Scheme – I

Sample Question Paper

Program Name : **Electronics & Tele-Communication Engineering, Electronics, Electronics & Communication Engineering, Electronics Engg. and Electronics & Communication Technology**

Program Code : **EJ/ET/EN/EX/EQ**

22333

Semester : **Third**

Course Title : **Electronics Measurements and Instrumentation**

Marks : **70** **Time: 3 Hrs.**

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) Preferably, write the answers in sequential order.

Q.1) Attempt any FIVE of the following. **10 Marks**

a) Define the term 'Measurement'.
b) Write the specifications of an analog multimeter.
c) State significance of lissajous figure.
d) Define Transducers.
e) Sketch block diagram of Instrumentation system.
f) State the applications of Bourdon Tube.
g) List application of Data Acquisition System.

Q.2) Attempt any THREE of the following. **12 Marks**

a) Describe the different types of errors occurs in measurement with one example.
b) Explain the role of shunt resistor connect across PMMC movement.
c) Describe the function of each block of CRO.
d) Explain with sketches the working principle of LVDT.

Q.3) Attempt any THREE of the following. **12 Marks**

a) Explain with sketches the working of analog ohm meter
b) Calculate horizontal to vertical frequency ratio for Lissajous figures as shown in figure no.1

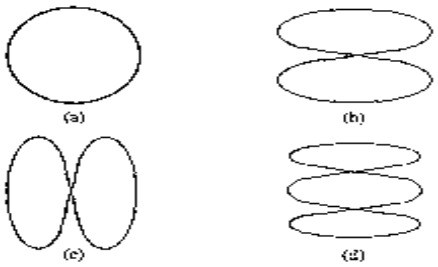


Figure no.-1

c) Explain significance of transducer in instrumentation system.

d) Sketch labeled DC signal conditioning circuits used for Pressure measurement

Q.4) Attempt any THREE of the following. 12 Marks

a) Convert the PMMC movement into a dc-ammeter of the range 0 to 100mA.

b) Sketch labeled equivalent circuit diagram of practical ammeter and voltmeter.

c) Suggest instrument to measure unknown frequency above 5 MHz and store result. Justify it.

d) Convert 520 mm of Hg into bar.

e) Sketch AC signal conditioning circuit for level measurement.

Q.5) Attempt any TWO of the following. 12 Marks

a) Determine the smallest measureable change in the voltage of an analog voltmeter having range 0-200V with resolution of 0.15% of full scale

b) Sketch and describe pressure measurement system for 800mm pressure, that contain Bourdon tube and LVDT.

c) Describe functions of the each block of DAS.

Q.6) Attempt any TWO of the following. 12 Marks

a) Sketch the DC signal conditioning circuit for pressure measurement using strain gauge. Justify it.

b) For the parameters accuracy, linearity and range, suggest the name of the temperature transducer to measure human body temperature. Justify it.

c) (i) Calculate the resistance of PT-100 for 40°C.

(ii) Sketch characteristics of PT-100 and compare it with that of thermocouple.

Scheme – I

Sample Test Paper - I

Program Name : **Electronics & Tele-Communication Engineering, Electronics, Electronics & Communication Engineering, Electronics Engg. and Electronics & Communication Technology**

Program Code : **EJ/ET/EN/EX/EQ**

22333

Semester : **Third**

Course Title : **Electronics Measurements and Instrumentation**

Marks : **20** **Time: 1 Hour**

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) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR. **08 Marks**

a) Differentiate analog and digital multimeter (any two points).

b) Define the term measurement.

c) List application of DSO.(any four)

d) Define Resolution and accuracy.

e) List type of Errors.

f) State significance of Lissagious figure.

Q.2 Attempt any THREE. **12 Marks**

a) Identify the standards for calibration of the multimeter instrument with justification

b) Describe error in measurement and classify it..

c) List different display device and explain PMMC meter.

d) Convert the PMMC with 100 ohm internal resistance with 10mA maximum deflection to 0- 10V range voltmeter.

e) Compare DSO and CRO with four features.

f) Sketch Block diagram of function generator and state function of each block.

Scheme – I

Sample Test Paper - II

Program Name : **Electronics & Tele-Communication Engineering, Electronics, Electronics & Communication Engineering, Electronics Engg. and Electronics & Communication Technology**

Program Code : **EJ/ET/EN/EX/EQ**

22333

Semester : **Third**

Course Title : **Electronics Measurements and Instrumentation**

Marks : **20** **Time: 1 Hour**

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) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR. **08 Marks**

a) Define Transducer.

b) Identify following transducer as active and passive -

i) Thermocouple ii) LDR iii) LVDT iv) Bellows

c) Sketch Burdon Tube and Bellows schematic.

d) List transducers used in level measurement.

e) Define signal conditioning.

f) State need of DAS.

Q.2 Attempt any THREE. **12 Marks**

a) Explain selection criteria of transducer.

b) Sketch basic building blocks of instrumentation system and state function of each block.

c) Explain working principle of orifice plate for flow measurement.

d) Convert 1bar pressure to pascal, psi, Hg mm.

e) Sketch pressure transducer system using DC bridge and instrumentation amplifier.

f) Describe basic DAS with neat and labeled sketch.

22333

12223

3 Hours / 70 Marks Seat No. | | | | | | | | |

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.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

(7) Preferably, write the answers in sequential order.

Marks

1. Attempt any FIVE of the following : **10**

(a) Define the term 'error'. State types of errors.

(b) State parameters that can be measured by analog multimeter.

(c) List any four applications of CRO.

(d) Sketch block diagram of Instrumentation system.

(e) Classify the temperature measuring transducer.

(f) State the application of Bourdon tube.

(g) State the need of signal conditioning.

2. Attempt any THREE of the following : **12**

(a) Explain various types of standards in instrument with suitable example.

(b) Explain with neat sketch working principle of PMMC.

(c) Sketch labelled diagram of CRT.

(d) Describe the working principle of C-shaped Bourdon tube with neat sketch.

3. Attempt any THREE of the following : **12**

(a) Explain with neat sketch the operation of analog multimeter.

(b) Explain with sketch the procedure to measure following parameter using CRO :

(i) Frequency

(ii) Phase angle

(c) Sketch and describe RTD.

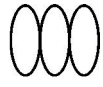
(d) Describe the function of each block of DAS.

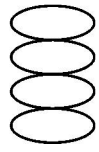
4. Attempt any THREE of the following : **12**

(a) Convert the PMMC movement into a DC-ammeter of the range 0 to 200 mA.

(b) Calculate the frequency of vertical input for an CRO for the following Lissajous figures.

(Horizontal input frequency is 10 kHz)

(i) 

(ii) 

(c) Suggest the suitable transducer for the following measurement :

(i) Humidity

(ii) Stresses

(iii) Pressure

(iv) Linear displacement

(d) Justify piezoelectric transducer active or passive. Also state the principle of operation of piezoelectric transducer.

(e) Sketch AC signal conditioning circuit for level measurement.

5. Attempt any TWO of the following : **12**

(a) The expected value of the voltage across a resistor is 80 V. However, the measurement gives a value of 79 V. Calculate :

(i) Absolute error

(ii) % error

(iii) Relative accuracy

(iv) Percentage accuracy

(v) Error expressed as a percentage of the full scale reading if the full scale deflection is 0-100 V.

(b) Sketch and describe pressure measurement system for 800 mm pressure that contain Bourdon tube & LVDT.

(c) Sketch the DC signal conditioning circuit for pressure measurement using strain gauge. Justify it.

6. Attempt any TWO of the following : **12**

(a) Draw the block diagram of dual beam oscilloscope. Compare it with single beam oscilloscope (any **six** points).

