DipIETE – ET (OLD SCHEME)

Code: DE11   **Subject: ELECTRONIC INSTRUMENTATION & MEASUREMENTS**
Time: 3 Hours   **Max. Marks: 100**

DECEMBER 2009

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.**
- **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. The bridges suitable for the measurement of an unknown inductance in terms of a capacitance would include

    (A) Maxwell and Hay   **(B)** Maxwell and Schering
    (C) Hay and Schering   **(D)** Maxwell, Hay and Schering

b. Hysteresis in an instrument means

    (A) The change in the same reading when input is first increased and then reduced
    (B) The reliability of the instrument
    (C) The repeatability of the instrument
    (D) The inaccuracy due to change in temperature

c. The frequency meter that can be used for measurement of radio frequency is

    (A) Weston   **(B)** Electrical resonance
    (C) Heterodyne   **(D)** Vibrating reed

d. A CRO has an electron gun having

    (A) Indirectly heated cathode and control grid
    (B) Horizontal and vertical plates
    (C) Phosphorescent screen
    (D) All the above

e. The gauge factor G is given by

    (A) $G = \dfrac{\Delta R / R}{\Delta \ell / \ell}$ **(B)** $G = \dfrac{\Delta \ell / \ell}{\Delta R / R}$
    (C) $G = \dfrac{\Delta R / R}{\Delta D / D}$ **(D)** None of the above

f. Capacitive transducer operates on the following principles

    (A) Variation of overlapping area of plates
    (B) Variation of separation between the plates
    (C) Variation of relative permittivity of dielectric material between the plates
    (D) All the above

g. The ratio of maximum displacement deviation to full scale deviation of the instrument is called the

      (A) Static sensitivity   (B) Accuracy
      (C) Linearity   (D) Precision

h. LVDT Windings are wound

      (A) Steel sheets (laminated)   (B) Aluminium
      (C) Ferrite   (D) Copper

i. An 8-bit DA converter has a maximum output voltage of 2V. If V_m = 1.5 V, the digital output at the end of conversion will be

      (A) 0001 1100   (B) 0010 0011
      (C) 0110 0000   (D) 1100 0000

j. The time base signal in a CRO is

      (A) A sinusoidal signal   (B) A square wave signal
      (C) A saw tooth signal   (D) A triangular wave signal

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

Q.2 a. Explain the errors that occur in a measurement system.   **(7)**

      b. Explain the terms Accuracy, Transmitters, Transponders.   **(9)**

Q.3 a. Draw the block diagram of a Basic Digital multimeter and explain.   **(8)**

      b. Derive the conditions for a Schering's bridge balance, which results in the expression for calculating the unknown capacitance and dissipation factor.   **(8)**

Q.4 a. Explain the block diagram of a pulse generator.   **(8)**

      b. Explain with the help of a block diagram the working of a spectrum analyser.   **(8)**

Q.5 a. Explain the horizontal deflecting system of a CRO.   **(8)**

      b. Draw the block diagram of storage oscilloscope and explain its working.   **(8)**

Q.6 a. Explain the principle of operation and the basic circuit of a Digital Frequency Meter.   **(8)**

      b. Explain the terms Sensitivity, Selectivity, Signal to Noise Ratio and Fidelity for a receiver.   **(8)**

Q.7 a. Why is a D/A converter considered as a decoder? With an example convert a digital signal into an equivalent analog signal.   **(8)**

      b. For a 5 bit resistive divider, determine the following   **(8)**

    (i)   The weights assigned to the LSB
    (ii)   The weights assigned to the 2nd and 3rd LSB
    (iii) The change in output voltage due to change in the LSB, 2nd LSB and 3rd LSB
    (iv) The output voltage for a digital input of 11011 and 10110
         (Assuming 0 = 0V and 1 = +10V)

Q.8   a.   Explain how temperature and force can be measured using thermoelectric and Piezoelectric transducers.
(10)

    b. What is a Bolometer? How power is measured using a Bolometer?   **(6)**

Q.9   Write notes on:-

    (i) Measurement of flux by induced emf method   **(8)**
    (ii) Measurement of displacement using LDVT   **(8)**