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MVCT-103

M. E./M. Tech. (First Semester) EXAMINATION, Dec., 2011

(Grading/Non-Grading System)

ADVANCED GEOTECHNICAL ENGINEERING

(MVCT-103)

Time : Three Hours

Maximum Marks : $\begin{cases} GS: 70 \\ NGS: 100 \end{cases}$

Note : Attempt any *five* questions. All questions carry equal marks. Assume suitable missing/misprint data if required. It should be clearly stated.

1. (a) Explain any *one* method of boring in soil and rock.

   (b) Write brief explanation on; Westergaard's analysis and Newmark's influence chart.

2. Discuss Caisson's. What are their various types ? Draw a neat sketch of an open Caisson and label all its components.

3. (a) Explain the 'tolerance limits of amplitudes' as given by Richart and by Barkan.

   (b) What are the special considerations for the design of 'Impact Machines' ?

4. Describe in brief different construction techniques in expansive and collapsible soil.

P. T. O.

3. a) Find the Hankel Transform of $\frac{\cos ax}{x}$ taking $xJ_0(sx)$ as the kernel.

   b) Define Hankel Transform and prove that :

   $$H\{f(ax)\} = a^{-2} H\left(\frac{s}{a}\right)$$

4. a) Define

   i) Functionals

   ii) Extremal

   b) Find the extremals of the functional

   $$I\left[y/x\right] = \int_{x_0}^{x_1} \frac{1+y^2}{y'^2}\,dx$$

5. a) Solve the Euler's Equation for $\int_{x_0}^{x_1} (x+y')y'\,dx$.

   b) Prove that the shortest distance between two points is along a straight line.

6. a) Solve the boundary value problem :

   $y'' - y' + x = 0 (0 \le x \le 1) y(0) = y(1) = 0$ by Rayleigh - Ritz method.

   b) Explain finite elements method for one dimensional problems considering suitable example.