

DEPARTMENT OF CIVIL ENGINEERING



**MAJOR EXAM :CVL861 ANALYSIS AND DESIGN OF
MACHINE FOUNDATIONS (2018-19)**

Time allowed: 2 hours
Venue : LH 510 (10:30am-12:30pm)

Date : 02 May 2019
Max marks : 30

NOTE: (a) This question paper contains eight questions and two printed pages 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. (e) **PART A AND B SHOULD BE ANSWERED IN SEPARATE ANSWER BOOKS.**

PART A

QUESTION 1

The block foundation shown in Figure 1 (all dimensions in mm) supports a reciprocating machine operating in horizontal direction at an RPM of 3000. The machine itself is 2000 kg in mass and is located on the top of the pedestal. It is exerting a force of 50 kN as shown. The foundation rests on four rubber pads of dimensions 300x300x400 mm of shore hardness 45° in turn placed on hard rock bed.

- Determine the adequacy of the foundation with regard to frequency and vibrational amplitude as per IS 2974.
- Determine the transmissibility of the foundation-rubber pad-rock system.
- Determine the inertial moment acting at a section situated 700 mm below the top of the pedestal.

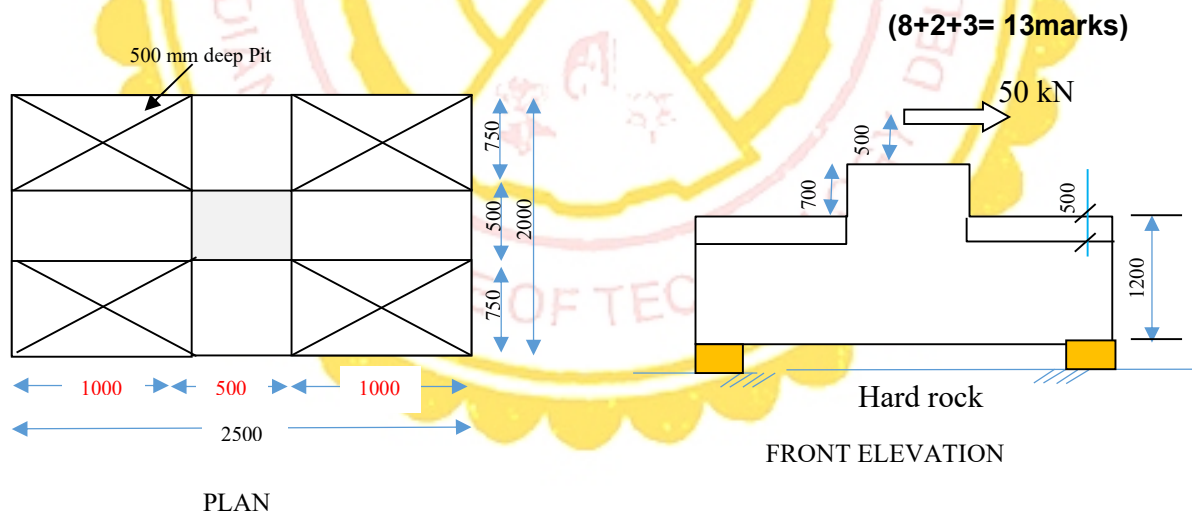


Figure 1

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PART B

QUESTION 2

Why both free vibration analysis and harmonic analysis are essential for frame type machine foundations?

(2 marks)

QUESTION 3

Among brick type solid elements and beam elements (suitably restrained using plate elements or bracings), which gives higher estimates for natural frequencies for frame type of machine foundations?

(2 marks)

QUESTION 4

From calculations point of view, what is the main benefit of doing structural analysis using 3D beam elements?

(2 marks)

QUESTION 5

Compare the frequency criteria of the block type machine foundations with that of the frame type foundations.

(3 marks)

QUESTION 6

State the approximate rated capacity of the TG at NTPC visited by your batch.

(2 marks)

QUESTION 7

If a machine involves a mass rotating horizontally at a fixed radius with a constant angular velocity, what modes of vibration (or combination) will act on the foundation block of the machine?

(3 marks)

QUESTION 8

Explain the experimental procedure for measuring the Young's modulus of elasticity of soil.

(3 marks)