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BANGALORE - 560 037

10IT35

Third Semester B.E. Degree Examination, June/July 2018  
**Electronic Instrumentation**

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

**PART - A**

- 1 a. Define the following terms as applied to an electronic instrument:  
(i) Accuracy (ii) Precision (iii) Resolution. (06 Marks)
- b. Explain the working of a true RMS voltmeter with the help of a suitable block diagram. (07 Marks)
- c. Find the voltage reading and % error of each reading obtained with a voltmeter on, (i) 5 V range (ii) 10 V range, If the instrument has a  $20 \text{ K}\Omega/\text{V}$  sensitivity and is connected across  $R_b$ . Comment upon the results. [Refer Fig. Q1 (c)] (07 Marks)

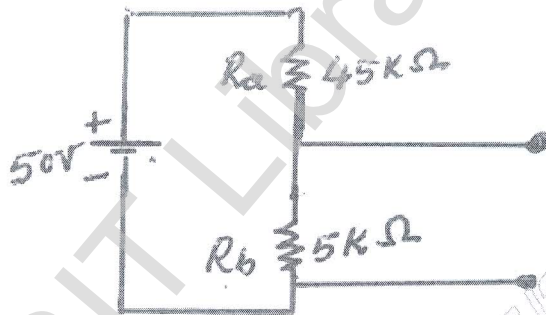


Fig. Q1 (c)

- 2 a. Explain the working of a digital frequency meter with the help of a block diagram. (08 Marks)
- b. Discuss the operation of dual slope integration type DVM with the help of block diagram (V-T). (08 Marks)
- c. Determine the resolution of a  $3\frac{1}{2}$  digit display on 1 V and 10 V ranges. (04 Marks)
- 3 a. Draw the basic block diagram of CRO, explain the functions of each block. (10 Marks)
- b. Explain the C.R.T features briefly. (04 Marks)
- c. Discuss the operation of an Electronic switch in oscilloscope. (06 Marks)
- 4 a. Explain the operation of digital storage oscilloscope with the help of a block diagram, mention the advantages. (10 Marks)
- b. Write an explanatory note on sampling oscilloscopes. (10 Marks)

**PART - B**

- 5 a. Explain the operating principle of a function generator with the help of a block diagram. (08 Marks)
- b. Explain the operation of a conventional standard signal generator with the help of a block diagram. Mention the applications. (08 Marks)
- c. Differentiate between pulse and square waves. Also mention their applications. (04 Marks)

- 6 a. What are the limitations of Wheat Stone's bridge? Derive the balance equation of Kelvin's bridge. (05 Marks)
- b. Derive the equation to measure an inductive impedance of a Maxwell's bridge. Also find the series equivalent of the unknown impedance if the bridge constants at balance are  $C_1 = 0.01 \mu\text{F}$ ,  $R_1 = 470 \text{ K}\Omega$ ,  $R_2 = 5.1 \text{ K}\Omega$  and  $R_3 = 100 \text{ K}\Omega$  (07 Marks)
- c. Explain the operating of the Wien's bridge with a neat circuit diagram. Derive the expression for the frequency. (08 Marks)
- 7 a. Distinguish between active and passive transducers with an example. (04 Marks)
- b. Explain the construction, principle and operation of LVDT, show characteristic curves. How is the direction of motion determined and list any three advantages. (12 Marks)
- c. A platinum temperature transducer has a resistance of  $100 \Omega$  at  $25^\circ\text{C}$ ,
- (i) Find its resistance at  $75^\circ\text{C}$  if the platinum has a temperature co-efficient of  $0.00392/^\circ\text{C}$ .
- (ii) If the platinum temperature transducer has a resistance of  $200 \Omega$ . Calculate the temperature use linear approximation. (04 Marks)
- 8 a. What is Bolometer? Explain RF power measurement using bolometer bridge. (07 Marks)
- b. Give the classification of digital displays, compare the LED's and LCD's. (06 Marks)
- c. A small AF voltage of  $15 \text{ V}$  is super imposed on the RF test power and balance is achieved. If the RF test power is now turned off,  $25 \text{ V}$  AF is required to balance the bridge. If the bridge arms has a resistance of  $200 \Omega$ . Calculate the RF test power. (04 Marks)
- d. A resistance strain gauge with a gauge factor of 4 is cemented to a steel member which is subjected to a strain of  $1 \times 10^{-6}$ . If the original gauge resistance is  $150 \Omega$ , calculate the change in resistance. (03 Marks)