

## JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- September 2016

B.Tech VII / M.Tech I Semester

COURSE CODE: 11M1WCE112

MAX. MARKS: 15

COURSE NAME: Structural Dynamics

COURSE CREDITS: 03

MAX. TIME: 1Hr

*Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

1. Consider the free oscillation of a cone-shaped compound pendulum suspended from the ceiling at a point O (as shown in **Fig # 1**). The height of the pendulum is  $h$  and base radius is  $r$ . The weight of the pendulum is given as  $W$ . The angular displacement of the centerline of the pendulum measured from the vertical line (OA) is denoted by  $\theta(t)$ . Derive the equation of motion of the pendulum for small oscillation. Also determine the natural frequency of the pendulum. [ 8 MARKS]
2. For the system shown in **Fig # 2**, set up the equation of motion and solve for the steady-state response and phase angle. Note that the mass is excited by applying a harmonic motion at the free end of the spring. [ 7 MARKS]

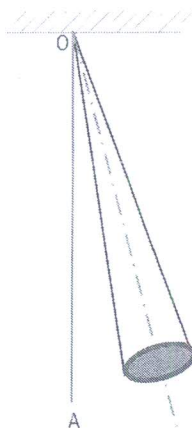


Fig # 1

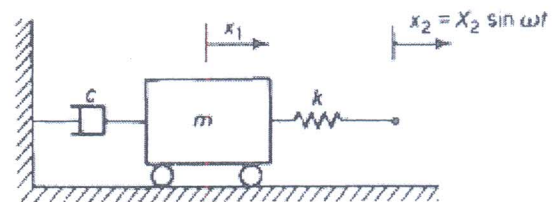


Fig # 2