

5295

B.Tech. Examination, 2013

(Fourth Semester)

(EC Branches)

Paper - V

**ELECTRONIC INSTRUMENTATION AND
MEASUREMENTS**

Time Allowed : Three Hours

Maximum Marks : 100

Note : Attempt any five questions.

Q. 1. (a) What do you understand by the dimension of

a quantity. Derive the dimensions of : 10

(i) electric current



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P.T.O.

(2)

(ii) magnetic flux

(iii) force and

(iv) voltage

(b) Explain the international, primary, secondary

and working standards with suitable

examples.

10

Q. 2. (a) Explain the different types of errors that may

occur in measurements.

10

(b) An 820Ω resistance with an accuracy of

$\pm 10\%$ carries a current of 10 mA. The current

(3)

was measured by an analog ammeter on a

25 mA range with an accuracy of $\pm 2\%$ of full

scale. Calculate the power dissipated in the

resistor, and determine the accuracy of the

result.

10

Q. 3. (a) Describe with the help of a labelled diagram,

the constructional details of a PMMC meter

and explain how "control" and 'damping' forces

are obtained ?

10

(4)

(b) A PMMC instrument with FSD (full scale

deflection) of $100 \mu\text{A}$ and a coil resistance of

$1 \text{ k}\Omega$ is to be converted into a voltmeter.

Determine the required multiplier resistance

if the voltmeter is to measure 50 V at full

scale. Also calculate the applied voltage

when the instrument indicates 0.8, 0.5 and

0.2 of FSD.

10

Q. 4.

(a) Draw and explain the simple transistor emitter

follower voltmeter.

10

(5)

(b) Draw and explain the circuit of a digital
frequency meter. 10

Q. 5. (a) What are the difficulties associated with the

measurement of low resistance. Describe

how low resistance is measured accurately

by Kelvin's double bridge. 10

(b) A wheat stone bridge as in Fig. 1 has $P = 3.5$

$k\Omega$, $Q = 7 k\Omega$, and galvanometer null is

obtained when $S = 5.51 k\Omega$. 10

(6)

(i) Calculate the value of R.

(ii) Determine the resistance measurement

range for the bridge if S is adjustable from

1 k Ω to 8 k Ω .

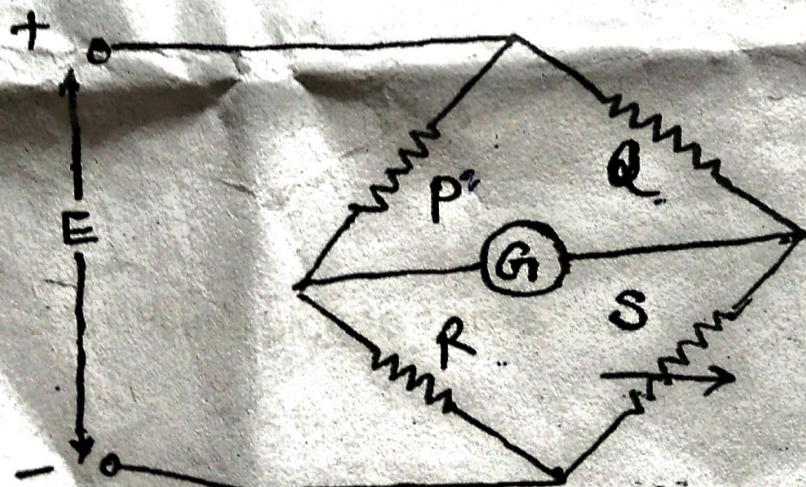


Fig. 1

Q. 6. (a) Describe the working of Hay's bridge. It is

said that this bridge is suitable for measuring

(7)

high Q inductors. Give reasons for such a
statement. 10

(b) Define Q factor of an inductor. Write the

equations for inductor Q factor with RL series

and parallel equivalent circuits. 10

Q. 7. (a) What is the difference between a CRT and

CRO ? Draw a neat block diagram of a

general purpose CRO and explain function of

each block.

