

**Code No: D2006**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**M.Tech II - Semester Examinations, March/April 2011**  
**ADVANCED FOUNDATION ENGINEERING**  
**(STRUCTURAL ENGINEERING)**

**Time: 3hours****Max. Marks: 60**

**Answer any five questions**  
**All questions carry equal marks**

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1. a) Discuss about effect of water table on bearing capacity and effective eccentricity of loading.  
b) Explain about Jaubou and Morgenstern method in detail. [6+6]
2. a) Specify the various methods to determine the load carrying capacity of piles and describe about pile load tests with neat diagrams.  
b) Write a short note on efficiency of pile group with necessary sketches. [6+6]
3. a) Mention the different stages involved in the construction of under-reamed pile foundation. Explain them in detail.  
b) Design of friction pile group to carry a load of 3000 kN including the weight of the pile cap at a site where the soil is uniform clay to a depth of 20 m, underlain by rock. Average unconfined compressive strength of the clay is 70 kN/m<sup>2</sup>. The clay may be assumed to be of normal sensitivity and normally loaded, with liquid limit 60%. A factor of safety of 3.0 is required against shear failure. [6+6]
4. a) Define the term “caisson” and discuss about types of caissons.  
b) Describe about design analysis of well foundation. [6+6]
5. a) Write about the assumptions and limitations in Terzaghi’s analysis.  
b) A square footing is to be constructed at a depth 4.0 m below the ground surface on a sandy clay soil for which the cohesion is 500 g/cm<sup>2</sup> and the bulk density is 1.68 g/cm<sup>3</sup>. The total load applied to the soil is 425 tonnes uniformly distributed. Find out the size of the footing using Terzaghi’s formula. Use a factor of safety 3.0 and  $N_c = 10$ ;  $N_q = 2$  and  $N_\gamma = 2$ . [6+6]
6. a) Write about the cantilever sheet piling in granular soils.  
b) An anchored bulk head 4.8 m high retains sand on both sides. The anchor rods are 1m below the top and depth of embedment is 1.44 m. Determine the factor of safety against failure. Angle of internal friction of sand is 35° and the sand is submerged throughout with a unit weight of 10 kN /m<sup>3</sup>. Comment if the depth of embedment which render the design adequate. [6+6]

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7. a) Briefly describe about design of anchored bulkhead by fixed-earth method including equivalent beam method.
- b) Write short notes on swell pressure and swelling potential. [6+6]
8. a) Draw a neat diagram with showing the details of interior & exterior beams of under-reamed pile foundation in expansive soils.
- b) Describe about the stabilization of expansive soils. [6+6]

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