Code: D-11 **Subject: ELECTRONIC INSTRUMENTATION & MEASUREMENTS**
Time: 3 Hours **Max. Marks: 100**

NOTE: There are 11 Questions in all.

- **Question 1 is compulsory and carries 16 marks. Answer to Q. 1. must be written in the space provided for it in the answer book supplied and nowhere else.**
- **Answer any THREE Questions each from Part I and Part II. Each of these questions carries 14 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1 Choose the correct or best alternative in the following: (2x8)

a. An RTD cannot be used to measure temperatures _____.

(A) above $100^{\circ}C$ and below $800^{\circ}C$.
(B) between $2000^{\circ}C$ and $2500^{\circ}C$.
(C) below $200^{\circ}C$.
(D) above $300^{\circ}C$

b. A load cell is used to measure _____ loads by means of a _____ arrangement.

(A) light, bridge. **(B)** heavy, opamp.
(C) heavy, steel bar. **(D)** light, opamp .

c. Foil type strain gauges are advantageous over wire type gauges because of their _____.

(A) high gauge factor. **(B)** much lower tensile strength.
(C) much greater dissipation. **(D)** very little dissipation.

d. Most of the thermistors have a _____.

(A) low gauge factor.
(B) low tensile strength.
(C) negative temperature coefficient.
(D) positive temperature coefficient.

e. The working principle of the Q meter is based on _____.

(A) balance of a wheatstone type of bridge.
(B) increase of the time constant under high temperature conditions.
(C) parallel electrical resonance.
(D) series electrical resonance.

f. The purpose of a delay line in a CRO is _____ .

(A) to provide correct 1-2-5 sequence attenuation to the vertical deflecting system.
(B) to delay the signal drive for vertical CRT plates.
(C) to delay the electron beam to the greatest amount of time that is possible.
(D) to generate the correct voltage to supply the cathode ray tube.

g. Considering the radio receiver characteristics, the ability to reject unwanted signals is indicated by the parameter namely _____.

(A) noise figure. **(B)** selectivity.
(C) image response. **(D)** sensitivity.

h. Considering the measurement of radio frequency power measurement using a bolometer bridge, the power is given by the expression _____.

(A) $\frac{v_1^2 + v_2^2}{2R_1}$. **(B)** $\frac{v_2^2 - v_1^2}{4R_1}$.

(C) $\frac{v_1^2 - v_2^2}{2R_1}$. **(D)** $\frac{v_1^2 + v_2^2}{4R_1}$.

PART I

Answer any THREE Questions. Each question carries 14 marks.

Q.2 a. Explain the following static performance characteristics of measuring instruments : linearity, hysteresis, and dead band. **(6)**

b. (i) Describe the process of calibration in instruments.
(ii) Explain primary and secondary standards. **(8)**

Q.3 a. Give the circuit diagram of a multirange volt meter and state how the term "multirange" arises. **(6)**

b. Convert a basic D'Arsonval movement with an internal resistance of 55Ω and a full scale deflection of 2.5 mA into a multirange d.c. voltmeter with voltage ranges of 0 – 10V, 0 – 50V, 0 – 100V and 0 – 250V. [Hint: Make use of Fig.1]

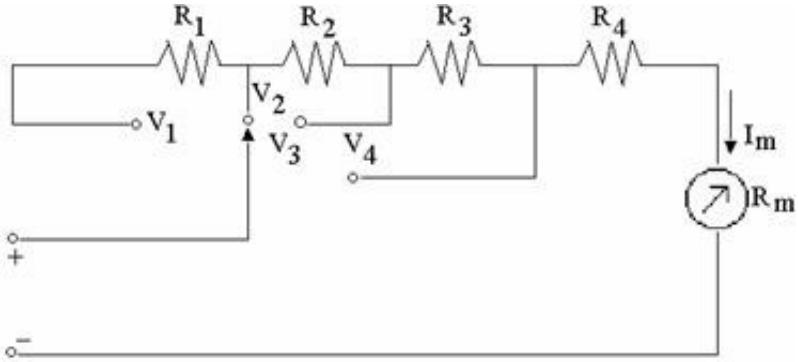

Fig.1

Q. expression for the unknown fre

b. If the sensitivity of a galvanometer in the circuit of Fig.2 is 12 mA/μA determine its deflection. **(7)**

