Islamic University Faculty of Engineering Department of Mechanical Engineering		الجامعة الإسلامية كليه الهندسة قسم الهندسة الميكانيكية

ME 222- DYNAMICS

QUIZ 5

Fall Semester 2016-2017

Name, Family Name: _____

ID #: _____ **Section #:** _____ **Signature:** _____

Marks
10

Date: 21/12/2016 **Max. Marks: 1 x 10 = 10**

Answer the following question.

Q.1 A cord is wrapped around a wheel in Fig. Q.1, which is initially at rest when $\Theta = 0$. If a force is applied to the cord and gives it an acceleration $a = (4t)\ m/s^2$, where t is in seconds, determine, as a function of time, (a) the angular velocity of the wheel, and (b) the angular position of line OP in radians.

$\theta_0 = 0,\ a = 4t\ m/s^2,\ \omega_0 = 0,\ \alpha = \frac{a}{r} = \frac{4t}{0.2} = 20t\ rad/s^2$

Angular velocity as function of Angular position

$\omega^2 = \omega_0^2 + 2\alpha_c(\theta - \theta_0)$

$\omega^2 = \omega_0^2 + 2\alpha_c(\theta - \theta_0)$

$\omega^2 = 0 + 20\theta \Rightarrow \omega = \sqrt{20\theta}$

$\theta = \theta_0 + \omega_0 t + \frac{1}{2}\alpha_c t^2$

$\omega = \int_0^t \alpha_c\, dt = \int_0^t 20t\, dt = 10t^2\ rad/s$

$\theta = \int_0^t \omega\, dt = \int_0^t 10t^2\, dt = \frac{10}{3}t^3\ rad$

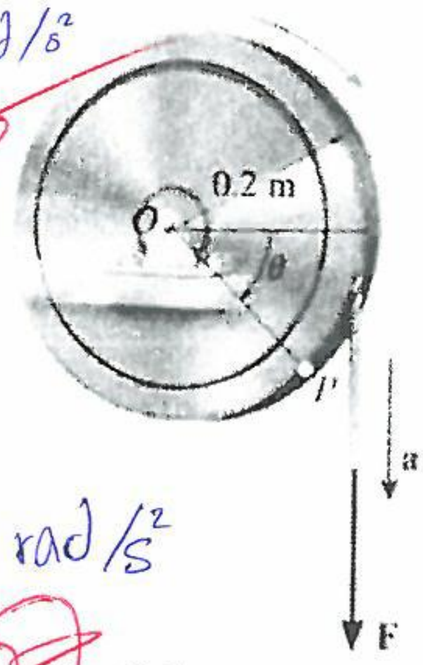

Fig. Q.1

**** For Instructor use only***

S O - 5	An ability to identify, formulate, and solve engineering problems
C O - 2	Solve Kinematics problems involving rectilinear, curvilinear and relative motion of particles
P I_5_13	Apply basic concepts of kinematics and kinetics to solve elementary problems