Prince Sultan University

Department of Mathematics & Physics

SCI 101- General Sciences

Second Exam

First Semester, Term 161

Sunday 11/12/2016

Examination Time : 60 minutes

Name …….

Student I.D. …….

Section: …….

Constants:
Acceleration of Gravity g = 10 m/s^2
Atmospheric Pressure = 101.3 kPa
Universal Gravitational Constant G = 6.67x10^{-11} N.m^2/kg^2

Important Instructions:

1. You can use a scientific calculator that does not have programming or graphing capabilities.
*2. You may **NOT** borrow a **calculator** from anyone.*
*3. Do not use **RED pen**.*
*4. This is a closed books and notes exam. Do **NOT** use notes or textbooks.*
*5. There should be **NO** talking during the examination.*
*6. Your will be **expelled** immediately from the exam if your mobile phone is seen or heard.*
*7. Any signs of **cheating** may cause you being expelled from the exam.*
*8. This examination has **2 parts**. **Part 1** has **12 multiple choice questions**, each question worth **1 point**. **Part 2** has **two workout problems** each problem worth **4 points**.*

Make sure your paper has all the questions and problems.

Part 1: 12 Multiple Choice Questions (1 mark each)

1) Energy and work are measured in a unit called Joule which is equivalent to

a) Newton/Meter b) Newton . Meter c) Meter/Newton d) Watt/second

2) If the speed of an object is doubled then its kinetic energy will be

a) Doubled b) quadrupled c) halved d) tripled

3) What is the mechanical energy of a 70 kg man running at 6 m/s above the ceiling of a 9 m high building?

a) 700 J b) 1260 J c) 6300 J d) 7560 J

4) How much energy is generated in 2 minutes by a 175 watt machine?

a) 45 kJ b) 750 J c) 21 kJ d) 350 J

5) How much power is required to increase the kinetic energy of an object from 220 J to 4000 J in 7 minutes?

a) 9 watt b) 10 watt c) 540 watt d) 0.11 watt

6) Two identical cars attract each other with a force of 2.49×10^{-7} N when they are parked such that their centers are 18 m apart. What is the mass of either car?

a) 1100 kg b) 1300 kg c) 1500 kg d) 1700 kg

7) What is the acceleration of gravity at the surface of a planet of mass 7×10^{25} kg and radius 8800 km?

a) 10 m/s^2 b) 107 m/s^2 c) 60 m/s^2 d) 75 m/s^2

8) "*Where the speed of the fluid increases, internal pressure in the fluid decreases*". This is the statement of

a) Archimedes' Principle b) Bernoulli's principle

c) Pascal's principle d) Universal gravitational law

9) The pressure exerted on the ground by the weight of a man is greatest when:

a) he stands on the toes of one foot

b) he lies down on the ground

c) he stands with both feet on the ground

d) he stands on one foot

10) Air pressure at sea level is 76 cm of mercury. If a barometer is taken to a very high mountain, then the recorded level of mercury will

a) Increase more than 76 cm.

b) Fall below 76 cm.

c) Remain 76 cm.

d) Everything is possible depending on temperature and air speed.

11) The Titanic ship was found lying at the bottom of north Atlantic Ocean at the depth of 4 km. If the density of sea water is 1.02 g/cm^3, what is the total pressure at this depth?

a) 1.3×10^7 Pa b) 2.7×10^7 Pa c) 3.1×10^7 Pa d) 4.1×10^7 Pa

12) A solid ball of mass 120 g displaces 80 cm^3 of water when it is completely submerged in water. What is the density of this ball?

a) 1 g/cm^3 b) 1.5 g/cm^3 c) 15 g/cm^3 d) 0.67 g/cm^3

Part 2: Solve the following two problems in the space provided in between showing all your steps (4 marks each)

Problem 1: A 6 kg box is released from rest from the top of a 125 m high building.

a) What is the gravitational potential energy of the box at the top of the building?

b) Use conservation of mechanical energy to find the height at which the speed of the box becomes 30 m/s.

c) Use conservation of mechanical energy to find the kinetic energy of the box just before it hits the ground?

d) What is the speed of the box just before it hits the ground?

Problem 2: A solid block is attached to a spring scale. When the block is suspended in air it weighs 20 N. When this block is completely submerged in water, the scale reads 15.7 N. Given that the density of water 1000 kg/m^3, find

a) The buoyant force on the block.

b) The mass of water displaced when this block is completely submerged in water.

c) The volume of the block.

d) The density of the block.

Scratch paper