

C177

Total Pages : 3

Roll No.

MAMT-05

Mechanics

M.Sc./M.A. Mathematics (MSCMT/MAMT-19)

Ist Year Examination, 2022 (June)

Time : 2 Hours]

Max. Marks : 80

Note : This paper is of Eighty (80) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein.

SECTION–A

(Long Answer Type Questions)

Note : Section 'A' contains Five (05) long answer type questions of Twenty (20) marks each. Learners are required to answer any Two (02) questions only.

(2×20=40)

1. Find the moment of effective forces about the axis of rotation of a rigid body rotating about a fixed axis.

2. Find the minimum time of oscillation of a compound pendulum and minimum length of simple equivalent pendulum. Hence deduce that if the length of simple equivalent pendulum is infinite then the time of oscillation is also infinite.
3. Derive Euler's Dynamical Equations of Motion.
4. Find the streamlines and the paths of the particles when

$$u = \frac{x}{(1+t)}, v = \frac{y}{(1+t)}, w = \frac{z}{(1+t)}$$

5. Derive the equation of continuity in spherical polar coordinates.

SECTION-B

(Short Answer Type Questions)

Note : Section 'B' contains Eight (08) short answer type questions of Ten (10) marks each. Learners are required to answer any Four (04) questions only. (4×10=40)

1. Deduce the general equations of motion of a rigid body from D' Alembert's Principle.
2. Define centre of Percussion. Find the position of centre of Percussion of a uniform rod with one end fixed.

3. Using Lagrange's equations find the equation of motion of a simple pendulum.
 4. Define Hamilton's Principle.
 5. Find surfaces orthogonal to the streamlines.
 6. Discuss the concept of permanence of irrotational motion.
 7. Find the Cauchy-Riemann equations in polar coordinates.
 8. Find image of a doublet with respect to a circle.
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