

Code No: **RT42042**

R13

Set No. 1

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2018

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

PART-A (22 Marks)

1. a) Define the terms Accuracy and Resolution. [3]
- b) List the applications of wave analyzers. [3]
- c) What are the advantages of dual beam for multiple trace oscilloscopes? [4]
- d) What are the possibilities of errors in PMMC ammeter? [4]
- e) Define Gauge factor for transducer and explain its significance. [4]
- f) Explain the working of dew point meter. [4]

PART-B (3x16 = 48 Marks)

2. a) What is the principle and operation of a thermocouple type RF ammeter? [8]
- b) A voltmeter having a sensitivity of $1\text{K}\Omega/\text{V}$ is connected across an unknown resistance in series with a milli ammeter reading 80V on 150V scale. When the milli ammeter reads 10mA, Calculate the (i) apparent resistance of the unknown resistor (ii) Actual resistance of the unknown resistor, and (iii) Error due to the loading effect of the voltmeter? [8]
3. a) Discuss square wave and pulse generator with neat block diagrams. [8]
- b) Explain the working principle of a harmonic distortion analyzer. [8]
4. a) Explain the operation of wheat stone bridge with derivations. [8]
- b) In case of a Schering bridge, arm AC has $R=4.7\text{K}\Omega$. Arm CD has unknown elements. Arm BD has $C=0.1\mu\text{f}$, Arm AB= $4.7\text{K}\Omega$ is shunt with 1MF. Determine values of components in the Arm CD. [8]
5. a) Draw the circuit diagram of Maxwell's bridge and derive conditions of balance. [8]
- b) Discuss various methods of connecting components to a Q-meter for measurement. [8]
6. a) Explain the operation of potentiometric transducer. [8]
- b) Describe the construction and working of LVDT. [8]
7. a) Explain the significance of load cell in static and dynamic force measurement. [8]
- b) How angular speed shall be measured using the digital method? [8]

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Set No. 2

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ELECTRONIC MEASUREMENTS & INSTRUMENTATION
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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) Define sensitivity and precision of an instrument. [3]
- b) Define the terms Dynamic range and Harmonic mixing. [3]
- c) Discuss about the factors affecting the brightness of the display. [4]
- d) What are the problems associated with shielding? And explain the remedies. [4]
- e) List the applications of inductive transducers. [4]
- f) What are the main elements of velocity transducer? [4]

PART-B (3x16 = 48 Marks)

2. a) How the working of a potentiometer type digital voltmeter be explained? [8]
- b) Two ammeters are joined in series in a circuit carrying 100A. One ammeter has a resistance of 1000ohm shunted by 0.1ohm while the other ammeter has a resistance of 150ohm shunted by 0.02ohm. If the shunts are interchanged what would be the readings of the instruments? [8]
3. a) Explain the significance and working of frequency selective wave analyzer. [8]
- b) An electrical deflected CRT has a final anode voltage of 2000V and parallel deflecting plates of 1.5cm long and 5mm apart. If the screen is 50cm from the centre of the deflecting plates. Find: (i) Beam speed (ii) Deflection sensitivity of the tube (iii) Deflection factor of the tube [8]
4. a) Explain the operation of vertical amplifier used in a CRO. [8]
- b) An unbalanced wheat stone bridge has the following resistances with $R_1=1\text{ K}\Omega$, $R_2=2.5\text{ K}\Omega$, $R_3=3.5\text{ K}\Omega$, $R_4=10\text{ K}\Omega$ with a battery voltage of 6V and a galvanometer resistance of $R_g=300\ \Omega$. Calculate the current through the galvanometer? [8]
5. a) Explain the sources of errors and their minimizing methods. [8]
- b) Describe the method of measuring high impedance using Q-meter. [8]
6. a) What is Piezo-electric effect? Explain the operation of Piezo-electric transducer. [8]
- b) Explain the working of capacitive transducers. [8]
7. a) What is proximity? Explain the operation of proximity transducer. [8]
- b) Explain how an LVDT can be used to measure the pressure. [8]

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ELECTRONIC MEASUREMENTS & INSTRUMENTATION
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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) Explain how the range of DC voltmeter is extended. [4]
- b) What are the applications of spectrum analyzer? [3]
- c) Describe the standard specifications of a CRO. [4]
- d) Explain the limitations of Wheatstone bridge. [3]
- e) Write short notes on Sensistors and Thermistors. [4]
- f) Explain the significance of load cell in force measurement. [4]

PART-B (3x16 = 48 Marks)

2. a) Define the sensitivity of a multimeter. Explain the operation of a multimeter using a simple block diagram. [8]
- b) Explain the dynamic response of a second order instrument. [8]
3. a) Draw the circuit diagram and explain the operation of Digital spectrum analyzer. [8]
- b) Explain the requirements of pulse with reference to generator. [8]
4. a) Write short notes on portable oscilloscopes. [8]
- b) Explain the operation of trigger pulse circuit. [8]
5. a) List out different sources of errors and explain the precautions and elimination methods in A.C bridges. [8]
- b) Describe the method of measuring high impedance using Q-meter. [8]
6. a) Explain the principle of operation of strain gauges with the help of neat diagrams. [8]
- b) What are the modes of operation of piezo electric crystals? Explain in detail. [8]
7. a) A Barium titanate pickup has the dimensions of 5 mm × 5 mm × 1.25 mm. The acting force is 5 N. The charge sensitivity of the material is 150 pc/N and permittivity is 12.5×10^{-9} F/m. If the modulus of elasticity of material is 12×10^6 N/m². Calculate the strain, charge and capacitance. [8]
- b) Draw the block diagram of a standard DAS and explain the function of each block. [8]

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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) Differentiate between a true r.m.s meter and an average responding meter. [4]
- b) Describe the random noise related to signal generators. [3]
- c) What are the features of a Dual beam oscilloscope? [3]
- d) List the sources of errors in Wheatstone bridge. [4]
- e) Write about the merits and demerits of resistance thermometer. [4]
- f) List the applications of Hydraulic force meter. [4]

PART-B (3x16 = 48 Marks)

2. a) What is the significance of the number of significant figures in a stated quantity? Give some examples. [8]
- b) Explain the bridge type thermocouple arrangement and mention its applications. [8]
3. a) Explain the working of a heterodyne analyzer using a block diagram. [8]
- b) Discuss about the generation of broadband sweep frequencies using a sweep generator. [8]
4. a) With a neat diagram, describe the working of a triggered sweep CRO. [8]
- b) Describe briefly about various probes used in CROs. [8]
5. a) Derive the expression for unknown resistance in Kelvin double bridge. [8]
- b) Explain the principle and working of Q-meter. [8]
6. a) Describe the operation of capacitive transducers using suitable equations. [8]
- b) A thermistor has a resistance of 3980Ω at the ice point (0°C) and 749Ω at 50°C . The resistance temperature relationship is $R_T = a R_0 e^{b/T}$. Find the values of a and b . Calculate the resistance to be measured in case the temperature varies from 40°C to 100°C ? [8]
7. a) Differentiate photo-electric and piezo-electric transducers. [8]
- b) Explain the stroboscopic method of measuring the angular speed. [8]