

Total number of printed pages – 6

B. Tech
CPEC 5303

Fifth Semester Examination – 2007

**ELECTRONICS MEASUREMENT AND
MEASURING INSTRUMENTS**

Full Marks – 70

Time : 3 Hours

*Answer Question No. 1 which is compulsory
and any **five** from the rest.*

*The figures in the right-hand margin
indicate marks.*

1. Answer the following questions : 2×10

- (a) The measured value of a capacitor is $205.3 \mu\text{F}$, where as its true value is $201.4 \mu\text{F}$. Determine the relative error.

P.T.O.

- (b) What is 'Q' of a coil? For high Q-factor of a coil which type of bridge circuit is used for Inductance Measurement and why?
- (c) What are the advantages of TVM's over conventional meters?
- (d) What would a true rms reading voltmeter indicate if a pulse waveform of 5 V peak and a duty cycle of 25% is applied to it?
- (e) Draw the Lissajous pattern with two equal voltage of equal frequency and (i) -45° phase shift (ii) 210° phase shift.
- (f) A Lissajous pattern of an oscilloscope is stationary and has 5 vertical maximum values and 4 horizontal maximum values. The frequency of the horizontal input is 1200 Hz. Determine the frequency of vertical input.

- (g) Compare between (i) Unbonded wire (ii) Bonded wire and (iii) Foil strain gauges.
- (h) What is strain gauge Rosettes?
- (i) What do you mean by Time base error for a frequency counter?
- (j) Draw the Electrical equivalent circuit of a Crystal used for oscillators and write down the expression of resonant frequency.
2. (a) With the neat circuit diagram explain the working of Peak reading A.C. voltmeter.
- (b) Define the term "Resolution" and "Sensitivity" and explain with suitable example.

3. (a) Explain the procedure of measuring a low resistance with the help of Kelvin's double bridge. Derive the relation for finding unknown resistance. 7

(b) The Four arm of Maxwell bridge are as follows. AB and BC are non reactive resistors of 100Ω each. DA is standard variable inductor L of resistance 32.7Ω and CD comprises a standard variable resistor R in series with a coil of unknown impedance, Balance is obtained when $L = 47.8 \text{ mH}$ and $R = 1.36 \Omega$. Find the resistance and reactance of the coil. 3

4. Explain clearly the main components of a cathode-ray tube. Draw Triggered sweep circuit and explain it clearly. What are the various special

types of cathode-ray oscilloscope? Draw block diagram of any one of them. 10

5. (a) With the help of block diagram describe a Function Generator and give its application also. 7

(b) Why output impedance of a Pulse Generator is an important consideration? 3

6. (a) With the help of block diagram, explain an Heterodyne wave analyzer and give its application. 7

(b) Explain a typical time base circuit used in a conventional frequency counter. 3

7. (a) Describe (i) Construction, (ii) Operating principles and (iii) Performance characteristics of an LVDT. What are the uses of LVDT? 6

(b) An LVDT is employed for measuring the deflection of a bellows. The sensitivity of the LVDT is 60 V/mm. The bellows is deflected by 0.15 mm by a pressure of $1.2 \times 10^6 \text{ N/m}^2$. Determine the sensitivity of the LVDT in V per N/m^2 and the pressure when the output voltage is 4.5 V.

4

8. Write short notes on any two:

5×2

- (a) Instrumentation amplifier
- (b) Digital voltmeter
- (c) Pulse generator.

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