ROLL NO. _____

Code: AE60/AE111 Subject: INSTRUMENTATION AND MEASUREMENTS

AMIETE – ET (Current & New Scheme)

Time: 3 Hours **JUNE 2017** **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. The difference between measured value and true value is called _____
(A) gross error **(B)** relative error
(C) probable error **(D)** absolute error

b. A thermometer is calibrated 150°C to 200°C. The Accuracy is specified within ±0.25% of instrument span. The maximum static error is
(A) + 0.25% **(B)** – 0.25%
(C) ± 0.125% **(D)** ± 0.25%

c. Large current in RF range at low moderate frequencies is measured by
(A) Simple ammeter **(B)** ammeter using thermocouple
(C) Using a CT **(D)** Using Aryton shunt

d. Device similar to an RTD but has a negative temperature coefficient is _____
(A) Strain Gauge **(B)** Thermistor
(C) Thermocouple **(D)** Negative-type RTD

e. An aquadag is used in a CRO to collect _____
(A) primary electrons
(B) secondary emission electrons
(C) both primary and secondary emission electrons
(D) None of these

f. X-Y recorders record one quantity:
(A) With respect to another quantity
(B) On X axis with respect to time on Y axis
(C) On Y axis with respect to time on X axis
(D) None of these

g. In signal generators
(A) Energy is created
(B) Energy is generated
(C) Energy is converted from a simple dc source into ac energy at some specific frequency
(D) All of these

h. The value of the multiplier resistance on the 500V range of d.c. voltmeter, that uses 50 μA meter movement with an internal resistance of 200 ohms is
(A) 99.99 MΩ **(B)** 0.999 MΩ
(C) 9.99 MΩ **(D)** 999 MΩ

i. An LVDT:
(A) Exhibits linear characteristics up to a displacement of ±5 mm.
(B) Has a linearity of 0.05%
(C) Has an infinite resolution and high sensitivity of the order of 40V per mm.
(D) All of these

j. The power consumption of PMMC instruments is typically about
(A) 0.25 W to 2 W **(B)** 0.25 mW to 2 mW
(C) 25 μW to 200 μW **(D)** None of these

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

Q.2 a. Define the following: **(8)**
(i) Accuracy
(ii) Linearity
(iii) Dead zone
(iv) Hysteresis

b. Differentiate between the direct and indirect method of measurement. **(8)**

Q.3 a. Draw the circuit of Wheatstone Bridge used for measurement of medium resistance. Explain its operation and derive the condition for its balance. **(8)**

b. A dielectric sheet of thickness 1mm is tested at 50Hz between two electrodes of 10 cm diameter. The Schering bridge employed has a standard compressed air capacitor C_3 of 100 pF; a non-inductive resistor R_4 of 350 Ω in parallel with a variable capacitor C_4 and a non-inductive variable resistor R_2. At balance C_4= 0.4μF, R_2 = 250Ω. Calculate the power factor and the permittivity of the sheet. **(8)**

Q.4 a. Calculate the multiplier resistor required for a 100 Vrms range on the voltmeter shown in given Fig.1. **(8)**

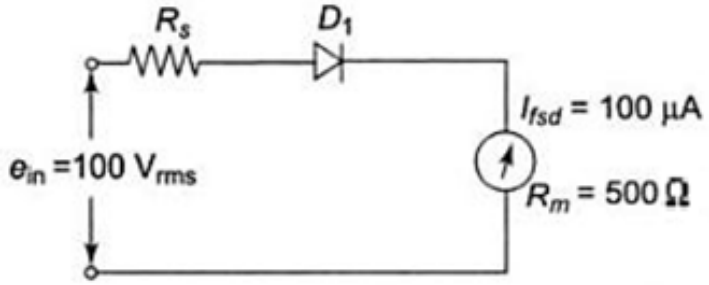

Fig.1

b. With the help of a neat diagram, explain true rms voltmeter. **(8)**

Q.5 a. Explain with the help of a neat diagram, the working of a digital frequency meter. **(8)**

b. Draw a schematic of a Dual Slope DVM and explain its principle. **(8)**

Q.6 a. Describe with the help of a neat block diagram the operation of an AF Sine wave generator. **(8)**

b. Discuss with the help of a neat circuit diagram the elements of a standard sweep generator. Draw its output waveform. **(8)**

Q.7 a. Explain Spectrum Analyzer with the help of block diagram. **(8)**

b. Explain Harmonic Distortion Analyser with neat block diagram **(8)**

Q.8 a. What is meant by Strip Chart Recorder? Explain basic Strip Chart Recorder with neat block diagram and write its applications. **(8)**

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

Q.9 a. Explain working of LVDT. Where it is used and what are its advantages? **(8)**

b. What are the different types of Instrumentation System? Explain in brief. Also, draw Block diagram of each. **(8)**