

R13

Code No: 126AH

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, April - 2018

ELECTRICAL AND ELECTRONICS INSTRUMENTATION

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A**(25 Marks)**

- 1.a) State two sources of error in moving iron instrument. [2]
- b) What are the various effects with which deflecting torque is produced? [3]
- c) What is true zero in potentiometer? [2]
- d) What are the sources of error in a current transformer? [3]
- e) Which errors are possible to occur in wattmeter? [2]
- f) How creeping adjustment is provided in induction type single phase energy meter? [3]
- g) What are the difficulties in measurement of high resistance? [2]
- h) What is hay's bridge? Why it is preferred over maxwell's bridge? [3]
- i) Distinguish between active and passive electrical transducers. [2]
- j) Why is a CRO considered one of the most important tools in the field of modern electronics? [3]

PART - B**(50 Marks)**

- 2.a) A moving-coil instrument gives the full-scale deflection of 10 mA when the potential difference across its terminals is 100 mV. Calculate (i) the shunt resistance for a full-scale deflection corresponding to 100 A, and (ii) the series resistance for full scale reading with 1000 V. Calculate the power dissipation in each case.
- b) With usual notation derive an expression for the deflecting torque in a PMMC instrument. [5+5]

OR

- 3.a) Explain how a potential divider arrangement is used for multipliers used multi range voltmeters.
- b) How temperature effect is corrected in the shunts? Discuss with a neat circuit diagram. [5+5]

- 4.a) Describe the methods employed for reducing ratio error and phase angle error in PTs?
b) Why the secondary winding of a CT should never be open circuited with its primary still energized? Explain briefly. [5+5]

OR

- 5.a) Explain with the help of suitable diagrams, how ac potentiometers can be used for (i) calibration of voltmeter (ii) calibration of ammeter.
b) A Crompton's potentiometer consists of a resistance dial having 15 steps of 10 ohm each and a series connected slide wire of 10 ohm divided into 100 divisions. If the working current of the potentiometer is 10 mA and each division of slide wire can be read accurately upto $1/5^{\text{th}}$ of its span, calculate the resolution of the potentiometer in volts. [5+5]
- 6.a) An electrodynamicometer-type wattmeter has a current coil with a resistance of 0.1Ω and a pressure coil with resistance of $6.5 \text{ k}\Omega$. Calculate the percentage errors while the meter is connected as (i) current coil to the load side, and (ii) pressure coil to the load side. The load is specified as (I) 12 A at 250 V with unity power factor, and (II) 12 A at 25 V with 0.4 lagging power factor.
b) How the phantom loading test is carried out with rotating substandard meter using phase shifting device? Explain. [5+5]

OR

- 7.a) Describe the method of measurement of reactive power in three phase circuits using single dynamometer type wattmeter.
b) Explain the errors caused due to pressure coil inductance and pressure coil capacitance in electrodynamicometer wattmeter. [5+5]
8. Explain the principle of working of a Kelvin's double bridge for measurement of unknown low resistances. Explain how the effects of contact resistance and resistance of leads are eliminated. [10]

OR

- 9.a) Explain why the maxwell's inductance capacitance bridge is useful for the measurement of inductance of coils having quality factors between 1 and 10.
b) Define quality factor of a coil. Why is Hay's bridge suitable for the measurement of inductance of high Q coils? [5+5]
- 10.a) What is an LVDT? Explain its working principle with necessary diagrams and characteristics. What are its advantages and uses?
b) Describe with suitable diagrams the working principle of strain gauges. [5+5]

OR

11. Write short notes on the following.
a) Vertical amplifier
b) Free running sweep
c) Oscilloscope limitations
d) Electromagnetic focusing. [10]