

B.Tech III Year II Semester (R13) Regular & Supplementary Examinations May/June 2017
ELECTRONIC MEASUREMENTS & INSTRUMENTATION
(Electronics & Communication Engineering)

Time: 3 hours

Max. Marks: 70

PART – A
(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- (a) Compare the terms 'Accuracy and Precision'.
 - (b) Define the term Instrument and give the function of Ohm meter.
 - (c) List out the standard specifications of CRO.
 - (d) What are the various probes of CRO?
 - (e) What are the limitations of AF Oscillators?
 - (f) Give the applications of logic analyzer.
 - (g) What is the significance of Q-meter?
 - (h) What do you understand by the term 'EMC'?
 - (i) What are active transducers and give its examples?
 - (j) Give the operating principle involved in piezoelectric transducers.

PART – B
(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 Explain in detail about the static and dynamic calibrations. Also, explain about the Lag and dynamic error.

OR

- 3 Discuss the various steps involved for multimeter for voltage, current and resistance measurements.

UNIT – II

- 4 Draw the block diagram of sampling oscilloscope and explain the operation of this oscilloscope. Also, explain how the sampling oscilloscope is different from general purpose oscilloscope.

OR

- 5 With a neat block diagram, explain the operating principles of Dual trace CRO. Also, give the significance of vertical deflection plates in a CRT.

UNIT – III

- 6 With a neat block diagram, explain the operation, advantages and limitations of Harmonic Distortion analyzer.

OR

- 7 Discuss in detail about the fixed and variable type of signal generators.

UNIT – IV

- 8 Discuss about the construction, operation and applications of Anderson Bridge, with a neat diagram.

OR

- 9 Identify the bridge used for measurement of inductance and explain the construction and operation of this bridge.

UNIT – V

- 10 With a neat diagram, explain the construction operation and applications of LVDT.

OR

- 11 Derive the expression for gauge factor of a strain gauge. Also, explain about the thermocouples.

B.Tech III Year II Semester (R13) Supplementary Examinations December 2017

ELECTRONIC MEASUREMENTS & INSTRUMENTATION

(Electronics & Communication Engineering)

Time: 3 hours

Max. Marks: 70

PART – A
(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- Differentiate between resolution and sensitivity.
 - List out the salient features of differential voltmeter.
 - What is the need of storage oscilloscope?
 - On what factors do the deflection sensitivity depends upon.
 - What are the applications of spectrum analyzer?
 - Compare spectrum and logic analyzers.
 - What do you understand by the term 'EMI'?
 - Give the principle involved in Kelvin bridge.
 - What are the disadvantages of LVDT?
 - What are passive transducers and give examples?

PART – B
(Answer all five units, 5 X 10 = 50 Marks)**UNIT – I**

- 2 Explain in detail about various types of errors. Also, explain about thermocouple type RF ammeter.

OR

- 3 With the block diagrams, explain in detail about the operation of DC ammeter and DC voltmeter.

UNIT – II

- 4 Draw the block diagram of CRO and explain its operation. Also, explain how phase measurement is done using this CRO.

OR

- 5 Discuss in detail about digital frequency counters. Also, explain about the function of vertical and horizontal amplifiers CRO.

UNIT – III

- 6 Compare wave analyzer and logic analyzer with respect to any four parameters. Also, explain in detail about A.F oscillators.

OR

- 7 Describe the functions of various blocks of function generator. Give the applications of harmonic distortion analyzer.

UNIT – IV

- 8 Explain about the measurement of capacitance using a bridge. Also, discuss the need of Q-meter.

OR

- 9 Discuss in detail about EMC interference and noise reduction technique. Also, explain about Wheat Stone bridge.

UNIT – V

- 10 Explain the principle involved in resistance thermometers. Also, explain about PH measurement.

OR

- 11 Explain how LVDT is used for measurement of displacement. Also, discuss about the need of signal conditioning circuits.

B.Tech III Year II Semester (R13) Supplementary Examinations December 2018
ELECTRONIC MEASUREMENTS & INSTRUMENTATION
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PART – A
 (Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- Define the term resolution.
 - What is meant by calibration of an instrument?
 - What is the use of AC control in a CRO?
 - Differentiate dual trace versus dual beam CRO.
 - Define duty cycle.
 - What is sweep generator?
 - Mention few and advantages of bridge based measurements.
 - Give some applications of Wheatstone's bridge.
 - What are the basic requirements for a thermo couple?
 - What is the need for signal conditioning circuit?

PART – B
 (Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 Define and explain the types of errors possible in an instrument.

