

GUJARAT TECHNOLOGICAL UNIVERSITY**M.E Sem-II Examination July 2010****Subject code: 721503****Subject Name: Advanced Foundation Engineering****Date: 07 /07 /2010****Time: 11.00am – 1.30pm****Instructions:****Total Marks: 60**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) How will you get frictional resistance of pile in cohesive soil? **06**
(b) A precast concrete pile for a jetty structure is required to carry a load of 350 kN in compression and 250 kN in uplift. It is driven through 7.0m of very soft silty clay into stiff boulder clay with a fairly uniform undrained shearing strength of 110 kN/m^2 . Determine required penetration depth. **06**

- Q.2** (a) A single cylinder engine of weight 12.5 kN rests on a 6 m X 1.5 m block of concrete of weight 680 kN. The engine operates at 1000 rpm and generates a frequency dependant unbalanced force. From manufacturer's data the quantity $m_e = 0.65 \text{ N-s}^2$. The soil data are $\mu = 0.3$, $G = 17.5 \times 10^3 \text{ kPa}$ and $\gamma = 19 \text{ kN/m}^3$. Find the resonance frequency and amplitude of vibration at resonance. Also find amplitude at operating frequency. **06**
(b) Derive an expression for natural frequency and amplitude of a machine foundation subjected to pure rocking machine **06**

OR

- (b) List the methods of analysis of block foundation. Explain any one in detail. **06**
- Q.3** (a) As a foundation engineer what recommendations would you offer if footing pressure is higher than bearing capacity of soil? **06**
(b) Draw neat sketch clearly showing different forces to be considered while checking stability of well against tilting. **06**

OR

- Q.3** (a) p-y curves, construction and utility. **06**
(b) A reinforced concrete column is acted upon by a vertical load of 300 kN and moment of 150 kNm. The footing is 3.3 m X 3.3 m placed at a depth of 1.0 m and underlying soil is clay with an unconfined compressive strength of 60 kN/m^2 , $\gamma = 20 \text{ kN/m}^3$. Determine the factor of safety. **06**

- Q.4** (a) What is reinforced earth concept? Give its practical applications. **06**
(b) Distinguish between floating pile and floating raft. Where floating raft is used? **06**

OR

- Q.4** (a) Discuss the design criteria of a reinforced earth wall. **06**
(b) What do you understand by soil-structure interaction? **06**

- Q.5** (a) Discuss the effect of contact pressure and rigidity of raft in analysis of Raft foundations. **06**
(b) How subgrade modulus is obtained in field? Give its limiting values for different types of soils. **06**

OR

- Q.5** (a) Explain uses of geotextiles with neat sketches **06**
(b) Derive general solution for beams resting on elastic foundations and give its practical applications. **06**