(b) Describe difference between the transducer and sensors (**six** points). State most commonly used temperature sensor with justification.

(c) (i) Calculate the resistance of PT 100 for 50°C.

(ii) Explain different types of Thermocouple.

22333

21222

3 Hours / 70 Marks Seat No. | | | | | | | | |

15 minutes extra for each hour

Instructions : (1) All Questions are *compulsory.*
(2) Answer each next main Question on a new page.
(3) Illustrate your answers with neat sketches wherever necessary.
(4) Figures to the right indicate full marks.
(5) Assume suitable data, if necessary.
(6) Use of Non-programmable Electronic Pocket Calculator is permissible.
(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following : **10**

(a) State need of level measurement.

(b) Define :

(i) Sensitivity

(ii) Accuracy

(c) List application of digital multimeter.

(d) State significance of lissajous figure.

(e) Define transducers. Give two examples of transducers.

(f) Write objective of Data Acquisition System.

(g) List different types of errors.

2. Attempt any THREE of the following : **12**

(a) Define Calibration and state its need.

(b) Explain with sketches the working principle of LVDT.

(c) Explain with sketches the working principle of optical pyrometer.

(d) Draw PMMC meter & describe it.

3. Attempt any THREE of the following : **12**

(a) Draw labelled block diagram of CRO.

(b) Compare analog meter and digital meter.

(c) State and explain different types of standards of measurements.

(d) State four selection criteria of transducer.

4. Attempt any THREE of the following : **12**

(a) Explain with sketches the working of analog ohm meter.

(b) Explain Piezoelectric transducer with appropriate diagram.

(c) Draw block diagram of function generator and explain its working.

(d) State and explain seeback and peltier effect.

(e) Explain block diagram of DC signal conditioning system.

5. Attempt any TWO of the following : **12**

(a) Describe function of each block of DAS.

(b) Compare CRO with DSO. (Any six points)

(c) Explain the electro-magnetic flow meter with neat sketch and write its applications.

6. Attempt any TWO of the following : **12**

(a) Draw the block diagram of DSO and explain function of each block.

(b) (i) Describe function of each block of instrumentation system.

(ii) Define sensor and give two examples of sensor.

(c) Design a D'Arsonval movement with internal resistor of 50 Ω and full scale deflection current 2 mA into multirange dc voltmeter with range of 0-10 V, 0-50 V, 0-100 V.

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22333

11819

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions : (1) All Questions are *compulsory.*
(2) Answer each next main Question on a new page.
(3) Illustrate your answers with neat sketches wherever necessary.
(4) Figures to the right indicate full marks.
(5) Assume suitable data, if necessary.
(6) Use of Non-programmable Electronic Pocket Calculator is permissible.
(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following : **10**

(a) Define :
  (i) Absolute Instrument
  (ii) Secondary Instrument
(b) State the meaning of PT-100.
(c) List applications of ohmmeter.
(d) State different types of errors in Instruments.
(e) State need of delay line in CRO.
(f) Differentiate AC and DC signal conditioning.
(g) State selection criteria of transducer.

2. Attempt any THREE of the following : **12**

(a) Explain working principle of PMMC instrument with diagram.
(b) State and explain different types of standards.
(c) Describe the working principle of Piezo-Electric Transducer.
(d) Compare Bourdon tube with Bellows.

3. Attempt any THREE of the following : **12**

(a) Define calibration and state its need.

(b) Draw labelled diagram of CRT.

(c) Identify Active and Passive transducers from : RTD, Piezoelectric transducer, Strain gauge, LVDT.

(d) Voltmeter never connected in series with source of emf. Justify it.

4. Attempt any THREE of the following : **12**

(a) Describe function of each block of Instrumentation system.

(b) Compare Analog and digital meters on :

(i) Principle

(ii) Accuracy

(iii) Resolution

(iv) Example

(c) Explain block diagram of AC signal conditioning.

(d) State and explain seeback and Peltier effects.

(e) Explain spectrum analyzer with block diagram.

5. Attempt any TWO of the following : **12**

(a) Explain with sketch procedure to measure frequency and Amplitude using CRO.

(b) (i) Explain working principle of Electromagnetic flow meter. **(3)**

(ii) Explain procedure to measure humidity using hygrometer. **(3)**

(c) Design a D'Arsonval moment with internal resistance of 60 Ω and full scale deflection current 3 mA into a multiranging dc voltage with voltage range of 0 – 20 V, 0 – 40 V, 0 – 100 V.

6. Attempt any TWO of the following : **12**

(a) (i) Explain the working of LVDT with neat diagram.

(ii) Compare LVDT with RVDT.

(b) Draw the block diagram of DSO and explain function of each block.

(c) (i) State need of signal conditioning. **(2)**

(ii) Explain with sketch function of each block of Data Acquisition System (DAS). **(4)**

22333

11920

3 Hours / 70 Marks Seat No. | | | | | | | | |

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.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following : **10**

(a) Define the term 'Measurement'.

(b) List different types of errors.

(c) Give any two applications of LED and LCD each.

(d) Define transducer. Give two examples of transducer.

(e) Define : (i) Laminar flow

(ii) Turbulent flow

(f) State significance of Lissajous figure.

(g) List the applications of DAS.

2. Attempt any THREE of the following : **12**

(a) Draw and explain working of half wave rectifier type AC voltmeter.

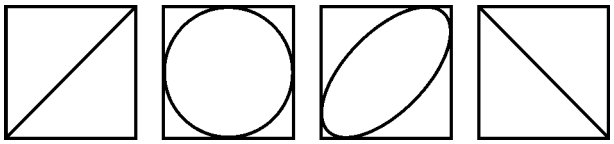
(b) Explain D'Arsonal PMMC movement in detail.

(c) Draw block diagram of CRO & explain function of each block of it.

(d) Draw the block diagram of instrumentation system and explain function of each block.

3. Attempt any THREE of the following : **12**

(a) What will be the phase shift for following Lissajous patterns ?



(i) (ii) (iii) (iv)

Fig. 3(a)

(b) Draw and describe the constructional diagram of LVDT.

(c) Describe working principle of radiation level measurement with neat diagram.

(d) Explain the need of signal conditioning.

4. Attempt any THREE of the following : **12**

(a) Suggest instrument to measure unknown frequency above 5 MHz and store result. Justify it.

(b) Convert the PMMC movement into a dc-ammeter of the range 0 to 100 mA.

(c) Draw and explain the block diagram of DAS.

(d) Draw the block diagram of function generator and explain its working.

(e) Explain the calibration of series type ohmmeter.

5. Attempt any TWO of the following : **12**

(a) Sketch DC signal conditioning circuit for pressure measurement using strain gauge. Justify it.

(b) Draw the sketch of electromagnetic flow meter and explain it. State advantages, disadvantages and applications of it.

(c) Explain Piezo-electric transducer with diagram. State its applications, advantages and disadvantages.

6. Attempt any TWO of the following : **12**

(a) Define accuracy and precision. Voltmeters (V_1, V_2, V_3 and V_4) are used to measure a voltage of 150 volts (true value). The voltage is measured four times by each voltmeter as mentioned in below table;

	Readings Shown			
$V_1 \rightarrow$	145	145	145	145
$V_2 \rightarrow$	149.1	150.1	149.5	149.6
$V_3 \rightarrow$	145	152	148	155
$V_4 \rightarrow$	150	150	150	150

By observing the above performance of each voltmeter, comment on the accuracy and precision of each voltmeter.

P.T.O.

(b) For the waveform shown in Fig. 6(b) if vertical attenuation is 3 mV/div.

