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

(An Autonomous Institution affiliated to VTU, Belgaum)

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

Semester End Examination; Dec - 2016/Jan - 2017

Measurements and Instrumentation

Time: 3 hrs *Max. Marks: 100*

***Note**: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.*
ii) Assume suitable missing data, if any.

UNIT - I

1 a. Write the modified multirange voltmeter circuit and explain with related equations. 6

b. Calculate the value of multiplier resistor for a 10 V rms AC range on the voltmeter shown in Fig. Q1(b). 6

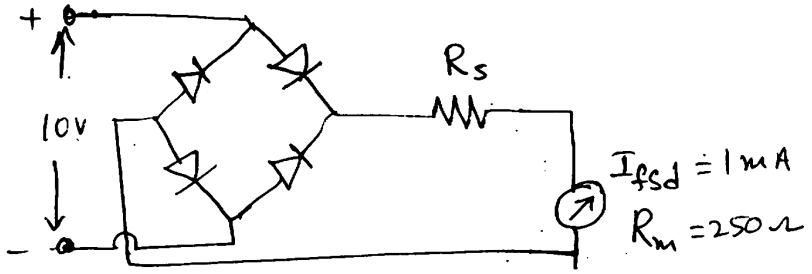

Figure Q.1(b)

c. Explain the principle of dual slope type DVM with block diagram. 8

2 a. Calculate the maximum resistance that one of these components might have at 75ºC. A component manufacturer constructs certain resistance to be any where between 1.14 kΩ and 1.26 kΩ and classifies them to be 1.2 kΩ resistors. What tolerance should be stated? If the resistance values are specified at 25ºC and the resistors have a temperature coefficient of +500 pp_m/ºC. 8

b. Explain the principle of successive approximations type DVM. 10

c. Define: 2

i) Accuracy ii) Gross Error.

UNIT - II

3 a. Describe the operation of the wheat stone bridge and derive necessary equation. 7

b. Formulate the equation to measure an inductive impedance of a Maxwell's bridge and also find the series equivalent of the unknown impedance if the bridge constants at balance are $C_1 = 0.01$ μf, $R_1 = 470$ kΩ, $R_2 = 5.1$ kΩ, and $R_3 = 100$ kΩ 8

c. Explain Wagner earth connection with circuit diagram. 5

Contd……2

4 a. Explain the operation of Schering's bridge and derive the equation $D = W C_x R_x$ 8

b. Compute the equivalent parallel resistance and capacitance that causes a wien bridge to null with the following components values, 6

$R_1 = 3.1\ k\Omega$, $C_1 = 5.2\ \mu F$, $R_2 = 25\ k\Omega$, $f = 2.5\ kHz$, $R_4 = 100\ k\Omega$.

c. Compute the series equivalent inductance and resistance of the network that causes an opposite angle (Hay bridge) to null with the bridge arms, 6

$W = 3000$ rad/s, $R_2 = 10\ k\Omega$, $R_1 = 2\ k\Omega$, $C_1 = 1\ \mu F$, $R_3 = 1\ k\Omega$.

UNIT - III

5 a. Define a transducer. Explain the principle of the resistive position transducer. 10

b. Show that $\boxed{K = 1 + 2\mu}$ for gauge factor. 10

6. a. Explain resistance thermometer with circuit diagram. Mention its advantages. 10

b. Describe the construction and working principles of LVDT and mention its advantages. 10

UNIT - IV

7 a. State what is piezoelectric transducer? Explain with equivalent circuit. 8

b. Explain the construction details and working of LCD. 8

c. Compare LED and LCD display devices. 4

8 a. Describe with diagram the operation of an AF sine and square wave generator. State the various control in the front panel of a sine and square wave generator. 10

b. Explain the working of function generator. 10

UNIT - V

9 a. Show the construction of a bistable storage CRT and explain its working. 10

b. Discuss the working of a sampling oscilloscope. 10

10a. Write a note on harmonic distortion analyzer and give its types? Explain Wien's bridge method of harmonic distortion analyzer. 10

b. State the wave analyzer and explain the working of RF Heterodyne wave analyzer with a neat diagram. 10

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