

II B.Tech II Semester Regular Examinations, Apr/May 2006
ELECTRICAL AND ELECTRONICS MEASUREMENTS
(Common to Electronics & Instrumentation Engineering and Electronics &
Control Engineering)

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. Explain in detail the analog type multimeter, with moving coil mechanism with relevant diagram. [10+6]
2. (a) With a neat sketch explain the principle and works of thermocouple meter. Mention advantages. [8]
(b) The multimeter movement has an internal resistance of 150Ω and requires 1.5mA for full-scale deflection. Two diodes D_1 and D_2 have an average forward resistance of 500Ω each. An Rsh is placed across the meter with 150Ω . The diode offer infinite resistance when reverse biased. For a 15V a.c range calculate
 - i. The multiplier value R_s .
 - ii. The Sensitivity of voltmeter on the a.c range.[5+3]
3. Explain in detail the working of stair case Ramp DVM, giving the block diagram. Compare its performance with other types of DVMs. [8+4+4]
4. (a) What are the constituent elements of a Digital Multimeters?
(b) For measuring small values of capacitance, a 60MHz source is to be used in a capacitance meter. What value of series resistance is required if the phase shift is to be kept below 5.7° for full scale capacitance reading of $1, 10$, and 100PF . [8+8]
5. (a) With figure, explain the time base schematic showing the origin of the signal.
(b) How does alternate sweep compare with chopped sweep? When would one method be chosen over the other? [8+8]
6. (a) What is a Probe? What are the advantages of using an active voltage probe?
(b) What is delayed sweep? When it is used?
(c) Why is an attenuator probe used? [6+4+6]
7. (a) What are signal sources? What are the desirable characteristics of a signal? Give an overview of different signal sources used.
(b) Distinguish between a function generator and an oscillator. [10+6]
8. (a) Draw and explain the logic diagram of a time base used for a frequency counter.

- (b) Draw and explain the input signal processing circuit for the frequency counter.
- (c) Define gating error. [8+6+2]

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1. (a) Explain about the loading effect in measurements and its effect on the accuracy of measurement. How this can be prevented? [6+2]
(b) A voltmeter with a sensitivity of $1000\Omega/V$ is being used, to measure the voltage across a $40\text{ k}\Omega$ resistor. The voltage is measured on 50v range. Determine the error in the reading due to loading effect. [8]
2. Explain the:
(a) Electrodynamometer type
(b) AC Rectifier Type of measuring instruments. [8+8]
3. (a) Explain a ramp type digital volt meter using voltage to time conversion principle.
(b) A dual slope integrating type of A/D converter has an integrating capacitor of $0.1\text{ }\mu\text{F}$ and a resistance of $100\text{ K}\Omega$ if the reference voltage is 2 volt and the output of the integrator is not to exceed 10 volts, what is the max time the reference voltage can be integrated. [10+6]
4. (a) How do you measure R, L and C using electronic instruments?
(b) How do you perform all-electronic capacitance measurements where the measurement is not performed by a comparison? Explain one method in detail. [8+8]
5. (a) With neat block diagram explain the working function of each block of general purpose oscilloscope.
(b) Mention the advantages of general purpose oscilloscope. [10+6]
6. (a) What is a Probe? What are the advantages of using an active voltage probe?
(b) What is delayed sweep? When it is used?
(c) Why is an attenuator probe used? [6+4+6]
7. (a) Explain with the help of block diagram the working of a spectrum analyzer?
(b) Explain the different applications of spectrum analyzer. [8+8]
8. (a) Explain with the help of a block diagram how the period can be measured?

- (b) What is meant by time base error and explain a calibration method to improve the accuracy of it. [10+6]

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1. Explain in detail the analog type multimeter, with moving coil mechanism with relevant diagram. [10+6]
2. Explain the:
 - (a) Electrodynamometer type
 - (b) AC Rectifier Type of measuring instruments. [8+8]
3. Draw the block diagram of a dual-slope digital volt meter and explain how it is advantageous to use dual slope A/D converter in DUM? [4+8+4]
4. (a) How do you measure R, L and C using electronic instruments?
(b) How do you perform all-electronic capacitance measurements where the measurement is not performed by a comparison? Explain one method in detail. [8+8]
5. (a) With neat block diagram explain the working function of each block of general purpose oscilloscope.
(b) Mention the advantages of general purpose oscilloscope. [10+6]
6. (a) Name different types of oscilloscopes. Compare their merits and demerits along with their applications.
(b) How is vertical axis of an oscilloscope is deflected? How does this differ from the horizontal axis? [8+8]
7. (a) Describe the working of a sweep frequency generator. What are the sweep errors.
(b) What is a frequency synthesizer? Draw the circuit and describe its working principle. [8+8]
8. (a) Explain a method to measure the ratio of two frequencies using suitable block diagram.
(b) To what accuracy can a frequency counter determine an unknown frequency of 500 KHz using a 1.2 sec time base and a time base accuracy of 0.02%. [10+6]

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1. Explain in detail the Permanent magnet moving coil mechanism with construction and temperature compensation. [8+4+4]
2. (a) How the elements of a single phase watt-hour meter are connected? Explain with the help of a sketch.
(b) Describe the principle of measurement and working of a domestic watt-hour meter. [8+8]
3. (a) Give the circuit of a basic DC voltmeter with F.E.T input and explain its working in brief.
(b) Give a circuit diagram of amplified voltage and current meter capable of measuring multi voltages and currents. [8+8]
4. (a) Compute the value of self-capacitance of a coil when the following measurements are made; at $f_1 = 2\text{MHz}$, the tuning capacitor is set at 450 pf. When the frequency is increased to 5 MHz, the tuning capacitor is tuned to 60 pf.
(b) Draw the block diagram of the RF milli voltmeter. Explain its working. [6+10]
5. (a) With neat block diagram explain the working function of each block of general purpose oscilloscope.
(b) Mention the advantages of general purpose oscilloscope. [10+6]
6. (a) Explain the working function of each blocks of a digital storage oscilloscope.
(b) How does the digital storage oscilloscope differ from the conventional storage oscilloscope using a storage CRT? What are the advantages of each? [8+8]
7. (a) Mention different types of signal generators and explain their working principles.
(b) Explain in detail about conventional standard signal generator. [10+6]
8. (a) Draw and explain the temperature compensated crystal oscillator circuit.
(b) List the suggestions to be followed to attain maximum accuracy in a frequency counter.
(c) Explain the basic principle behind the extension of frequency range of counter. [6+4+6]
