Code No: **R204104K** **R20** **Set No. 1**

IV B.Tech I Semester Regular Examinations, January – 2024

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

(Electronics and Communication Engineering)

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

Answer any FIVE Questions
ONE Question from Each unit
All Questions Carry Equal Marks

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UNIT - I

1 a) Explain the following terms
   (i) Series type Ohmmeters
   (ii) Shunt type Ohmmeters [7]

   b) An ohmmeter is designed around a 1mA meter movement and a 3V battery. If the battery voltage decays to 2.8V because of adding, calculate the resulting error at the midrange on the ohmmeter scale. [7]

(OR)

2 a) Explain the working of a basic DC voltmeter. How can its range be extended? [7]

   b) Calculate the value of multiplier resistance on the 20V range of a dc voltmeter that uses a 100μA meter movement with an internal resistance of 500Ω. [7]

UNIT - II

3 a) What is Heterodyning and explain the use of Heterodyning in spectrum analyzer along with its circuit diagram. [7]

   b) Write short notes on Function Generator in detail. [7]

(OR)

4 a) Draw the circuit diagram of Digital Fourier Analyzers and explain its operation. [7]

   b) What is AF oscillators and explain its operation along with circuit diagram. [7]

UNIT - III

5 a) Draw the circuit diagram of Sampling oscilloscope and explain its operation in detail. [7]

   b) Explain various types of probes used for CRO. [7]

(OR)

6 a) Explain the operation of trigger pulse circuit along with circuit diagram. [7]

   b) List out specifications of CRO. [7]

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UNIT - IV

7 a) Draw and explain the operation of Wien Bridge and derive the bridge balance condition. [7]

b) In the case of a Schering Bridge, arm Ac has R=8.7kΩ. Arm CD has unknown elements. Arm BD has C=0.01μF, Arm AB=5.7kΩ is shunt with 10MF. Determine Values of components is the arm CD. [7]

(OR)

8 a) Define Quality factor and give the expressions for the inductive and capacitive Quality factors. [7]

b) Draw the circuit diagram of Schering's Bridge and explain the operation of it. [7]

UNIT - V

9 a) Briefly explain the working principles and measurement of force by any two nonelectric techniques? [7]

b) Explain the different Advantages of Electrical Transducers in detail. [7]

(OR)

10 a) List out different types of Strain Gauges used Transducer and explain any one in detail. [7]

b) Explain the different Advantages of Electrical Transducers in detail. [7]

Code No: **R204104K** **R20** **Set No. 2**

IV B.Tech I Semester Regular Examinations, January – 2024

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

(Electronics and Communication Engineering)

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Answer any FIVE Questions
ONE Question from Each unit
All Questions Carry Equal Marks

*****

UNIT - I

1 a) What are the different types of errors in measurement? Explain briefly. [7]

b) A 500Ω basic movement is to be used as an ohmmeter requiring a full scale deflection of 1mA and internal battery voltage of 5V. A half-scale deflection marking of 4k is desired. Calculate (i) Values of R1 and R2 (ii) Maximum value of R2 to compensate for a 10% drop in battery voltage. [7]

(OR)

2 a) List out different AC voltmeters and explain the working of any one voltmeter in detail. [7]

b) Explain the following terms in detail.
(i) Accuracy (ii) Resolution (iii) Precision (iv) Expected value [7]

UNIT - II

3 a) Explain the requirements of pulse with reference to generator along with block diagram. [7]

b) Distinguish between spectrum analyzer and harmonic distortion analyzer. [7]

(OR)

4 a) Explain the working principle of a harmonic distortion analyzer along with circuit diagram. [7]

b) List the applications of wave analyzers. [7]

UNIT - III

5 a) Draw and explain the block diagram of vertical amplifier used in oscilloscopes. [7]

b) List out the differences between analog storage oscilloscope and digital storage oscilloscope with specifications. [7]

(OR)

6 a) Describe in detail the Lissajous method of frequency measurement. [7]

b) What is the purpose of a trigger pulse in a CRO? [7]

Code No: **R204104K** **R20** **Set No. 2**

UNIT – IV

7 a) Explain the "parallel-connection" method of using Q-meter and obtain the expressions for resistance, reactance and Q factor. [7]

b) What are the problems associated with shielding? And explain the remedies. [7]

(OR)

8 a) Explain the operation of Maxwell's Bridge and derive the condition for balance of a Bridge. [7]

b) In the case of Hay's Bridge one arm has resistance of 400kΩ. Another arm has a resistance of 2.7kΩ. The third arm 10kΩ in series with a capacitor of 0.5μF. Determine the values of the elements Rx and Lx in the fourth arm. [7]

