Prince Sultan University

Department of Mathematics & Physics

SCI 101- General Sciences

Final Exam

Second Semester, Term 142

Thursday 21/5/2015

Examination Time : 120 minutes

Name (Please Print). . . . . .

Student I.D. . . . . .

Section No. . . . . .

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 **20 multiple choice questions**, each question worth **1 point**. **Part 2** has **five workout problems** each problem worth **4 points**.*

Make sure your paper has all the questions and problems.

Part 1: 20 Multiple Choice Questions (1 mark each)

1) A stone is dropped from rest from a large height. If air resistance is neglected, what is the distance traveled by the stone in the ninth second?

a) 90 m b) 170 m c) 85 m d) 125 m

2) The resistance of an object to any change in its motion is called its:

a) Velocity. b) Air resistance. c) Acceleration. d) Inertia.

3) If the net force on an object is zero, then the object

a) Must be moving with constant velocity.

b) Is at rest or moving with constant velocity.

c) Is accelerating.

d) Must be at rest.

4) A falling skydiver encounters air resistance equal to 4/5 his weight at a certain point. What is his acceleration at this point?

a) 6 m/s^2 b) 4 m/s^2 c) 10 m/s^2 d) 2 m/s^2

5) When two objects are moving towards each other along the same straight line, then the relative speed of each of them with respect to the other is

a) Larger than the speed of each of them.

b) Smaller than the speed of each of them.

c) Equals the speed of the faster object.

d) Equals the speed of the slower object.

6) A car has a kinetic energy of 620 kJ. What kinetic energy would the car have if its speed is halved and its mass is tripled?

a) 2790 kJ b) 930 kJ c) 465 kJ d) 413 kJ

7) "**A change in pressure at any point in an enclosed fluid at rest is transmitted to all points in the fluid."** This is the statement of

a) Boyle's Law b) Bernoulli's principle
c) Archimedes' Principle d) Pascal's Principle

8) Which of the following is **NOT** true about work?

a) The net work done on an object equals the change in its kinetic energy.

b) The unit used to measure work is equivalent to N.m.

c) Work might be negative.

d) Work done against gravity is always zero.

9) What will be the length of the liquid column in a barometer at sea level when a liquid of density 3.6 g/cm^3 is used instead of mercury?

(given that the density of mercury is 13.6 g/cm^3 and the atmospheric pressure at sea level is 76 cm mercury)

a) 3720 cm b) 22 cm c) 1055 cm d) 287 cm

10) The weight of an object in air is 127 N and its weight when completely submerged in water is 81 N. What is the weight of water displaced by this object?

a) 208 N b) 46 N c) 73 N d) 59 N

11) On a cold winter day, the temperature falls to -4°F. What is that temperature in °K?
a) -257 b) 253 c) -293 d) 288

12) Sand heats up and cools down faster than sea water because

a) Sand has smaller specific heat capacity compared to water.

b) Sand has larger specific heat capacity compared to water

c) Sand has smaller latent heat of fusion compared to water.

d) Sand has larger latent heat of fusion compared to water.

13) How much thermal energy would be needed to heat 550 g of Aluminum metal from a temperature of 68 ºF to a temperature of 131 ºF? (Given that the specific heat of Aluminum is 900 J/(kg.ºC)?

a) 17325 J b) 31185 J c) 37125 J d) 98505 J

14) Which of the following is NOT a method of heat transfer?

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

15) How many joules are there in 250 calorie?

a) 121 b) 482 c) 1045 d) 59.8

16) A wave transmits

a) wavelength. b) frequency. c) amplitude. d) energy.

17) If you triple the period of a vibrating object, what happens to its frequency?

a) The frequency triples also.

b) The frequency is reduced to one third.

c) The frequency stays the same.

d) The frequency is reduced to one ninth.

18) The speed of the wave does NOT depend on:

a) The amplitude of the wave. b) The frequency of the wave.

c) The wavelength of the wave. d) The medium through which the wave moves.

19) A train whistle at rest has a frequency of 523 Hz. If you are standing still and observe the frequency to be 531 Hz, then you can conclude that

a) The sound from the train has echoed.

b) The train is moving toward you.

c) The train is moving away from you.

d) The train is at rest.

20) The vibrations along a longitudinal wave move in a direction
a) above the wave. b) below the wave.

c) along and parallel to the wave d) perpendicular to the wave.

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

Problem 1: A train is accelerated from a speed of 54 km/h to a speed of 162 km/h in a time of 2 minutes.

a) What is the acceleration of the train?

b) If it continues to accelerate at the same rate, how much extra time is needed to reach a speed of 180 km/h?

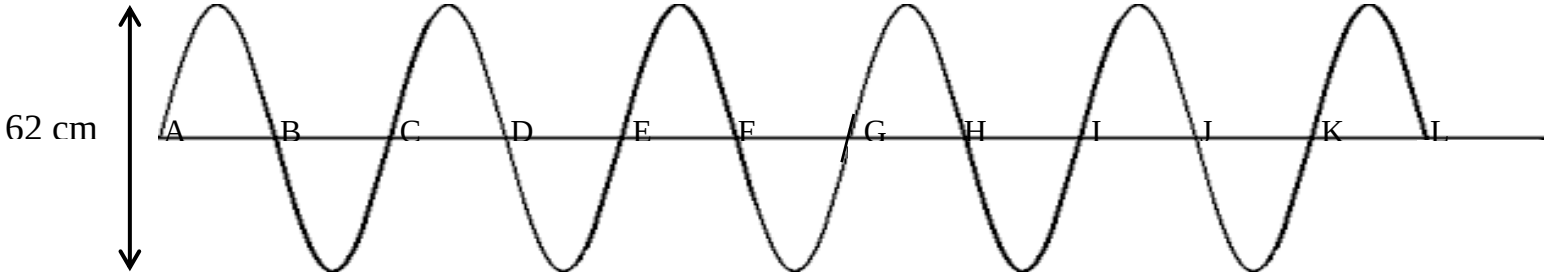
Problem 2: The mass of a car and its passengers is 1700 kg. The car was moving initially at a speed of 12 m/s. Calculate the new speed of the car after a 435.2 kJ of net work is done on it?

Problem 3: Determine the final temperature when a 400 g piece of Copper at a temperature of 70 °C is placed into 300 g of water at a temperature of 15 °C. Given that the specific heat capacity of copper is 390 J/(kg.°C) and the specific heat capacity of water is 4180 J/(kg.°C).

Problem 4: Calculate the thermal energy needed to convert a 2.5 kg of ice at a temperature of -30 °C to water at 15 °C.

Given that: the specific heat capacity of ice is 4350 J/(kg.°C)
the specific heat capacity of water is 4180 J/(kg.°C)
the latent heat of fusion of ice is 336000 J/kg

Problem 5: For the shown wave, if the distance from B to K is 126 cm and the time from C to F is 0.25 seconds, find



a) The wavelength of the wave

b) The period of the wave

c) The speed of the wave

d) The amplitude of the wave