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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Third Semester, B.E. - Electronics and Communication Engineering

Semester End Examination; Dec. - 2019

Electronic Instrumentation

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1 a. Define the following with an example:
i) Resolution ii) Gross error iii) Accuracy — 6

b. Design a modified multi-range DC voltmeter to convert a basic D'Arsonval movement with internal resistance of 100 Ω and full scale deflection of 10 mA, with range from 0 - 5 V, 0 - 50 V, 0 - 100 V, 0 - 250 V. — 8

c. Describe the working of true RMS voltmeter with neat diagram. — 6

2 a. Explain the DVM with block diagram which has excellent noise rejection because noise and superimposed ac are averaged out in the process of integration. — 10

b. Describe the working of successive approximation type DVM with diagram. — 10

UNIT - II

3 a. Derive the equation for unbalanced wheat stone bridge and mention the limitations of wheat stone's bridge. — 8

b. An ac bridge has the following constants:
Arm AB -- Capacitor of 0. 5μF in parallel with 1 kΩ resistance
Arm AD -- Resistance of 2 kΩ
Arm BC -- Capacitor of 0.5 μF
Arm CD -- Unknown capacitor and resistor in series
Frequency 1 kHz
Determine the unknown capacitance, unknown resistance, dissipation factor and write the bridge circuit and name it. — 6

c. Calculate the series equivalent inductance and resistance of the network that causes an opposite angle (Hay's Bridge) to null with following arms :
W = 3000 rad/s, R_2 = 10 kΩ, R_1 = 2 kΩ, C_1 = 1 μF, R_3 = 1 kΩ. — 6

4 a. Describe with diagram the working of a Wagner's ground connection. — 6

b. Find the equivalent parallel resistance and capacitance that causes a wein bridge to null with the following component values :
R_1 = 3.1 kΩ, C_1 = 5.2 μF , R_2 = 25 kΩ, f = 2.5 kHz and R_4 = 100 kΩ — 6

c. Derive the bridge circuit which is more convenient for measuring high-Q coils (Q > 10). — 8

Contd…2

UNIT - III

5	a.	List and define five important parameters of electrical transducers.	8
	b.	Illustrate resistance position transducer and explain.	8
	c.	Brief out semiconductor strain gauge.	4
6	a.	Explain the construction, principle and operation of Linear Variable Differential Transducer (LVDT).	10
	b.	Write construction diagram and bridge circuit of resistance thermometer and explain.	10

UNIT - IV

7	a.	Describe the working of frequency selective voltmeter with block diagram.	10
	b.	Explain the working of R.F heterodyne wave analyzer.	10
8	a.	Write the block diagram of data acquisition system with pre-amplification and explain.	10
	b.	Describe the operation differential instrumentation amplifier using transducer bridge.	10

UNIT - V

9	a.	Sketch and explain the block diagram of delayed time base oscilloscope and its system waveforms.	10
	b.	With neat block diagram and waveforms, explain the basic operation of sampling oscilloscope.	10
10	a.	Sketch and explain the complete block diagram and the system waveform for the sweep frequency generator.	10
	b.	Explain frequency synthesizer with block diagram.	10

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