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06IT35

Third Semester B.E. Degree Examination, Dec. 07 / Jan. 08
Electronic Instrumentation

Time: 3 hrs. Max. Marks:100

Note : ***Answer any FIVE full questions.***

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. **(08 Marks)**

c. Determine the value of the multiplier resistance on the 50 V range of a dc voltmeter, that uses a 250 μA meter movement with an internal resistance of 100 Ω. **(06 Marks)**

2 a. Discuss the advantages of a digital voltmeter over an analog voltmeter. **(04 Marks)**

b. Explain the working of a digital frequency meter with the help of a block diagram. **(10 Marks)**

c. Determine the resolution of a 3½ digit display on 1 V and 10 V ranges. **(06 Marks)**

3 a. Draw the basic block diagram of an oscilloscope. Explain the functions of each block. **(08 Marks)**

b. Describe the following modes of operation available in a dual trace oscilloscope:
i) ALTERNATE mode ii) CHOP mode. **(06 Marks)**

c. Explain the operation of an electronic switch with the help of a block diagram. **(06 Marks)**

4 a. Explain why time delay is necessary in oscilloscopes. **(04 Marks)**

b. Explain the operation of a digital storage oscilloscope with the help of a block diagram. Mention the advantages. **(10 Marks)**

c. Write an explanatory note on sampling oscilloscopes. **(06 Marks)**

5 a. Explain the operation of a conventional standard signal generator with the help of a block diagram. Mention the applications. **(08 Marks)**

b. Explain the operating principle of a function generator with the help of a block diagram. **(08 Marks)**

c. Describe briefly any one application of sweep frequency generator. **(04 Marks)**

6 a. A highly sensitive galvanometer can detect a current as low as 0.1 nA. This galvanometer is used in a Wheatstone Bridge as a detector. Each arm of the bridge has a resistance of 1 kΩ. The input voltage applied to the bridge is 20 V. Calculate the smallest change in resistance, which can be detected assuming the resistance of the galvanometer is negligible. **(06 Marks)**

b. Explain the operation of the Wien's Bridge with a neat circuit diagram. Derive the expression for the frequency. **(08 Marks)**

c. Write a note on Wagner's earth connection. **(06 Marks)**

7 a. Distinguish between active and passive transducers with an example. **(04 Marks)**

b. A 120 Ω strain gage with a gage factor of 2 is affixed to a metal bar. The bar is stretched and this causes a change in resistance of 0.001 Ω. Find the change in length if the original length was 10 cm. **(06 Marks)**

c. Describe the different types of thermistor. **(04 Marks)**

d. Explain the working principle of a photo cell with an application. **(06 Marks)**

8 a. Compare LED and LCD types of displays. **(06 Marks)**

b. Explain how power is measured using a bolometer, with a suitable diagram. **(08 Marks)**

c. Write a short note on signal conditioning system. **(06 Marks)**

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06IT35

Third Semester B.E. Degree Examination, Dec. 07 / Jan. 08
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c. Write a short note on signal conditioning system. **(06 Marks)**

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06IT35

Third Semester B.E. Degree Examination, June / July 08
Electronic Instrumentation

Time: 3 hrs. Max. Marks:100

Note : ***1. Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. Assume any missing data.

PART A

1 a. Explain the following with example:
i) Gross Errors ii) Systematic Errors iii) Random Errors iv) Absolute Errors and v) Relative Errors. **(10 Marks)**

b. Find the voltage reading and % Error of each reading obtained with a voltmeter on i) 5 V range ii) 10 V range and iii) 30 V range, if the instrument has a 20 kΩ/V sensitivity and is connected across R_b. Comment upon the results. **(10 Marks)**

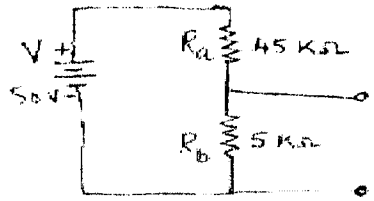

Fig.Q1(b)

2 a. With block diagram explain the principle and operation of successive approximation type DVM. Show transition diagram for 3 bit. **(10 Marks)**

b. With schematic explain the principle and operation of digital frequency meter. **(10 Marks)**

