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

Total Number of Pages : 02

B.Tech.
PEE3I104

3rd Semester Regular/Back Examination 2018-19
ELECTRICAL AND ELECTRONICS MEASUREMENT
BRANCH : ELECTRICAL
Time : 3 Hours
Max Marks : 100
Q.CODE : E790

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part- I

Q1 **Short Answer Type Questions (Answer All-10)** (2 x 10)

a) Distinguish between fundamental and derived units.

b) Differentiate between measurement and measured.

c) Explain about different types of drift.

d) In calculating voltage drop, a current of 4.37 A is recorded in a resistance of 31.27 ohm. Calculate the voltage drop across the resistor to the appropriate number of significant figures

e) Define standard.What are the different types of standard?

f) Distinguish between sensitivity & dead zone.

g) Mention two applications of Wien Bridge.

h) Classify transducers with reference to power requirement.

i) Describe the term "standardization", of a d.c. potentiometer. How is the standardization done for an a.c. potentiometer?

j) What is a volt-ratio box?

Part- II

Q2 **Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 x 8)

a) Describe about different types of errors in measurement.

b) A moving coil voltmeter with a resistance of 20 Ω gives a full-scale deflection of 120^0 when potential difference of 100 mV is applied across it. The moving coil has a dimensions of 30 mm × 25 mm and is wounded with 100 turns. The control spring constant is 0.375×10^{-6} Nm/deg. Find the flux density in the air gap. Find also the diameter of the copper wire of coil winding if 30% of instrument resistance is due to coil winding. The specific resistance for Cu=$1.7 \times 10^{-8}\Omega$m.

c) An uncompensated spring-controlled dynamometer wattmeter reads 250 W with d.c. currents of 1 A and 0.05 A in its current and potential coils respectively. Calculate what this wattmeter will read when the current coil current is 10 sin (377 t + 15^0) + 5 sin (1131 t) ampere and the potential coil voltage is 500 cos (377 t- 30^0) +800 sin (754 t + 45^0) volt. Calculate also the resistance of the potential coil circuit assuming it to be purely resistive.

d) Describe the working of the Bridge for measurement of medium inductance. Derive the equations for balance.

e) What is the relation between power factor (PF) and dissipation factor (D) of the series RC circuit used in Schering Bridge for measurement of insulating properties and derive the expression for unknowns of the bridge

f) A basic slide wire potentiometer has a working battery voltage of 3.0 V with negligible internal resistance. The resistance slide wire is 400 Ω and it's length is200 cm. A 200 cm scale is placed along the slide wire. The slide wire has 1 mm scale divisions and is possible to read up to 1/5 of a division. The instrument is standardized with 1.018 V standard cell with sliding contact at the 101.8 cm mark on scale. Calculate :
   i) Working current
   ii) The resistance of series rheostat
   iii) The measurement range, and
   iv) The resolution of the instrument.

g) Define the terms "current sensitivity", "voltage sensitivity", "Megaohm sensitivity" as applied to d'Arsonaval galvanometers. Explain how current sensitivity of a galvanometer can be increased

h) Discuss the utility of an dc voltmeter using a FET input

i) How is true RMS responding voltmeter is advantageous? Explain it's working.

j) How is the electron beam focused to a fine spot on the face of Cathode Ray Tube, discuss with detailed diagrams

k) Derive the expression for deflection sensitivity of CRO.

l) What is the oscilloscope probe compensation? How is this adjusted? What effects are noted when the compensation is not correctly adjusted.

Part-III

Long Answer Type Questions (Answer Any Two out of Four)

Q3 Describe the construction and working of a PMMC instrument. Derive the equation for deflection if the instrument is spring controlled. Describe the method of damping used in these instruments. (16)

Q4 (16)
a) Explain the constructional difference between Wheatstone and Kelvin double bridge.
b) Derive the equation of balance for the Kelvin Double bridge
c) The ratio arms of Kelvin bridge are 200Ω each. The Galvanometer has an internal resistance of 500 Ω & a current sensitivity of 200mm/μA. The unknown resistance Rx=0.1002 Ω and standard resistance is set at 0.1 Ω. A DC current of 10 A is passed through the standard & the unknown from a 2.2 V battery in series with a rheostat. The resistance of the yoke is neglected. Calculate i) the deflection of the galvanometer.ii) the resistance unbalance required to produce a galvanometer deflection of 1 mm?