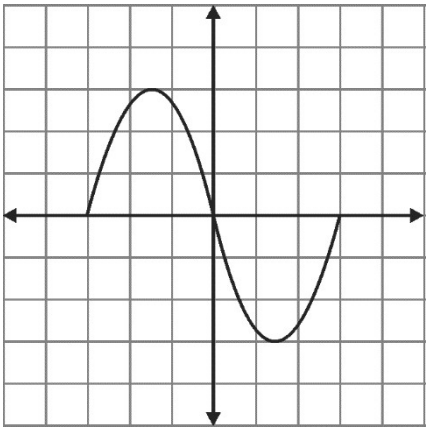


Fig. 6 (b)

Find, (i) Peak to peak voltage.

(ii) Amplitude

(iii) rms value of the signal.

(c) Sketch and describe pressure measurement system for 800 mm pressure, that contain Bourdon tube and LVDT.

22333

21819

3 Hours / 70 Marks Seat No. | | | | | | | | |

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.

Marks

1. Attempt any FIVE of the following : **10**

(a) Write any two applications of Instrumentation System.

(b) Define :

(i) Resolution

(ii) Accuracy

(c) Sketch Block diagram of vertical deflection system used in CRO.

(d) Define :

(i) Sensor

(ii) Transducer

(e) List any four types of transducer.

(f) State need of level measurement.

(g) Write objective of Data acquisition system.

2. Attempt any THREE of the following : **12**

(a) Define any two dynamic characteristics of measurements.

(b) Draw PMMC meter movement and describe it.

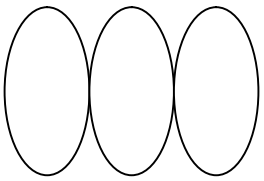
(c) Describe the block diagram of function generator.

(d) Explain with sketches, the working principle of Bourdon tube.

3. Attempt any THREE of the following : **12**

(a) Compare Analog meter and Digital meter.

(b) Calculate the frequency of channel-1 Input for an oscilloscope when shows the following Lissajous patterns. Assume the channel-2 frequency 15 kHz.



Lissajous Patterns

(c) Sketch and describe the working principle of LVDT.

(d) (i) Define signal conditioning system.

(ii) Draw the circuit diagram of DC signal conditioning circuit.

4. Attempt any THREE of the following : **12**

(a) Draw the block diagram of successive approximation type ADC. Draw the SAR register waveform for unknown voltage, $V_X = \sigma$ volts.

(b) A 1 mA meters movement with an internal resistance of 100 Ω is to be converted into a 0 – 100 mA. Calculate the value of shunt resistance required.

(c) Sketch the block diagram of function generator & describe the circuit of sine wave generation.

(d) Compare thermistor and thermocouple.

(e) Draw and describe general Data acquisition system.

5. Attempt any TWO of the following : **12**

(a) Describe the need for calibration.

(b) Explain the electro-magnetic flow meter with neat sketch and write it's application.

(c) Describe the circuit diagram of AC signal conditioning.

6. Attempt any TWO of the following : **12**

(a) (i) Compare CRO and DSO.

(ii) State the formula for phase measurement using CRO with necessary diagram.

(b) (i) Write one example and application of thermal, optical, magnetic and electric sensor.

(ii) State four selection criteria of transducer.

(c) (i) State the principle of Humidity measurement using hygrometer.

(ii) State the type of humidity measurement and range with it.

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11819

17317

3 Hours / 100 Marks Seat No. | | | | | | | | |

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****.*

Marks

1. A) Solve **any six** : **12**

a) Define :
   i) Accuracy
   ii) Precision.

b) Compare analog and digital multimeter.

c) State applications of digital frequency meter.

d) State the advantages of Digital instrument.

e) List different types of CRO probes (any four).

f) State the difference between CRO and DSO.

g) Define signal generator and state its need.

h) State two uses of logic analyzer.

B) Attempt **any two** : **8**

a) Define standards. State and explain classification of standards.

b) How are instruments classified ? Describe the different types.

c) Design a multirange DC ammeter (Shunt resistor type) for $R_m = 100\ \Omega$, $I_m = 1mA$ and required current ranges are 0-50 mA, 0-100 mA and 0-200 mA.

2. Attempt **any four** : **16**

a) Explain gross error , systematic error and random error.

b) Draw and explain block diagram of Horizontal deflection system.

P.T.O.

Marks

c) Draw the construction of CRT . Write two materials used for CRT display screen.

d) Explain the measurement of voltage and frequency using CRO.

e) Explain the concept of single beam dual trace CRO with its block diagram.

f) Explain measurement of phase and frequency using Lissagous pattern. Write the formula for each one.

3. Attempt **any four** : **16**

a) Define the following :

1) Speed of Response

2) Lag

3) Fidelity

4) Dynamic Error.

b) Draw the construction and explain working principle of PMMC instruments.

c) Derive the relation for deflection torque in PMMC instrument.

d) Draw the basic block diagram of single trace CRO and describe the function of delay line.

e) Draw block diagram of function generator. Write two specifications of it.

f) What is a video pattern generator ? State its application.

4. Attempt **any four** : **16**

a) A basic D' Arsonval movement with internal resistance of 50 Ω and full scale deflection current of 1 mA is to be used as a multirange voltmeter. Design a series of string of multiplier to obtain the voltage range of 0-20 V and 0-40 V.

b) Explain sensitivity and loading effect in voltmeter.

c) State and explain any four specifications of analog multimeter.

d) Explain the working of full wave rectifier type analog AC voltmeter with its circuit diagram.

e) Write four specification of DMM.

f) Draw and state how Aryton shunt type DC ammeter operates. State advantage of using Aryton shunt.

Marks

5. Attempt **any four** : **16**

a) Draw block diagram of DSO. State applications of DSO.

b) State and describe different triggering available in CRO.

c) Draw block diagram of RF signal generator and explain its operation.

d) Define wave analyzer and state its need. Draw the block diagram of it.

e) Draw block diagram of spectrum analyzer. State applications of spectrum analyzer.

f) Draw block diagram of distortion factor meter and explain its operation.

6. Attempt **any four** : **16**

a) Compare analog and digital instruments.

b) Draw block diagram of digital voltmeter and describe its operation.

c) Draw Q meter circuit of series connection and explain it.

d) What is LCR meter ? Draw digital LCR-Q meter block diagram.

e) Draw block diagram of DMM. State its advantages.

f) Draw block diagram of digital frequency meter in time mode and describe its operation.

Scheme – I

Sample Question Paper

Program Name : **Electronics & Tele-Communication Engineering, Electronics, Electronics & Communication Engineering, Electronics Engg. and Electronics & Communication Technology**

Program Code : **EJ/ET/EN/EX/EQ**

22333

Semester : **Third**

Course Title : **Electronics Measurements and Instrumentation**

Marks : **70** **Time: 3 Hrs.**

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) Preferably, write the answers in sequential order.

Q.1) Attempt any FIVE of the following. **10 Marks**

a) Define the term 'Measurement'.
b) Write the specifications of an analog multimeter.
c) State significance of lissajous figure.
d) Define Transducers.
e) Sketch block diagram of Instrumentation system.
f) State the applications of Bourdon Tube.
g) List application of Data Acquisition System.

Q.2) Attempt any THREE of the following. **12 Marks**

a) Describe the different types of errors occurs in measurement with one example.
b) Explain the role of shunt resistor connect across PMMC movement.
c) Describe the function of each block of CRO.
d) Explain with sketches the working principle of LVDT.

