

**4E4122**

Roll No. \_\_\_\_\_

Total No. of Pages : **3****4E4122**

**B. Tech. IV-Sem. (Main/Back) Exam; April-May 2017**  
**Electronics Instrumentation & Control Engg.**  
**4E13A Electrical Measurement**

Time : 3 Hours

Maximum Marks : 80  
Min. Passing Marks : 24*Instructions to Candidates :-*

*Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly. Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)*

1. Nil

2. NIL

**UNIT-I**

- 1 (a) What do you mean by phantom loading ? Explain the calibration techniques of single phase energy meter by phantom loading. 8
- (b) The inductance of a moving iron ammeter with a full scale deflection of  $90^\circ$  at 1.3 A, is given by the expression  $L = (200 + 35\theta - 5\theta^2 - \theta^3) \mu H$ , where  $\theta$  is the deflection in radian from the zero position. Estimate the angular deflection of the pointer for a current of 1.0 A. 8

**OR****4E4122 ]****1****[ P.T.O.**

- 1 (a) A 50 volt range spring controlled electrodynamic voltmeter having a square law scale response takes 0.04A on d.c. for full scale deflection of  $90^\circ$ . The control constant is  $0.5 \times 10^{-6}$  N-m/degree and the initial mutual inductance of the instrument is 0.31 H. Find the true potential difference across the instrument when it reads 50V at 50 Hz. 8
- (b) Explain the working of repulsion type moving iron instruments. Discuss about the methods of producing controlling and damping torques in them. 8

### UNIT-II

- 2 (a) Explain the effect of secondary burden on the ratio and phase errors of a current transformer. 8
- (b) Explain two wattmeter method of measuring power in three phase circuits. 8

OR

- 2 (a) Define the following terms used for instrument transformers :  
(i) Transformation ratio  
(ii) Nominal ratio  
(iii) Turns ratio  
(iv) Ratio correction factor. 8
- (b) Explain the Arnold's method for testing of current transformers. 8

### UNIT-III

- 3 Explain the working of co-ordinate A.C. potentiometer. How is it standardized ? What are the functions of the transfer instrument and the phase shifting transformer. 16

OR

- 3 (a) Explain the circuit diagram of slide wire potentiometer and explain its applications also. 8
- (b) Explain the reasons why d.c. potentiometer cannot be used for a.c. measurement straight way. Explain the modifications that are needed in a d.c. potentiometer to be used for a.c. applications. 8

#### UNIT-IV

- 4 (a) Explain the Price's Guard wire method for the measurement of high resistance. 8
- (b) Draw and explain the circuit of Kelvin's Double bridge method for the measurement of low resistance. Also derive the conditions for balance. 8

OR

- 4 (a) Explain the loss of charge method for measurement of insulation resistance of cables. 8
- (b) What do you mean by fall of potential method. What are the factors which influence the earth resistance. 8

#### UNIT-V

5 Explain the following AC bridges with phasor diagram :

- (a) Heaviside bridge. 8
- (b) Anderson bridge. 8

OR

- 5 (a) Derive the balance equations of Hay's bridge. Draw the phasor diagram for balance conditions. 8
- (b) What are the various sources of error in bridge measurement and their precautions. 8