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17EE36

## Third Semester B.E. Degree Examination, June/July 2019 Electrical and Electronic Measurements

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing  
ONE full question from each module.*

### Module-1

- 1 a. Define sensitivity of Wheatstone bridge and obtain expression for sensitivity  $S_B$  of wheatstone bridge. (08 Marks)
- b. A small resistance of approximately  $50\mu\Omega$  is measured using Kelvin's double bridge. At balance, the value of the standard resistance is  $100.05\mu\Omega$  resistances of the inner ratio arms are  $100.51\Omega$  and  $200\Omega$  respectively, resistances of outer ratio arms are  $100.4\Omega$  and  $200\Omega$  respectively. The resistance of the interlink is  $800\mu\Omega$ . Calculate the magnitude of error in measurement. (06 Marks)
- c. Explain with a neat sketch, construction and working principle of Megger. (06 Marks)

**OR**

- 2 a. Explain measurement of inductance by Anderson's bridge with neat diagram. (08 Marks)
- b. A a.c. bridge is balanced at 2kHz with following components in each arm. Arm AB =  $10K\Omega$ , Arm BC =  $100\mu f$  in series with  $100K\Omega$ , Arm AD =  $50K\Omega$ . Find the unknown impedance  $R + jX$  in the arm DC, if the detector is between BD. (06 Marks)
- c. Explain sources and detectors in a.c. bridges. (06 Marks)

### Module-2

- 3 a. Explain the types of errors and how to minimize errors in wattmeters. (06 Marks)
- b. Explain with neat sketch calibration of single phase energy meter. (08 Marks)
- c. A wattmeter has a current coil of  $0.03\Omega$  resistance and a pressure coil of  $6000\Omega$  resistance. Calculate % error if the wattmeter is so connected that
  - i) Current coil is on load side
  - ii) The pressure coil is on load side
 (a) If the load takes 20A at voltage of 220V and 0.6 p.f in each case  
 (b) What load current would give equal errors with the two connections? (06 Marks)

**OR**

- 4 a. With a neat sketch, explain the construction and working of II-phase electrodynamicometer power factor meter. (08 Marks)
- b. With the neat sketch, explain the operation of western frequency meter. (06 Marks)
- c. The number of revolutions/kwh of a 230V, 10A Watt-hour meter is 900. On a test at half load, the time taken for 20 revolution of the disc is found to be 69 secs. Determine the meter error at half load. (06 Marks)

### Module-3

- 5 a. With the help of neat sketch and phasor diagram, obtain the expression for transformation ratio (R) and phase angle ( $\theta$ ) of current transformer. (10 Marks)
- b. Explain Silbee's method of testing current transformer. (06 Marks)
- c. Write note on shunts and multipliers. (04 Marks)

OR

- 6 a. Explain the method of measurement of magnetizing force with a neat diagram. (08 Marks)  
 b. A particular bar type current transformer has 300 secondary turns. The secondary winding carries a burden of ammeter having resistance  $1\Omega$  and inductive reactance of  $0.53\Omega$ . While the secondary resistance and reactance are  $0.25$ ,  $0.35\Omega$ . The magnetizing m.m.f. required is  $85A$  while the current component for core losses is  $50A$ . Find: i) The primary current when secondary current is  $5A$ , ii) The ratio error, iii) The reduction in the number of turns of secondary to obtain zero ratio error. (12 Marks)

Module-4

- 7 a. With the help of neat sketch, explain the working of true RMS voltmeter. (08 Marks)  
 b. Explain the working of electronic multimeter. (06 Marks)  
 c. Explain the working principle of electronic energy meter. (06 Marks)

OR

- 8 a. With a block diagram, explain the  
 i) Ramp-type digital voltmeter  
 ii) Integrating type digital voltmeter. (10 Marks)  
 b. What are the advantages of electronic instruments? (04 Marks)  
 c. A coil with a resistance of  $12\Omega$  is connected across the test terminals of Q-meter circuit and resonance occurs when the frequency of the oscillator is  $1000\text{kHz}$  and the capacitance of the resonating capacitor is  $75\text{pf}$ . Calculate % error introduced in calculated value of Q due to an insertion resistance of  $0.02\Omega$  across the oscillator. (06 Marks)

Module-5

- 9 a. Explain the following: i) Light emitting display ii) Liquid crystal display. (08 Marks)  
 b. Explain with neat sketch, cathode ray tube. (06 Marks)  
 c. Write short notes on: i) Dot-matrix display ii) Bar-matrix display. (06 Marks)

OR

- 10 a. Explain with neat sketch electro-cardio-graph [ECG]. (08 Marks)  
 b. Explain strip-chart recorders. (06 Marks)  
 c. Explain x-y recorders. (06 Marks)

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