UTTARAKHAND OPEN UNIVERSITY, HALDWANI (NAINITAL)
उत्तराखंड मुक्त विश्वविद्यालय, हल्द्वानी(नैनीताल)

M.A./ M.Sc. Mathematics
ASSIGNMENT- FIRST YEAR

Last Date of Submission:	*15 May*	जमा करने की अन्तिम तिथि:	**15 मई**

Cosurse Title: Mechanics   **Course code:** MAT 505

Year: 2012-13   **Maximum Marks : 40**

Section 'A'
भाग क

Attempt any 04 questions. Each carrey 05 marks.

1. A rough uniform board of mass m and length 2a rests on smooth horizontal plane, and a body, of mass M, walks on it form one end to the other. Show that the distance through which the board moves in this time is 2 ma/m+n.

2. Show that the centres of suspension and oscillation are convertible.

3. An equilateral traingunar lamina is rotating in its plane with uniform angular velocity about an axis through one vertex. If this vertx is released and one of the other vertices fixed. Show that the new angular velocity is 1/5 of the former volue.

4. A particle of mass m moves in a force field of potential V. Write the Hamiltonian.

5. A uniform sphere roles down in inclined plane, rough enough to prevent any sliding. Find distance described in time t.

6. Set up hagrangian for a simple pendulum.

7. If a point moves along a circle with constant speed, prove that its angular velocity about any point on the circle is half of that about the centre.

8. A heavy circular disc is revolving in a horizontal plane about its centre which is fixed. An insect, of mass 1/n[th] that of the disc walk from the centre along aradius and then flies away. Show that the final angular velocity is n/n+2 time the original angular velocity of the disc.

Section 'B'
भाग ख

Section 'B' contains 04 long answer-type questions of 10 marks each. Learners are required to answers 02 questions only.

1. Find the equation of continuity.

2. A top is executing steady motion, with its axis inclined at a constant angle α to the vertical and precessional velocity ω. Show that motion is stable.

3. A uniform road of mass 5m and length 2a, turns freely about one end which is fixed, to its other extremity is attached one end of a light string, of length 2a, which carrier at its other end aparticleof mass m, show that the periods of the small oscillators in avertical plane are the same as those of simple pendulum of length 2a/3 and 20a/7.

4. A uniform rod, of mass 3m and length 2 l has its middle point fixed and a mass m attached at one extremity. The rod when in horizontal position is set rotating about a vertical axis through its centre with angular velocity equalto $\sqrt{2ng/l}$, show that the heavy end of the rod wil fall till the inclination of the rod to the vertical is $\cos^{-1}[\sqrt{n^2+1} -n]$ and will then rise again.