

- (B) an rms voltage reading device.
 (C) an instrument to measure the change in resistance of a load due to heating.
 (D) an instrument to measure VSWR.
- g. Selectivity of a receiver is
- (A) its ability to prevent image response.
 (B) its ability to maintain constant output power.
 (C) its ability to reject unwanted signals.
 (D) the ratio of input RF and local oscillator frequency.
- h. Wave analyzer is an instrument to measure
- (A) the frequency difference between fundamental and a harmonic.
 (B) bandwidth of a tuned amplifier.
 (C) frequency shift due to mixing of two frequencies.
 (D) relative amplitudes of frequency components in a signal generator.
- i. The functioning of a thermocouple as a temperature sensor is related to
- (A) Seebeck effect. (B) Piezoelectric effect.
 (C) Stefan Boltzmann's law. (D) Thermal conductivity.
- j. A ratio detector is used for
- (A) AM alignment. (B) Sweep alignment.
 (C) FM alignment. (D) Dual sweep alignment.

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

- Q.2** a. Define accuracy and precision. Explain why a precise instrument may not necessarily be accurate. (8)
- b. What are primary, secondary and working standards? Give examples of each. (8)
- Q.3** a. Draw the circuit of a Schering bridge and derive an expression for value of unknown capacitance in the bridge. Explain how the bridge may be calibrated to directly read dissipation factor of lossy capacitors. (10)
- b. What is a multimeter? Using simple circuit schemes, show how a wide range of dc voltages and resistances are measured using the meter. (6)
- Q.4** a. Why attenuators are used in a signal generator? List the attenuator types used in sinewave generators. Describe the operation of any one of them. (10)

- b. Using a circuit diagram, explain the input processing for a frequency counter. **(6)**
- Q.5** a. Explain the principle underlying the working of a sampling oscilloscope. What are advantages in using sampling scope over conventional oscilloscopes? Draw a block schematic of the sampling system for a CRO. **(10)**
- b. Explain how phase angle between two sine waves can be measured using a CRO. **(6)**
- Q.6** a. Delineate, writing neat figures of an experimental set up, the procedure to measure RF power using a bolometer. **(10)**
- b. Explain a method to obtain the hysteresis loop of a magnetic material under ac operating conditions. Draw a figure to show your experimental set up. **(6)**
- Q.7** a. Draw a neat figure to show the measurement system for AM alignment and write steps in the alignment procedure. **(8)**
- b. Explain how selectivity of a radio receiver may be measured by sweep method. **(8)**
- Q.8** a. Draw a figure to illustrate the block schematic of a general purpose spectrum analyzer and explain operation of the analyzer. **(10)**
- b. A 10-bit dual-slope A/D converter has a reference voltage of 10V. Find the digital output for an input voltage of 6.8V. **(6)**
- Q.9** a. Explain the phenomenon of 'magnetostriction'. Describe the construction and operation of a transducer which works on the principle of magnetostriction. **(10)**
- b. Find the resistance change produced by the application of strain of $150 \mu\text{m}/\text{m}$ on
 (i) a metal wire gauge with $GF = 2.0$ and
 (ii) a semiconductor gauge with $GF = 140$ both of which have a nominal unstrained resistance of 120Ω . **(6)**