7. (a) Draw the internal structure of the Cathode Ray Tube. List and explain the main parts of the CRT. (10)

(b) Draw circuit diagram and equation for output voltage when an op-amp is used as:

(i) Inverter,

(ii) Adder. (5)

8. (a) Draw the block diagram of a Dual Slope Integrating A/D Convener and explain how it works. (10)

(b) Differentiate between Digital and Analog instruments. (5)

9. Write short notes (any *three*): (3×5=15)

(a) Digital Multimeter

(b) Q- meters

(c) Frequency Meter

(d) Binary Weighted Resistance D/A Convertor.

Total No. of printed pages = 4

EC 131305 OR

Roll No. of candidate

2019

B.Tech. (ECE) 3rd Semester End-Term Examination

ELECTRONIC MEASUREMENT AND INSTRUMENTATION

(Old Regulation)

Full Marks – 100 Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer question No. 1 and any *six* from the rest.

1. Answer the following : (MCQ/Fill in the blanks) (10 × 1 = 10)

(i) _____ instruments are used for direct current measurements only.

(ii) The unit of Energy is _____.

(iii) Two bridges used for measuring resistance are _____ and _____.

(iv) Voltmeters are always connected in _____ in a circuit.

(v) _____ instruments are the cheapest disregarding the accuracy.

(vi) The conditions for balance of an AC bridge are _____ and _____.

(vii) The temperature error in ammeters can be eliminated by using a _____.

(viii) Output impedance of an ideal op-amp is _____.

(ix) The torques required for satisfactory operation of an indicating instrument are _____ and _____.

(x) Flash Converters are used for _____ conversion.

2. (a) Explain the construction of D' Arsonval Galvanometer with proper labeled diagram. (6)

(b) What is an ohmmeter? Draw circuit diagram for a shunt type ohmmeter. (3)

(c) Mention a few advantages and disadvantages of PMMC Instruments. (6)

3. (a) A moving coil instrument gives a full scale deflection of 10mA when the potential difference across the terminals is 100mV. Calculate:

(i) The shunt resistance for a full scale deflection corresponding to 100 A

(ii) The series resistance for full scale reading with 1000 V.

Calculate the power dissipation in each case. (7)

(b) Briefly explain what is coupling torque. (3)

(c) For a certain dynamometer ammeter the mutual inductance M varies with deflection Θ (expressed in degrees) as : $M = -6\cos(\theta + 30°)$ mH.

Find the deflecting torque produced by a direct current of 50 mA corresponding to a deflection of 60°. (5)

4. Explain with circuit diagram (derive the balanced condition): (7.5×2=15)

(a) Maxwell Bridge

(b) Schering Bridge.

5. (a) Design a multi-range d.c. milli-ammeter using a basic movement with an internal resistance $R_m = 50\ \Omega$ and a full scale deflection current $I_m = 1$ mA. The ranges required are 0-10 mA, 0-50 mA, 0-100 mA and 0-500 mA. (6)

(b) List some errors encountered in electrodynamometer type instruments. (4)

(c) What is the resolution of a $3\frac{1}{2}$ digits display? Also find the resolution of a $3\frac{1}{2}$ digit meter in case its range is 1 V. (5)

6. (a) Draw a commonly used sample- hold circuit and explain the operation of Sample-Hold Circuits. (7)

(b) What is the use of digital electronic counters? With proper figure explain a decade counter. (2+6)