

DipIETE – ET (Current & New Scheme)

Time: 3 Hours

December-2016

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)

- Instrumental errors arise due to
 - Inherent shortcomings in the instrument
 - Misuse of the instrument
 - Loading effect of instrument
 - All of these
- In a kelvin double bridge two sets of readings are taken when measuring a low resistance, one with the current in one direction and the other with direction of current reversed. This is done to
 - Eliminate the effect of contact resistance
 - Eliminate the effect of resistance of leads
 - Correct for changes in battery voltage
 - Eliminate the effect of thermo-electric emf's
- Multimeter are provided with separate scale for low a.c. voltages
 - To improve the readability of the scale
 - To have high accuracy
 - To take into account the high value of resistance of rectifier at low voltages (and currents) and also the fact that at low voltages (and currents) the value of rectifier resistance is not constant but varies even for small changes in voltages (or current)
 - None of these
- In a digital frequency meter the Schmitt trigger is used for
 - Sinusoidal waveforms into rectangular pulses
 - Scaling of sinusoidal waveforms
 - Providing time base
 - None of these
- A vertical amplifier for a CRO can be designed for
 - Only a high gain
 - Only a broad bandwidth
 - A constant gain times bandwidth product
 - All of these

- f. A heterodyne wave Analyser is used
 (A) For measurement of frequency in kHz range
 (B) For measurement of frequency in MHz range
 (C) To study energy distribution across frequency spectrum of electrical signal
 (D) For saw tooth waveform generator
- g. XY Recorders
 (A) Record one quantity with respect to another quantity
 (B) Record one quantity on X axis with respect to time on Y axis
 (C) Record one quantity on Y axis with respect to time on X axis
 (D) Is a galvanometer type of strip chart recorder
- h. Following is not a component of data acquisition system
 (A) Transducer (B) Signal conditioning equipment
 (C) Multiplexer (D) Meggar
- i. Capacitive transducers have high input impedance and therefore
 (A) To reduce loading effects long lengths of cable should be used
 (B) To increase the value of resonant frequency long lengths of cable should be used
 (C) Long cable lengths should be used in conjunction with capacitive transducers in order to improve their frequency response
 (D) None of these
- j. Storage factor Q is used in laboratory for testing
 (A) Radio frequency coil (B) Inductors
 (C) Capacitors (D) All of these

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

- Q.2** a. A voltage has a true value of 1.50V. An analog indicating instrument with a scale range of 0-2.50V shows a voltage of 1.46V. What are the values of absolute error and correction? Express the error as a fraction of the true value and the full scale deflection. (3)
- b. Explain the phenomenon of hysteresis in measurement systems. Also explain the terms 'Threshold' and 'Dead Zone'. Draw neat diagrams to explain your answer. (10)
- c. Derive the dimensional equations for the following in the e.m system of units
 (i) Magnetic Flux (ii) Reluctance
 (iii) Permeance (3)
- Q.3** a. Draw the circuit of Kelvin's double bridge used for measurement of low resistance. Derive the condition of balance. (6)
- b. Write advantages and disadvantages of Anderson Bridge (4)
- c. Draw the circuit diagram of Schering Bridge and derive the equation for capacitance and dissipation factor. (6)

- Q.4** a. Describe the circuit diagram and operation of a true rms reading voltmeter using thermocouples. (8)
- b. Write short notes on thermocouple. (4)
- c. Write advantages of rectifier instruments. (4)
- Q.5** a. Describe the working of an Integrating Type Digital Voltmeter. (6)
- b. Draw and explain the circuit of a Digital Frequency Meter. (6)
- c. Write short notes on Digital pH meter. (4)
- Q.6** a. What is a function generator? Draw the block diagram of function generator and describe the basic elements of a function generator. (6)
- b. Draw the different parts of a CRT. Briefly explain function of each part. (4)
- c. Briefly explain the working of vertical amplifier used in a CRO. (6)
- Q.7** a. With the help of block diagram explain the working of heterodyne wave analyser (8)
- b. Describe the basic circuit of a spectrum analyser. Explain how the spectra of the following is displayed (8)
- (i) Continuous wave signals (ii) Amplitude modulated signals
- Q.8** a. Explain with the help of diagram the working of a potentiometric type recorder. (4)
- b. What are the basic components of a tape recorder? Explain the function of each component. (6)
- c. Write short notes on X-Y strip chart recorders (6)
- Q.9** a. Explain the construction and principle of working of a linear voltage differential transformer (L.V.D.T). (6)
- b. What are thermistors? Draw the different forms of construction of thermistors. (4)
- c. Draw the block diagram of digital data acquisition system and explain the function of each component (6)