GATE **Instrumentation Engineering** Coaching by IGC

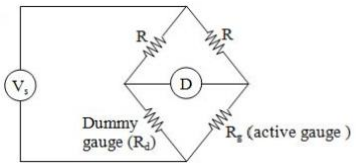
**Sensors and Industrial Instrumentation**

**Strain Gauge**: Assignment (sample)

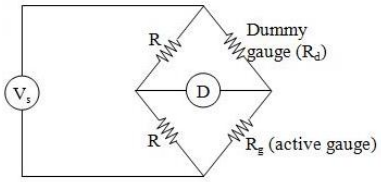
**Level +**

Q1. The right way to place dummy and active gauge in bridge is

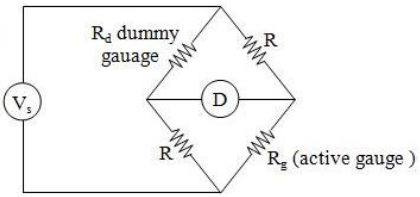
(A).




(B).




(C).




(D). Both (A) & (B)

Q2. The strain that results from a tensile force of 1000 N applied to a 10-m aluminum beam having a $4 * 10^{-4}$ $m^2$ cross-sectional area. The modulus of elasticity of aluminum is ($6.89 * 10^{10}$ $N/m^2$) is _____.

Q 3. A strain Gauge having a gauge factor of G = -100, the type of strain gauge is

(a). Unbonded metal type (b). Bonded metal foil type

(c). P-type semiconductor (d). N- type semiconductor

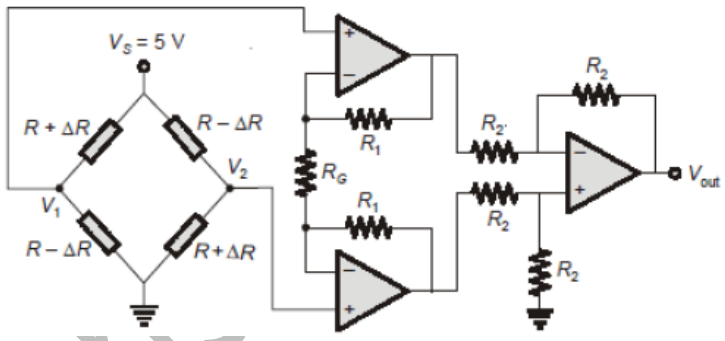
Q 4. A strain gauge having a gauge factor GF = 2.14 and nominal resistance of 120 ohms. The resistance change (in ohms) resulting from a strain of 144um/m is

_____ .

**Level + +**

Q .5 For the measurement of torque, four 120 Ω resistance strain gauges having gauge factor 2.0, are mounted on a shaft, 4 cm in diameter, at 45° to the axis of the shaft and are connected in a bridge configuration to get maximum sensitivity. For the shaft material, the Young's modulus is $2.0 \times 10^{11}$ N/m$^2$ and Poisson's ratio is 0.3. Speed of the shaft is 1200 rpm. Excitation voltage to the bridge is 10 V.
If the output voltage of the bridge is 5 mV, then the value of power transmitted by the shaft is close to _____ kw.

Q 6. A strain in the range 0 to $10^{-4}$ is to be measured using a four strain gauge bridge connected to an instrumentation amplifier circuit as shown in the given figure. The strain gauges have nominal resistance of 120 Ω each and gauge factor of 2. If the output voltage signal range of the circuit is 0 to 12 V, then the gain of the instrumentation amplifier is _____.




**Answer key**:
1. (D)
2. **36.3** um/m
3. (D)
4. 0.037
5. 60.70
6. 12000