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National Institute of Technology, Hamirpur (HP)

Name of Examination: B.Tech, End Semester Theory Examination, December-2022

Branch : Electrical Engineering **Semester : V^th^**

Course Name : Transducer and Signal Conditioning **EE: 314**

Time: 3:00 Hours **Maximum Marks: 50**

Note: All questions are Compulsory. Assume suitable value for any missing data.

Question 1. **(5+5=10)**

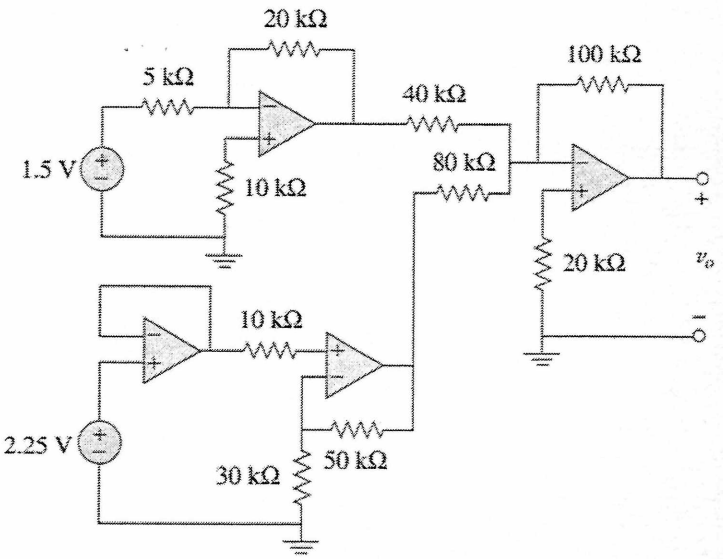
(a) Explain the different methods used for measurement of humidity. A thermistor has a resistance of 3980 Ω at the ice point (0°C) and 794 Ω at 50°C. The resistance temperature relationship is given by $R_T = a\, R_0 \exp(b/T)$. (i) Calculate the constant 'a' and 'b'. (ii) Calculate the range of resistance to be measured in case the temperature varies from 40°C to 100°C.

(b) Describe the working of Hot wire Anemometer flow meter. An electromagnetic flow meter having a flow tube of 125 mm diameter gives an output voltage of 75 mV for the magnetic flux density of 5000 V-s/cm^2. Determine the rate of discharge of liquid through the flow meter.

Question 2. **(5+5=10)**

(a) Show how you would use a single op amp to generate $v_0 = -\int_0^t (v_1 + 4v_2 + 10v_3)d\tau$. If the integrating capacitor is $C = 5\mu F$, determine the other component values.

(b) Obtain v_0 of the instrumentation amplifier circuit as shown right side.



Question 3. **(5+5=10)**

(a) What is advantage of $3\frac{1}{2}$ digit display over 3 digit display? An electrically deflected CRT has a final anode voltage of 2000 V and parallel deflecting plates 1.5 cm long and 5 mm apart. If the screen is 50 cm from the centre of deflecting plates, find (a) speed of beam, and (b) deflection sensitivity of the tube.

(b) What are the various marking mechanism used in the strip chart recorder? Also, explain the working of digital frequency meter with suitable diagram.

Question 4. **(5+5=10)**

(a) Define telemetry. Explain time division multiplexing as applied to telemetry in detail.

(b) Define RF telemetry with an example. Explain the working of data acquisition system with suitable diagram?

Question 5. **(5+5=10)**

(a) What are the varies ADC techniques? Explain the working of 4-bit flash converter with suitable diagram.

(b) Explain the working of S/H and peak detector circuits with suitable diagram and wave form.
