May 2, 2006

## PHYSICS DEPARTMENT

## Final Exam

PHY 1033 S. Obukhov

Name (print):

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On my honor, I have neither given nor received unauthorized aid on this examination.

Signature:

## YOUR TEST NUMBER IS THE 5-DIGIT NUMBER AT THE TOP OF EACH PAGE.

## DIRECTIONS

- (1) Code your test number on your pink answer sheet (use 76–80 for the 5-digit number). Code your name on your answer sheet. Darken circles completely (errors can occur if too light). Code your UFID on your answer sheet.
- (2) Print your name on this sheet and sign it also.
- (3) You may use a calculator and 1 side of handwritten  $8\frac{1}{2} \times 11$  formula sheet. No other materials allowed.
- (4) Do all scratch work anywhere on this exam that you like. At the end of the test, this exam printout and the formula sheet are to be turned in. No credit will be given without both answer sheet and printout with scratch work most questions demand.
- (5) Work the questions in any order. Incorrect answers are not taken into account in any way; you may guess at answers you don't know if you feel that a correct answer is listed. Guessing on all questions will most likely result in failure.
- (6) It is not our intention to omit the right answer, but if you believe that none of the answers is correct, please mark the answer closest to your answer.
- (7) Blacken the circle of your intended answer completely, using a number 2 pencil. Do not make any stray marks or the answer sheet may not read properly.
- (8) As an aid to the examiner (and yourself), in case of poorly marked answer sheets, please circle your selected answer on the examination sheet.
- (9) Take g=10 m/s<sup>2</sup> and  $c = 3 \times 10^8$  m/s throughout this test.
- (10) Good luck!!!

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1. Sound waves cannot travel in
  - (1) a vacuum. (2) water. (3) steel. (4) air. (5) none of these.

2. When the speed of sound near the ground is greater than it is at higher altitudes, the sound tends to be bent

(1) upward. (2) to the right. (3) downward. (4) to the left. (5) None of these.

3. Sound waves can interfere with one another so that no sound results.

- (1) True (2) False (3) True or false, depending on the air temperature. (4) (5) -
- 4. A 340-hertz sound wave travels at 340 m/s in air with a wavelength of
  - (1) 1 m. (2) 10 m. (3) 100 m. (4) 1000 m. (5) None of these.
- 5. The ratio of the energy of a photon to its frequency is
  - (1) Planck's constant. (2) the photon's wavelength. (3)  $\pi$  (4) the photon's speed. (5) not known.
- 6. Which has more energy per photon?
  - (1) blue light (2) red light (3) Both have the same energy. (4) (5) -

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7. T	The photoelectric eff	fect best demonstrat	es the				
(1	1) particle nature of	f light. (2) wave	e nature of light.	(3) both of these	(4) none of these	(5) —	
8. T	8. The uncertainty principle applies not only to momentum and position, but also to energy and time. This statement is						
(1	1) true.	(2) false.	(3) —	(4) —	(5) —		
9. A	9. According to the uncertainty principle, the more we know about a particle's momentum, the less we know about its						
(1	1) location.	(2) speed.	(3) mass	(4) kinetic energy.	(5) none of t	hese	
10. Two beams of light, a red beam and a blue beam, have the same energy. The beam with the greater number of photons is the							
(1	1) red beam.	(2) blue beam.	(3) both	the same	(4) — (5)		
11. X	-rays may be regar	ded as					
(1	1) high frequency ra	adio waves. (2) hig	gh frequency sound w	aves. (3) both of t	hese (4) none of th	ese $(5)$ —	
12. V	Which radiation has	no electric charge as	ssociated with it?				
(1	1) gamma rays	(2) alpha rays	(3) beta rays	(4) all of the	se $(5)$ none of	f these	
13. V	When a nucleus emit	ts a beta particle, its	s atomic number				
<ol> <li>(1) changes, but its mass number remains constant.</li> <li>(2) changes, and so does its mass number.</li> <li>(3) remains constant, and so does its mass number.</li> <li>(4) remains constant, but its mass number changes.</li> <li>(5) none of these</li> </ol>							
14. T	`he atomic number	of an element is the	same as the number	of its			
(1	1) protons.	(2) nucleons.	(3) neutrons	s. (4) par	tons. $(5)$		
15. T	'he half-life on an is	sotope is one day. At	t the end of three day	vs, how much of the i	sotope remains?		
(1	1) one-eighth	(2) one-half	(3) one-qua	arter (4)	none $(5)$		
	The helium in a chile A. former beta par	d's balloon is compo ticles. B. al	sed of pha-particle remnant	s of previous radioac	tive processes.		
(1	1) both A and B	(2) A only	(3) B only	(4) neither	A nor B (5	) —	
17. Compared to clocks in a stationary reference frame, clocks in a moving reference frame run							
(1	1) slower.	(2) faster.	(3) at the same spe	ed. (4) bao	ckwards. (5	) —	

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		r time, length and mome ds B. relativisti				
	(1) both A and B	(2) A only	(3) B only	(4) neither A no	or B	(5) —
	According to the speci would notice your puls	al theory of relativity, if e rate to	you measure your c	own pulse while trav	veling at very	high speeds, you
	(1) be the same as usu	al. (2) decreas	e. (3) incr	rease. (4)	_	(5) —
20.	20. The length of a meterstick projected like a spear at 0.87c is seen by a person at rest to be					
	(1) 0.5 m.	(2) 1.5 m.	(3) 1 m.	(4) 1.25 m.	(5) 0.8'	7 m.
21. Suppose at the surface of the Earth a person can do 20 pushups. In a spaceship far away from any gravitational influence, accelerating at $g$ , the same person could do						
	(1) 20 pushups.	(2) more than 20 pushu	ps. $(3)$ less the	an 20 pushups.	(4) —	(5) —
22.	From a general relativi	stic point of view, a pers	son on the ground flo	oor of a skyscraper	ages	

- (1) slower than a person on the top floor.
- (2) faster than a person on the top floor.
- (3) at the same speed as a person on the top floor.
- (4) this question cannot be answered.
- (5) -

23. Fire a cannonball from a cannon and it curves due to gravity. Shine a light from a flashlight and it

- (1) curves per second the same as the cannonball.
- (2) follows a straight-line path with no curvature at all.
- (3) curves slightly, but not as much per second as the cannonball.
- (4) curves half as much as the cannonball.
- (5) not enough data.

24. Particle A has twice the charge of nearby particle B. Compared to the force on Particle A, the force on Particle B is

(1) the same. (2) four times as much. (3) half as much. (4) twice as much. (5) None of these.

- 25. When two lamps are connected in parallel to a battery, the electrical resistance that the battery senses is
  - (1) less than the resistance of either lamp.
  - (2) more than the resistance of either lamp.
  - (3) none of these
  - (4) impossible to say
  - (5) -

26. **BONUS** If the speed of a moving object doubles, which of the following also doubles?

(1) momentum (2) acceleration (3) kinetic energy (4) inertia (5) —

(1) at the focal point. (2) beyond the focal point. (3) in front of the focal point. (4) - (5) -