2002 SCHEME   IT35

Third Semester B.E. Degree Examination, Dec.08 / Jan.09
Electrical and Electronic Measurements

Time: 3 hrs.   Max. Marks:100

Note : 1. *Answer any FIVE full questions.*
        2. *Assume missing data suitably.*

1 a. Define the following :
   i)   Transducer
   ii) Inverse transducer
   iii) Output transducer.
   Give examples.   (10 Marks)
   b. A resistant strain-gage with a gauge factor of 2 is fastened to a steel member, which is subjected to a strain of 1×10^{-6}. If the original resistance value of the gage is 130 Ω, calculate the change in resistance.   (05 Marks)
   c. With a neat sketch explain the unbounded strain-gage.   (05 Marks)

2 a. Explain the construction and principle of working of a Linear Voltage Differential Transducer (LVDT). Explain how the magnitude and direction of the displacement of core of an LVDT detected. Why is the frequency of excitation of primary winding is kept very high as compared to the frequency of the signal detected?   (10 Marks)
   b. An a.c LVDT has following data :
      Input 6.3 volts, Output > 5.2 volts, Range is ± 0.50 inch, Determine
      i) The plot of output voltage versus core position for a core movement going from 0.45 inch to –0.03 inch.
      ii) The output voltage when the core is –0.25 inch from centre.   (10 Marks)

3 a. Draw the circuit of a Wheatston's bridge and derive the conditions of balance. (10 Marks)
   b. In the Fig.3(b) there is an unknown resistance R_x Assuming that the current through the galvanometer is zero determine R_r.   (08 Marks)
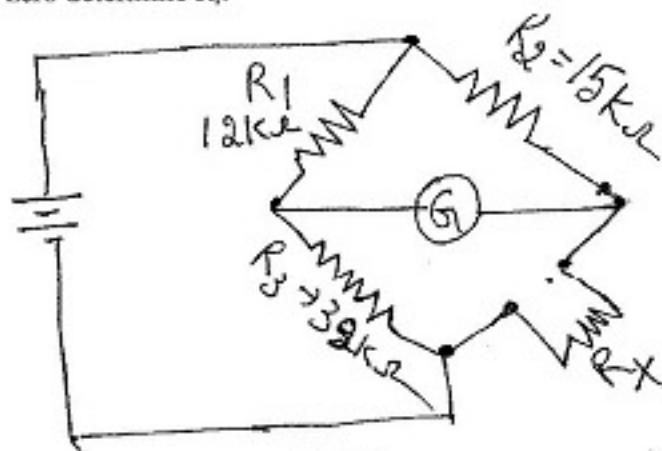

Fig.3(b)

   c. What is the importance of value of earth resistance and what factors will influence its value? Describe the fall of potential method for measurement of earth resistance. (02 Marks)

4 a. The frequency of a given electromagnetic spectrum is 6×10^{14} Hz. Find its wave length. Does this radiation fall within visible range? (05 Marks)
   b. Derive an expression for the critical angle for achieving total internal reflection in a fiber optic transmission line. (10 Marks)
   c. Write a note on the sources and detectors used for fiber optic measurements. (05Marks)

5 a. Explain with block diagram the essential functional operations of a digital data acquisition system. Compare the digital and analog forms of data acquisition systems. (10 Marks)
   b. Explain the principle, construction and working of :
      i) Current transformer   ii) Potential transformer. (10 Marks)

6 a. Explain the interfacing of frequency counters with IEEE – 488 bus, with the help of a neat block diagram. (08 Marks)
   b. Briefly explain about the instruments used in computer controlled instrumentation. (06 Marks)
   c. Write a note on the different sources and detectors used for a.c bridge measurements. (06 Marks)

7 a. With a neat sketch, explain the construction and working of an electrodynamometer type single phase power factor meter. (10 Marks)
   b. An electro-dynamometer movement, that has a full scale deflection of the current rating of 10 mA is to be used in a voltmeter circuit. Calculate the value of the multiplier for a 10–volt range if R_m equal to 50 Ω. (05 Marks)
   c. With a neat circuit, explain the requirement, significance of and procedure of calibration of single phase energy meter. (05 Marks)

8 Explain the following :
   a. The basic circuit of an electronic multimeter
   b. Photovoltaic cell and its space application
   c. Ramp type digital voltmeter
   d. The measurement of reactive power in 3 phase circuit. (20 Marks)

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