Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES End Semester Examination, December 2019

Course: Electronic Measurement and Instrumentation (ECEG 2021) Semester: V

Program: B.Tech.(ECE)

Time: 03 hrs. Max. Marks: 100

Instructions: All questions are compulsory.

SECTION A (4*5=20 marks)

S. No.		Marks	CO	
Q 1	Compare Digital Instruments with Analog instruments on behalf of different parameters such as input impedance, speed of response, resolution, accuracy and operational power consumption.	5	CO1	
Q 2	A voltmeter having a guaranteed accuracy of 1.5 % reads 9V on a 0-150 V voltmeter scale. Calculate the % limiting error?	5	CO1	
Q 3	A strain guage with nominal resistance of 120Ω and a guage factor of 2 undergoes a strain of 10^{-5} . What is the change in resistance in response to the strain?	5	CO1	
Q 4	A spring control instrument uses phosphor bronze spring to produce the controlling torque, if the ratio of length of the spring to the thickness of spring is 3000 for the deflection of 90°, what should be this ratio if the scale is extended to 120°?	5	CO2	
SECTION B (4*10=40 marks)				
Q 5	Derive the expression for measurement of Pressure using Active Transducers. Illustrate Piezoelectric effect.	10	CO2	
Q 6	The PMMC ammeter A shown in figure has arrange of 0-3mA. When switch S1 is opened, the pointer swings to the 1mA mark returns & settles at 0.9mA mark. The meter is: a.) Critically damped and has a coil resistance of 100 Ω . b.) Critically damped and has a coil resistance of 200 Ω . c.) Underdamped and has a coil resistance of 100 Ω . d.) Underdamped and has a coil resistance of 200 Ω .	10	CO3	

	1.8V +— 1.8K ohm				
Q 7	A galvanometer has a resistance of 5Ω and gives a full-scale deflection for a current of 15 mA. What maximum current can be measured if a 0.002 Ω resistor shunts it.	10	CO2		
Q 8	A voltmeter reads 14 V on its 100 V range and the ammeter reads 75mA on its 150 mA range in the circuit. Both the instruments are guaranteed to an accuracy of +/- 2% of full scale deflection. Calculate the limiting error in the measured power?	10	CO2		
	SECTION-C(2*20=40)				
Q 9	A Cu constantan thermocouple was found to have linear calibration between 0-400°C with emf. at maximum temperature (ref. junction at 0°C) equal to 20.68 mV. Determine: a.) Correction which must be made to indicate emf. if the cold junction temperature is 25°C. b.) If the indicated emf. is 8.92mV in the thermocouple circuit. Determine the temperature of hot junction.	20	CO3		
Q10	a.) Considering a cylindrical wire, analyze the generalized expression of guage factor for metal wire stain gauges.	10	CO4		
	b.) A linear resistance potentiometer is 100mm long and is uniformly wound with a wire of total resistance of $10,000 \Omega$. Under normal conditions, the slider is at the center of potentiometer. Determine the linear displacement when the resistance of potentiometer as measured by wheat stone bridge is 3700Ω . If it is possible to measure a minimum value of 5Ω resistance with this set-up. Determine the resolution of the potentiometer.	10	CO4		
