



Prince Sultan University
Department of Mathematics & Physics
SCI 101- General Sciences
Final Exam First Semester, Term 171
Tuesday Jan 9, 2017
Examination Time: 3 hours

Name

Student I.D.

Section / class time.

Instructors Dr. Asif Zaidi.....Dr. Hazim A ...

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 10 **multiple choice questions**, each question worth 1 point. **Part 2** has five questions. **Part 3** has 4 **workout problems** each problem worth 5 points (**In part 4 show your work completely**). Make sure your paper has all the questions and problems.

Part 1	
Part 2	
Q1	
Q2	
Q3	
Q4	
Total (40)	

Part 1: 10 Multiple Choice Questions (1 mark each)

Q1.

Which one of the following is the derived unit in SI system?

- a) Sec. b) N. c) m d) kg

Q 2.

The statement “*Gravitational Force between two masses is directly proportional to the product of the masses and inversely proportional to the square of the distance between the masses*” is known as

- a) Newton’s First Law b) Newton’s Second Law
c) Newton’s third Law d) Newton’s Law of gravitation

Q 3

The gravitational attractive force between two objects is 900 N. If the distance between these objects is tripled, what will be new value of force?

- a) 100 N b) 300 N c) 600 N d) 900 N

Q. 4.

A 80 kg skater moving at 5 m/s hits a wall and stops in 0.2 seconds. Force experienced by him is:

- a) 800 N b) 1000 N c) 2000 N d) 2500 N

Q 5.

Your car speedometer at any time indicates:

- a) Average speed b) Average Velocity
c) Instantaneous speed. d) Instantaneous acceleration

Q 6

A ball of mass of 200 g is thrown straight upwards with initial kinetic energy of 1000 J. How high up ball will go? Neglect air friction.

- a) 50 m b) 100 m c) 200 m d) 500 m.

Q 7

When snow forms in clouds, the nearby air temperature:

- a) Decreases b) Increases
c) Both (a) and (b) d) None of the above

Q 8.

“An immersed object is buoyed up by a force equal to the weight of the fluid it displaces”.
This is a statement of:

- a) Archimedes' Principle b) Bernoulli's principle
c) Pascal's Principle d) None of the above

Q 9.

How much heat does a refrigerator remove from 100 g of water at 20°C to make ice at zero °C. Given Latent heat of freezing of ice is 80 cal /g and specific heat capacity of water is 1 cal /g °C. (1 cal = 4. 18 J).

- a) 2 kcal. b) 8 kcal c) 10 kcal d) 20 kcal

Q 10.

If a Neutral atom loses two electrons, electrical charge of atom is:

- a) - 2 b) - 1 c) + 1 d) + 2

Part 2: 4 Multiple Choice Questions (2 mark each). Q5 show your work (2 points)

Q 1

A 240 g bullet moving at 108 km/h hits a sand bag and comes to rest in sand after moving 20 cm. What is the average force on the bullet?

- a) 108 N b) 216 N c) 540 N d) 1080 N

Q 2

A 20 000 kg railroad car moving at 4 m/s, it collides and joins another same mass railroad car at rest. What is the speed of the two combined cars just after collision?

- a) 1 m/s b) 2 m/s c) 4 m/s d) 6 m/s

Q 3

A hydraulic jack is used to lift cars at a service station. If the area of small piston is 78.5 cm^2 and the area of large piston is 706.5 cm^2 . The force that must be exerted on the small piston to lift a car weighing 15000 N is:

- a) $1.67 \times 10^3 \text{ N}$ b) $16.7 \times 10^3 \text{ N}$ c) $20.8 \times 10^3 \text{ N}$ d) $24 \times 10^4 \text{ N}$

Q 4

Internet signal rides on light and travels with the speed of light. Speed of light is $3 \times 10^8 \text{ m/s}$. Distance between Boston and Riyadh is 10000 Km. Time it takes to reach internet signal from Boston to Riyadh is:

- a) 0.01 s b) 0.02 s c) 0.03 s d) 0.6 s

Q 5

Use dot diagram to show formation of salt molecule Lithium fluoride Li F. Atomic number of lithium is 3 and fluorine is 9. Is this compound ionic or covalent? (Show Your Work in space provided below).

Part 2: Solve the following four problems in the space provided in between showing all your steps (5 marks each)

Problem 1:

A 2500 kg car moving at 10 m/s accelerates to reach a speed of 50 m/s in 20 seconds. During this time car covers a distance of 600 m.

- a) What is the acceleration of the car?

- a) What is the speed of the car 10 seconds after it started to accelerate?

- b) What is the net force on the car during its acceleration?

- c) What is the work done by its engine?

- d) What is the power of the engine?

Problem 2

A boy pushes 0.5 kg toy car on a horizontal floor. Car moves with initial velocity of 2 m/s due to one-time push. The toy car encounters an inclined plane, Assume no friction:

- What is the total mechanical energy of the car after initial push?
- What is the maximum height car can reach on the inclined plane?
- What is the potential energy at this height?
- If boy places car 0.5 m high above on incline plane. What will be the toy car's speed on horizontal surface?

Problem 3:

The temperature of a .05 kg of metal is raised to 200 °C and this metal is dropped into 0.4 kg of water initially at 20 °C. If the final equilibrium temperature of the mixed system is 22.4 °C.; (Specific heat capacity of water = $4.19 \times 10^3 \text{ J/ kg } ^\circ\text{C}$)

(a) What is the specific heat capacity of this metal?

(b) If mass of hot metal dropped at 200 °C is increased to 200 g, how much will be the final temperature of mixture in part (a)?

Problem 4:

A transverse traveling wave moving towards positive x-direction, its crest is 15 cm high and the distance between two consecutive crests is 40 cm. If frequency of this wave is 8 Hz find the following:

- Draw picture of this wave and find its amplitude.
- What is the wave length of this wave?
- What is the time period of this wave?
- What is the speed of this wave?
- Show by drawing how two such waves will interfere constructively?

Scratch paper (Do not Remove)