3 a. Write typical CRT connection details and explain different control knobs on the front panel of the CRO. **(10 Marks)**

b. What is the difference between Dual beam and Dual trace CRO? **(05 Marks)**

c. An electrically deflected CRT has a final anode voltage of 2000 V and parallel deflecting plates 1.5 cm long and 5 mm apart. If the screen is 50 cm from the center of deflecting plates, find: i) Beam speed, ii) The deflection sensitivity of the tube and iii) The deflection factor of the tube. **(05 Marks)**

4 a. Explain the principle and operation of sampling oscilloscope. What are its advantages and disadvantages? **(10 Marks)**

b. With block diagrams explain the principle and operation of digital storage oscilloscope. Also explain how to overcome the limitations of this oscilloscope using high performance converter. **(10 Marks)**

PART B

5 a. With block diagram explain conventional standard signal generator. **(10 Marks)**

b. Explain with a block diagram AF Sine-Square wave audio oscillator with different knobs on the front panel. **(10 Marks)**

6 a. What are the limitations of Wheatstone's Bridge? Derive the balance equation of Kelvin's Double Bridge for unknown low resistance. **(10 Marks)**

b. Four arms of an AC bridge are as follows: AB = a pure capacitance of 0.2 μF, BC = 500 Ω pure resistance, CD = unknown series circuit impedance, DA = 0.1 μF capacitance in parallel with 300 Ω resistance. Arm BD is connected with a detector and 5 V, 1000 Hz supply is connected across AC. Find unknown components value which are in series in branch CD at bridge balance condition. Write circuit diagram. **(10 Marks)**

7 a. What are the factors to be considered for the selection of better transducer? Explain. **(10 Marks)**

b. Explain the construction, principle and operation of LVDT. Show characteristic curves. How is the direction of motion determined? **(10 Marks)**

8 a. What are the different types of photoelectric transducers? Explain any two. **(10 Marks)**

b. Explain the principle of LED and RTD. Comment on their characteristics. **(10 Marks)**

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06IT35

Third Semester B.E. Degree Examination, Dec.08/Jan.09
Electronic Instrumentation

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions selecting at least two questions from each part.***

Part A

1 a. Explain the following in brief:
i) Accuracy and precision.
ii) Resolution.
iii) Grass error. **(06 Marks)**

b. With relevant expressions explain the working of practical multirange voltmeter. **(06 Marks)**

c. A basic D'Arsonoral movement with an internal resistance of 50 Ω and a full scale deflection current of 2 mA is to be used as a multirange voltmeter. Design a series string of multipliers to obtain the voltage ranges of 0 – 10 V, 0 – 50 V, 0 – 100 V, 0 – 500 V. **(08 Marks)**

2 a. Describe in detail working of successive approximation DVM. **(10 Marks)**

b. With a block schematic explain the working of digital multimeter. **(10 Marks)**

3 a. Describe the working of basic CRO with the block diagram. **(08 Marks)**

b. Explain what are Lissagous pattern. In the CRO the horizontal signal is designated as f_h and vertical signal as f_v, with reference to this explain in brief the various Lissajous patterns for,

i) $f_v = f_h$ ii) $f_v = 2f_h$ iii) $f_v = 3f_h$ iv) $f_v = 4f_h$ v) $f_v = 5f_h$

vi) $f_v = \frac{1}{2} f_h$ vii) $f_v = \frac{1}{3} f_h$ viii) $f_v = \frac{1}{4} f_h$ ix) $f_v = \frac{1}{5} f_h$ **(12 Marks)**

4 a. With a block diagram explain construction and working of digital storage oscilloscope. **(10 Marks)**

b. With relevant block diagrams and waveforms explain the working of sampling oscilloscope. **(10 Marks)**

Part B

5 a. Explain the working of AF sine and square wave generator. **(10 Marks)**

b. With a block diagram, explain the working of pulse generator. **(10 Marks)**

6 a. A wheatstone's bridge shown with corresponding resistances. The battery voltage is 5V and its internal resistance is negligible. The galvanometer used is of sensitivity 5 mm/μA and an internal resistance of 200 Ω. Determine the deflection of galvanometer caused by 2 Ω unbalance in arm AD. Also determine the sensitivity of the bridge in terms of deflection per unit change in resistance. **(08 Marks)**