Q5 (16)
a) Describe the principle of operation and construction of different types of metallic wire strain gauge.
b) Derive the expression of gauge factor for a metallic wire strain gauge.
c) A resistance, wire strain gauge with a gauge factor of 2 is bonded to a steel structural member subjected to a stress of 100 MN/m^2. The modulus of elasticity of steel is 200GN/m^2. Calculate the percentage change in the value of the gauge resistance due to the applied stress.

Q6 (16)
a) Describe the construction and working of a ballistic galvanometer.
b) Explain the difference in constructional detail of different types of a ballistic galvanometer and d' Arsonaval galvanometer.
c) Prove that in a ballistic galvanometer, the charge is proportional to first swing of the moving coil.
d) Describe the different methods used for calibration of a ballistic galvanometer.

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)

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

Total Number of Pages : 02

B.Tech
PET4I103

4th Semester Regular / Back Examination 2018-19
ELECTRICAL AND ELECTRONICS MEASUREMENT
BRANCH : ECE, ETC
Time : 3 Hours
Max Marks : 100
Q.CODE : F835

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part- I

Q1 **Only Short Answer Type Questions (Answer All-10)** (2 x 10)

a) How the IEEE standard is different from other standards?
b) Draw a graph to distinguish between low accuracy & high precision
c) Name two null detectors for ac bridges.
d) Name the bridge circuit that measures unknown inductance in terms of a known capacitance. Draw the circuit.
e) How is Wagnor ground connection useful?
f) Write down important applications of D.C POT (at least 4).
g) Compare ballistic galvanometer and vibration galvanometer.
h) Distinguish between CT and PT.
i) Why is the FET input D.C voltmeter is required?
j) How are digital voltmeters broadly classified?

Part- II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 x 8)

a) Explain all the static characteristics of measurement.
b) Classify different standards based on their use.
c) Develop the equation of balance for the bridge used for measurement of inductance for high Q-coil.
d) If $Z_1 = 450\ \Omega$, $Z_2 = (300\text{-}j600)\ \Omega$, $Z_3 = (200+j100)\ \Omega$, then find out the value of Z_4, so that, the bridge is balanced.
e) Deduce the equation of balance for the Anderson bridge with a neat diagram. Explain its usefulness for measurement of self-inductance. Draw the phasor diagram when the bridge is at balance.
f) Derive the expression for deflection torque of PMMC instruments.
g) A Crompton's potentiometer consists of a resistance dial having 15 steps of 10 ohm each and a series connected slide wire of 10 Ω which is divided into 100 divisions. If the working current of potentiometer is 10 mA and each division of slide wire can be read accurately upto 1/5 th of its span, calculate the resolution of the potentiometer in volts.
h) A dynamometer wattmeter reading correctly on D.C is used to measure power in circuit of resistance of 2 Ω and inductance of 0.25 H. The supply is 200 V at 50 Hz and the pressure coil circuit of wattmeter has a resistance of 1000 Ω and inductance of 5.6 mH. Calculate the actual reading of the wattmeter. Neglect the impedance of the current coil circuit. Assume the pressure coil is connected on load side of the instrument.
i) What is power factor? Explain the construction and operation of crossed coil power factor meter.
j) Explain the working of true rms responding voltmeter with suitable block diagram.
k) Explain in detail the operation of digital storage oscilloscope with suitable block diagram.
l) What are the functions of time base in frequency counter?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 a) Explain the constructional difference between Wheatstone and Kelvin double bridge. (16)

b) Derive the equation of balance for the Kelvin Double bridge

c) The ratio arms of Kelvin bridge are 200Ω each. The Galvanometer has an internal resistance of 500 Ω & a current sensitivity of 200mm/μA. The unknown resistance Rx=0.1002 Ω and standard resistance is set at 0.1 Ω. A DC current of 10 A is passed through the standard & the unknown from a 2.2 V battery in series with a rheostat. The resistance of the yoke is neglected. Calculate i) the deflection of the galvanometer .ii) the resistance unbalance required to produce a galvanometer deflection of 1 mm?

Q4 a) Describe the principle of working of a moving iron instrument. How are they classified? (16)

b) Show that this type of instrument can be used for both D.C and A.C measurements.

c) Illustrate the errors involved in both types of measurement.

Q5 a) How the principle of operation of A.C. potentiometers differs from D.C. potentiometers and what are the factors that must be considered for operation of A.C. potentiometers? (16)

b) Explain about standardization and classification of A.C. potentiometers.

c) Compare the operation of Drysdale-Tinsley & Gall-Tinsley Potentiometer.

Q6 a) What is the use of Q-meter? Describe basic Q-meter circuit. (16)

b) What are the methods used for connecting unknown components to the test terminal of Q-meter? Explain all the methods in details.