

## DEPARTMENT OF CIVIL ENGINEERING



### MAJOR :CVL864 STRUCTURAL HEALTH MONITORING (2017-18)

**Time allowed:** 2 hours  
**Venue** : LH 527

**Date** : 08 May 2018  
**Max marks** : 30

**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.**

Derive an expression for electro-mechanical admittance across a PZT patch of length " $l$ " connected to a mechanical impedance  $Z$  on one end with the other end fixed. State all the assumptions clearly.

(08 marks)

**Question 2.**

State two limitations which are overcome when global vibration technique is applied in combination with the EMI technique.

(2.5 marks)

**Question 3.**

State the limitation of the thermal imaging technique with regard to the depth of the defect. What is the underlying reason?

(2.5 marks)

**Question 4.**

Explain the working principle of eddy current technique. State two main limitations.

(03 marks)

**Question 5.**

What are two distinctive features of the acoustic emission technique which distinguishes it from all other SHM/ NDE techniques?

(03 marks)

**Question 6.**

How does the relative stiffness vary with cycle ratio for a component under fatigue. Now, if the absolute stiffness is replaced by "piezo identified equivalent stiffness", how can it be used as an alternative? What is the difference in performance in steel and reinforced concrete?

(06 marks)

**Question 7.**

State two drawbacks each of ESG and VWVG.

(03 marks)

**Question 8.**

What is the difference between the mode shape obtained using PZT patches with that obtained from accelerometers.

(2 marks)