**Registration No:** | | | | | | | | | | |

**Total Number of Pages: 03** **B.Tech**

**PEL3I104**

# 3rd Semester Regular/Back Examination 2017-18
# ELECTRICAL AND ELECTRONICS MEASUREMENT
## BRANCH: EEE
## Time: 3 Hours
## Max Marks: 100
## Q.CODE: B965

**Answer Question No.1 and 2 which are compulsory and any four from the rest.**
**The figures in the right hand margin indicate marks.**

**Q1** **Answer the following questions: *multiple type or dash fill up type*** **(2 x 10)**

**a)** A voltmeter connected across a resistor gives a value of 65 V but the expected value of resistor was 68 V. The absolute error and the relative accuracy of the measurement are …….. and ……. Respectively.

**b)** The moving system in the indicating instruments is subjected to ……. torque, …….torque and ……torque.

**c)** It is desired to convert a 0-1000A meter movement, with an internal resistance of 100 ohms, into a 0-100mA meter. The required value of shunt resistance is ……..

**d)** In the case of an instrument reading of 8.3V with a 0 to 150V voltmeter having a guaranteed accuracy of 1% full-scale reading . The percentage limiting error is……..

**e)** Ballastic tests are used in magnetic measurements for thedetermination of:
a) Flux density of the specimen
b) B-H curve of the specimen
c) Hysteresis loop of the specimen
d) All the above

**f)** Anderson Bridge is used to measure:
a) L
b) C
c) V
d) I

**g)** The relative error is the
a)Difference of the measured value and the true value
b) Ratio of absolute error to the measured value of the quantity under measurement
c) Ratio of the absolute error to the true value of the quantity under measurement
d)Ratio of the probable error to the true value of the quantity under measurment

**h)** The ballistic galvanometer is usually lightly damped so that:
a) It may oscillate
b) It may remain stable
c) Amplitude of the first swing is large
d) Amplitude of the first swing is small

**i)** Hysterisis of an instrument means
a) The change in same reading when input is first increased and then decreased.
b)The reliability of the instrument.
c)The repeatability of the instrument
d) The inaccuracy due to change in temperature.

**j)** The nominal ratio for a current transformer is given by
a) (rated primary winding current)/(rated secondary winding current)
b) (number of turns in the primary winding)/(number of turns in the secondary winding )
c) (number of turns in the secondary winding)/(number of turns in the primary winding )
d) (rated secondary winding current)/(rated primary winding current)

**Q2** **Answer the following questions: *Short answer type*** **(2 x 10)**

**a)** Give two examples of (i) Absolute Instruments (ii) Secondary Instruments.
**b)** Draw the symbols of (i) Test voltage for 2 Kv (ii)Class index for 1.5 (iii)Instrument for vertical mounting (iv) Moving Iron instrument
**c)** A Lissajous pattern on an oscilloscope is stationary and has 5 vertical maximum values and 4 horizontal maximum values. The frequency of the horizontal input is 1200 Hz. What is the frequency of vertical input?
**d)** The deflection sensitivity of cathode ray tube is 0.08mm/V and unknown voltage applied to the deflection plate shifts the spot by 4mm towards the left in the horizontal direction. Determine the unknown applied voltage.
**e)** What is knee voltage ? Draw the VI characterstics of Current Transformer.
**f)** What is the difference between accuracy and precision. Explain with examples.
**g)** What is the difference between PMMC and MI instrument . Which one is more accurate for industrial applications and why.
**h)** What is insulation resistance? What is the Importance of IR in various electrical equipments.
**i)** What is Q-meter.
**j)** Distinguish between Reliability and Repeatability.

**Q3** **a)** Describe the construction and working of PMMC instrument. Derive the equation for deflection if the instrument is spring controlled. **(10)**

**b)** A wattmeter has a current coil of 0.1 ohm resistance and a pressure coil of 6500 ohm resistance. Calculate the percentage error due to resistance **(5)**
(i) when pressure coil is connected on the supply side.
(ii) when the current coil is connected on the supply side

**Q4** **a)** (i) Describe the principle of operation of Energy Meter. **(10)**
(ii) The meter constant of a 230 V , 20 A watthour meter is 2000 revolutions/ KWH. The meter is tested at half load at rated voltage with 0.9 lagging power factor. The meter is found to make 90 revolutions in 135 seconds. Determine the meter error at half load.

**b)** Explain Creep in Energy Meter. **(5)**

**Q5** **a)** Construction, Theory and Principle of operation of DC Potentiometers (Crompton). **(10)**

**b)** A D'arsonaval Galvanometer has the following data. **(5)**
Flux density Wb/, Number of turns = 300, length of coil=15 mm, width of coil= 30mm. spring constant= Nm/rad. Calculate
(i) The deflection of Galvanometer for a current of 1 micro ampere.
(ii) Current sensitivity in mm/microampere if the scale is kept 1 metre away from the mirror.

**Q6** **a)** Describe the working of Maxwell's inductance-capacitance bridge for measurement of inductance. Derive the equation and draw the phasor diagram under balance condition. **(10)**

**b)** Write down the advantage and disadvantage of Anderson bridge. **(5)**

**Q7** **a)** What is megger? Why it is used? Explain the working principle of Megger with relevant diagram. **(10)**

**b)** Explain how voltage and current is measured using CRO. **(5)**

**Q8** **a)** A current transformer has a bar primary and 400 secondary winding turns. The secondary winding is a ammeter of resistance 1 ohm and reactance 0.6 ohm, the secondary winding has a resistance of 0.4 ohm and reactance of 0.2 ohm. The core requires the equivalent of an mmf of 100 ampere for magnetization and 50 ampere for core losses. **(10)**

(i)Find the primary current and ratio error when the ammeter in the secondary winding circuit indicates 5 ampere.

(ii)How many turns could be reduced in the secondary winding in order that the ratio error be zero for this condition

**b)** Reduction of errors in potential transformers. **(5)**

**Q9** **a)** What do you mean by Frequency Meter? What do you mean by Digital Multimeter **(10)**

**b)** Derive the measurement of relative permittivity with Schering bridge. **(5)**