

AMIETE – ET

Time: 3 Hours

DECEMBER 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. Not taking care of zero adjustment of an instrument before measurement can be classified as

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|----------------------|-------------------|
| (A) systematic error | (B) gross error |
| (C) random error | (D) dynamic error |

b. A galvanometer recorder has

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|-------------------------------|------------------------------|
| (A) very high input impedance | (B) high input impedance |
| (C) low input impedance | (D) very low input impedance |

c. A Dual beam CRO uses

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|-----------------------|--------------------------------------|
| (A) electronic switch | (B) two electron guns |
| (C) one electron gun | (D) two time base generator circuits |

d. The sensitivity of a Wheatstone bridge depends upon _____.

- | | |
|--------------------------------------|-----------------------------|
| (A) galvanometer current sensitivity | (B) galvanometer resistance |
| (C) bridge supply voltage | (D) All of these |

e. The value of the multiplier resistance on the 500V range of d.c. voltmeter, that uses 50 μ A meter movement with an internal resistance of 200ohms is

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|----------------------|----------------------|
| (A) 99.99 M Ω | (B) 0.999 M Ω |
| (C) 9.99 M Ω | (D) 999 M Ω |

f. The chart speed of a recording instrument is 30mm/s. One cycle of the signal being recorded extends over 5mm(time base)then the frequency consumes is

- | | |
|---------------|--------------|
| (A) 30 cycles | (B) 6 cycles |
| (C) 0.3cycles | (D) 5 cycles |

- g. A Null type of instrument as compared to a deflection type instrument has
- (A) high accuracy (B) low sensitivity
(C) fast response (D) all of these
- h. A voltmeter having a resistance of 998 ohms is connected to a cell of emf 2 volt and internal resistance 2 ohm. The error in the measurement of emf will be
- (A) 4×10^{-1} V (B) 2×10^{-1} V
(C) 4×10^{-3} V (D) 2×10^{-3} V
- i. Maxwell's bridge is used to measure Q factor in the range of
- (A) 1-100 (B) 1-10
(C) 1-50 (D) 2-200
- j. For a quarter wavelength ideal transmission line of characteristics impedance 50 ohm and load impedance 100 ohm, the input impedance is
- (A) 25Ω (B) 52Ω
(C) 250Ω (D) 2.5Ω

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

- Q.2** a. Differentiate between the direct and indirect method of measurement. (8)
- b. Define limiting errors. A 0-10A ammeter has an accuracy of 1.5% of full scale reading. The current indicated by the ammeter is 2.5 A. Calculate the limiting values of current and percentage limiting error. (8)
- Q.3** a. A Kelvin's bridge is shown in Fig.1 below, the ratio of R_a to R_b is 1200 ohms $R_1=10$ ohms and $R_1=0.5R_2$. Calculate unknown resistance R_x . (8)

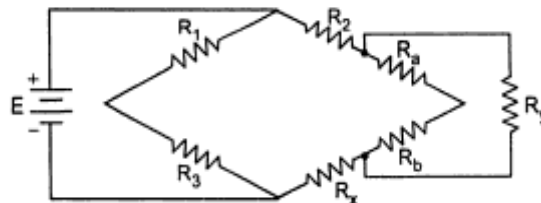


Fig.1

- b. An ac bridge has the following constants in Fig.2.
- Arm AB – capacitor of $0.5 \mu\text{F}$ in parallel with $1\text{k}\Omega$ resistance
 Arm AD – resistance of $2\text{k}\Omega$
 Arm BC – capacitor of $0.5 \mu\text{F}$
 Arm CD – unknown capacitor C_x and R_x in series
 Frequency – 1 kHz
 Determine the unknown capacitance and dissipation factor. (8)

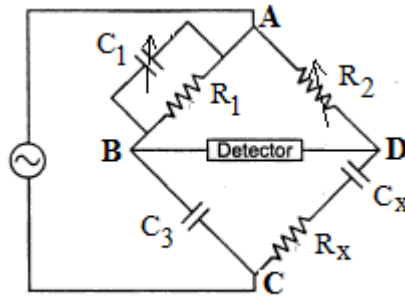


Fig.2

- Q.4** a. Convert a basic D'Arsonval movement with an internal resistance of 100 ohm and full scale deflection of 10mA into a multirange dc voltmeter with ranges from 0-5V,0-50V,0-100V. (8)

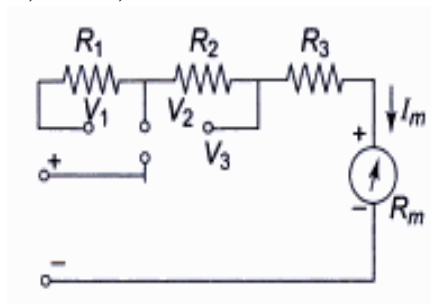


Fig.3

- b. Explain with the diagram solid state voltmeter using Op-Amp. (8)
- Q.5** a. Explain with the help of a neat diagram the working of a Universal Counter for measurement of frequency and time period. (8)
- b. Draw the labelled circuit diagram and explain working of a Q-meter. Write its applications. (8)
- Q.6** a. Describe with the help of a neat block diagram the operation of an AF Sine wave generator. (8)
- b. Explain any four features of CRT. (8)
- Q.7** a. Explain the working of Heterodyne Wave Analyzer. Write its applications. (8)
- b. Explain with the block diagram, the working of a harmonic distortion analyzer. (8)
- Q.8** a. Write the importance of Recording Data. Explain the working and application of X-Y recorder. (8)
- b. Discuss the advantages and limitation of digital data recording. (8)
- Q.9** a. Explain working of LVDT. Where it is used and what are its advantages. (8)

- b. (i) Calculate the strain in a specimen if the attached strain gauge has a strain factor of 2, a resistance of 120ohms and the change in resistance measured is 0.1ohms. (4)
- (ii) Calculate the gauge factor of a strain gauge made from a material that acts like a perfectly incompressible material deforming elastically at small strain. (Assuming the resistivity doesn't change with strain) (4)