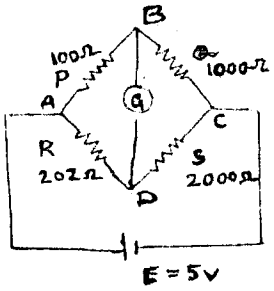

Fig. Q6 (a)

6 b. An AC bridge with terminals A, B, C, D (consecutively marked) has in arm AB a p. resistance. Arm BC has a resistance of 800 Ω in parallel with a capacitor of 0.5 μF, arm C. has a resistance of 400 Ω in series with a capacitor of 1.0 μF. Arm DA has a resistance o. 1000 Ω,

i) Obtain the value of the frequency for which the bridge can be balanced by first deriving the balance equations connecting the branch impedance and

ii) Calculate the value of the resistance in arm AB to produce balance. (12 Marks)

7 a. With a neat sketch explain construction and working of LVDT. (08 Marks)

b. What is gauge factor? Derive appropriate relation for the same. (06 Marks)

c. A platinum temperature transducer has a resistance of 100 Ω at 25°C,

i) Find its resistance at 75°C if the platinum has a temperature coefficient of 0.00392/°C.

ii) If the platinum temperature transducer has a resistance of 200 Ω. Calculate the temperature. Use linear approximation. (06 Marks)

8 a. With a neat sketch explain construction and working of platinum RTD. (10 Ma - ,

b. Describe the working of optical pyrometer. Mention its merits and demerits. (10 Mar s)

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06IT35

Third Semester B.E. Degree Examination, June-July 2009
Electronic Instrumentation

Time: 3 hrs. Max. Marks:100

Note: ***1.Answer any FIVE full questions, selecting at least TWO questions from each part.***
2.Missing data to be assumed suitably.

PART – A

1 a. Write a note on Gross and Systematic errors. How these errors can be controlled? **(06 Marks)**

b. Component manufacturer constructs certain resistances to be between 1.33K and 1.47K. What tolerance should be stated? If the resistance values are specified at 25°C, calculate maximum resistance at 75°C if temperature coefficient is +500 ppm/°C. **(06 Marks)**

c. Explain the working of AC voltmeter using Full wave bridge rectifier. **(08 Marks)**

2 a. A 4½ digit DVM has an accuracy of ± 0.5% of reading ± 1 digit.
i) What is the possible error, in volts when the instrument is reading 5V on 200V range.
ii) What is the possible error, in volts when the instrument is reading 0.1V on 2V range? **(10 Marks)**

b. With the help of block diagram explain the working of Dual slope DVM. **(10 Marks)**

3 a Explain the working of dual trace CRO. **(10 Marks)**

b. Compare alternate sweep with chopped-sweep. **(04 Marks)**

c. Write a note on following controls available on CRO panel:
i) Time-base ii) X – shift iii) Y – shift **(06 Marks)**

4 a. Explain the operation of Delayed time-base system. **(10 Marks)**

b. Sketch a diagram to show the construction of a variable persistence storage CRT. Explain its operation. **(10 Marks)**

PART – B

5 a. Draw the block diagram of function generator and explain the working of each block. **(10 Marks)**

b. Explain the working of frequency – synthesizer. **(10 Marks)**

6 a. Derive an expression for deflection current (I_g) of an unbalanced Wheatstone's bridge. **(10 Marks)**

b. A capacitance comparison bridge is used to measure a capacitive impedance at a frequency of 2 kHz. The bridge constant at balance are C3=100 μF, R_1 = 20 kΩ , R_2 = 50 kΩ, R_3=100kΩ. Find the equivalent series circuit of the unknown impedance. Show the bridge diagram. **(10 Marks)**

7 a. What is the difference between active and passive transducers? **(04 Marks)**

b. Explain how to use a bonded resistance wire strain gauge. **(06 Marks)**

c. Show the construction of LVDT. Explain its operation and list any three advantages. **(10 Marks)**

8 a. Describe the operation of photo electric transducer. **(08 Marks)**

b. Name any four display devices. **(04 Marks)**

c. What is a signal conditioner? Briefly explain the operation of DC signal conditioning system. **(08 Marks)**