OR

- 3 By deriving the expressions for shunt resistance and multiplier resistance, explain how the range of ammeter and voltmeter can be extended.

UNIT – II

- 4 State and explain various front panel controls of an analog CRO.

OR

- 5 Draw and explain the block diagram of digital CRO. Mention its advantages over analog CRO.

UNIT – III

- 6 Draw the basic block diagram of function generator and explain.

OR

- 7 With neat block diagram, explain the working principle of spectrum analyzer.

UNIT – IV

- 8 Explain how inductance is measured by using Maxwell's bridge.

OR

- 9 Explain Kelvin's double bridge method for the measurement of low resistance.

UNIT – V

- 10 Explain in detail about construction and working of LVDT.

OR

- 11 Write a brief note on:
- Temperature transducers.
 - Transducers for velocity measurement.

ELECTRONIC MEASUREMENTS & INSTRUMENTATION

(Electronics & Communication Engineering)

Time: 3 hours

Max. Marks: 70

PART – A
(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- Define resolution and sensitivity of an instrument.
 - What is Ohm meter?
 - What are passive probes?
 - What is principle of sampling?
 - Compare fixed and variable signal generators.
 - What is harmonic distortion?
 - Draw the circuit of Anderson bridge.
 - Define EMI and EMC.
 - Compare sensor and transducer.
 - Write about strain gauges.

PART – B
(Answer all five units, 5 X 10 = 50 Marks)**UNIT – I**

- 2 (a) State the three types of systematic errors and explain how to minimize these errors in measurement.
 (b) A resistor has a nominal value of $100\Omega \pm 1\%$. A voltage is applied across the resistor and the power consumed in the resistor is calculated in two ways from: (i) $P = VI$. (ii) $P = V^2/R$. Calculate the uncertainty in the power determination in each case when the measured values of V and I are $V = 100V \pm 2\%$ and $I = 1A \pm 2\%$.

OR

- 3 (a) Explain the construction and working of a thermocouple measuring instrument. Why is it classified as an RF instrument? What are its limitations?
 (b) List out salient features of AC voltmeters using rectifiers and true RMS responding voltmeter.

UNIT – II

- 4 (a) Give the block diagram of a CRO and explain the function of each block.
 (b) What is a current probe? Explain its action.

OR

- 5 (a) With the help of a block diagram, explain the working of a digital storage oscilloscope.
 (b) The Lissajous pattern on CRO is stationary and has 6 horizontal & 2 vertical tangencies. The frequency of the horizontal input is 3 kHz. Determine the frequency of vertical input.

UNIT – III

- 6 What are arbitrary waveform generators and discuss about their standards.

OR

- 7 (a) What is the difference between a wave analyzer and a harmonic distortion analyzer?
 (b) Draw the circuit diagram and explain the working of a heterodyne type wave analyzer.

UNIT – IV

- 8 Explain how inductance can be measured using Maxwell's bridge with the help of neat sketch.

OR

- 9 (a) Describe giving the necessary theory, how you would determine the reactance of small capacitors using Q-meter.
 (b) A coil was tested using a Q-meter and the following readings are obtained.
 At a frequency of 3 MHz, the value of capacitance to give maximum voltage across the variable capacitor was 25 pF while at 6 MHz frequency it was 50 pF. Calculate the self capacitance of the coil.

UNIT – V

- 10 What are Piezoelectric transducers and explain how they will be used to measure pressure?

OR

- 11 (a) Explain the role of thermistors in the measurement of temperature.
 (b) Write about signal conditioning circuits.

B.Tech III Year II Semester (R15) Regular Examinations May/June 2018
ELECTRONIC MEASUREMENTS & INSTRUMENTATION
 (Electronics & Communication Engineering)

Time: 3 hours

Max. Marks: 70

PART – A
 (Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- What are dynamic characteristics of instruments?
 - What are differential voltmeters?
 - What is sync selector circuit?
 - What are active probes?
 - What is logic analyzer?
 - What is random noise in signal generators?
 - List all precautions in using bridges.
 - Draw the circuit diagram of Kelvin bridge.
 - What is signal conditioning circuit?
 - Compare active and passive transducers.

PART – B
 (Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 (a) Explain different types of errors along with their sources and precautions to minimize them.
 (b) The accuracy of five digital voltmeters is checked by using each of them to measure a standard 1.0000 V from a calibration in instrument. The voltmeter readings are as follows:
 $V_1 = 1.001 \text{ v}$, $V_2 = 1.002 \text{ v}$, $V_3 = 0.999 \text{ v}$, $V_4 = 0.998 \text{ v}$ and $V_5 = 1.0000 \text{ v}$.
 Calculate the average measured voltage and the average deviation.

