

DEPARTMENT OF CIVIL ENGINEERING



MINOR I :CVL 861 ANALYSIS AND DESIGN OF MACHINE FOUNDATIONS (2016-17)

Time allowed: 1hour
Venue : LH 605

Date : 02 February 2017
Max marks : 15

NOTE: (a) This question paper contains two questions and 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.

Differentiate between safe net bearing capacity and safe bearing pressure

(2 marks)

Question 2.

What are the specific design considerations to be exercised in the case of machine foundations but may be ignored in general building foundations?

(2 marks)

Question 3.

A piston-crank based linear-to-rotating machine operates at a frequency of 100 Hz. The weight of piston is 5 kg, weight of the connecting rod is 1 kg and that of the crank is 50 kg. The length of the crank is 0.5 m and that of the connecting rod is 1 m, both having uniform cross-section. The linear motion occurs in vertical plane and there are two such systems operating in synchronization such that the horizontal component is completely neutralized. The machine rests on a concrete block of 2x2x2 m, beneath which there is soil of C_z equal to 20000 kN/m³. Determine the following:

- Amplitude of the harmonic force acting on the foundation in the horizontal direction.
- Natural frequency of the machine foundation system.
- Amplification factor (assume 7% damping ratio for soil)
- Amplitude of vertical motion.

(8 marks)

Question 4.

Determine pressure distribution below the base of a foundation under a static horizontal force of 50 kN acting at a height of 2m from the base. Assume that the foundation has plan dimensions of 2x2m and a thickness of 400 mm, has a pedestal of 400x400 mm, and is under a cover of 1 m thick soil.

(3 marks)