Lukhdhirji Engineering College, Morbi

Mechanical Engineering Department

5th Semester Dynamics of Machinery

Asssignment: Dynamic force analysis of mechanisms (CO1)

1	Define inertia force and inertia couple. State D′ Alembert principle.
2	What are the requirements of an equivalent dynamically system?
3	The crank and connecting rod of a vertical single cylinder gas engine running at 1800 rpm are 60 mm and 240 mm respectively. The diameter of piston is 80 mm and the mass of the reciprocating parts is 1.2 kg. At a point during the power stroke when the piston has moved 20 mm from the top dead center position, the pressure on the piston is 800 kN/m^2. Determine 1. Net force on the piston 2. Thrust in the connecting rod 3. Thrust on the sides of cylinder walls 4. Engine speed at which the above values are zero.
4	The crank and connecting rod of a steam engine are 300 mm and 1500 mm in length respectively. The crank rotates at 180 rpm clockwise. Determine the velocity and acceleration of the piston when the crank is at 40 degrees from the inner dead center position. Also determine the position of the crank for zero acceleration of the piston.
5	The following data relate to a horizontal reciprocating engine: Mass of reciprocating parts = 120 kg, Crank length = 90 mm, Engine speed = 600 rpm, Connecting rod Mass = 90 kg, Length between centres = 450 mm, Distance of center of mass from big end centre = 180 mm, Radius of gyration about an axis through centre of mass = 150 mm. Find the magnitude and the direction of inertia torque on the crankshaft when the crank has turned 30^0 from the inner dead centre.
6	In a slider crank mechanism, the length of the crank and connecting rod are 150 mm and 600 mm respectively. The crank position is 60^0 from the dead center. The crank shaft speed is 450 r.p.m. (clock wise). Using analytical method, determine: I). Velocity and acceleration of the slider. And II). Angular velocity and angular acceleration of the connecting rod