Q.3) Attempt any THREE of the following. **12 Marks**

a) Explain with sketches the working of analog ohm meter
b) Calculate horizontal to vertical frequency ratio for Lissajous figures as shown in figure no.1

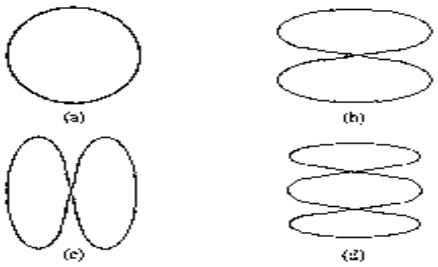

Figure no.-1

c) Explain significance of transducer in instrumentation system.

d) Sketch labeled DC signal conditioning circuits used for Pressure measurement

Q.4) Attempt any THREE of the following. 12 Marks

a) Convert the PMMC movement into a dc-ammeter of the range 0 to 100mA.

b) Sketch labeled equivalent circuit diagram of practical ammeter and voltmeter.

c) Suggest instrument to measure unknown frequency above 5 MHz and store result. Justify it.

d) Convert 520 mm of Hg into bar.

e) Sketch AC signal conditioning circuit for level measurement.

Q.5) Attempt any TWO of the following. 12 Marks

a) Determine the smallest measureable change in the voltage of an analog voltmeter having range 0-200V with resolution of 0.15% of full scale

b) Sketch and describe pressure measurement system for 800mm pressure, that contain Bourdon tube and LVDT.

c) Describe functions of the each block of DAS.

Q.6) Attempt any TWO of the following. 12 Marks

a) Sketch the DC signal conditioning circuit for pressure measurement using strain gauge. Justify it.

b) For the parameters accuracy, linearity and range, suggest the name of the temperature transducer to measure human body temperature. Justify it.

c) (i) Calculate the resistance of PT-100 for 40°C.

(ii) Sketch characteristics of PT-100 and compare it with that of thermocouple.

Scheme – I

Sample Test Paper - I

Program Name : **Electronics & Tele-Communication Engineering, Electronics, Electronics & Communication Engineering, Electronics Engg. and Electronics & Communication Technology**

Program Code : **EJ/ET/EN/EX/EQ**

22333

Semester : **Third**

Course Title : **Electronics Measurements and Instrumentation**

Marks : **20** **Time: 1 Hour**

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) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR. **08 Marks**

a) Differentiate analog and digital multimeter (any two points).

b) Define the term measurement.

c) List application of DSO.(any four)

d) Define Resolution and accuracy.

e) List type of Errors.

f) State significance of Lissagious figure.

Q.2 Attempt any THREE. **12 Marks**

a) Identify the standards for calibration of the multimeter instrument with justification

b) Describe error in measurement and classify it..

c) List different display device and explain PMMC meter.

d) Convert the PMMC with 100 ohm internal resistance with 10mA maximum deflection to 0- 10V range voltmeter.

e) Compare DSO and CRO with four features.

f) Sketch Block diagram of function generator and state function of each block.

Scheme – I

Sample Test Paper - II

Program Name : **Electronics & Tele-Communication Engineering, Electronics, Electronics & Communication Engineering, Electronics Engg. and Electronics & Communication Technology**

Program Code : **EJ/ET/EN/EX/EQ**

22333

Semester : **Third**

Course Title : **Electronics Measurements and Instrumentation**

Marks : **20** **Time: 1 Hour**

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) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR. **08 Marks**

a) Define Transducer.

b) Identify following transducer as active and passive -

i) Thermocouple ii) LDR iii) LVDT iv) Bellows

c) Sketch Burdon Tube and Bellows schematic.

d) List transducers used in level measurement.

e) Define signal conditioning.

f) State need of DAS.

Q.2 Attempt any THREE. **12 Marks**

a) Explain selection criteria of transducer.

b) Sketch basic building blocks of instrumentation system and state function of each block.

c) Explain working principle of orifice plate for flow measurement.

d) Convert 1bar pressure to pascal, psi, Hg mm.

e) Sketch pressure transducer system using DC bridge and instrumentation amplifier.

f) Describe basic DAS with neat and labeled sketch.

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21718

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions : *(1)* ***All*** *questions are* ***compulsory****.*
(2) Answer ***each*** *next main Question on a* ***new*** *page.*
(3) Illustrate your answers with neat sketches ***wherever*** *necessary.*
(4) Figures to the ***right*** *indicate* ***full*** *marks.*
(5) Assume suitable data, if ***necessary****.*
(6) Use of Non-programmable Electronic Pocket Calculator is ***permissible****.*
(7) Mobile Phone, Pager and any other Electronic Communication devices are ***not*** *permissible in Examination Hall.*

Marks

1. Attempt **any five** : **20**

a) Classify instruments and give example of each.

b) Draw and explain working of PMMC instrument.

c) Explain how shunt resistor type DC ammeter is measures current.

d) List advantages of digital instruments over analog instruments (any 4).

e) Draw the block diagram of vertical deflection system and explain.

f) List different applications of CRO.

g) Define signal generator and state necessity of signal generator.

2. Attempt **any four** : **16**

a) Define :

i) Accuracy ii) Sensitivity

iii) Resolution iv) Speed of response.

b) Explain working of multirange DC voltmeter.

c) Compare Analog instruments with digital instruments (4 points).

d) Explain measurement of 'Time' and 'Frequency' using CRO.

e) Draw and explain block diagram of function generator.

f) Draw and explain block diagram of spectrum analyzer.

P.T.O.

Marks

3. Attempt **any four**: **16**

a) Give the classification of error and explain in brief.

b) Derive the equation of torque of PMMC instruments.

c) State the disadvantages of digital instruments.

d) Draw and explain block diagram of Digital Multimeter (DMM).

e) Draw and explain Dual beam Dual trace CRO.

f) What do you mean by waveform analyzer ? State the necessity of waveform analyzer.

4. Attempt **any four**: **16**

a) Classify 'standards' of measurement and explain each standard.

b) Derive expression for shunt resistance of DC ammeter.

c) List different applications of digital instruments.

d) Draw neat labeled block diagram of digital storage oscilloscope and applications of DSO.

e) Explain working of frequency selective wave analyzer.

f) Draw and explain logic analyzer and state any two applications.

5. Attempt **any four**: **16**

a) Draw and explain half wave rectifying type AC voltmeter.

b) Draw and explain block diagram of digital frequency meter.

c) Draw block diagram of CRO. Explain function of each block.

d) Draw a neat diagram of pattern generator.

e) State advantages of CRO over multimeter.

f) Draw and explain circuit diagram of time base generator in CRO.

6. Attempt **any four**: **16**

a) How phase shift can be measured using Lissajous pattern ?

b) Explain block diagram of radio frequency type signal generator.

c) Describe loading effect of voltmeter. How to avoid it ?

d) Draw and explain block diagram of ramp type digital voltmeter.

e) Draw and explain full wave rectifying type AC voltmeter.

f) Compare between single trace CRO and dual trace CRO.

17317

11718

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions : *(1)* ***All*** *questions are* ***compulsory****.*
(2) Answer ***each*** *next main question on a* ***new*** *page.*
(3) Illustrate your answers with neat sketches ***wherever*** *necessary.*
(4) Figures to the ***right*** *indicate* ***full*** *marks.*
(5) Assume suitable data, if ***necessary****.*
(6) Use of Non-programmable Electronic Pocket Calculator is ***permissible****.*
(7) Mobile Phone, Pager and any other Electronic Communication devices are ***not permissible*** *in Examination Hall.*

Marks

1. A) Attempt **any six**: **12**

a) Define the term 'accuracy' and 'sensitivity'.
b) State the types of standards of measurement.
c) List four application of CRO.
d) List four dynamic characteristics.
e) State two advantages of moving coil instrument.
f) What is the requirement of shunt in multirange ammeter ?
g) What is the role of delay line in CRO ?
h) State the need of signal generators (any two).