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06IT35

Third Semester B.E. Degree Examination, Dec.09/Jan.10
Electronic Instrumentation

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain the following:
i) Systematic errors ii) Relative errors. **(04 Marks)**

b. Explain the working principle of multi-range voltmeter, with the help of suitable circuit diagram. **(08 Marks)**

c. Convert a basic meter movement with an internal resistance of 50 Ω and a full scale deflection current of 2 mA in to a multi-range 'dc' voltmeter with voltage ranges of 0-10V, 0-50V, 0-100V and 0-250V with following Fig.1(c). **(08 Marks)**

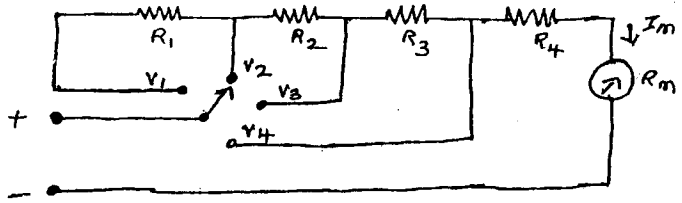

Fig.1(c).

2 a. Explain the ramp type digital voltmeter with the help of block diagram. **(10 Marks)**

b. Explain the digital multimeter with basic circuit diagram. **(10 Marks)**

3 a. Explain the C.R.T. features briefly. **(06 Marks)**

b. With the basic block diagram, explain the principle of operation of simple C.R.O. **(08 Marks)**

c. Explain the operation of an electronic switch, with the help of a block diagram. **(06 Marks)**

4 a. Explain the principle and operation of sampling oscilloscope. What are its advantages and disadvantages? **(10 Marks)**

b. Explain the operation of digital storage-oscilloscope with the help of a block diagram. Mention the advantages. **(10 Marks)**

PART – B

5 a. With a block diagram, explain modern laboratory signal generator. **(10 Marks)**

b. Sketch the circuit and waveforms for an OP-AMP astable multivibrator for use as a square wave generator. Explain its operation. **(10 Marks)**

6 a. Explain the Wheatstone bridge and derive the balance equation for Wheatstone bridge. **(06 Marks)**

b. Explain AC bridge and derive the balance equation for capacitance comparison bridge. **(08 Marks)**

c. Find the equivalent parallel resistance and capacitance that causes a wein bridge to null with the following components values:
$R_1 = 3.1\ k\Omega$, $c_1 = 5.2\mu F$, $R_2 = 25\ k\Omega$, $f = 2.5kHz$ and $R_4 = 100k\Omega$ **(06 Marks)**

7 a. Explain the potentiometer with figure. **(06 Marks)**

b. Explain the resistance thermometer with circuit diagram. **(06 Marks)**

c. Explain the construction, principle and operation of LVDT. Show characteristics curve. **(08 Marks)**

8 a. Explain piezo electrical transducer, with circuit diagram. **(06 Marks)**

b. Explain the light emitting diodes (LED) with diagram. **(06 Marks)**

c. Explain how power is measured using a bolometer, with a suitable diagram. **(08 Marks)**

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06IT35

Third Semester B.E. Degree Examination, Dec.09/Jan.10
Electronic Instrumentation

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain the following:
i) Systematic errors ii) Relative errors. **(04 Marks)**

b. Explain the working principle of multi-range voltmeter, with the help of suitable circuit diagram. **(08 Marks)**

c. Convert a basic meter movement with an internal resistance of 50 Ω and a full scale deflection current of 2 mA in to a multi-range 'dc' voltmeter with voltage ranges of 0-10V, 0-50V, 0-100V and 0-250V with following Fig.1(c). **(08 Marks)**

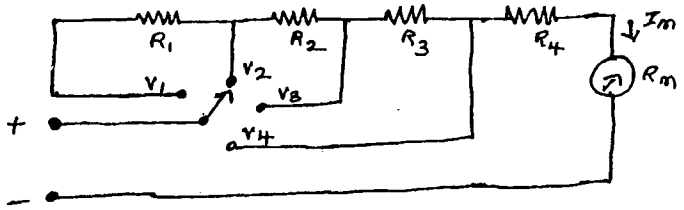

Fig.1(c).

