

B.Tech III Year I Semester (R13) Regular Examinations December 2015

**ELECTRONIC MEASUREMENTS & INSTRUMENTATION**

(Electronics and Instrumentation Engineering)

Time: 3 hours

Max. Marks: 70

**PART – A**

(Compulsory Question)

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- 1 Answer the following: (10 X 02 = 20 Marks)
- What are the properties that a system should satisfy, for it to be considered a linear system?
  - What is Time-domain reflectometry?
  - How is over voltage protection achieved in the design of direct coupled amplifiers?
  - Drift stability is a problem in direct-coupled amplifier. How is it overcome without using choppers?
  - What are the different ways in which digital volt meters classified?
  - Average value of a sine wave is zero. What reading does the average-responding voltmeter show when it is measuring a sinusoidal wave? What is form factor?
  - What is the principle of operation of Complex Impedance meters?
  - What is 'three terminal resistance measurement' on Wheatstone bridge? When does such a situation arise?
  - The most useful figure of merit of an oscillator is the 'The maximum frequency of oscillation'. Under what condition(s) does it occur?
  - What is a T – network used for? What are the different types of T-networks?

**PART – B**

(Answer all five units, 5 X 10 = 50 Marks)

**UNIT – I**

- 2 (a) List the precautions that are to be taken while making Sine-wave testing.  
 (b) Explain how a 'Diode ring modulator' or 'Synchronous detector' can be used as phase detector. Derive an expression for the same.

**OR**

- 3 (a) A first order instrument, with a time constant of 1 sec is subjected to the following inputs. Find the response in each case:  
 (i)  $u(t)$  (Unit step function)  
 (ii)  $2\sin(t)$  (Sinusoidal input)  
 (b) What are the common sources of Non-linearity in a measuring instrument? Classify the different non-linearities.

**UNIT – II**

- 4 Explain the advantages and disadvantages of Chopper stabilized amplifiers

**OR**

- 5 Derive an expression for overall voltage gain of a Differential amplifier with the configuration containing 'three integrated-circuit blocks'.

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**UNIT – III**

- 6 (a) With the help of a block diagram, list and explain the sequence of events that take place in 'successive approximation' type of digital voltmeter.  
(b) What considerations that are to be taken in selection/calculation of the required frequency of the local oscillator in linear ramp type DVM?

**OR**

- 7 (a) Sketch a range-changing circuit for a DVM. Explain how it operates.  
(b) How is the working principle of Direct Current probe different from Alternating Current probe?

**UNIT – IV**

- 8 (a) Discuss the problems involved in measuring small Capacitance C quantities. Explain suitable measuring techniques.  
(b) Explain the role of 'phase sensitive detector' in the digital inductance/capacitive measurement

**OR**

- 9 A Wheatstone bridge has ratio arms of  $1000 \Omega$  and  $100 \Omega$  and is being used to measure an unknown resistance of  $25 \Omega$ . Two galvanometers are available. Galvanometer 'A' has a resistance of  $50 \Omega$  and a sensitivity of  $200 \text{ mm}/\mu\text{A}$  and Galvanometer 'B' has values of  $600 \Omega$  and  $500 \text{ mm}/\mu\text{A}$ . Which of the two galvanometers is more sensitive to a small unbalance on the above bridge? What is the ratio of sensitivities? The Galvanometer is connected from the junction of the ratio arms to the opposite corners. Comment on the results.

**UNIT – V**

- 10 (a) 'Impulsive noise rejection' measurement and 'Quieting characteristic' measurements are often performed on receiving systems. Discuss about the same with suitable test setups.  
(b) Compare the advantages and disadvantages of different types of Microwave amplifiers.

**OR**

- 11 (a) List at least five publications and their titles that detail the performance specifications applicable to design, construction and measurement of radio receiving and transmitting equipment (Commercial/Aeronautical/Military).  
(b) Discuss measurement techniques to characterize 'Conducted-interference' present on power or control leads.

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