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 तिथिः 15 मई

Course Title: Mechanics **Course Code: MAT 505**

Year: 2013-14 **Maximum Marks : 40**

Section 'A'
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Section 'A' contains 08 short answer type questions of 5 marks each. Learners are required to answers 4 questions only. Answers of short answer-type questions must be restricted to 250 words approximately.

Briefly discuss the following:

1. Show that the motion of a body about its centre of inertia is the same as it would be if the centre of inertia were fixed and the same force, acted on the body.

2. Define centre of suspension and centre of oscillation. Also find minimum value of time period of compound pendulum.

3. Find equation of motion in Two-dimension under Impulsive forces for a rigid body.

4. A small insect moves along a uniform bar of mass equal to itself and of length 2a, the ends of which are constrained to remain on the circumference of a fixed circle whose radius is $\frac{2a}{\sqrt{3}}$. If the insects starts from middle point of the bar and move along the bar with relative velocity V, show that the bar in time t will turn through angle $\frac{1}{\sqrt{3}}\tan^{-1}\frac{vt}{a}$

5. Discuss principle of least action.

6. Determine the stream line if the velocity of an in compressible fluid at the point (x, y, z) is given by $\left(\frac{3x^2}{r^5}, \frac{3y^2}{r^5}\frac{3z^2-r^2}{r^5}\right)$ where $r^2 = x^2+y^2+z^2$

7. Discuss principle of permanence of irrotational motion.
8. Find formula fa complex potential for a doublet.

Section 'B'

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

1. Find Euler's Dynamical Equation of Motion.
2. Deduce principle of energy from the Lagrange's equation.
3. Find Equation of continuity (vector form) by Euler's Method.
4. Prove that the Cauchy's integrals are the integrals of the Helmholtz equations.