Instructions: 
(1) All questions are compulsory.
(2) Illustrate your answers with neat sketches wherever necessary.
(3) Figures to the right indicate full marks.
(4) Assume suitable data, if necessary.
(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

1. A) Attempt any six of the following:
   
   a) Define sensitivity and reproducibility.  
   b) Enlist the specifications of analog DC voltmeter.  
   c) State how DMM can be used to check diode and transistor.  
   d) Define RMS value and peak to peak value.  
   e) List the four applications of CRO.  
   f) List out any four features of logic analyzer.  
   g) State the function of delay line.  
   h) Define wave analyzer and state its need.

   Marks: 12

   B) Attempt any two of the following:
   
   a) State the reason for ammeter never connected in shunt across a source of EMF.  
   b) State how frequency and phase can be measured using Lissajous pattern.  
   c) Explain primary standard and secondary standard.

   Marks: 8

2. Attempt any four of the following:
   
   a) Describe Gross error, systematic error and random error.  
   b) Design multirange DC ammeter for $R_m = 100 \Omega$, $I_m = 1 \text{ mA}$ and required current ranges are $0-20 \text{ mA}$, $0-100 \text{ mA}$, $0-200 \text{ mA}$.  
   c) Explain the working of linear ramp type DVM.  
   d) Draw the block diagram of horizontal deflection system. State the role of trigger circuit and time base generator in CRO.  
   e) Draw the circuit of multirange AC voltmeter and explain its working.  
   f) Explain the working of standard RF signal generator and explain it.

   Marks: 16
### 3. Attempt any four of the following:

a) Draw constructional diagram of PMMC meter and explain working principle.
   - 4 marks

b) Draw labelled diagram of CRT and explain working of CRT.
   - 4 marks

c) Draw diagram of LCR-Q meter and how different parameters are measured using it.
   - 4 marks

d) Explain different dynamic characteristics of instrument.
   - 4 marks

e) Explain the working of Ayrton Shunt type DC ammeter with the help of diagram.
   - 4 marks

f) Draw the block diagram of pulse generator and explain its operation.
   - 4 marks

### 4. Attempt any four of the following:

a) Define calibration of instrument and explain need of calibration.
   - 4 marks

b) Draw the circuit of DC voltmeter and derive the equation of series resistance.
   - 4 marks

c) Compare digital instrument with analog instrument. (4 points).
   - 4 marks

d) Explain the working of single beam dual trace CRO with the help of block diagram.
   - 4 marks

e) Draw the block diagram of spectrum analyzer. State any four application of spectrum analyzer.
   - 4 marks

f) Explain the operation of digital frequency meter with the help of block diagram.
   - 4 marks

### 5. Attempt any four of the following:

a) Define sensitivity and loading effect of voltmeter.
   - 4 marks

b) Draw the block diagram of digital multimeter and state how i) resistance ii) current is measured.
   - 4 marks

c) Draw the block diagram of dual beam dual trace CRO and state function of each block.
   - 4 marks

d) Describe working of distortion factor meter with the help of diagram.
   - 4 marks

e) Draw the labelled block of dual slope integrating type DVM. State its operation.
   - 4 marks

f) List out any four front panel control of basic CRO with their functions.
   - 4 marks

### 6. Attempt any four of the following:

a) Explain the working of analog AC ammeter with the help of diagram.
   - 4 marks

b) Compare successive approximate type DVM with linear ramp type DVM (4 points).
   - 4 marks

c) Describe the methods of measurement using CRO:
   - 4 marks

   i) Voltage measurement  ii) Current measurement

   iii) Time period measurement  iv) Frequency measurement.

   d) Explain working of frequency selective wave analyzer with the help of diagram.
   - 4 marks

e) Draw the block diagram of digital storage oscilloscope. Write function of each block.
   - 4 marks

f) Draw the block diagram of video pattern generator. State the uses of various patterns generated by pattern generator.
   - 4 marks