B. Tech.

(SEM. III) EXAMINATION, 2007-08

ELECTRONICS MEASUREMENTS & INSTRUMENTATION

Time : 3 Hours]   *[Total Marks : 100*

Note :   (1)   Attempt **all** questions.

(2)   All questions carry **equal** marks.

(3)   Be precise in your answer.

(4)   No **second** answer book will be provided.

1   Attempt any **four** parts of the following :   5×4=20

(a)   Describe various types of errors in instruments.

(b)   Distinguish between "Intelligent Instrumentation System" and "Dumb Instrumentation System".

(c)   A wattmeter having a range of 500 W has an error of ± 1.5 per cent of full scale deflection. If the true power is 50 W, what would be the range of the reading?

(d)   A moving coil milliammeter having a resistance of 10 ohms gives full scale deflection when a current of 5 mA is passed through it.

Explain how this instrument can be used for mesurement of

(i) Current upto 1 A

(ii) Voltage upto 5 V.

(e) Differentiate between the primary and secondary transducer.

(f) Describe the method for measurement of temperature with use of RTD and Thermistor.

2 Attempt any **four** of the following :   5×4=20

(a) Describe the working of a low voltage Schering bridge.

(b) Explain briefly electronic multimeter.

(c) Explain vector impedance-meter with the help of block diagram.

(d) In a bridge shown in **figure** below the balance was obtained with $L_1 = 52.6$ mH and $R_2 = 1.68$ Ω. Find the resistance and inductance of coil.
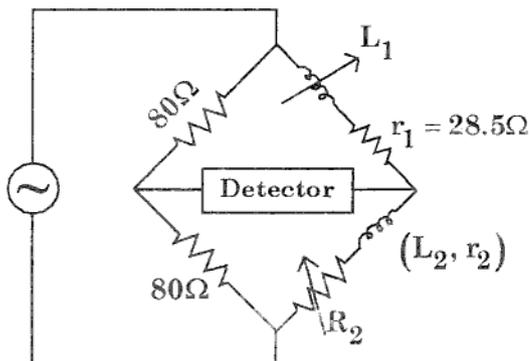
(e) A circuit having an effective capacitance of 160 PF is tuned to a frequency of 1.2 MHz. In this circuit the current falls to 70.2% of its resonant value when the frequency of an e.m.f. of constant magnitude injected in series with the circuit deviates from the resonant frequency by 6 kHz. Calculate the Q factor and effective resistance of the circuit.

(f) Discuss the circuit for measurement of power at radio frequencies.

3 Attempt any **two** parts of the following : 10×2=20

(a) Describe the working of an integrating type digital voltmeter. A D/A converter has 6 bits and a reference voltage of 10 V. Calculate the minimum value of R such that the maximum value of output current does not exceed 10 mA. Find also the smallest quantized value of output current.

(b) Explain the theory and working of LCDs. Describe the advantage of LEDs.

(c) Draw the circuit of a digital frequency meter. Explain the difference between $3\frac{1}{2}$ digits and 4 digits displays.

4 Attempt any **two** parts of the following : 10×2=20

(a) Describe the following for CRO circuit :

(i) Blanking circuit

(ii) Z axis modulation

(iii) Astigmation control

(iv) Time base generator.

(b) (i) Derive the expression for vertical deflection of an electron beam in a CRT and sensitivity of CRT.

(ii) Draw the Lessajous patterns for same voltage put frequency $f_x = \dfrac{7}{2} f_y$ inputs are connected to y and x plates of the oscilloscope respectively.

(c) (i) An oscillation has an input capacitance 50 PF and resistance of $2\,M\Omega$ and the voltage divider ratio of 10. What are the parameters of a high impedance probe?

(ii) Write a short note on storage oscilloscope.

5   Attempt any **four** parts of the following :   5×4=20

(a) Discuss the function of wave analyzer.

(b) Discuss the different types of analog instruments based on measurements.

(c) Explain in brief spectrum analyzer.

(d) Explain the working of function generator.

(e) Write a short note on the working of Harmonic distortion meter.

(f) Define the terms :

(i) Accuracy

(ii) Resolution

(iii) Linearity

(iv) Static sensitivity.