2 a. Explain the ramp type digital voltmeter with the help of block diagram. **(10 Marks)**

b. Explain the digital multimeter with basic circuit diagram. **(10 Marks)**

3 a. Explain the C.R.T. features briefly. **(06 Marks)**

b. With the basic block diagram, explain the principle of operation of simple C.R.O. **(08 Marks)**

c. Explain the operation of an electronic switch, with the help of a block diagram. **(06 Marks)**

4 a. Explain the principle and operation of sampling oscilloscope. What are its advantages and disadvantages? **(10 Marks)**

b. Explain the operation of digital storage-oscilloscope with the help of a block diagram. Mention the advantages. **(10 Marks)**

PART – B

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b. Explain AC bridge and derive the balance equation for capacitance comparison bridge. **(08 Marks)**

c. Find the equivalent parallel resistance and capacitance that causes a wein bridge to null with the following components values:
$R_1 = 3.1\ k\Omega$, $c_1 = 5.2\mu F$, $R_2 = 25\ k\Omega$, $f = 2.5kHz$ and $R_4 = 100k\Omega$ **(06 Marks)**

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c. Explain how power is measured using a bolometer, with a suitable diagram. **(08 Marks)**

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06IT35

Third Semester B.E. Degree Examination, May/June 2010
Electronic Instrumentation

Time: 3 hrs. Max. Marks:100

Note: ***Answer any 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. **(06 Marks)**

c. Convert a basic D'Arsonval movement with an internal resistance of 50 Ω and a full scale deflection current of 2 mA into a multrange dc voltmeter with voltage ranges of 0 – 10 V, 0 – 50 V, 0 – 100 V and 0 – 250 V. **(08 Marks)**

2 a. Differentiate analog meters and digital meters. **(04 Marks)**

b. Explain the principle of operation of a digital frequency meter with the help of a block diagram. **(10 Marks)**

c. A 4½ digit voltmeter is used for voltage measurements:
i) Find its resolution ii) How would 12.98 V displayed on a 10 V range?
iii) How would 0.6973 be displayed on 1 V and 10 V ranges? **(06 Marks)**

3 a. Draw the basic block diagram of an oscilloscope. Explain the function of each block. **(08 Marks)**

b. Describe the following modes of operation available in a dual trace oscilloscope:
i) ALTERNATE mode ii) CHOP mode. **(06 Marks)**

c. Explain the operation of an electronic switch, with the help of a block diagram. **(06 Marks)**

4 a. With the help of a neat diagram, explain the working of sampling oscilloscope. **(10 Marks)**

b. With the help of a neat block diagram, explain the operation of a digital storage oscilloscope. Mention the advantages. **(10 Marks)**

PART – B

5 a. Explain the working of AF sine and square wave generator. **(10 Marks)**

b. With a block diagram, explain the working of pulse generator. **(10 Marks)**

6 a. What are the limitations of wheat stone's bridge? Derive the balance equation of Kelvin's bridge. **(06 Marks)**

b. An unbalanced wheat stone's bridge is shown in Fig.Q6(b). Calculate the current through the galvanometer. **(06 Marks)**

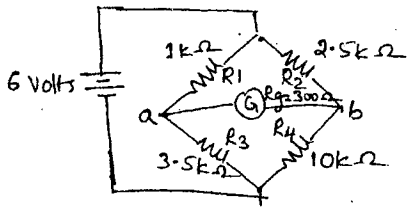

Fig.Q6(b)

c. 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 $C_1 = 0.01\ \mu F$, $R_1 = 470\ k\Omega$, $R_2 = 5.1\ k\Omega$ and $R_3 = 100\ k\Omega$. **(08 Marks)**

7 a. What is gauge factor? Derive appropriate relation for the same. **(10 Marks)**

b. Explain the construction, principle and operation of LVDT. Show characteristic curves. How is the direction of motion determined? **(10 Marks)**

8 a. Explain important features of LCDs. **(06 Marks)**

b. Explain how power is measured, using a suitable bolometer bridge diagram. **(06 Marks)**

c. Write a short note on signal conditioning system. **(08 Marks)**

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.