



# 17317

15116

3 Hours / 100 Marks

Seat No.

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- 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. 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  $R_m = 100 \Omega$  and a full scale, current of  $I_m = 1\text{mA}$ , 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.**



## 3. Attempt any four :

(4×4=16)

- Define standards and give their classifications.
- Derive the torque equation for PMMC Instruments.
- Draw a neat and labelled diagram of internal structure of a CRT.
- Calculate the ratio of vertical to horizontal frequencies for an oscilloscope which displays the following Lissajous figures shown in Fig. 1

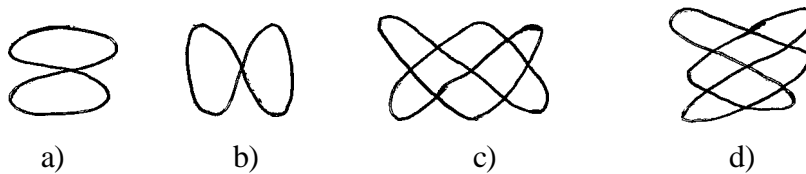


Fig. 1

- State the principle of operation of a function generator with neat block diagram.
- Draw a neat block diagram of pulse generator.

## 4. Attempt any four :

(4×4=16)

- Explain with neat circuit diagram how full wave rectifier type analog AC voltmeter is used to measure unknown voltage ?
- Describe working principle of PMMC instrument with neat construction diagram.
- Give the classification of analog ammeter and voltmeter.
- Describe the time base generator to produce waveform on CRO screen.
- It is desired to measure the voltage across a  $50\text{ K}\Omega$  resistor in the circuit shown in Fig. 2. Two voltmeters are available for this purpose : Voltmeter A with a sensitivity of  $1000\ \Omega/\text{V}$  and voltmeter B with a sensitivity of  $20,000\ \Omega/\text{V}$ . Both meters have  $0-30\text{ V}$  range. Calculate the reading of each voltmeter.

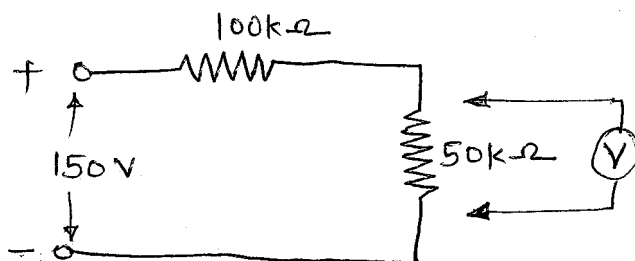


Fig. 2

- 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  $50\ \Omega$  and a full scale deflection current of 1 mA is to be used.

**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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