Printed Pages – 3 **EC – 604**

(Following Paper ID and Roll No. to be filled in your Answer Book)										
PAPER ID : 3041	**Roll No.**									

B.Tech.

SIXTH SEMESTER EXAMINATION, 2005-2006

MEASUREMENTS AND INSTRUMENTATION

Time : 2 Hours *Total Marks : 50*

Note : *(i) Attempt **ALL** questions.*

(ii) In case of numerical problems assume data wherever not provided.

(iii) Be precise in your answer.

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1. Attempt *any four* parts of the following : **(3.5x4=14)**

(a) With the help of block diagram explain the working of a hetrodyne frequency meter.

(b) Describe a frequency counter used for measurement of frequency. What is a time base ?

(c) Discuss in detail, the type of errors that may be encountered white measuring power by means of an electrodynamic wattmeter.

(d) Show that in two wattmeter method of three phase power measurement the sum of the two wattmeter gives the total power consumed in a 3 phase circuit.

Hence prove, $\tan\phi = \sqrt{3}\,\frac{W_1 - W_2}{W_1 + W_2}$

(e) The current coil of a wattmeter is connected in series with an ammeter and an inductive load. A voltmeter and the voltage circuit of the wattmeter are connected across a 400 Hz supply. The ammeter reading is 4.5 A and voltmeter and wattmeter reading are respectively 240 V and 29 W. The inductance of the voltage circuit is 5 mH and its resistance is 4kΩ. If the voltage drops across the ammeter and current coil is negligible, what is the percentage error in wattmeter reading ?

(f) Write short notes on Lipman type induction wattmeter. What is the advantage of this type wattmeter ?

2. Attempt *any two* parts of the following : **(6x2=12)**

(a) Describe the principle of operation of the transducer suitable for measurement of linear displacements of the order of 0.25 cm arising from the circular diaphragms when measuring pressure variations. Discuss the relative merits of each.

A LVDT produces an rms output voltage of 1.5 V for a displacement of 300×10^{-6} mm. Calculate the sensitivity of LVDT in μV/mm.

(b) Explain the principle of operation of velocity and acceleration transducers.

A quartz crystal has the dimensions of 2 mm × 2 mm × 1 mm. Quartz has the following properties : charge sensitivity 2μc/H, $x = 8.6 \times 10^{10}$ N/m^2 and permittivity = 4.6×10^{-12} F/m.

Calculate the value of force, charge and voltage if the crystal is subjected to strain of 10×10^{-6} mm.

(c) What is a resistance strain gauge ? What is the difference between unbonded and bonded strain gauges ? Describe a method of measuring displacement of a beam using a strain gauge.

3. Attempt *any three* parts of the following : **(4x3=12)**

(a) What are the three requirements of an automatic test system ? Why is it preferred to use the three state driver for the IEEE 488 bus driver ?

(b) Discuss various types of modulation used in a-c telemetering system.

(c) What do you understand by the term delay distortion on digital data transmission ? How is it reduced in a practical system ?

(d) Compare TDM and FDM system it multiplexing.

(e) Explain how the quantization noise and channel bandwidth are related in pulse code modulation system.

4. Attempt *any two* parts of the following : **(6x2=12)**

(a) Explain the principle of operation of an electro - cardiograph with special reference to noise suppression, recording arrangement and electrodes used. Also explain its merits and demerits.

(b) Describe segmental gas discharge displays. How will you convert BCD to 7 segment display.

(c) Describe the differential method used for digital tape recording. Also explain the advantages and disadvantages.

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