Electronics and Electrical Communication Engineering Department

Electronic measurements	Year:2nd

Sheet# (4)

1.A strain gauge is bounded to abeam 0.1m long and has across sectional area of 4cm2. Young modulus for steel is 207GN/m2. The strain gauge has an unstrained resistance of 240 Ω and a gauge factor of 2.2. when a load is applied, the resistance of gauge changes by 0.013 Ω . Calculate the change in length of the steel beam and the amount of force applied to the beam.

2.A metallic strain gauge has a resistance of 120 Ω and a gauge factor of 2. It is installed on an aluminium structure which has a yield point stress of 0.2GN/m2 and a young modulus of 68.7GN/m2. Determine the change in the resistance of the gauge that would be caused by loading the material to yield point.

3. The wire of a strain gauge is 0.1 m long and has an initial resistance of 120 Ω. On application of force, the wire resistance increases by 0.21 Ω and length of 0.1 mm. Determine the gauge factor of the device.

4. A resistance strain gauge is used to measure stress on steel. The steel is stressed to 1400 kgf/cm2 Young's modulus = 2.1 × 106 kgf/cm2. Calculate the percentage change in resistance of strain gauge assuming the gauge factor to be 2.

5. A strain gauge with a gauge factor of 2 is subjected to stress of 1000 kg/cm2. E = 2 × 106 kg/cm2. Calculate the percentage change in resistance of the strain gauge. Find Poisson's ratio.

6. A platinum resistance thermometer has a resistance of 120 Ω at 25°C. Determine its resistance at 75°C. The temperature coefficient of resistance is 0.00392 at 25°C. If the resistance 180 Ω, what is temperature T3?

7. A copper resistor having a resistance of 15 Ω at 20°C is used to indicate the temperature of a machine. Determine the limiting value of resistance k, if the maximum temp is 175°C. The temperature coefficient**(**T.C.) = 0.00425 at 20°C.

8. A thermistor has temperature coefficient of resistance of –0.05 over a temperature range of 25–50°C. Determine the resistance of the thermistor at 40 °C if the resistance of the thermistor at 25°C is 120 Ω.

Best Wish

Eng. Marwa Ahmed