

6E3115

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B. Tech. VI Semester (Main/Back) Exam. May/June 2013

ELECTRICAL ENGINEERING # 6EE6.2

POWER SYSTEM INSTRUMENTATION

Time : 3 Hours

Min. Passing Marks : 24

Maximum Marks : 80

Instruction to Candidates :

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

Unit-I

1. (a) The following 10 observations were recorded when measuring a Voltage: 31, 6, 31, 0, 31.7, 31.0, 32.1, 31.9, 31.0, 31.0, 31.9, 32.5 and 31.8 volt. Find:
- The probable error of one reading
 - The probable error of mean. [8]
- (b) Define the following for Gaussian distribution of data:
- Precision index
 - Probable error
 - Standard deviation of mean
 - Standard Deviation of standard deviation. [8]

OR

1. (a) Define limiting (guarantee) errors. Derive the expression for relative limiting error. [8]
- (b) Explain the following:
- Systematic errors
 - Random errors [8]

Unit-II

2. (a) What are different selection criteria for proper transducer? Explain the input, output and transfer characteristics of a transducers. [8]
- (b) Derive an expression for the gauge factor of strain gauges. Differentiate the bonded and unbonded type strain gauges. [8]

OR

2. (a) Explain the construction and working of seismic accelerometers. [8]
- (b) Explain the various modes of operation of Piezo-electric transducers. Also, give applications of it. [8]

Unit-III

3. (a) Explain the working principle of a function

generator with block diagram. [8]

- (b) Explain the circuit diagram of instrumentation amplifiers and discuss the applications, merits, & demerits also. [8]

OR

3. (a) Explain the construction and working of frequency to voltage converters with suitable diagrams. [8]
- (b) What do you mean by isolation amplifiers? Explain the circuit diagram & applications also. [8]

Unit-IV

4. (a) What is a power factor? Explain the causes of low power factor and methods of improvement of power factor.
- (b) Explain the single electro-dynamometer type wattmeter method of measurement of reactive power in 3 ϕ circuits. [8]

OR

4. (a) Explain the construction and working principal of the ratio meter type frequency meter. [8]
- (b) Explain the industrial metering and various types of industrial tariffs. [8]

Unit-V

5. (a) Explain the Wilson compensation method for reduction of errors in current transformers.
- (b) Explain the effect of the following on the performance of current transformers:
- Change of secondary circuit burden
 - Change of frequency [8]

OR

5. (a) Explain the various protection criterions for current transformers. [8]
- (b) Explain the active and reactive power in the different plants. [8]