B) Attempt **any two**: **8**

a) Draw the circuit diagram of DC ammeter using basic 'D' Arnsoval movement and derive the expression for shunt resistance.
b) Give significance of calibration.
c) List different types of errors and its source of generation/occurrence.

2. Attempt **any four**: **16**

a) Describe the construction of PMMC instrument.
b) Explain the working of rectifier type of AC voltmeter with neat diagram (any one).
c) State the reason for voltmeter never connected in series with source of emf.
d) Explain the block diagram of DFM (Digital Frequency Meter).
e) Compare DSO with CRO (any four points).
f) Explain the concept of time domain and frequency domain.

P.T.O.

Marks

3. Attempt **any four**: **16**

a) What is loading effect and sensitivity of multirange voltmeter ?

b) How does electron beam generate horizontal ref line on CRT screen ?

c) Write the steps (and procedure) for measurement of frequency and phase of signal by CRO.

d) How does Half wave rectifier type AC analog voltmeter use to measure unknown voltage.

e) Calculate the value of multiplier, if basic movement having (I_{fsd}) full scale deflection current of 10 mA and Internal resistance Rm of 50 Ω is used to measure 400 volts.

f) Describe the block diagram of Ramp type of voltmeter.

4. Attempt **any four**: **16**

a) Compare analog instruments with digital instruments.

b) A 2mA meter with internal resistance of 100 Ω is to be converted to 0 – 150 mA ammeter. Calculate the value of Shunt resistance required.

c) State two advantages and two disadvantages of PMMC meter.

d) Calculate the vertical input frequency if horizontal frequency is 1500 Hz for fig. (a) and fig. (b).

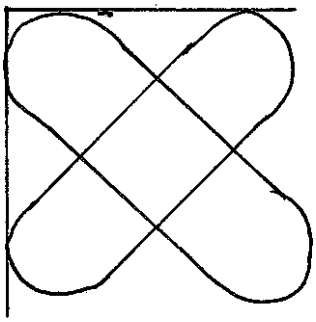

Fig. (a)

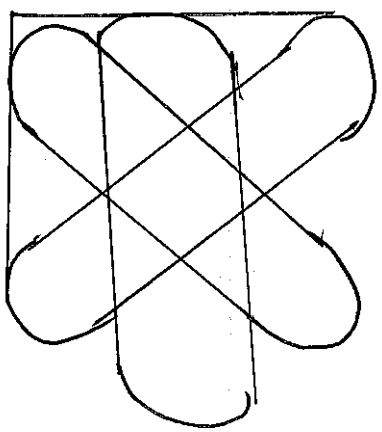

Fig. (b)

e) Explain the block diagram of function generator.

f) Explain the working principle of wave analyser with neat block diagram.

Marks

5. Attempt **any four**: **16**

a) i) What is the resolution of 4½ DMM.

ii) Write two uses of Video pattern generator.

b) Find the phase relation for following fig. (c) and fig. (d).

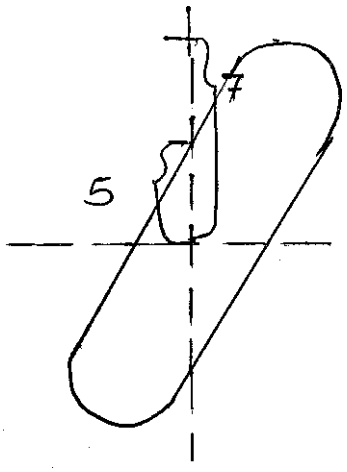

Fig. (c)

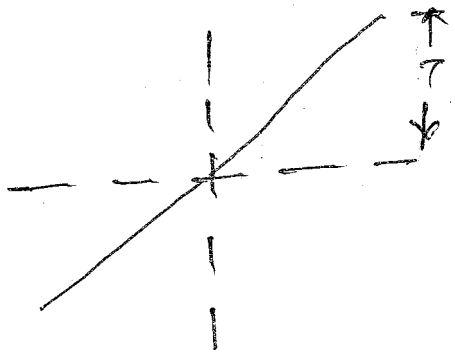

Fig. (d)

c) Draw the block diagram of DSO.

d) Draw and explain RF signal generator.

e) Explain the block diagram of spectrum analyser.

f) What is the use of Q meter ? Draw its neat diagram.

6. Attempt **any four**: **16**

a) Draw dual trace CRO and explain the function of Alt/Chop mode.

b) How diode and transistor are tested with help of (i) DMM (ii) CRO ?

c) i) Draw characteristics of pulse and label it.

ii) Define – Rise Time, Overshoot.

d) Explain the block diagram of Dual slope DVM.

e) List the specification of DMM.

f) Give the functions **any four** knob of following :

i) X-shift on CRO. **1**

ii) CT MODE Button on CRO. **1**

iii) Symmetry knob on function generator. **1**

iv) Level knob on function generator. **1**

v) V/div on CRO. **1**

vi) Mono/Dual Button on CRO. **1**

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16117

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions : *(1)* ***All*** *questions are* ***compulsory****.*

(2) Attempt 06 questions including Question No. ***1*** *which is* ***compulsory****.*

(3) Answer ***each*** *next main question on a* ***new*** *page.*

(4) Illustrate your answers with neat sketches ***wherever*** *necessary.*

(5) Figures to the ***right*** *indicate* ***full*** *marks.*

(6) Assume suitable data, if ***necessary****.*

(7) Use of Non-programmable Electronic Pocket Calculator is ***permissible****.*

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Marks

1. A) Attempt **any six** of the following : **(6×2=12)**

I) Define the term

i) Resolution ii) Sensitivity.

II) State two advantages and two disadvantages of PMMC instrument.

III) List four application of CRO.

IV) State four applications of digital storage oscilloscope.

V) State the need of wave analyzer.

VI) State two applications of Logic Analyzer.

VII) State any two disadvantages of digital instruments.

VIII) Which section of DMM decides its resolution ?

B) Attempt **any two** of the following : **(4×2=8)**

I) Differentiate between absolute instrument and secondary instrument.

II) A basic D′ Arsonval movement with an internal resistance of 50Ω and a full scale deflection current of 1 mA is to be used as a multirange voltmeter. Design a series of string of multipliers to obtain the voltage ranges of 0 – 15 V and 0 – 30 V.

III) Draw a Q-meter circuit of series connection and explain it.

P.T.O.

Marks

2. Attempt **any four** of the following : **(4×4=16)**

a) Describe the different standards.

b) Draw the block diagram of vertical deflection system and describe its operation.

c) Draw the labeled diagram of CRT.

d) Explain the working of successive approximation type DVM.

e) How function generator differs from signal generator ?

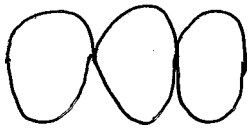
f) Differentiate digital instruments with Analog Instruments.

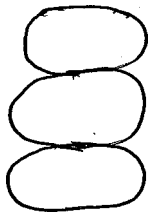
3. Attempt **any four** of the following : **(4×4=16)**

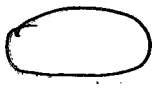
a) Derive the relation for deflection torque in PMMC instruments.

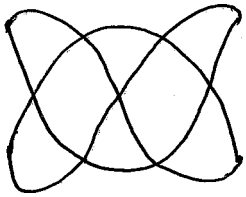
b) Define calibration. Explain why calibration is needed for measuring instrument.

c) Calculate the ratio of vertical to horizontal frequencies for an oscilloscope, which displays the following Lissajous patterns shown in Fig.1.

a) 

b) 

c) 

d) 

d) Explain the function of each block of horizontal deflection system of CRO.

e) Draw the block diagram of Logic Analyzer and describe its operation.

f) Describe the working of spectrum analyzer with the help of block diagram.

