Prince Sultan University

Department of Mathematics & Physics

SCI 101- General Sciences

Final Exam

Second Semester, Term 162

Tuesday 23/5/2017

Examination Time : 180 minutes

Name (Please Print). . . . . .

Student I.D. . . . . .

Circle your Section

451	452	453	
10 – 10:50	11 – 11:50	1 – 2:15	
Dr. Muaffaq Nofal	Dr. Muaffaq Nofal	Dr. Asif Zaidi	

Use g = 10 m/s^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 **3 parts**. **Part 1** has **12 multiple choice questions**, each question worth **1 point**. **Part 2** has **6 multiple choice questions**, each question worth **2 point. Part 3** has **4 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) Which of the following is **NOT** true about mass?

a) Mass is measured in kilogram.

b) Mass is a vector quantity.

c) Mass does not depend on the location of the object.

d) Mass is the measure of inertia.

2) What happens when two cars with different masses hit each other in a collision?

a) The car with smaller mass experience a greater force of impact.
b) The car with larger mass experience a greater force of impact.
c) Both cars experience the same force of impact.
d) Both cars undergo the same acceleration.

3) What is the speed of a 20 kg bicycle moving with 360 J of kinetic energy?

a) 36 m/s b) 3 m/s c) 18 m/s d) 6 m/s

4) A ball is dropped from 10 m above the ground, what is its speed just before hitting the ground?

a) 14.1 m/s b) 10 m/s c) 20 m/s d) 1.41 m/s

5) The driver of a car is pushed forward when the brakes are applied. This best demonstrates that

a) There is an action-reaction pair of forces. b) The driver has inertia.

c) The driver has no acceleration. d) None of these.

6) "*Every object continues in a state of rest or uniform speed in a straight line unless acted upon by a nonzero force*". This statement is called

a) Newton's first law. b) Newton's second law.

c) Newton's third law. d) Action-reaction law.

7) Heat transfers from sun to earth by a process called

a) Conduction. b) Convection. c) Radiation. d) Isolation.

8) A solid melts at a temperature of 194 ^{o}F. What is its melting point in Kelvin scale?

a) 363 K b) 398 K c) 90 K d) 654.2 K

9) At what depth under sea water is the liquid pressure 132 kPa given that the density of sea water is 1.2 g/cm^3?

a) 1100 m b) 0.0011 m c) 110 m d) 11 m

10) Which of the following is NOT true about temperature?

a) Temperature is proportional to the average translational kinetic energy per particle in the substance.

b) Temperature can be measured by different scales.

c) Temperature has no lower limit but has an upper limit.

d) Temperature has no upper limit but has a lower limit.

11) Why does metal feel colder than wood, if they are both at the same temperature?

a) Because metals are thermal conductors while wood is thermal insulator.

b) Because metals are thermal insulators while wood is thermal conductor.

c) Because wood conducts heat to the hand.

c) Because metals have light colors.

12) A surface is a *net absorber* if

a) It does not emit energy. b) It is hotter than its surroundings.

c) It absorbs more energy than it emits. d) It emits more energy than it absorbs.

Part 2: 6 Multiple Choice Questions (2 mark each)

1) How much power is required to increase the kinetic energy of an object from 420 J to 2100 J in 4 minutes?

a) 10.5 Watt b) 420 Watt c) 7 Watt d) 12.7 Watt

2) The speed of a 0.2 kg object is increased from 4 m/s to 18 m/s during a time of 0.5 seconds. What is the average force acting on the object?

a) 4.4 N b) 2.8 N c) 5.6 N d) 8.8 N

3) A 10 g bullet is fired from a 3 kg rifle with a speed of 600 m/s. What is the recoil speed of the rifle?

a) 2000 m/s b) 0.5 m/s c) 6 m/s d) 2 m/s

4) To make a cup of tea, 300 g water is heated to 100 ^{o}C . Given that the specific heat capacity of water is 4200 J/(kg.°C), calculate How much heat is required if the initial temperature of water was 27 ^{o}C.

a) 92000 KJ b) 92 KJ c) 126 KJ d) 34 KJ

5) What will be the length of the liquid column in a barometer at sea level when a liquid of density 3.2 g/cm^3 is used instead of mercury? (The density of mercury is 13.6 g/cm^3 and the atmospheric pressure at sea level is 76 cm mercury)

a) 1033.6 cm b) 323 cm c) 17.88 cm d) 5.6 cm

6) If 22800 J of heat is required to evaporate 400 g of a certain material, what is the latent heat of vaporization of that material?

a) 57000 J/kg b) 57 J/kg c) 9120 J/kg d) 3687 J/kg

Part 3: Solve the following four problems in the space provided in between showing all your steps (4 marks each)

Problem 1 (4 marks): A car of mass 1300 kg moving initially at 108 km/h is stopped in 5 seconds due to applying the brakes.

(a) Calculate the car's deceleration.

(b) Calculate the braking force on the car.

Problem 2 (4 marks): A 125 g block of solid at a temperature of 90^{o} C is dropped in 0.326 kg of water at a temperature of 20^{o} C. The system reaches a final temperature of 23.4^{o} C. Given that the specific heat capacity of water is 4200 J/(kg.°C), calculate

a) How much heat is gained by water?

b) How much heat is lost by the solid block?

c) What is the specific heat capacity of the unknown solid block?

Problem 3 (4 marks): A 0.5 kg ball of clay moving to the right at 6 m/s collides with another ball of clay of mass 0.3 kg moving to the left at 4 m/s. The two balls stick and move together.

a) What the speed of the combined ball just after the collision?

b) How much kinetic energy is lost during this collision?

Problem 4 (4 marks): An object of mass 7 kg weighs 53 N when submerged in sea water of density 1.1 g/cm^3.

a) What is the buoyant force acting on the object?

d) What is the weight of the displaced water by the object?

b) What is the volume of the displaced water by the object?

c) What is the density of the object?

Scratch paper