



Reg. No. : .....

Name : .....

First Semester M.Tech. Degree Examination, March 2013

Branch : Civil (2008 Scheme)

STRUCTURAL ENGINEERING

CSC 1001 : Dynamics of Structures

Time: 3 Hours

Max. Marks: 100

**Instruction : Answer any five full questions.**

- I. a) What are the different dynamic loads to which a structure can be subjected ? 5  
b) Derive from first principles, an expression for the displacement at any time 't' of a damped single degree of freedom system undergoing free vibration with initial velocity  $\dot{v}(0)$  and initial displacement  $v(0)$  at time  $t = 0$ . 15
- II. a) Explain Hamilton's principle. 5  
b) Starting from Hamilton's principle, derive the Lagrange's equation of motion for a multi degree of freedom system. 15
- III. Express the periodic loading shown in Fig. 1 as a Fourier series. Find the expression for the response of a damped single degree of freedom system subjected to the above periodic force. 20

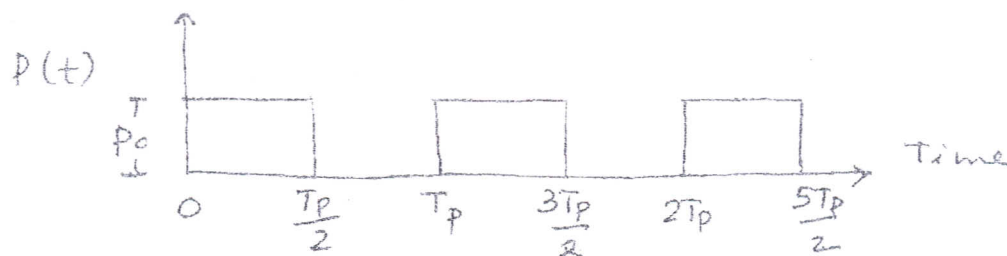


Fig. 1



- IV. a) Explain the step by step procedure of the analysis of a multi degree of freedom system by the method of mode superposition . 15
- b) Explain the working principle of accelerometers. 5
- V. a) Derive the orthogonality relationships of free vibration of a multi degree of freedom system. 10
- b) Explain deterministic and stockastic analysis. 5
- c) Explain the following terms : 5
- i) Narrow band process
  - ii) Wide band process
  - iii) White noise.
- VI. Write short notes : (4×5=20 Marks)
- i) Single degree of freedom system subjected to base acceleration
  - ii) Displacement meters
  - iii) Coulomb damping
  - iv) Half power method.
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