4. Attempt **any four** of the following : **(4×4=16)**

a) Describe the working of Shunt Resistance Ammeter with diagram.

b) Why ammeter never connected across source of emf ? Justify.

c) What do you mean by 3½ digit display in digital voltmeter ?

d) Explain how frequency is measured with the help of digital frequency meter.

e) Draw the block diagram of Dual trace CRO.

f) Describe with neat block diagram the operation of frequency selective wave analyzer.

Marks

5. Attempt **any four** of the following : **(4×4=16)**

a) Design a Ayrton shunt to provide an ammeter with current ranges of 2A, 5A and 12 A. A basic meter with an internal resistance of 50Ω and a full scale deflection current of 1 mA is to be used.

b) Describe the working of digital multimeter with block diagram.

c) Draw the block diagram of DSO and describe its working.

d) Differentiate between Dual trace CRO and Dual Beam CRO for two points.

e) State how frequency and amplitude can be measured on CRO.

f) Draw the block diagram of pulse generator. State its operation.

6. Attempt **any four** of the following : **(4×4=16)**

a) Define unit and give any two examples of base, supplementary and derived units.

b) State detailed classification of error.

c) Draw neat electrical circuit diagram of Analog Multimeter.

d) Describe the working of LCR meter with diagram.

e) Explain the process of phase measurement by Lissajous pattern.

f) Draw the block diagram of pattern generator. Explain generation of cross hatch pattern.

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13141

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

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(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

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Marks

1. a) **Attempt any <u>SIX</u> of the following:** **12**

i) Define precision and dead zone.

ii) Classify analog instruments.

iii) Define linearity and monotonicity with respect to digital instruments.

iv) Define quality factor.

v) Draw block diagram of single trace CRO.

vi) State uses of oscilloscope.

vii) State any two requirements of signal generator.

viii) State any two applications of spectrum analyzer.

Marks

b) **Attempt any <u>TWO</u> of the following:** **08**

i) Define the following:

1) Speed of response

2) Fidelity

3) Lag

4) Dynamic error.

ii) Define standard and state its classification

iii) State requirements of shunt in the multirange meter.

2. Attempt any <u>FOUR</u> of the following: **16**

a) What is calibration ? State its necessity.

b) Draw labelled diagram of CRT. State the function of accelerating anode.

c) Draw block diagram of dual trace CRO. State the function of each block.

d) Draw block diagram of vertical deflection system. State function of each block.

e) Draw block diagram of dual beam CRO. State function of each block.

f) State how frequency and phase can be measured using Lissajous Pattern.

Marks

3. Attempt any FOUR of the following: **16**

a) State what is

i) Gross error

ii) Systematic error

iii) Random error.

b) State four advantages and disadvantages of PMMC instrument.

c) Why ammeter never connected across a source of emf ? Justify.

d) List out any four advantages and applications of DSO.

e) With the help of block diagram state working principle of function generator.

f) Draw block diagram of pulse generator. State its operation.

4. Attempt any FOUR of the following: **16**

a) Draw circuit of basic DC ameter derive equation of shunt resistance.

b) Draw constructional diagram of PMMC instrument. Derive deflecting torque equation.

c) Convert a basic D'Arsonal movement with an internal resistance of 50 Ω and full scale deflection current of 200 A into multirange DC voltmeter with voltage range of 0-10V. 0-50V, 0-100V, 0-250V.

d) Draw electrical circuit of analog multimeter.

e) State the reasons for voltmeter never connected in series with source of emf.

f) Draw block diagram of basic rectifier type AC voltmeter. State its working.

Marks

5. Attempt any <u>FOUR</u> of the following: **16**

a) Draw time base generator circuit. State role of time base generator in CRO.

b) List various front panel controls of CRO.

c) Draw characteristics of pulse and define:

i) Rise time

ii) Fall time

iii) Droop.

d) Draw block diagram of spectrum analyzer. State function of each block.

e) Draw block diagram of logic analyzer. State its two applications.

f) Draw block diagram of distortion factor meter. State its operation.

6. Attempt any <u>FOUR</u> of the following: **16**

a) Draw block diagram of digital frequency meter. State function of each block.

b) State advantages of digital voltmeter over analog voltmeter (four points).

c) Draw block diagram of digital LCR-Q meter. State role of oscillator in the LCR-Q meter.

d) Draw labelled block diagram of dual slope integrating DVM. State its operation.

e) Compare analog multimeter and digital multimeter (four points).

f) Draw the circuit of basic Q meter. State how inductance can be measured by Q meter.

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13141
3 Hours / 100 Marks

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21314

3 Hours/100 Marks

Seat No. | | | | | | | | |

Instructions : *(1)* ***All*** *questions are* ***compulsory****.*
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MARKS

1. A) Attempt **any six** : **12**

a) List the dynamic characteristics of an instrument.

b) List the parameters that can be measured by analog multimeter.

c) State the applications of digital voltmeter.

d) List any four applications of CRO.

e) What is the role of schmitt trigger in the block diagram of pulse generator ?

f) State any four applications of wave analyzer.

g) State the function of delay line.

h) What is role of mirror in analog type instrument ?

B) Attempt **any two** : **8**

a) Compare absolute instruments and standard instruments.

b) Draw the constructional diagram of PMMC meter and explain its working principle.

c) Differentiate digital instruments over with analog instruments.

P.T.O.

MARKS

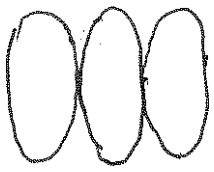
2. Attempt **any four** : **16**

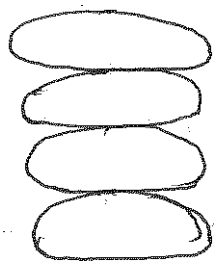
a) Draw the circuit of basic Q-meter. Explain its working.

b) Draw a neat and labelled diagram of CRT.

c) Draw the block diagram of spectrum analyzer and explain its operation.

d) Calculate the frequency of vertical input for an oscilloscope which displays the following Lissajous figures.
(Assume Horizontal input frequency is 10 KHz)

a) 

b) 

e) Draw the circuit of multirange A.C. voltmeter and explain its working.

f) State any two types of systematic error. How does they occur ? What are the remedies to avoid them ?

3. Attempt **any four** : **16**

a) A D.C. voltmeter uses 50 μA and having an internal resistance of 400 Ω. Calculate the value of multiplier on ranges :

i) 10 V

ii) 15 V

iii) 20 V

iv) 25 V

b) Draw the block diagram of dual beam oscilloscope. What are the different methods used to generate two different beams ?

c) Draw the block diagram of pulse generator. Give two applications of it.

MARKS

d) Draw the block diagram of digital multimeter. List its four applications.

e) What is meant by calibration of an instrument ? State its concept and need in detail.

f) Draw the block diagram of dual slope type digital voltmeter. Draw the waveform of voltage verses time.

4. Attempt **any four** : **16**

a) What is use of Q-meter ? Draw circuit diagram of Q-meter.

b) Draw the basic block diagram of CRO. State which material is used for coating for a Fluorescent screen.

c) Draw the circuit of basic D.C. ammeter. Derive equation for shunt resistance.

d) Define the term :

i) Sensitivity of voltmeter ii) Loading effect of voltmeter

e) How we can classify the electronic Instruments ? List the static characteristics of Instrument.

f) How distortion factor meter works ? Explain with neat sketch.

