

C 6083

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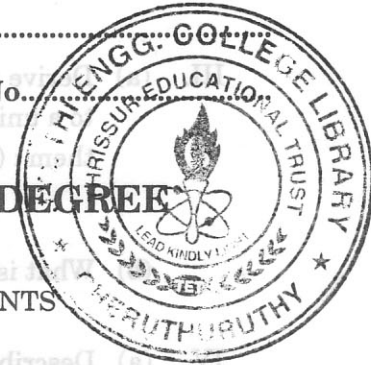
Name.....

Reg. No.....

**FOURTH SEMESTER B. TECH. (ENGINEERING) DEGREE  
EXAMINATION, JUNE 2010**

AI 04 405 – ELECTRONIC INSTRUMENTS AND MEASUREMENTS

(2004 Admissions)



Time : Three Hours

Maximum : 100 Marks

- I. (a) Differentiate between the terms “Scale Range” and “Scale Span” giving suitable examples.  
(b) Suppose we have two variables  $x$  and  $y$ . Explain how method of least squares can be used to find the best linear function connecting  $y$  with  $x$ .  
(c) Discuss why is it necessary to carry out frequency domain analysis of measurement systems. What are the two plots obtained when the frequency response of a system is carried out?  
(d) Describe the working of a sweep frequency generator.  
(e) A good quality analog transducer having an input of 0 – 8 V is able to distinguish a change of 1 mV in its input signal. Calculate the number of bits the A/D converter should have in order to achieve a resolution not lower than that of the analog devices.  
(f) Describe one method of digital to analog (D/A) conversion.  
(g) Describe the measurement of following using a Q meter :  
(i) Q-factor.  
(ii) Inductance.  
(iii) Effective resistance.  
(h) Derive an expression for vertical deflection of an electron beam in a CRT.

(8 × 5 = 40 marks)

- II. (a) The following values were obtained from the measurements of the value of a resistor : 147.2  $\Omega$ , 147.4  $\Omega$ , 147.9  $\Omega$ , 148.1  $\Omega$ , 147.1  $\Omega$ , 147.5  $\Omega$ , 147.6  $\Omega$ , 147.4  $\Omega$ , 147.6  $\Omega$  and 147.5  $\Omega$ . Calculate (i) arithmetic mean ; (ii) average deviation ; (iii) standard deviation, treating the data as finite ; (iv) standard deviation treating the data as population.

Or

- (b) Explain the method of treatment of single sample data with the help of uncertainty analysis by giving suitable examples. Define the terms (i) uncertainty distribution ; (ii) mean value ; (iii) uncertainty interval ; and (iv) odds.

(15 marks)

Turn over

III. (a) Derive the expression for time response of a 2<sup>nd</sup> order under damped system when subjected to a unit step input. Sketch the response. Define the following terms and find expressions for them : (i) Rise time ; (ii) peak time ; (iii) peak overshoot ; (iv) settling time.

Or

(b) What is frequency synthesizer? Describe its circuit details.

(15 marks)

IV. (a) Describe in detail the dual slope method of analog to digital (A/D) conversion.

Or

(b) Describe the following in conjunction with digital to analog conversion : (i) Range of converter. (ii) MSB. (iii) LSB. Derive the expression for an  $n$  bit A/D converter.

(15 marks)

V. (a) (i) Describe the principle of working and circuit diagram of a digital oscilloscope.

(ii) Describe the measurement of self capacitance and bandwidth using a Q meter.

(8 + 7 = 15 marks)

Or

(b) Explain the functioning of a basic type of strip chart recorder. Explain the different types of marking mechanisms used in it.

(15 marks)

[4 × 15 = 60 marks]