



University of Technology
Department of Applied Sciences
Final Examination 2014/2015



Subject: Mechanic
Branch: Laser
Examiner: Dr. Jehan Admon

Class: 1 st year
Time: 3 hours
Date: / /2015

Note: Answer only five questions

Q1: a) Find the resultant of the sum of the following vectors:

$$\mathbf{V}_1 = u_x(-1) + u_y(3) + u_z(4) \text{ units, } \quad \mathbf{V}_2 = u_x(3) + u_y(-2) + u_z(-8) \text{ units,}$$

$$\mathbf{V}_3 = u_x(4) + u_y(4) + u_z(4) \text{ units}$$

Also obtain the magnitude and direction of the resultant. **(5 marks)**

b) A pendulum consists of a brass sphere suspended from a string 0.75m long. It is found that in 30 minutes the amplitude decreases from 8° to 7.5° . Determine **1)** the damping coefficient **2)** angular frequency and **3)** the period. **(7 marks)**

Q2: a) A ring roll down along an inclined plane starting at a height 4m. Find the velocity when it arrives at the base of the plane. ($y = 2.5\text{m}$) **(9 marks)**

b) What is the interesting features of particles? **(3marks)**

Q3: A particle whose mass is 5kg, is moving with initial velocity 2m/s along the x -axis, and collides with another particle, of mass 3kg, which is at rest. After the collision, the first particle moves at 1m/s in a direction making an angle of 30° with the x -axis. Determine the magnitude and direction of the velocity of the second particle after the collision. **(12 marks)**

Q4: a) A force $F=6t$ N acts on a particle whose mass is 2kg. If the particle starts from rest, find the work done by the force during the first 5s. **(8 marks)**

b) Define **only four** of the following:

Steiner's theorem, Period, Energy resonance, Watt, Stokes law. **(4 marks)**



University of Technology
Department of Applied Sciences
Final Examination 2014/2015



Subject: Mechanic
Branch: Laser
Examiner: Dr. Jehan Admon

Class: 1 st year
Time: 3 hours
Date: / /2015

Q5: a) Find the components of the vector that is 20 units long and makes an angle θ of 25° with the Z-axis, and whose projection in the XY-plane makes an angle Φ of 45° with the + X-axis. Find also the angles with the X- and Y-axes. (7 marks)

b) A projectile is fired in such a way that its horizontal range is equal to three times its maximum height. What is the angle of projection? (5 marks)

Q6: a) Explain the types of polarization with equations. (3 marks)

b) Draw the graphs with equation of velocity and displacement for uniform rectilinear motion. (2 marks)

c) A rotating wheel is subject to a torque of 10 Nm due to the friction on the axis. The radius of the wheel is 50cm, its mass is 150kg, and it is rotating at 200 rad/s. How long (in minute) will the wheel take to stop? (7 marks)

Good Luck