

DEPARTMENT OF CIVIL ENGINEERING



MINOR I :CEL864 STRUCTURAL HEALTH MONITORING (2017-18)

Time allowed: 1hour
Venue : V 211

Date : 03 February 2018
Max marks : 15

NOTE: (a) This question paper contains one page only. (b) All questions are compulsory. (c) **Assume any data which you deem is necessary but not supplied.** (d) Draw neat and clear sketches wherever required.

Question 1.

Comment on the suitability of following sensors for dynamic measurements, say at 100 Hz sampling rate.

- (a) Electrical strain gauge
- (b) Accelerometer
- (c) Vibrating wire strain gauge
- (d) Piezoelectric sensor

(4 marks)

Question 2.

A stainless steel vibrating wire strain gauge (VWSG) of 5 cm length (coefficient of thermal expansion $18 \times 10^{-6}/\text{C}^\circ$) is bonded to a different composition steel beam (coefficient of thermal expansion $12 \times 10^{-6}/\text{C}^\circ$). The VWSG is strained such that its initial frequency is 200 Hz at 25 °C. After this, the member is subjected to both load and temperature rise to 30 °C, such that the frequency of the VWSG increases to 230 Hz. Determine the true strain in the structural member. Both steels have density of 7850 kgm^{-3} and Young's modulus of 200 GPa.

(5 marks)

Question 3.

State three advantages of FBG sensors over other sensors. State one limitation also

(4 marks)

Question 4.

What precaution needs to be observed while selecting a measurement point at the time of experimentally obtaining the mode shape of a structural member.

(2 marks)