**Guru Nanak Dev Engineering College, Ludhiana**

**MST-II**

**Max. Marks: 24 Elements of Earthquake Engineering (BTCE-602) Time: 1.5 Hrs.**

**Section A (4x2=8)**

**Q 1.** What is D-Alembert’s principle?

**Q 2.** What is spring constant, damping ratio, absolute damping and critical damping?

**Q 3.** What is viscous damping?

**Q 4.** In which state the natural frequency is said to be in resonance and how it affects the system?

**Section B (2x4=8)**

**Q1.** Show that for an Un-damped system in free vibration the logarithmic decrement may be written aswhere k is the number of cycles separating two measured peak amplitudes yi and yi + k

**Q 2.** A weight of 50N is suspended from a spring of stiffness 4000 N/m and is subjected to a harmonic force of amplitude 60 N and frequency 6 Hz. Find (a) the extension of the spring due to the suspended weight, (b) the static displacement of the spring due to the maximum applied force and, (c) amplitude of the forced motion of the weight.

**Section C (1x8=8)**

**Q 1.** Show that the displacement for critically damped and under-damped system with initial displacement yo and velocity vo may be written as