

## DEPARTMENT OF CIVIL ENGINEERING



### MINOR I :CEL864 STRUCTURAL HEALTH MONITORING (2018-19)

**Time allowed:** 1hour  
**Venue** : LH 410

**Date** : 05 February 2019  
**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.

Explain how thermal compensation can be done under varying temperature conditions for measurements made using VWSG/ ESG.

(5 marks)

#### Question 4.

A PZT patch of size 5x5x0.2 mm acts as a sensor attached to the mid point of a steel beam with a section modulus of 36.6 cm<sup>2</sup>. What bending moment shall be required to generate a potential difference of 1V is across the PZT sensor. The parameters of the PZT patch are as follows: Electric permittivity: 2.12x10<sup>-5</sup> F/m, strain coefficient = 2.10x10<sup>-10</sup> m/V, Young's modulus = 6.67x10<sup>10</sup> N/m<sup>2</sup>. Young's modulus of steel = 200 GPa

(5 marks)

#### Question 3.

Explain the working principle of a thermocouple.

(2.5 marks)

#### Question 4.

Explain why the mode shape curvature approach offers greater advantage as compared to flexibility/ stiffness approaches

(2.5 marks)