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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

### Electronic Instrumentations

Time: 3 hrs

Max. Marks: 100

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

#### UNIT - I

- 1 a. List the static characteristics of an instrument. 8
- b. The expected value of the current through a resistor is 35 mA. The measurement yields a current value of 30 mA. Calculate; 4
- i) Absolute error                      ii) % error
- iii) Relative error                      iv) % accuracy.
- c. Explain the principle of Dual slope integrating type digital voltmeter with a block diagram. 8
- 2 a. What are Systematic errors? Explain the different types of it and also describe how these errors can be minimized? 10
- b. Calculate the value of the multiplier resistance on the 25 V range of a DC voltmeter that uses a 300  $\mu$ A meter movement with an internal resistance of 200  $\Omega$ . 2
- c. Describe the principle of ramp type digital voltmeter with block diagram. 8

#### UNIT - II

- 3 a. Draw the circuit diagram and obtain balance conditions for Hay's bridge circuit. 8
- b. A Wien bridge circuit consist of the following  $R_1 = 4.7 \text{ k}\Omega$ ,  $C_1 = 5 \text{ nf}$ ,  $R_2 = 20 \text{ k}\Omega$ ,  $C_3 = 10 \text{ nf}$ ,  $R_3 = 10 \text{ k}\Omega$ ,  $R_4 = 100 \text{ k}\Omega$ . Determine the frequency of the circuit. 2
- c. List out any two applications and limitations of Whetstone's bridge. 4
- d. With necessary diagram, explain the working principle of Wagner ground connection. 6
- 4 a. Explain with a diagram how Schering's bridge can be used to measure unknown capacitance? 8
- b. What are the precautions to be taken when using a bridge? 3
- c. An inductance comparison bridge is used to measure inductive impedance at a frequency of 5 kHz. The bridge constants at balance are  $L_3 = 20 \text{ mH}$ ,  $R_1 = 20 \text{ k}\Omega$ ,  $R_2 = 50 \text{ k}\Omega$ ,  $R_3 = 100 \text{ k}\Omega$ . Find the equivalent series circuit of the unknown impedance. 3
- d. Explain with a block diagram Inductance comparison bridge. 6

#### UNIT - III

- 5 a. Explain the basic principle, advantages and limitations of a thermistor. 10
- b. Explain the operation of photo transistor with a neat diagram. 5
- c. Mention any five advantages of LVDT. 5

- 6 a. Explain the basic principle and advantages of differential output transducers with a neat block diagram. 10
- b. Explain the operation of a piezoelectric transducer with a block diagram. 6
- c. Mention any four advantages of potentiometers. 4

**UNIT - IV**

- 7 a. Explain the working principle of a spectrum analyzer with a neat block diagram. 10
- b. Explain the operation of a frequency selective wave analyzer with a neat diagram. 10
- 8 a. Explain instrumentation amplifier with a neat schematic diagram. 10
- b. List out any six objectives of a Data acquisition system. 6
- c. With a neat block diagram, explain single channel data acquisition system. 4

**UNIT - V**

- 9 a. Explain the operation of a Digital Storage oscilloscope with a block diagram and sketch the system waveform. 10
- b. Explain the operation of Bistable Analog storage oscilloscope with diagram. 10
- 10 a. Explain the operation of frequency synthesizer with a neat block diagram and sketch the system waveforms. 10
- b. Mention the applications of digital storage oscilloscopes with necessary waveforms. 10

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