

17058(M)

B. Tech 4th Semester Examination

Electrical Measurements & Measuring Instruments (CBS)

EE-402

Time : 3 Hours

Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all, selecting one question from each of the section A, B, C, and D and all the subparts of the question in Section E. Marks for each question are given in bracket and assume missing data if any suitably.

SECTION - A

1. (a) State and explain the classification of measuring instruments based upon their principle of operation. (6)
(b) Explain the various types of errors in measurement by giving suitable examples and suggest the means to minimize such errors. (6)
2. (a) Explain the construction of wire wound strain gauges and derive the expression for gauge factor. (6)
(b) A wattmeter having a range of 1000 W has an error of $\pm 1\%$ of full scale reading. If the true power is 100 W, what would be the range of readings? Suppose the error is specified as the percentage of true value, what would be the range of readings? (6)

SECTION - B

3. (a) Explain the working principle of attraction type moving iron instruments and also state the sources of errors in such instruments. (6)

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- (b) A moving coil instrument has a resistance of 10Ω and gives full scale deflection when carrying a current of 50 mA. Show how it can be adopted to measure voltage upto 750 V and current upto 1000 A. (6)
4. (a) Explain the working principle of a permanent magnet moving coil instrument and also state their relative merits and demerits. (6)
(b) Explain the construction and working of dynamometer type wattmeter. (6)

SECTION - C

5. (a) Explain the construction and working of a three phase dynamometer type power factor meter. (6)
(b) Explain the low resistance measurement by Kelvin's Double Bridge and derive the condition for balance. (6)
6. (a) Explain the construction and working of a ratio-meter type frequency meter. <https://www.hptuonline.com> (6)
(b) Explain the construction and working of a meggar and its applications. (6)

SECTION - D

7. (a) Explain the sources of null detectors that are used for AC bridges. (6)
(b) Derive the equation of balance for Anderson's bridge. Draw the phasor diagram of the bridge under balanced conditions. (6)
8. (a) Derive the equation for capacitance and dissipation factor in low voltage Schering bridge. Also draw the phasor diagram of the bridge under balanced conditions. (6)

[P.T.O.]

- (b) Explain the function and working of Wagner Earth Device.
State its limitations. (6)

SECTION - E

9. (a) Define the absolute instruments giving example.
- (b) Differentiate between primary and secondary transducers.
- (c) State why and where multipliers are used.
- (d) Name the instruments those can measure both AC and DC quantities.
- (e) State why controlling torque is required.
- (f) What is creeping error and in which instrument it is encountered.
- (g) State the various sources of errors in bridge circuits.
- (h) State the applications of thermocouple in measurements.
- (i) Which bridge is used to measure frequency and how.
- (j) State the multiplying factor of a wattmeter and its importance. (10×1.2=12)