

DEPARTMENT OF CIVIL ENGINEERING



MINOR I :CEL836 STRUCTURAL HEALTH MONITORING (2013-14)

Time allowed: 1hour
Venue : SAL (V 216)

Date : 10 February 2014
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.

A structure is monitored using a set of ESGs with a base resistance of 120 ohms and temperature coefficient of resistivity equal to 2×10^{-6} . The coefficient of thermal expansion of the structure and the ESG are 6×10^{-6} and 3×10^{-6} respectively. Both loading and temperature effects occur simultaneously, the ambient temperature increases by 20°C during the measurement. The apparent strain measured by the gauge is 350 microstrain (tensile). Calculate the true strain.

(5 marks)

Question 2.

Explain the change in mode shape curvature approach for damage detection. Explain how the curvature mode shape can be obtained using a set of PZT patches more easily as compared to a set of accelerometers?

(4 marks)

Question 3.

Explain how mode shape can be obtained using a single impact excitation of the structure.

(3 marks)

Question 4.

What is the most practical advantage offered by fibre Bragg grating sensors not offered by any other type of sensor.

(3 marks)