



Reg. No. :

Name :

**Fourth Semester B.Tech. Degree Examination, May 2015
(2013 Scheme)
13.404 : ELECTRICAL MEASUREMENTS AND MEASURING
INSTRUMENTS (E)**

Time : 3 Hours

Max. Marks : 100

Instructions : Answer *all* questions from Part A and *one* question from *each* Module in Part B.

PART – A (10x2=20 Marks)

1. What is difference between accuracy and precision ?
2. Name the sources of possible errors in instruments.
3. What is meant by phantom loading ?
4. What are the intrinsic constants ?
5. What are the methods used for testing of instrument transformers ?
6. Compare Wheatstone's bridge and Kelvin's bridge.
7. What are the advantages of potentiometer ?
8. Define impulse voltage.
9. What are the factors that affect earth resistance ?
10. Explain the principle of PMU.



PART – B (4x20=80 Marks)

Module – I

11. a) Explain the requirement of shunt and obtain the expression for shunt resistance of ammeter. 10
- b) An electro-dynamometer wattmeter is used for measurement of power in a single phase circuit. The load voltage is 100 V and the load current is 9 A at a lagging power factors of 0.1. The wattmeter voltage circuit has a resistance of 3000 Ω and an inductance of 30 mH. Estimate the percentage error in the wattmeter reading when the pressure coil is connected i) on the supply side and ii) on the load side. 10

OR



12. a) The deflection torque of an ammeter varies as the square of the current passing through it. If a current of 5 A produces a deflection of 90° , what deflection will occur for a current of 3 A when the instrument is i) Spring controlled ii) Gravity controlled. 10
- b) Explain the procedure to obtain the lag adjustment in energy meters. 10

Module – II

13. a) A moving coil ballistic galvanometer of 150Ω resistance gives a throw of 75 divisions when the flux through the search coil to which it is connected is reversed. Find the flux density in which the reversal of coil, given that the galvanometer constants = $110 \mu \text{C/div.}$ and the search coil has 1400 turns, a mean area of 5000 mm^2 and a resistance of 20Ω . Calculate also the ballistic and flux linkage sensitivities of the galvanometer. 10
- b) Explain the mutual inductance method for testing the current transformer. 10

OR

14. a) With a neat phasor diagram discuss the theory of operation of potential transformer. 10
- b) Obtain the expressions for ratio and phase angle errors. 10

Module – III

15. a) Describe how the unknown resistance is obtained by using Kelvin's double bridge method. 10
- b) Explain the function of delay line in vertical deflecting system. 10

OR

16. Discuss the procedure involved in the phase and frequency measurements obtain by Lissajous pattern. 20

Module – IV

17. a) Explain how the peak value of voltage obtained by sphere gaps. 10
- b) Explain the need of dc hall effect sensors and how it is used for measuring the high currents. 10

OR

18. a) Derive an expression for insulation resistance of single core cable. The conductor of a cable has a diameter of 5 mm and overall diameter of the cable is 25 mm. If the insulation resistance of the cable is $16,000 \Omega/\text{km}$, calculate the specific resistance of insulating material. 10
- b) Briefly explain the methods used for rotational speed measurements. 10