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Total Number of Pages: 02

**B.TECH**  
**PECI 5412**

**8<sup>th</sup> Semester Regular / Back Examination 2016-17**

**ADVANCED FOUNDATION ENGINEERING**

**BRANCH: CIVIL**

**Time: 3 Hours**

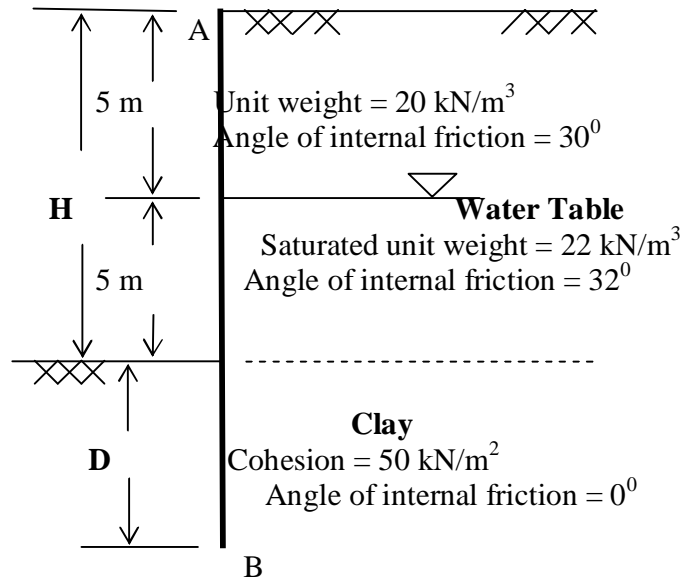
**Max marks: 70**

**Q.CODE: Z200**

**Answer Question No.1 which is compulsory and any five from the rest.  
The figures in the right hand margin indicate marks.**

- Q1 Answer the following questions: (2 x 10)**
- a) Define: 'frequency ratio', 'magnification factor', 'damping ratio' and 'natural frequency'.
  - b) How the dynamic shear modulus and the damping ratio of a soil sample change with straining of the specimen?
  - c) What do you obtain from a bender element test?
  - d) What is equivalent beam method?
  - e) Sketch an anchored bulk head with forces acting on it.
  - f) What is the use of a lime column?
  - g) Discuss full floating foundation with an example.
  - h) What do you mean by bottom elastic heave? When it occurs?
  - i) What is a 'collapsible soil'? Explain with an example.
  - j) At what strain levels resonant column works?
- Q2 a) List various sources of dynamic loads. Enumerate the parameters influencing the design of machine foundations. Sketch and discuss a 'box type' machine foundation. (5)**
- b) The exciting force in a constant force type of excitation was 125 kN. The natural frequency of the machine foundation is 5 Hz. The damping factor is 0.32. Determine the magnification and transmitted force at an operating frequency of 10 Hz. (5)**
- Q3 a) Discuss various types of machine foundations. Enlist and discuss various IS code provisions for design of foundations for reciprocating type machines. (5)**
- b) What are basic dynamic properties of a soil? Enumerate various small strain tests to determine these properties. Discuss the dilatometer test. (5)**

- Q4** Compute the embedment length  $D$  for the sheet pile wall  $AB$  shown in Figure 1. (10)



**Figure 1**

- Q5** a) A cohesive soil has unit weight of  $20 \text{ kN/m}^3$ , unit cohesion as  $14 \text{ kN/m}^2$  and angle of internal friction as  $10^\circ$ . The ground has a surcharge load of  $3 \text{ kN/m}^2$ . Calculate the critical height of vertical excavation that can be made without any lateral support. (5)
- b) What is a 'floating foundation'? Discuss the difference between 'partial floating' and 'full floating' foundations. What is a buoyancy raft? (5)
- Q6** a) What are characteristics of an 'expansive soil'? How do you identify that? What do you mean by 'free swell'? How do you calculate the 'free swell index'? Define and discuss 'expansion index'. (5)
- b) Discuss various environmental and structural solutions to problems in design of foundations in expansive soils. (5)
- Q7** a) Sketch the mode of deflection and distribution of lateral earth pressure on various types of sheet pile walls. Discuss the steps for obtaining the pressure distribution diagram on a cantilever sheet pile penetrating into cohesion less soil. (5)
- b) Explain in brief the block vibration test. How do you correlate various dynamic soil properties from this test results. (5)
- Q8** Write short notes on: (5 x 2)
- Damping ratio
  - Dolphins
  - Backfilled structure
  - Differential swell
  - Pressure meter test