# PARUL UNIVERSITY
## FACULTY OF ENGINEERING & TECHNOLOGY
### M.Tech. Winter 2017 - 18 Examination

Semester: 1                                                          Date: 02/01/2018
Subject Code: 03215103                                    Time: 02.00pm to 4.30pm
Subject Name: Soil Dynamics and Machine Foundation        Total Marks: 60

**Instructions:**
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

**Q.1  A)** Define following terms: (i) Period (ii) frequency (iii) Resonance (iv) Amplitude (v) cycle  **(05)**

**B)** Explain different types of machine foundations with neat sketch  **(05)**

**C)** Define Liquefaction & Explain types of Liquefaction  **(05)**

**Q.2  Answer the following questions. (Attempt any three) (Each five mark)**  **(15)**

**A)** Assuming resonance to have occurred at the frequency of 22 cycles/second in a vertical vibration of a test block, 1.0 x 1.0 x 1.0m size, determine the coefficient of elastic uniform in compression ($C_u$).

**B)** Describe the codal provisions for design and construction of Impact Machine.

**C)** For a machine foundation, given weight of the foundation = 45 kN and spring constant = $10^4$ kN/m, determine a) natural frequency of vibration, and b) period of oscillation

**D)** For a machine foundation, given weight = 60 kN, spring constant = 11,000 kN/m, and $c$ = 200 kN-s/m, determine
(a) whether the system is overdamped, underdamped, or critically damped,
(b) the logarithmic decrement, and
(c) the ratio of two successive amplitudes

**Q.3  A)** Explain pressure bulb theory to calculate natural frequency  **(07)**

**B)** A machine and its foundation weigh 140 kN. The spring constant and the damping ratio of the soil supporting the soil may be taken as 12 x $10^4$ kN/m and 0.2, respectively. Forced vibration of the foundation is caused by a force that can be expressed as $Q$ (kN) = $Q_0$ sin $wt$ , $Q_0$ = 46 kN, $w$ = 157 rad/s. determine  **(08)**
(a) the undamped natural frequency of the foundation,
(b) amplitude of motion, and
(c) Maximum dynamic force transmitted to the subgrade.

<div align="center">OR</div>

**B)** Write design criteria of foundations for reciprocating machines as per IS:2974  **(08)**

**Q.4  A)** Explain any three mitigation methods of liquefaction  **(07)**

<div align="center">OR</div>

**A) As shown in Fig. below** If $\beta$ = 0°, $i$ = 0°, $\phi$ = 36°, $\delta$= 18°, $H$ = 4.5 m, $\gamma$ = 17.6 kN/m³, $k_u$ = 0.2, and $k_h$ = 0.3, determine the active force per unit length of the wall.  **(07)**
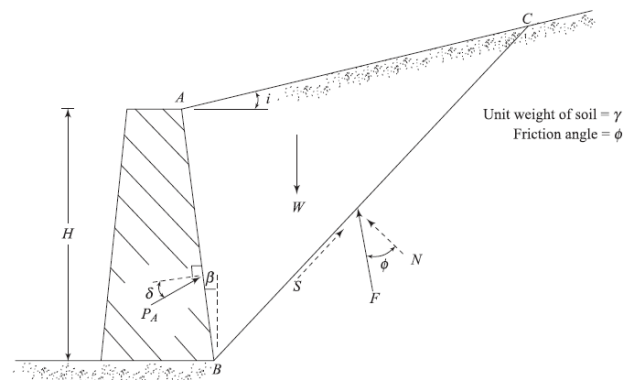


**B)** Write short note on Vibration isolation  **(08)**