

Marks Scored:

KATHMANDU UNIVERSITY
End Semester Examination
February/ March, 2019

Level : B.E.

Year : III

Exam Roll No. :

Time: 30 mins.

Course : EPEG 317

Semester: I

F.M. : 20

Registration No.:

Date FEB. 27 2019

SECTION "A"

[20 Q × 1 = 20 marks]

Encircle the most appropriate answer for the following questions:

1. A supervisory control is one in which the monitors measurements and updates setpoints of the plant.
a. human b. ADC c. computer d. Error detector
2. In calculating voltage drop, a current of 3.05A is recorded in a resistance of 37.45Ω. The voltage drop across the resistor to the appropriate number of significant figures is V.
a. 114.2225 b. 114.22 c. 114.2 d. 114
3. A step input of 10V is applied to a volt-meter. The pointer swings to 10.28V and finally comes to rest at 10.05V. The percentage error in the instrument is
a. -0.5 b. -2.3 c. -2.8 d. -4.6
4. In an indirect method of calibration of a meter, the meter is compared with the response of a standard
a. source b. generator c. meter d. transducer
5. A X-Y plotter is an example of atype instrument.
a. indicating b. controlling c. recording d. integrating
6. A wattmeter is connected as shown in figure-1. The wattmeter reads.....
a. zero b. total power consumed by Z1 and Z2
c. power consumed by Z1 d. power consumed by Z2

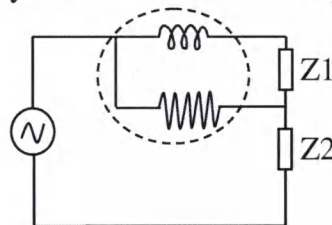


Figure-1

7. Eddy current method is used in system of a PMMC instrument.
a. deflecting b. damping c. controlling d. attraction
8. A 2mA meter with an internal resistance of 100Ω is to be converted to 0-150mA ammeter. The value of the shunt resistance required is.....
a. 1.351Ω b. 1.333Ω c. 0.666Ω d. 3Ω

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Level : B.E.
Year : III
Time : 2 hrs. 30 mins.

Course : EPEG 317
Semester: I
F.M. : 55

SECTION "B"
[5Q × 11 = 55 marks]

Attempt *ANY FIVE* questions. Assume necessary data if required.

1. a. Instruments must be calibrated before they are used for testing purposes. Explain what calibration is and describe the different methods adopted for calibration of instruments. [3]
b. Damping system is provided in a PMMC instrument for correct measurement. With the schematic diagram of a PMMC meter, explain the operation of the damping system in it. [3]
c. A voltmeter reads 40V on its 50V range and an ammeter 50mA on its 125mA range, while used in a circuit. Both the instruments are guaranteed to be accurate within $\pm 2\%$ full scale deflection. Determine the limiting error of the power calculated. [5]
2. a. Draw the schematic diagram of a two element three phase energy meter and describe its working principle. [4]
b. Describe the use of a phase meter for an electrical measurement system. With its schematic block diagram explain the working of a digital phase meter. [4]
c. Draw the ac voltmeter section of a multi-meter, and explain the use of the multi-meter for the measurement of ac voltage. [3]
3. a. A true r.m.s voltmeter measures the effective voltage of a system. With a suitable block diagram explain the working of a true r.m.s responding voltmeter. [3]
b. Draw the block diagram of a cathode ray oscilloscope and explain the function of the trigger circuit, time base generator and horizontal amplifier of the oscilloscope. [5]
c. The power measurement of an electrical feeder (area load) at a substation is done with the help of C.T. and P.T. Draw the connections of C.T. and P.T. for power measurement, and describe the power measurement process. [3]
4. a. What is a strain gauge? Explain with suitable diagrams the basic forms of resistance wire strain gauges. [3]
b. What is Seebeck effect and Peltier effect concerned with thermoelectricity? Describe the construction and working principle of a thermocouple used for temperature detection, and elaborate the use of Seebeck effect for the measurement. [3]
c. Photodiodes are used for light intensity detection in electronic circuits. With its characteristics curves and schematic diagram explain the working of a photodiode. [3]
d. Meter **A** has a range of 0-100V and multiplier resistance of 25k Ω . Meter **B** has a range 0-1000V and a multiplier resistance of 150k Ω . Both the meters have basic meter resistance of 1k Ω . Which of the two meter is more sensitive? [2]

5. a. With a suitable block diagram explain the operation of a successive approximation ADC used for signal conversion. [3]
- b. Data from the signal conditioning systems are to be transferred to the computer through standard cable. Describe what is RS232C interface standard and how is it used for data transfer between two equipments DTE and DCE. [3]
- c. A Wheatstone bridge circuit with values of the elements is shown in figure.1. The galvanometer used has a current sensitivity of $12\text{mm}/\mu\text{A}$, and internal resistance of 200Ω . Calculate the deflection of the galvanometer caused by 5Ω unbalance in arm BD. [5]

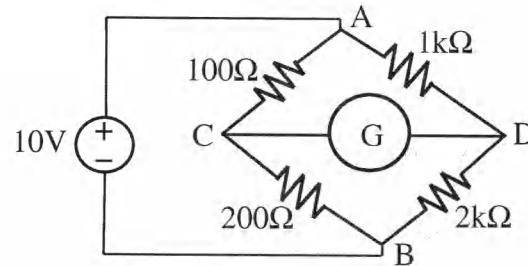


Figure.1

6. a. Design a multi-range dc milli-ammeter with a basic meter having a resistance 75Ω and full scale deflection for the current of 2mA . The required ranges are $0\text{-}10\text{ mA}$, $0\text{-}50\text{ mA}$ and $0\text{-}100\text{ mA}$. [5]
- b. Proper insulation is a necessity of electrical equipments, and measurements of insulation are required before the use of the equipments in an electrical system. Explain with an example, how insulation of equipments can be measured in the laboratory. [3]
- c. Signal Conditioning is a necessity of every instrumentation system. Describe the general guidelines for signal conditioning system design for an instrumentation system. [3]