

**II B.Tech II Semester Supplementary Examinations,  
November/December 2005  
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**

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1. Derive the expression for  $R_h$  in shunt type ohm-meter. Also prove with an example its suitability for very low resistance measurement. [8+8]
2. Explain the:
  - (a) Electrodynamometer type
  - (b) AC Rectifier Type of measuring instruments. [8+8]
3. (a) How can one select Digital volt meter? What are the outstanding qualities to make the selection? [3+3]  
(b) Classify the Digital voltmeters. Explain the operating principle of one of the above Digital Voltmeters. [2+8]
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) Why electronic circuits in the oscilloscope causes a certain amount of time delay in the transmission of signal voltages to the deflection plates.  
(b) With neat circuit diagram explain the operation of delay of the vertical signal allows horizontal sweep to start prior to vertical deflection. [8+8]
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 the block diagram of a frequency counter and explain its operation using appropriate waveforms.  
(b) How many displays should a frequency counter have if its accuracy and resolution are to be 0.001% and explain why? [10+6]

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1. (a) What are shunts? Describe their constructional features and materials used. Obtain the expression for the multiplying power of a shunt. [2+4+4]  
(b) It is desired to extend the range of a DC milliammeter of the range 0 to 100mA, to measure up to 1 A. The meter resistance  $R_m$  is  $1k\Omega$ . Determine the value of shunt to be used and its multiplying power. [4+2]
2. (a) Explain principle and working of power factor meter. [10]  
(b) Calculate the value of series resistance required to extend the 0-150V range of a  $22,000\Omega/V$  meter to 0-1000V? Also find the power rating. [4+2]
3. (a) Explain a resistance range selector circuit of a VOM.  
(b) To check the distributed capacitance of a coil, the coil is resonated at 15 MHz with 40 PF. What is the inductance of the coil and what is the equivalent distributed capacitance. [8+8]
4. Write a notes on sources of error encountered in capacitance measuring meter. Explain parasitic inductance, resistance and capacitance. [4+4+4+4]
5. (a) Explain the working operation of differential deflection amplifier for an oscilloscope.  
(b) Give the specifications of CRO. [8+8]
6. (a) What are the major blocks of an oscilloscope and what are the functions of each?  
(b) What is the velocity of electrons that have been accelerated through a potential of 2200 volts? [10+6]
7. (a) Explain the different types of distortions caused by amplifiers.  
(b) Describe the Engineering applications of wave analyzers. [8+8]
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. 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 Multimeter?  
(b) For measuring small values of capacitance, a 60 MHz 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  $5.7^\circ$  for full scale capacitance reading of 1,10, and 100 PF. [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) Briefly explain the working operation of storage and sampling oscilloscope.  
(b) What precautions must be taken when using a sampling oscilloscope? [10+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 block diagram of a multiple period measuring system for measuring oscillator deviations.  
(b) Derive the expression for the deviation in measurement the above system. [10+6]

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1. (a) Derive the value of Torque and Deflection of the galvanometer with its dynamic behavior.  
(b) What value of shunt resistance is required for using  $50\mu\text{A}$  meter movement with an internal resistance of  $250\Omega$  for measuring 0-500mA. [10+6]
2. (a) With neat diagram explain the principle and working of AC voltmeter.  
(b) An AC voltmeter calibrated for sine wave is used to measure a ramp voltage waveform rising to a peak value of 6 V in 3 m.sec. Determine the percentage error. [8+8]
3. (a) How can one select Digital volt meter? What are the outstanding qualities to make the selection? [3+3]  
(b) Classify the Digital voltmeters. Explain the operating principle of one of the above Digital Voltmeters. [2+8]
4. (a) Name the measurements for which a vector voltmeter is used.  
(b) Draw the block diagram of the vector volt meter, mention all the blocks. [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) How does the sampling oscilloscope increase the apparent frequency response of an oscilloscope?  
(b) What precautions must be taken when using a sampling oscilloscope? [10+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) Explain the principle of period measurement.  
(b) Explain a method of multiple period averaging scheme using suitable block diagram [8+8]

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