

Department of Mechanical Engineering, IIT Delhi
Minor I: MCL 731 Analytical Dynamics

Instructor	S.K. Saha	Marks	20
Venue	LH318	Duration	09:30-10:30 (1 hour)
Date	8/30/2017 Wednesday		

Instruction

- *Don't keep mobile with you. Keep in the front;*
- *Don't share calculator, Pencil, Compass, etc.*
- *Don't ask anything about the question paper (Do whatever you feel best!)*
Show your I-card when signing the attendance sheet

-
1. For a particle with mass m rotating in a circular ring of radius r , [5+5=10]
- a. Express its position, velocity, acceleration vectors, and its kinetic energy.
 - b. If a frame F is rotated by 90 degree about its Z-axis, followed by 90 degree about the new Y-axis, what is the resultant rotational transformation matrix of the new frame with respect to frame F . Show its geometrical interpretation using a sketch.
-
2. Answer the following questions: [4+3×2=10]
- a. If a slender rod of length a and mass m is rotated about an axis orthogonal to the plane of its motion, write its Euler's equation of motion.
 - b. Using appropriate sketches, define (i) generalized coordinates; (ii) holonomic and non-holonomic systems; (iii) Coriolis acceleration.
-

-- End --