a) Describe the different electrical methods for measurement of liquid level. Compare their advantages and disadvantages. [7]
   b) Explain the measurement of angular velocity using D.C tachometers with neat sketch. [7]

5. a) Describe the working of dual slope integration continuous balance type DVM. [7]
   b) Explain the basic principle and working of successive approximation DVM. [7]

6. a) Distinguish between analog and digital type data logger. [7]
   b) What precautions should be taken when using the sampling oscilloscope? [7]

7. a) What is total harmonic distortion and how do you find it out? [7]
   b) Discuss about the working of Q-meter. [7]

Code No: **R164102D** **R16** **Set No. 2**

IV B.Tech I Semester Regular Examinations, October/November - 2019

INSTRUMENTATION

(Electrical and Electronics 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 FOUR questions from Part-B
*****

PART–A *(14 Marks)*

1. a) Distinguish between gross errors and systematic errors. [3]
   b) What do you mean by a transducer? [2]
   c) What do you mean by strain and how do you measure it? [2]
   d) What are the advantages of DVM? [3]
   e) What are the advantages of digital data loggers? [2]
   f) Define the term 'total harmonic distortion. [2]

PART–B *(4x14 = 56 Marks)*

2. a) Draw the block diagram of the measuring system and explain the each stage with their functions. [10]
   b) What is pulse code modulation? Explain their relative merits. [4]

3. a) Write the characteristics and choice of transducers. [7]
   b) An LVDT with a secondary voltage of 5 V has a range of ±25 mm (i) find the output voltage when the core is -18.75 mm from the centre (ii) plot the output voltage versus core position for a core movement going from +18.75 mm to -10 mm. [7]

4. a) Discuss the working of Pirani gauge for measurement of vacuum with neat sketch. [7]
   b) Compare the advantages and disadvantages of DC tachometer generation and AC tachometer generator. [7]

5. a) Draw and explain the circuit of a digital frequency meter. What are the different methods used for high frequency determination? [10]
   b) State the advantages of ramp type DVM. [4]

6. a) What is the relationship between the period of a waveform and its frequency? How is an oscilloscope used to determine frequency? [8]
   b) Explain the working of a sampling oscilloscope with the help of its diagram. [6]

7. a) Describe the circuits and working of wave analyzers used for audio frequency and megahertz ranges. [7]
   b) Explain about the basic spectrum analyzers. [7]

Code No: **R164102D** **R16** **Set No. 3**

IV B.Tech I Semester Regular Examinations, October/November - 2019

INSTRUMENTATION

(Electrical and Electronics 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 FOUR questions from Part-B
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PART–A *(14 Marks)*

1.	a)	Why do you modulate a signal?	[2]
	b)	What is LVDT and how it works?	[3]
	c)	How does a electromagnetic flow meter work?	[2]
	d)	Compare between analog and digital voltmeters.	[3]
	e)	How does a analog data logger work?	[2]
	f)	State the applications of wave analyzers.	[2]

PART–B *(4x14 = 56 Marks)*

2.	a)	Classify the systematic errors giving suitable examples. Explain the measures taken to minimize these errors.	[7]
	b)	Explain in detail about statistical analysis of random errors.	[7]
3.	a)	Explain the constructional features of synchro's. Discuss how the synchro's can be used as an error detector?	[7]
	b)	Describe the properties of materials used for piezo electric transducers. Derive expressions for voltage and charge sensitivities.	[7]
4.	a)	Explain the principle of measurement of torque using magneto-strictive transducer.	[7]
	b)	Explain the measurement of angular velocity using D.C tachometers with neat sketch.	[7]
5.	a)	Describe the working principle of digital phase angle meter.	[7]
	b)	State the advantages of microprocessor based ramp type DVM over normal ramp type DVM.	[7]
6.	a)	Describe the significance of the following Lissajous figures: (i) Straight line (ii) Ellipse	[7]
	b)	The lissajous pattern on an CRO is stationary and has five horizontal and two vertical tangencies. The frequency of the horizontal input is 1000 Hz. Determine the frequency of vertical input.	[7]
7.	a)	Discuss briefly about frequency selective wave Analyzer.	[7]
	b)	What is a peak reading voltmeter? Explain.	[7]

Code No: **R164102D** **R16** **Set No. 4**

IV B.Tech I Semester Regular Examinations, October/November - 2019
INSTRUMENTATION
(Electrical and Electronics 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 FOUR questions from Part-B
*****

PART–A *(14 Marks)*

1. a) What are the advantages of pulse code modulation? [3]
   b) How does a thermocouple work? [2]
   c) What is the gauge sensitivity? [2]
   d) State the disadvantages of ramp type DVM. [2]
   e) How Lissajous patterns are displayed? [2]
   f) Mention a few applications of heterodyne wave analyzers. [3]

PART–B *(4x14 = 56 Marks)*

2. a) How do you characterize the periodic signals with respect to a reference point of time? [7]
   b) How the performance characteristics of an instrument are classified? [7]

3. a) Classify transducers. Explain the principle of operation of capacitor transducer. [7]
   b) Explain the following: (i) Thermistors (ii) Photo diode. [7]

4. a) Explain the principle of operation of electromagnetic flow meter. Describe how flow is measured with a neat sketch? [7]
   b) Explain the construction and working of the LVDT accelerometer. [7]

5. a) What are the operating and performance characteristics of a DVM? [7]
   b) Describe the working principle of ramp type DVM. [7]

6. a) Compare between the horizontal and vertical amplifiers. [7]
   b) An electrically deflected CRT has a final anode voltage of 2000V and parallel deflecting plates 1.5 cm long and 5 mm apart. If the screen is 50 cm from the centre of deflecting plates. Find (i) beam speed (ii) the deflection sensitivity of the tube and (iii) the deflection factor of the tube. [7]

7. a) Distinguish the principles of working of a spectrum analyzer and wave analyzer. Draw the block diagram of spectrum analyzer. [10]
   b) What is RMS voltmeter? How do you calculate true RMS voltage? [4]