UNIT - V

9 a) Draw the Linear variable differential Transducer and explain its operation in detail. [7]

b) Explain the Resistive position Transducer along with circuit diagram. [7]

(OR)

10 a) What is Thermistor and explain its importance along with advantages of it? [7]

b) List out difference between active and passive transducer in detail. [7]

Code No: **R204104K** **R20** **Set No. 3**

IV B.Tech I Semester Regular Examinations, January – 2024

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

(Electronics and Communication Engineering)

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

Answer any FIVE Questions
ONE Question from Each unit
All Questions Carry Equal Marks

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UNIT - I

1 a) Draw the sketch and explain the principle and operation of Thermocouple type Ammeter. [7]

b) Two ammeters are joined in series in a circuit carrying 550A. One ammeter has a resistance of 20000Ω shunted by 0.10Ω while the other ammeter has a resistance of 100Ω shunted by 0.02Ω. If the shunts are interchanged what would be the readings of the instruments? [7]

(OR)

2 a) Draw the block diagram of successive approximation type Digital voltmeter and explain its operation. [7]

b) Differentiate between a true R.M.S meter and an average responding meter. [7]

UNIT - II

3 a) What are fixed and variable signal generators? Discuss briefly. [7]

b) Explain the working of AF Sine and square wave generator with neat block diagram. [7]

(OR)

4 a) What is a Spectrum Analyzer? Discuss in detail its working principle with a neat block diagram. [7]

b) What is the difference between a simple signal generator and a sweep generator? [7]

UNIT - III

5 a) Explain the concept of simple compensated Attenuator. [7]

b) Explain the working of a CRO in detail. [7]

(OR)

6 a) Explain the following terms in detail.
(i) Active probe
(ii) Passive Probe [7]

b) State the various applications of a Dual beam oscilloscope. [7]

Code No: **R204104K** **R20** **Set No. 3**

UNIT - IV

7 a) Describe the method of measuring high impedance using Q-meter. [7]
b) Explain the limitations of Wheatstone bridge. [7]

(OR)

8 a) Explain the measurement of Inductance using Maxwell's bridge. [7]
b) What type of errors can occur while using bridges? [7]

UNIT - V

9 a) What is Piezo-electric effect? Explain the operation of Piezo-electric transducer. [7]
b) Define Gauge factor for transducer and explain its significance. [7]

(OR)

10 a) Define and explain about Absolute humidity, Relative humidity, Specific humidity. Elaborate how humidity is measured. [7]
b) Explain the working of capacitive transducers. [7]

Code No: **R204104K** **R20** **Set No. 4**

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*****

UNIT - I

1 a) Explain in detail about DC voltmeters with the suitable example. [7]

b) A Voltmeter having a sensitivity of 30k/V reads 80V on a 100V scale when connected across an unknown resistor. The current through the resistor is 2mA. Calculate the percentage of error due to loading effect. [7]

(OR)

2 a) What is dynamic error? Plot it with respect to time delay. [7]

b) Calculate the value of multiplier resistance on the 50V range of a dc voltmeter that uses a 400μA meter movement with an internal resistance of 100Ω. [7]

UNIT - II

3 a) Explain the operation of function generator with a neat block diagram. [7]

b) Draw the block diagram of Random Noise Generator and explain its operation. [7]

(OR)

4 Explain the following terms in detail:
(i) Marker Generator
(ii) Digital Fourier Analyzer [14]

UNIT - III

5 a) Explain the concept of Storage oscilloscope along with circuit diagram. [7]

b) Draw the circuit diagram of sampling oscilloscope and explain its operation n detail. [7]

(OR)

6 a) Explain the measurement procedure of Lissajous patterns with one example. [7]

b) Explain the concept of delay line in CRO. [7]

Code No: **R204104K** **R20** **Set No. 4**

UNIT - IV

7 a) Explain briefly the working of Schering bridge. [7]

b) What are the various errors and precautions to be taken while using bridges? [7]

(OR)

8 a) Draw and explain the working of a Wheatstone bridge in detail. [7]

b) What resistance range must resistor R3 have in order to measure unknown resistor in the range 1-100kΩ using a Wheatstone bridge. Given R1=1k and R2=10k. [7]

UNIT - V

9 a) What is the difference between photo-emissive, photo-conductive and photovoltaic transducers? [7]

b) Derive the expression for Gauge factor of a strain Gauge. [7]

(OR)

10 a) Explain the working of LVDT in detail. [7]

b) An AC LVDT has the following data: Input=6.3V, output=5.2V, range ±0.5in. Determine

(i) The output voltage vs core position for a core movement going from +0.45in to -0.30in

(ii) The output voltage when the core is -0.25in from the centre. [7]