

Total No. of Questions : 10 ] [ Total No. of Printed Pages : 3

Roll No. ... 0502 EX 0910 35

### EE/EX-303

B. E. (Third Semester) EXAMINATION, Dec., 2011

(Grading/Non-Grading System)

(Common for EE & EX Engg. Branch)

ELECTRICAL INSTRUMENTATION

Time : Three Hours

Maximum Marks :  $\begin{cases} 100 \text{ (Non-Grading)} \\ 70 \text{ (Grading)} \end{cases}$

Note : Attempt any *one* question from each Unit. Total *five* questions are to be answered. All questions carry equal marks. Assume suitable missing data if necessary.

#### Unit-I

1. (a) What do you understand by digital instrument ?  
Explain with the help of a block diagram.
- (b) What do you understand by hysteresis and loading effect ?

Or

2. (a) The hysteresis loop for a certain magnetic material is drawn to the following scale.  
 $10 \text{ mm} = 200 \text{ AT/m}$  and  $10 \text{ mm} = 0.1 \text{ Tesla}$   
The area of the hysteresis is  $4800 \text{ mm}^2$ . Assuming the density of the material to be  $7.8 \times 10^3 \text{ kg/m}^3$ , calculate the hysteresis loss in watts per kg at 50 Hz.
- (b) Explain the construction and operation of Flux meter in details.

P. T. O.

## Unit-II

3. (a) Write down the working of electro-dynamometer.  
(b) A voltmeter having  $150\text{ k}\Omega$  resistance, reads  $100\text{ V}$  on its  $150\text{ V}$  scale when connected an unknown resistor in series with a milliammeter. When the milliammeter reads  $5\text{ mA}$ , calculate :  
(i) Apparent resistance of the unknown resistor.  
(ii) Actual resistance of the unknown resistor.  
(iii) Error due to loading effect of the voltmeter.

Or

4. (a) A resistor is measured by the voltmeter-ammeter method. The voltmeter reading is  $123.4\text{ V}$  on the  $250\text{ V}$  scale and the ammeter reading is  $283.5\text{ mA}$  on the  $500\text{ mA}$  scale. Both meters are guaranteed to be accurate within  $\pm 1\%$  of full scale reading. Calculate :  
(i) The indicated value of resistance.  
(ii) The limits within which the result can be guaranteed.  
(b) Explain the construction and working of PMMC and write its advantages and disadvantages.

## Unit-III

5. (a) What are the modifications in design for Reduction of Errors in Potential transforms which lead to smaller total errors.  
(b) Discuss the measurement of power in D. C. circuits and in A. C. circuits.

Or

6. (a) Explain the shape of scale of electro-dynamometer wattmeters and errors in electro-dynamometer wattmeters.

[ 3 ]

- (b) Write down the characteristics of potential transformers in details.

**Unit-IV**

7. (a) A 220 V, 5 A d. c. energy meter is tested at its marked ratings. The resistance of the pressure circuit is  $8800\ \Omega$  and that of current coil is  $0.1\ \Omega$ . Calculate the power consumed when testing the meter with :
- (i) Direct loading arrangements.
  - (ii) Phantom loading with current excited by a 6 V battery.
- (b) Describe in details the working of a Trivector meter.

Or

8. (a) Explain the term "Standardization" of a potentiometer.
- (b) Describe the construction and working of a polar type potentiometer. How is it standardized ?

**Unit-V**

9. (a) Describe the Lloyd Fisher square for measurement of iron losses in a specimen of laminations. How is the true value of flux density obtained in the laminations determined ?
- (b) What are the different difficulties encountered in the measurement of high resistance ? Explain how these difficulties are overcome.

Or

10. (a) Describe the construction and working of 3-phase alternating field power factor meter.
- (b) Explain the construction and working of a Weston type synchroscope.