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PHYSICS DEPARTMENT
PHY 2004 Exam 3 April 8, 2013

Name (print, last first):

Signature:

On my honor, I have neither given nor received unauthorized aid on this examination.
YOUR TEST NUMBER IS THE 5-DIGIT NUMBER AT THE TOP OF EACH PAGE.

DIRECTIONS

- (1) Code your test number on your answer sheet (use 76-80 for the 5-digit number). Code your name on your answer sheet. **DARKEN CIRCLES COMPLETELY.** Code your student number on your answer sheet.
- (2) Print your name on this sheet and sign it also.
- (3) Do all scratch work anywhere on this exam that you like. At the end of the test, this exam printout is to be turned in. No credit will be given without both answer sheet and printout with scratch work most questions demand.
- (4) Blacken the circle of your intended answer completely, using a #2 pencil or blue or black ink. Do not make any stray marks or the answer sheet may not read properly.
- (5) The answers are rounded off. Choose the closest to exact. There is no penalty for guessing.

First answer is the correct answer

1- A U tube has water on one side and oil on the other. If the column of water has a height of 24 cm, what is the height of the oil column in cm? (density of water is 1 g/cm^3 and that of oil is 0.956 g/cm^3)

- a) 25.1
- b) 22.9
- c) 24.8
- d) 26.9

2- While diving at a depth of 8 m in a freshwater lake a diver emits an air bubble of volume 5 mm^3 . What is the volume of the bubble as it reaches the surface(mm^3)? Atmospheric pressure 100 kPa and the density of water is 1 g/cm^3 .

- a) 8.92
- b) 2.80
- c) 4.00
- d) 12.42

3- A steel rod has a length L of 12.50 m at 90°C . What is the length of the rod in meters at 20°C ? The expansion coefficient of steel $12 \times 10^{-6} / ^\circ\text{C}$

- a) 12.49
- b) 12.51
- c) 12.46
- d) 12.54

4- What is the mass in grams of water at 0°C needed to bring a 100g of steam at 100°C to 50°C ? Heat of evaporation of water is 539 cal/g, and the specific heat of water is 1 cal/g/ $^{\circ}\text{C}$

- a) 1178
- b) 100
- c) 2356
- d) 1078

5- How many atoms are there in 36 kg of water (H_2O)? The molar mass of hydrogen is 1 kg/kmol and that of oxygen is 16 kg/kmol

- a) 3.6×10^{27}
- b) 3.6×10^{30}
- c) 1.2×10^{30}
- d) 1.2×10^{27}

6- A steel girder has a cross section area of 40 cm^2 . How large a compressive force in Newton would be need to shorten the girder by 0.02 percent? Young modulus $200 \times 10^9 \text{ Pa}$

- a) 16×10^4
- b) 24×10^4
- c) 12×10^4
- d) 36×10^4

7- A lead ball falls from a height of h into water. If 20% of its energy ends up as heat in the ball, how much does the temperature of the ball change? (note that c is the specific heat capacity)

- a) $gh/5c$
- b) $gh/2c$
- c) gh
- d) gh/c
- e) $gh/2$

8. A 1kg of iron is dropped into a 1kg of water at 25°C . The final temperature is 24°C . What is the original temperature of the iron? ($c=1 \text{ cal/g/C}$ for water, and $c=0.1 \text{ cal/g/C}$ for iron)

- a) 14°C
- b) 10°C
- c) 5°C
- d) 1°C

9. Which of the following statement is wrong?

- a) Internal energy of a system increases when the system is doing work on the outside world
- b) In an adiabatical process, heat exchange between the system and outside world is zero
- c) In an isochoric process, the work done on the outside world is zero
- d) In an isothermal process, temperature does not change
- e) In general, P , V , T , U can all change