X

Unit 12 - Week 11

Week-11 Assignment on pH and viscosity measurement

1) *2 points*

The hydroxide (OH^-) ion concentration of an aqueous solution is 1.0×10^{-4} moles/litre. What is the pH o the solution at standard 25 °C?

- a) 4
- b) 6
- c) 10
- d) 12

Accepted Answers:
c) 10

2) *2 points*

At 100 °C, pH of pure water is 6.14. An aqueous solution has a pH of 7.0 at this temperature. What is th condition of the aqueous solution and pure water at this temperature, respectively?

- a) basic, acidic
- b) basic, neutral
- c) acidic, neutral
- d) acidic, basic

Accepted Answers:
b) basic, neutral

3) *4 points*

The pH electrode is connected through a shielded cable to a non-inverting amplifier as shown in figu

1. The input resistance of the inverting amplifier is given by, $R = R_i(1 + A_O \frac{R_F}{R_1})$; where A_O is the op loop gain and R_i is the input resistance of opamp. Find the voltage V_O of the circuit when a 100 mV sig is generated at the electrode.

Data given: Resistance of the electrode = 10^{11} Ω; leakage resistance of the shielded cable = 10^{11} Ω; A 10^6; $R_i = 10^5$ Ω and $R_F/R_1 = 1$.

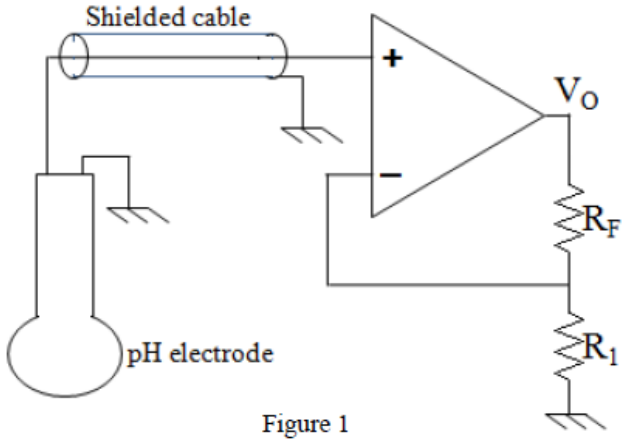

Figure 1

a) 33.33 mV
b) 66.67 mV
c) 200 mV
d) 333.3 mV

Accepted Answers:
b) 66.67 mV

4) ***3 points***

A solid cylinder of radius R_1 = 130 mm rotates concentrically inside a fixed hollow cylinder of inner rad R_2 = 135 mm. Both cylinders are 250 mm long. Determine the viscosity of liquid which fills the spa between cylinders if a torque of 1.5 N-m is required to maintain the angular speed of 60 rpm.

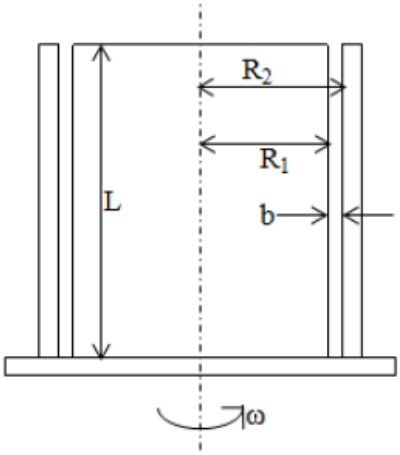

Figure 2

a) 0.111 PI
b) 0.222 PI
c) 0.333 PI
d) None of these

Accepted Answers:
c) 0.333 PI

5) *3 points*

In the above problem, let us say R_2 is given by, $R_2 = (135 \pm 2)$ mm. Find out the maximum error in th measurement of viscosity (in the unit of Pl).

- a) 0.13 Pl
- b) 0.23 Pl
- c) 0.33 Pl
- d) 0.47 Pl

Accepted Answers:
a) 0.13 Pl

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