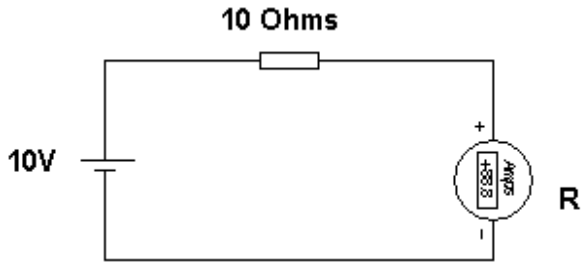
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, April/May 2018
SET-1

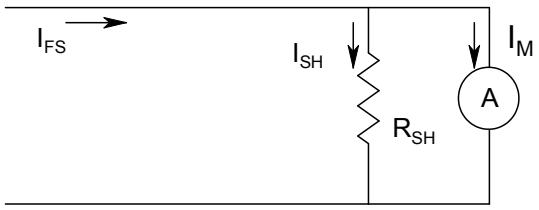
Course: Sensor Technology & Instrumentation **Semester: IV**
Program: B. Tech EE-IOT
Time: 03 hrs. **Max. Marks: 100**

SECTION A

S. No.		Marks	CO
Q 1	Calculate the current displayed by "Ammeter" in Fig.1. If the internal resistance of the ammeter is R = 5 Ω. Calculate the loading error caused by the ammeter. 	4	CO1
Q 2	Explain the importance of calibration in a measurement device. How is calibration performed? Briefly explain procedure for how to calibrate a voltmeter.	4	CO1
Q 3	Briefly define the following terms with respect to measurement systems: I. Resolution II. Reproducibility III. Static Error IV. Dead Zone V. Calibration	4	CO2
Q 4	Differentiate between a sensor and a transducer. Explain the classification of transducers based on various factors.	4	CO3
Q 5	Define the static characteristics (desirable and undesirable) of measuring system & its types.	4	CO1

SECTION B

Q 6	Three resistors have the following ratings: R_1= 37 Ω ± 5 %, R_2= 75 Ω ± 5%, R_3= 50 Ω ± 5% Determine the magnitude and limiting error in ohm and in percent of resistance of	10	CO4

	these resistances in connected in series.		
Q 7	Explain the working of a Ramp Type Digital Voltmeter.	**10**	**CO3**
Q 8	a. What are the basic blocks of a Generalized Instrumentation System? Draw the various blocks and explain their significance. b. What are Systematic errors? Classify systematic error into subcategories. Can systematic errors be avoided/removed from a measurement system? c. Explain the role of shunt resistance in an Ammeter. Derive the equations for full scale current (I_{FS}), meter current (I_M), and shunt current (I_{SH}). 	**10**	**CO4**
Q 9	What are the benefits of a "Digital Storage Oscilloscope" over a "Cathode Ray Oscilloscope"? With the help of a block diagram explain the working of a Digital Storage Oscilloscope. **OR**	**10**	**CO4**
Q 10	Explain how PMMC meter can be used to measure AC voltages/currents. A permanent magnet moving coil instrument has a coil of dimension 15mm×12mm. The flux density in the air gap is 1.8×10^{-3} Wb/m^2 and the spring constant is 0.14×10^{-6} Nm/rad. Determine the number of turns required to produce an angular deflection of 90 degrees when a current of 5mA is flowing through the coil.	**10**	**CO2**
SECTION-C			
Q 11	Design a series type ohmmeter to measure the value of an unknown resistance. The movement to be used requires 0.5mA for full scale deflection and has internal resistance of 50Ω. The internal battery has a voltage of 3V. The desired value of half scale resistance is 3000Ω. Calculate the values of series and parallel resistances R1 and R2 and the range of values of R2, if the battery voltage may vary from 2.7V to 3.1V. Use the value of R_1, calculated in (a). And also compare to any other standard deflection instrument. **OR**	**20**	**CO4**
Q 12	Explain the advantages of Electronic voltmeters over conventional type voltmeters on the basis of: a. Detection of low level signals	**20**	**CO2**

	b. Power consumption c. Frequency range		
Q 13	Design a microprocessor/ microcontroller based Internet of things system to do the following tasks a. Read the LPG gas sensor readings in a room. b. Display the values on the LCD panel and on the cloud server. **c.** Turn-on an alarm if the values exceed the certain value (assume any PPM threshold value) Write down the steps of initializing the TCP/IP protocol using SIM800.	**20**	**CO5**

	deflection instrument. **OR**		
Q 13	Explain how PMMC meter can be used to measure AC voltages/currents. A permanent magnet moving coil instrument has a coil of dimension 15mm×12mm. The flux density in the air gap is 1.8×10^{-3} Wb/m^2 and the spring constant is 0.14×10^{-6} Nm/rad. Determine the number of turns required to produce an angular deflection of 90 degrees when a current of 5mA is flowing through the coil.	**20**	**CO2**