5. Attempt **any four** : **16**

a) Draw the block diagram of Digital Frequency Meter. State the function of Schmitt trigger in DFM.

b) Describe the working of Frequency selective wave analyzer.

c) Draw the block diagram of video pattern generator. State the uses of various patterns generated by pattern generator.

d) Draw the block diagram of Digital Storage Oscilloscope. Give its applications.

e) Draw the circuit of basic D.C. voltmeter. Explain how it can be converted into multirange D.C. voltmeter.

f) Differentiate between single beam dual trace and dual beam dual trace CRO.

MARKS

6. Attempt **any four** : **16**

a) Explain how phase can be measure on CRO using Lissajous patterns.

b) Draw the block diagram of horizontal deflection system. State the role of trigger circuit and time base generator in oscilloscope.

c) Why ammeter is never connected across a source of e.m.f. ? Justify your answer.

d) Design multirange D.C. ammeter for $R_m = 100\,\Omega$ and $I_m = 1$ mA and required current ranges are 0-20 mA, 0-100 mA and 0-200 mA.

e) Compare analog and digital multimeter on the basis of

i) Display

ii) Resolution

iii) Function available

iv) Power consumption

f) Draw the block diagram of function generator. State the function of diode wave shaping circuit.

17317

14115

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

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(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any <u>FIVE</u> of the following: **20**

a) Define the following terms:

(i) Accuracy

(ii) Precession

(iii) Sensitivity

(iv) Resolution

b) Define calibration. Explain why calibration is needed for measuring instrument.

c) Give the two advantages and two disadvantages of PMMC instrument.

Marks

d) Compare analog and digital meter on the basis of:

(i) Display

(ii) Resolution

(iii) Function available

(iv) Power consumption

e) List any four application of CRO.

f) List any four specification of function generator.

g) Explain the concept of time domain and frequency domain.

2. Attempt any <u>FOUR</u> of the following: **16**

a) Draw and explain working principle of Shunt Resistance Ammeter.

b) Draw and explain block diagram of Digital Frequency Meter (DFM)

c) Design a multi range DC ammeter using a basic movement with an internal resistance $R_m = 50\Omega$, and a full scale deflection current I_m = L mA. The range required are 0–10 mA, 0–50 mA, 0–100 mA, 0–500 mA.

d) State how DMM can be used as for continuity test. Which section decides resolution in DMM.

e) Compare between single trace CRO and dual trace CRO.

f) Draw block diagram of logic analyzer. Give any two application of logic analyzer.

Marks

3. Attempt any <u>FOUR</u> of the following: **16**

a) Draw the neat block diagram of pulse generator. List any four specification of pulse generator.

b) Draw the circuit of time base generator of single trace CRO. Describe its working.

c) Explain the method of Q-measurement with its block diagram.

d) Draw and explain operation of Electronic AC voltmeter (Average Responding)

e) Define the term standard. State types of standard.

f) Define the term:

(i) Sensitivity of voltmeter

(ii) Load effect of voltmeter

4. Attempt any <u>FOUR</u> of the following: **16**

a) Define the relationship between defelecting Torque (Td) and controlling Torque (Tc)

b) With neat sketch explain working principle of PMMC.

c) State any four application of logic analyzer.

d) Draw a neat labelled diagram of CRT.

e) Draw the circuit diagram of rectifier type AC voltmeter and explain.

f) What is grounding? Why it is provided?

Marks

5. Attempt any FOUR of the following: **16**

a) Draw block diagram of a digital Multimeter. State function of each block.

b) Draw neat labelled diagram of CRO.

c) Sketch block diagram of RF signal generator. Which type of signal can be generated from RF generator.

d) State types of CRO probe. How current probe operates.

e) Calculate the value of the multiplier resistance on the 50 V range of a dc voltmeter that uses a 200 μA meter movement with an internal resistance of 100 Ω.

f) Draw block diagram of DSO. State function of each block.

6. Attempt any FOUR of the following: **16**

a) List out any four specification of function generator.

b) With neat diagram explain horizontal amplifier in CRO.

c) Write your specification of DMM.

d) Draw and state how the Ayrton shunt type D.C. ammeter operates.

e) What is loading effect in multi range voltmeter?

f) List any eight specification of CRO

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17317

21415

3 Hours/100 Marks

Seat No. | | | | | | | | |

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

MARKS

1. A) Attempt **any six** of the following :
   a) Define the terms : **2**
      i) Resolution ii) Dead zone.
   b) Draw a circuit diagram of universal shunt voltmeter. **2**
   c) State any two disadvantages of digital instruments . **2**
   d) State principle of digital frequency meter. **2**
   e) Explain in brief function of focusing and accelerating anodes in CRT. **2**
   f) Draw a block diagram of vertical deflection system in CRO. **2**
   g) State need of signal generators. **2**
   h) List one example of time domain and frequency domain instruments. **2**

   B) Attempt **any two** of the following :
   a) List dynamic characteristics of instruments. Define any two. **4**
   b) Describe the different standards. **4**
   c) Draw a diagram of D′Arsonval movement and state its principle. **4**

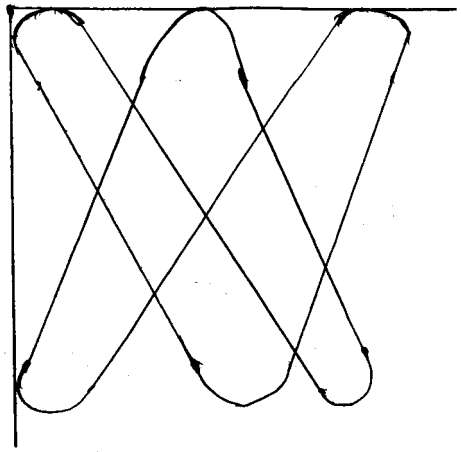
2. Attempt **any four** of the following :
   a) Explain the need of calibration and calibration process. **4**
   b) Draw a block diagram of dual beam CRO. **4**
   c) Describe the waveform generation in CRO. **4**
   d) Draw a circuit of time base generator and explain it. **4**
   e) Explain operation of dual trace CRO, with neat block diagram. **4**
   f) Explain phase measurement using Lissajous patterns. **4**

3. Attempt **any four** of the following :
   a) State detailed classification of errors. **4**
   b) A basic D′Arsonval movement with an internal resistance of 50 Ω and a full scale deflection current of 2 mA is to be used as a multirange voltmeter. Design a series of string of multipliers to obtain the voltage ranges of 0 – 10 V, 0 – 50 V. **4**
   c) Derive the expression for shunt resistors required in multirange Ammeter. **4**

P.T.O.

MARKS

d) The Lissajous pattern observed on CRO is as shown in figure. Calculate the vertical input frequency if horizontal input frequency is 1500 Hz. **4**



e) Draw a block diagram of function generator. State function of each block. **4**

f) Write two uses of **4**
1) Video pattern generator 2) Function generator.