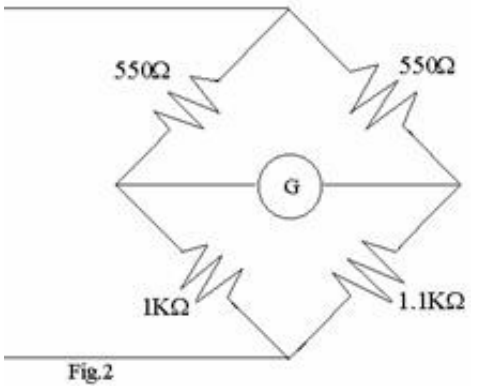

Fig.2

Q.5 a. Explain 'Sample Mode' and 'Hold Mode' as applied to a Sample and Hold circuit. Draw the circuit of a practical S/H circuit and explain its operation. **(8)**

b. Draw the block diagram of a simultaneous sampled system multiplexer and explain its operation. **(6)**

Q.6 a. Explain the principle of a spectrum analyser with the help of a parallel filter bank analyser. **(6)**

b. Define : sensitivity, selectivity and noise figure as applied to a radio receiver. **(4)**

c. With the help of a block diagram explain the operation of an AM receiver. **(4)**

PART II

Answer any THREE Questions. Each question carries 14 marks.

Q.7 a. Give a set up for each of the following :

(i) Unbonded resistance wire strain gauge.

(ii) Bonded resistance wire strain gauge.

Explain how strain can be measured with them. **(10)**

b. Describe the following in brief : (i) Thermistor, (ii) Variable reluctance type of transducer. **(4)**

Q.8 a. With the help of the block diagram of a CRO briefly indicate the use of its various parts. **(6)**

b. Considering a (VHF) sampling oscilloscope, give the input wave and sweep ramp voltage waveforms at each of its blocks. **(8)**

Q.9 a. Draw the block diagram of a function generator and explain its features. **(6)**

b. What are the requirements of a pulse generated in the laboratory by means of a pulse generator? **(8)**

Q.10 a. Give the block diagram of a pulse generator and explain its working. **(7)**

b. Explain the purpose of the circuits shown in Fig. 3(a) and Fig. 3(b) and give their nomenclature. **(7)**

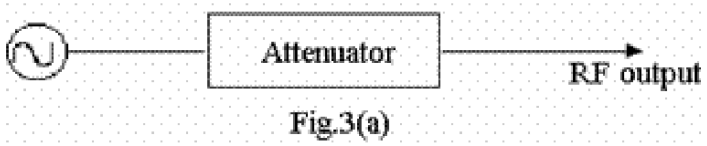

Fig.3(a)

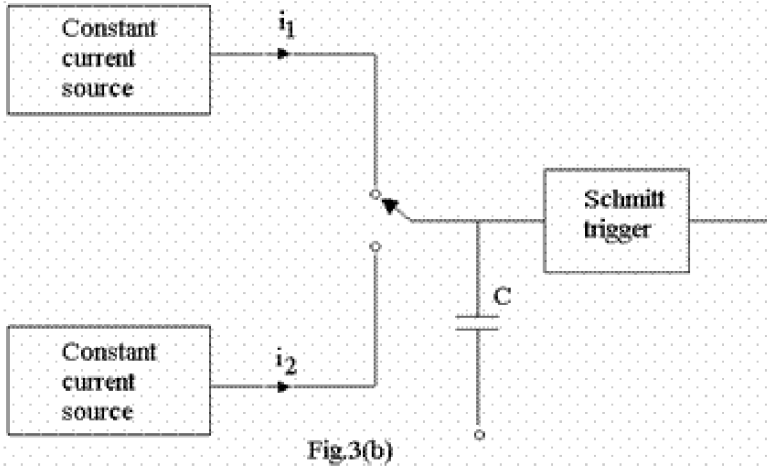

Fig.3(b)

Q.11 Write short notes on any **TWO** of the following: **(7 + 7)**

(i) Thruline RF wattmeter.
(ii) Measurement of flux by induced EMF.
(iii) Digital transducers.