



# CBCS SCHEME

15EE36

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

Time: 3 hrs.

Max. Marks: 80

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

### Module-1

- 1 a. Derive the dimension of MMF, EMF, magnetising force and flux density in LMTI system. (04 Marks)
- b. In deriving equation for resistance in Hay's bridge the following expression is obtained
- $$R = \frac{w^2 R_1 R_2 R_3 C^2}{1 + w^2 R_2^2 C}$$
- Find whether the equation is dimensionally correct or not. In case there is an error, find the error and correct the question accordingly. (08 Marks)
- c. State and explain sensitivity of Wheatstone's bridge. (04 Marks)

### OR

- 2 a. Obtain the balance equation for Maxwell's inductance capacitance bridge used for measurement of unknown inductance. Draw the phasor diagram at balance condition. (08 Marks)
- b. The bridge consists of the following :
- Arm AB – a choke coil having a resistance  $R_1$  and inductance  $L_1$ .
- Arm BC – a non inductive resistance  $R_3$
- Arm CD – a mica – condenser  $C_4$  is series with a non inductive resistance  $R_4$ .
- Arm DA – non inductive resistance  $R_2$ .
- When the bridge is fed from a source of 500Hz. balance is obtained under following conditions  $R_2 = 2410\Omega$ ,  $R_3 = 750\Omega$ ,  $C_4 = 0.35 \mu F$ ,  $R_4 = 64.5\Omega$ . The series resistance of capacitor is  $0.4\Omega$ . Calculate the resistance and inductance of the choke coil. The supply is connected between A and C while the detector is between B and D. (08 Marks)

### Module-2

- 3 a. Derive the torque equation of single phase electrodynamic type wattmeter. (06 Marks)
- b. A 3- $\phi$  400V motor takes an input of 40kW at 0.45 p.f lag. Find readings of each of the two single phase wattmeter connected to measures the input. (05 Marks)
- c. The name plate of a single phase energy meter reads as 250V, 20A, 1800 rev/kwh. The meter is tested at  $\frac{3}{4}$ <sup>th</sup> load and upf. The meter makes 20 revolutions in 10sec. Determine the percentage error in the reading of the energymeter. (05 Marks)

### OR

- 4 a. The constant of energy meter is 750rev/kwh calculate the number of revolutions made by it when connected to a load carrying 100A at 230V and 0.8p.f in 30sec. If it makes 110 revolutions in 30sec. find the percentage error. (06 Marks)
- b. Derive an expression for a single phase induction type energy meter to show that the number of revolutions of disc are proportional to the power consumed by the load. (06 Marks)
- c. What are the causes of creeping and how it is prevented. (04 Marks)

**Module-3**

- 5 a. What is shunt? How it is used to extend the range of an ammeter. (04 Marks)
- b. A current transformer has bar primary and 400 secondary turns. The secondary winding has an impedance  $(0.3 + j0.4)\Omega$  and the secondary burden is an ammeter of impedance  $(1.5 + j0.6)\Omega$ . The core requires 80 A magnetization and 60A for core loss.  
Find :
- The ratio error when ammeter reads 5A and the primary current
  - The turns compensation required to bring the ratio error to zero
  - Phase angle of the current transformer
- c. Differentiate between current transformer and potential transformer. (04 Marks)

**OR**

- 6 a. Explain Hopkinson's permeameter. (06 Marks)
- b. Explain the constructional details of flexmeter. (06 Marks)
- c. Explain the measurement of leakage factor using search coil. (04 Marks)

**Module-4**

- 7 a. What are the advantages of electronic voltmeter? (04 Marks)
- b. With a block diagram, explain the working of a true RMS responding voltmeter. (06 Marks)
- c. Mention the salient features of digital voltmeter. (06 Marks)

**OR**

- 8 a. Explain the operation of successive approximation type of digital voltmeter. (06 Marks)
- b. With a neat block diagram, explain the principle of working of electronic energy meter. (06 Marks)
- c. What is the working principle of Q meter? (04 Marks)

**Module-5**

- 9 a. With the help of neat diagram. Explain EMG. Recording. (06 Marks)
- b. Explain the methods of magnetic tape recording in brief. (10 Marks)

**OR**

- 10 a. With a neat figure, explain the liquid crystal display. (06 Marks)
- b. Draw and explain the structure and main components of conventional Cathode Ray Tube. (10 Marks)

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