4. Attempt **any four** of the following :
   a) State classification of analog meters. **4**
   b) Draw a diagram of full wave rectifier type AC voltmeter. Explain its working. **4**
   c) Derive the relation between deflection torque in PMMC instruments. **4**
   d) Explain the loading effect in voltmeters. How to avoid it ? **4**
   e) A 2 mA meter with an internal resistance of 100 Ω is to be converted to 0 – 150 mA ammeter. Calculate the value of shunt resistance required. **4**
   f) Draw a circuit diagram of Ayrton shunt type Ammeter. What is the advantage of it over normal shunt type ammeter ? **4**

5. Attempt **any four** of the following :
   a) State any four applications of CRO. **4**
   b) Draw a basic block diagram of digital storage CRO . Write the function of each block. **4**
   c) Draw a block diagram of pattern generator. Explain generation of cross hatch pattern. **4**
   d) Draw the block diagram of Logic analyzer. List the types or modes of displays in it. **4**
   e) Draw a block diagram of wave analyzer. Write its principle. **4**
   f) Describe the operation of spectrum analyzer with neat diagram. **4**

6. Attempt **any four** of the following :
   a) Compare analog and digital meters (any 4 points) : **4**
   b) Draw a block diagram of digital multimeter. **4**
   c) What do you mean by $3\frac{1}{2}$ digit display ? **4**
   d) Draw a block diagram of digital frequency meter. Explain its operation. **4**
   e) Explain SAR type digital voltmeter with neat labelled diagram. **4**
   f) Write any four specifications of DMM. **4**

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15116

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions : *(1)* ***All*** *questions are* ***compulsory****.*
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(3) Figures to the ***right*** *indicate* ***full*** *marks.*
(4) Assume suitable data, if ***necessary****.*
(5) Use of Non-programmable Electronic Pocket Calculator is ***permissible****.*
(6) Mobile Phone, Pager and any other Electronic Communication devices are ***not*** *permissible in Examination Hall.*

Marks

1. A) Attempt **any six** : **(6×2=12)**

a) Define Resolution and Dead Zone.

b) What is loading effect of multirange voltmeter ?

c) State any two advantages of digital instruments over an analog instruments.

d) Define Accuracy in Digital Meters.

e) State the function of delay line in CRO.

f) Define deflection sensitivity and deflection factor of a CRT.

g) State the need of signal generators.

h) Define wave analyzer.

B) Attempt **any two** : **(2×4=8)**

a) Define unit and give any two examples each of base, supplementary and derived units.

b) Define calibration and state its need.

c) Draw neat electrical circuit diagram of analog multimeter.

2. Attempt **any four** : **(4×4=16)**

a) Explain types of errors.

b) Derive the relation of shunt resistance with internal resistance of meter to extend Ammeter range.

c) Draw the block diagram of CRO and state the function of each block.

d) A basic d'Arsonval meter with an internal resistance Rm = 100 Ω and a full scale, current of Im = 1mA, is to be converted into a d.c. voltmeter with range of 0.10 V. Find the values of series resistance.

e) Describe Lissajous patterns for phase measurement.

f) Explain digital frequency meter with neat block diagram.

P.T.O.

Marks

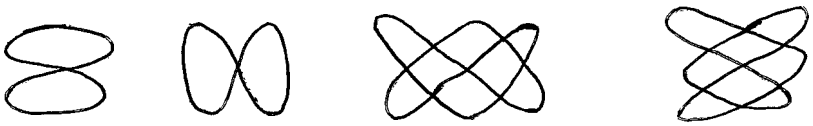
3. Attempt **any four** : **(4×4=16)**

a) Define standards and give their classifications.

b) Derive the torque equation for PMMC Instruments.

c) Draw a neat and labelled diagram of internal structure of a CRT.

d) Calculate the ratio of vertical to horizontal frequencies for an oscilloscope which displays the following Lissajous figures shown in Fig. 1



a) b) c) d)

Fig. 1

e) State the principle of operation of a function generator with neat block diagram.

f) Draw a neat block diagram of pulse generator.

4. Attempt **any four** : **(4×4=16)**

a) Explain with neat circuit diagram how full wave rectifier type analog AC voltmeter is used to measure unknown voltage ?

b) Describe working principle of PMMC instrument with neat construction diagram.

c) Give the classification of analog ammeter and voltmeter.

d) Describe the time base generator to produce waveform on CRO screen.

e) It is desired to measure the voltage across a 50 K Ω resistor in the circuit shown in Fig. 2. Two voltmeters are available for this purpose : Voltmeter A with a sensitivity of 1000 Ω/V and voltmeter B with a sensitivity of 20,000 Ω/V. Both meters have 0 – 30 V range. Calculate the reading of each voltmeter.

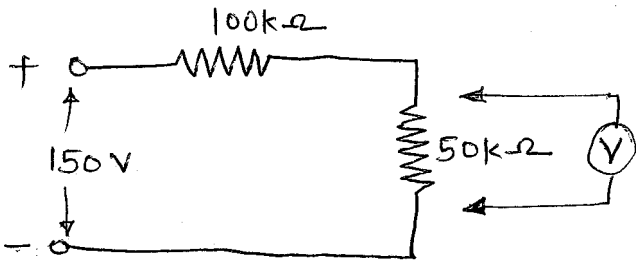


Fig. 2

f) Design an Ayrton shunt to provide an ammeter with current ranges of 1 A, 5 A and 10 A. A basic meter with an internal resistance of 50 Ω and a full scale deflection current of 1 mA is to be used.

Marks

5. Attempt **any four** : **(4×4=16)**

a) Explain with neat block diagram the operation of single beam dual trace oscilloscope.

b) Explain with neat diagram the operation of vertical deflection system.

c) Describe with neat diagram the operation of AF signal generator.

d) Describe with neat block diagram the operation of frequency selective wave analyser.

e) Describe with neat block diagram the spectrum analyser.

f) Describe the working principle of logic analyser with neat diagram.

6. Attempt **any four** : **(4×4=16)**

a) Compare analog instrument with digital instruments (any four points).

b) List the applications of DSO.

c) How to connect ammeters and voltmeters in electrical circuits ? Give justification.

d) Explain operation of Integrating type digital voltmeter with neat block diagram.

e) Explain digital multimeter with neat block diagram.

f) Explain working principle of Q meter with neat circuit diagram.

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15162

3 Hours / 100 Marks Seat No. | | | | | | | | |

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

Marks

1. A) Attempt **any six** of the following : **12**

a) Define sensitivity and reproducibility. **2**

b) Enlist the specifications of analog DC voltmeter. **2**

c) State how DMM can be used to check diode and transistor. **2**

d) Define RMS value and peak to peak value. **2**

e) List the four applications of CRO. **2**

f) List out any four features of logic analyzer. **2**

g) State the function of delay line. **2**

h) Define wave analyzer and state its need. **2**

B) Attempt **any two** of the following : **8**

a) State the reason for ammeter never connected in shunt across a source of EMF. **4**

b) State how frequency and phase can be measured using Lissajous pattern. **4**

c) Explain primary standard and secondary standard. **4**

2. Attempt **any four** of the following : **16**

a) Describe Gross error, systematic error and random error. **4**

b) Design multirange DC ammeter for $R_m = 100\,\Omega$, $I_m = 1$ mA and required current ranges are 0-20 mA, 0-100 mA, 0-200 mA. **4**

c) Explain the working of linear ramp type DVM. **4**

d) Draw the block diagram of horizontal deflection system. State the role of trigger circuit and time base generator in CRO. **4**

e) Draw the circuit of multirange AC voltmeter and explain its working. **4**

f) Explain the working of standard RF signal generator and explain it. **4**

P.T.O.

Marks

3. Attempt **any four** of the following : **16**

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

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

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

d) Explain different dynamic characteristics of instrument. **4**

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

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

4. Attempt **any four** of the following : **16**

a) Define calibration of instrument and explain need of calibration. **4**

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

c) Compare digital instrument with analog instrument. (4 points). **4**

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

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

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

5. Attempt **any four** of the following : **16**

a) Define sensitivity and loading effect of voltmeter. **4**

b) Draw the block diagram of digital multimeter and sate how i) resistance ii) current is measured. **4**

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

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

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

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

6. Attempt **any four** of the following : **16**

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

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

c) Describe the methods of measurement using CRO : **4**

i) Voltage measurement ii) Current measurement

ii) Timp period measurement iv) Frequency measurement.

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

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

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