OR

- 3 (a) Explain the basic principle of a shunt type ohmmeter.
 (b) Calculate the maximum percentage error in the sum and difference of two voltage measurements when $V_1 = 100 \text{ v} \pm 1\%$ and $V_2 = 80 \text{ v} \pm 5\%$.

UNIT – II

- 4 (a) Derive an expression for electrostatic deflection sensitivity of a CRO.
 (b) A sinusoidal voltage of 83.3 kHz from a standard signal generator gave nine free waves on the screen starting from the X-axis when connected to 'y'-terminal of a CRO, while the tenth wave was slightly short of being a full wave, the end of the trace being at a position that was half the amplitude away from X-axis. If the time base is internally synchronized, determine the rise and decay time of the saw tooth time base voltage.

OR

- 5 (a) Explain the measurement of frequency, time and phase difference using CRO.
 (b) An electro statically deflected CRT has plates which are 2.5 cm long and 0.5 cm apart and the distance from their centre to the screen is 20 cm. The electron beam is accelerated by a potential difference of 2500 volts and is projected centrally between the plates. Calculate the deflecting voltage required to cause the beam to strike a deflecting voltage and find the corresponding deflection of the screen.

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UNIT - III

6 Draw the block diagram of function generator and explain its operation.

OR

- 7 (a) With a neat sketch of the block diagram, explain the principle of operation of Heterodyne wave analyzer. Explain what makes its performance better than a resonant type wave analyzer.
(b) What is the minimum detectable signal (MDS) of a spectrum analyzer with a (i) N.F of 25 dB using/KHz 3-dB filter? (ii) If N.F is increased to 40 dB using same filter as above, estimate MDS and write the inference from the above two cases.

UNIT - IV

8 Draw the circuit Wheatstone bridge and explain its operation. Also write about errors occur in DC bridges.

OR

- 9 (a) Explain the working principle of a Q-meter and state the factors that causes errors during Q measurement.
(b) What is interference and discuss about its reduction techniques.

UNIT - V

10 Explain any two methods to measure displacement using suitable circuit diagrams.

OR

11 Write about:

- (a) pH measurement.
(b) Velocity measurement.

B.Tech III Year II Semester (R15) Regular & Supplementary Examinations May/June 2019
ELECTRONIC MEASUREMENTS & INSTRUMENTATION
 (Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 70

PART – A
 (Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- The capacitance is specified as $20 \text{ F} \pm 5\%$. Determine the limits of capacitance that it is guaranteed.
 - What are the factors to be considered in the selection of voltmeter?
 - How can you operate a CRO?
 - Determine the velocity of the electron beam of an oscilloscope when the voltage applied is 2500 V.
 - What is Harmonic distortion? Define PIV and TUF for rectifiers.
 - Draw the block diagram of a pulse generator.
 - What is the significance of bridge circuit measurements over direct meter measurements?
 - Compare AC and DC bridges.
 - Give the construction details of thermocouples.
 - What are the various laws of thermocouples?

PART – B
 (Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 (a) Three resistors R_1 , R_2 and R_3 have the following values. $R_1 = 200\Omega \pm 5\%$, $R_2 = 100\Omega \pm 5\%$, $R_3 = 50\Omega \pm 5\%$. Determine the relative error, if the resistors are: (i) Connected in series. (ii) Connected in parallel.
- (b) Explain the principle of thermocouple RF Ammeter.

OR

- 3 (a) The following readings are obtained in the measurement of an inductor: 1.003, 0.998, 1.001, 0.991, 1.009, 0.986, 1.005, 0.997, 1.008 and 0.994. Determine: (i) Arithmetic mean. (ii) Average deviation. (iii) Standard deviation.
- (b) Explain in detail about static characteristics of an instrument.

UNIT – II

- 4 What are the major blocks of the oscilloscope and what does each do?

OR

- 5 (a) How much voltage is required across two deflection plates separated by 1 cm to deflect an electron beam 1° , if the effective length of the deflection plates is 2 cm and the accelerating potential is 1000 V?
- (b) Compare and contrast digital storage oscilloscope and conventional storage oscilloscope.

UNIT – III

- 6 Draw and explain laboratory square wave and pulse generator.

OR

- 7 Discuss about harmonic distortion analyzers.

UNIT – IV

- 8 Draw the circuit of Kelvin double bridge and explain its operation and importance.

OR

- 9 Identify the bridge used for inductance measurement and explain its construction and operation.

UNIT – V

- 10 With a neat diagram, explain operation advantages and limitations of LVDT?

OR

- 11 Write short note on strain gauges and signal conditioning circuits.
