

AMIETE – ET

Time: 3 Hours

JUNE 2013

Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 Minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1 Choose the correct or the best alternative in the following: (2×10)

a. A megger is used for measurement of

- (A) low valued resistance
- (B) medium valued resistance
- (C) high valued resistance
- (D) all of these

b. A thermocouple consists of two different_____

- (A) resistors
- (B) dielectrics
- (C) conductors
- (D) batteries

c. Schering bridge is a bridge circuit used for measuring unknown_____

- (A) capacitance
- (B) resistance
- (C) inductance
- (D) current

d. Hall effect is used for_____

- (A) DC ammeters
- (B) AC/DC ammeters
- (C) AC ammeters
- (D) RMS meters

e. Resolution of a digital meter is given by _____ where n is the number of bits of ADC

- (A) $1/2^n$
- (B) 2^n
- (C) n
- (D) $2n$

f. Field strength meter measures_____

- (A) Power of RF signal
- (B) Electrical voltage per meter
- (C) Joules
- (D) Amperes

g. An oscilloscope has upper limiting frequency is given by

(A) $f_r = V_{ax}/4l$

(B) $f_r = V_{ax}/l$

(C) $f_r = V_{ax} \times 4l$

(D) $f_r = V_{ax}^2 / 4l$

h. Bolometer is used for measurement of

(A) RF frequency

(B) Microwave Power

(C) Energy

(D) Temperature

i. Strip chart recorder is used for

(A) Plotting light meter

(B) ECG

(C) MRI

(D) Antenna plots

j. Strain gauge measures _____

(A) pressure

(B) voltage

(C) fuel level

(D) biometric data

Answer any FIVE Questions out of EIGHT Questions.

Each question carries 16 marks.

- Q.2** a. Define the following with respect to the measuring system:
- | | | |
|----------------------|------------------------|------------|
| (i) True value | (ii) Static correction | |
| (iii) Relative error | (iv) Reproducibility | (8) |
- b. A voltmeter has a range of 0-5 V. The true value of the measured voltage is 3 V, while the read value is 2.95 V. What is the absolute error and relative error? **(4)**
- c. What is dynamic response? Explain the various types of dynamic response. How are they differ from dynamic characteristics? **(4)**
- Q.3** a. Derive an expression for the sensitivity of a Wheatstone bridge. **(8)**
- b. What are the advantages and disadvantages of an Anderson's bridge? In an Anderson's bridge the different arms have components as shown in Fig.1. Calculate the value of unknown inductance. Where $R_3 = 600\Omega$, $r = 400\Omega$, $R_4 = 600\Omega$, $R_2 = 600\Omega$, $C = 0.5\mu F$ **(8)**

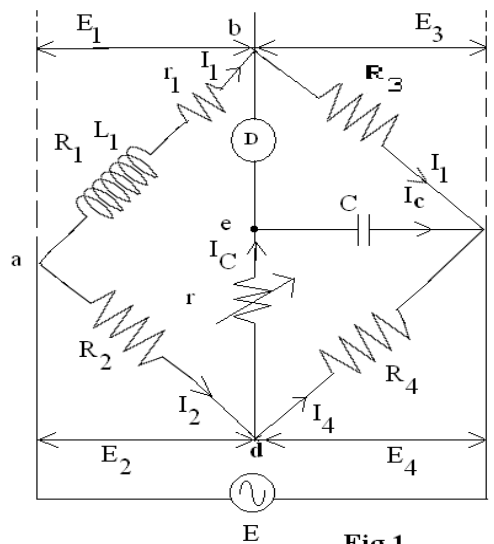


Fig.1

- Q.4** a. Draw the scheme of a Multi-range ammeter. Design a multi-range DC ammeter with an internal resistance $10\ \Omega$. The full scale deflection current is 10 mA and it is required to measure 0 to 50 mA, 0 to 100 mA and 0 to 250 mA (8)
- b. Explain the working of a True RMS voltmeter. (8)
- Q.5** a. Draw a schematic of a Dual Slope DVM and explain its principle. (8)
- b. What is the importance of Q in a RLC circuit? Explain the principle of Q measurement. Calculate the shunt resistance required in a LC circuit given inductance of 10 mH and capacitance 200 pF. The internal resistance of inductance is $12\ \Omega$. The required Q of the circuit is 10 at a frequency of 100 kHz. (8)
- Q.6** a. Explain basic elements of a function generator. What is the importance of:
 (i) Duty cycle (ii) Rise time (8)
- b. Define sensitivity and deflection factor of a Cathode Ray Tube (CRT). What are the role of the following in CROs:
 (i) Time base generator circuit (ii) X-channel
 (iii) Triggered Sweep (iv) Astigmatism (8)
- Q.7** a. What is the difference between wave analyzer and spectrum analyzer? Explain and discuss the principle of a spectrum analyzer. (8)
- b. What is the purpose of heterodyning in a high frequency measurement? (8)
- Q.8** a. Bring out the difference between CRO and recorders. Draw the schematic of a simple X-Y recorder. (8)

b. What is the principle of working of magnetic recorders? Explain the recording process. (8)

Q.9 a. What do you mean by transfer characteristic? Draw and explain transfer characteristic of atleast three transducers. (4)

b. Discuss the various metals used for temperature sensing and converting to electrical signal. (6)

c. Find the temperature coefficient, if the variation in resistance at different temperature of a thermistor is tabulated as shown below:

Temp(°C)	80	85	90	95	100	105	110	115	120	125	130
Resistance(Ω)	550	558	562	568	573	578	584	589	594	600	615

(6)