10

(8)

MOSA

- (b) Describe the working principle and block diagram of a DSO. 10

Q. 8. Write short notes on the following : 20

(a) Voltage calibrator

(b) X-Y recorder

(c) Plotter

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B.Tech. Examination, 2016

(Fourth Semester)

(EC Branches)

Paper - V

**ELECTRONIC INSTRUMENTATION
AND MEASUREMENTS**

Time Allowed : Three Hours

Maximum Marks : 100

Note : Attempt any five questions. All questions carry

equal marks.

Q. 1. (a) Define the term "Units", "Absolute units",

"Fundamental units" and "Derived units".

(b) Three resistors have the following ratings :

$$R_1 = 37\Omega \pm 5\%, R_2 = 75\Omega \pm 5\%, R_3 = 50\Omega \pm 5\%$$

Determine the magnitude and limiting error in

(2)

ohm and in percent of the resistance of these resistances connected in series.

Q. 2. (a) Explain the following by suitable example :

(i) Gross error

(ii) Systematic error

(iii) Random errors

(b) Explain the construction of D' Arsonval

galvanometer.

Q. 3. (a) Calculate the value of the multiplier resistance

on the 500 V range of a d.c. voltmeter that

uses 50 μ A meter movement with an internal

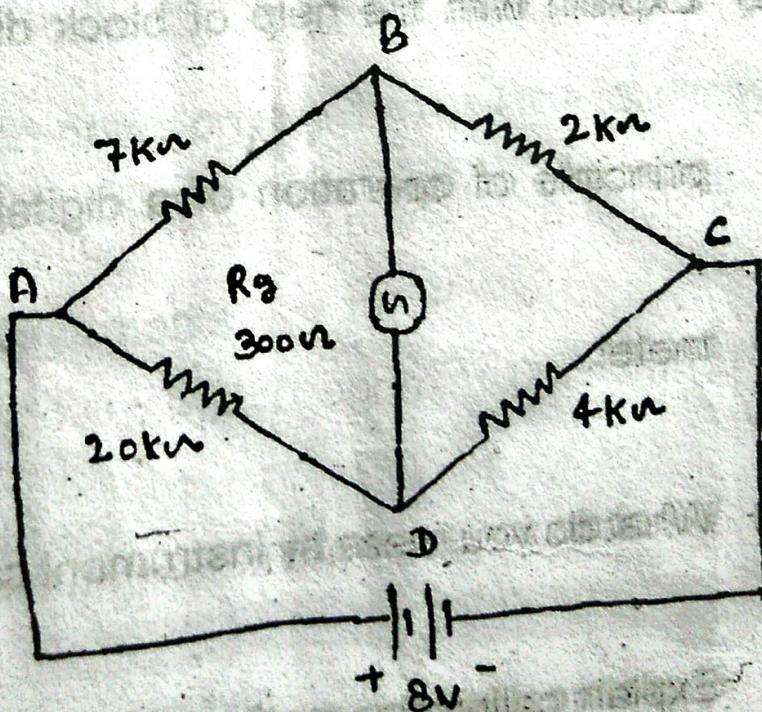
resistance of 200 Ω .

(3)

- (b) Explain the working of wheatstone bridge and derive its balance condition.

Q. 4. (a) Derive the bridge balance equation for the basic a.c. bridge. Compare Maxwell's bridge with Hay's bridge.

- (b) Calculate the current through the galvanometer for the bridge shown in fig.



(4)

Q. 5. (a) Draw the block diagram of general purpose

CRO. Explain the functions of various

blocks.

(b) With the help of suitable block diagram, explain

X-Y recorder. List advantages and applications

of the X-Y recorder.

Q. 6. (a) Explain with the help of block diagram, the

principle of operation of a digital frequency

meter.

(b) What do you mean by instrument calibration ?

Explain calibration methodology.

Q. 7. (

Q. 8. V

(5)

Q. 7. (a) An ammeter reads 8.3 A and the true value of the current is 8.5 A. Determine the absolute error and relative percentage error.

(b) Explain the working of an electronic analog multimeter.

Q. 8. Write short notes on any three of the following :

(i) Measurements

(ii) Accuracy

(iii) Reproducibility

(6)

(iv) Sensitivity

(v) Resolution