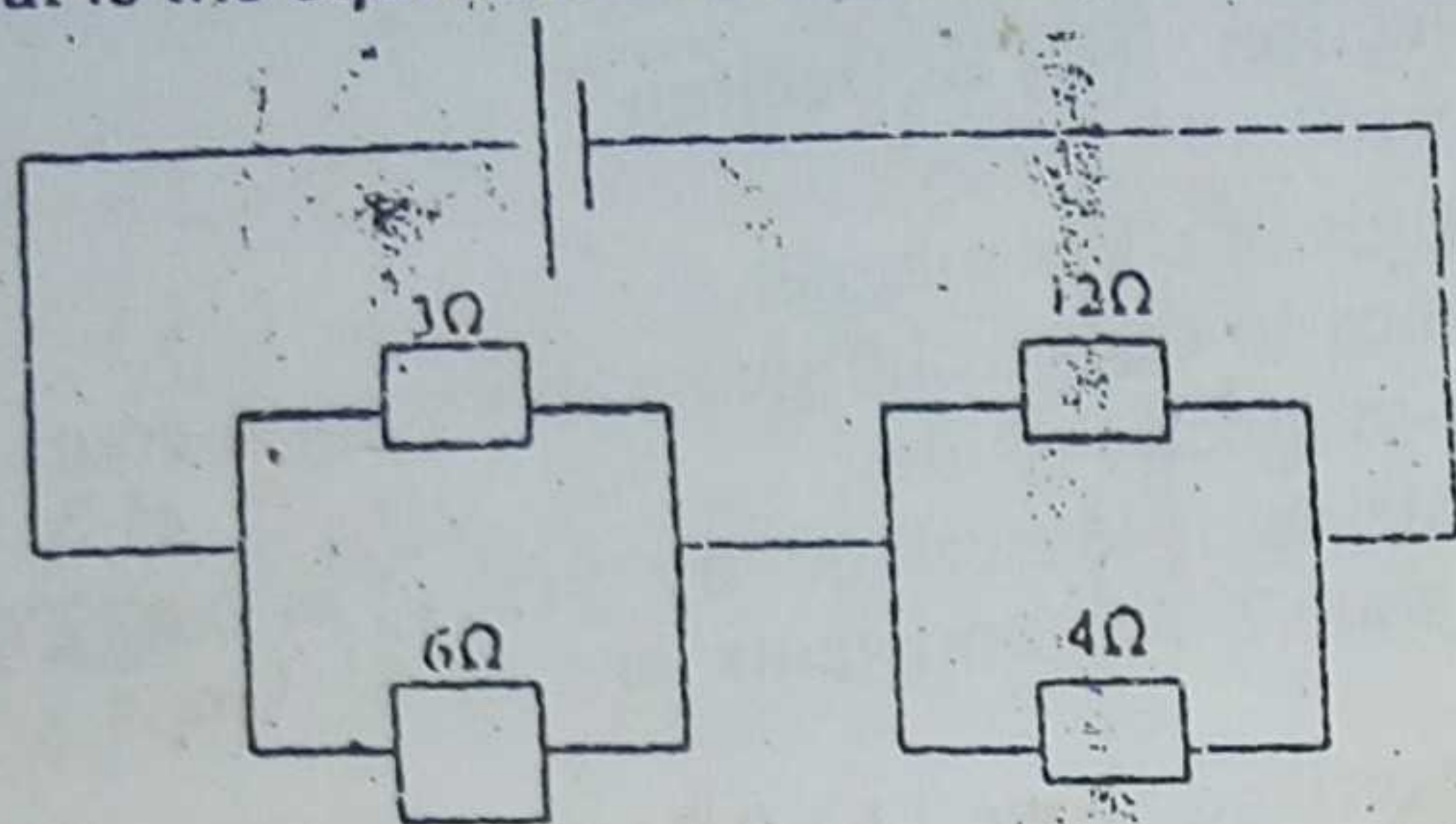


OLABISI ONABANJO UNIVERSITY, AGO-IWOYE  
FACULTY OF SCIENCE  
DEPARTMENT OF PHYSICS  
2007/2008 RAIN SEMESTER EXAMINATION  
PHY 102: GENERAL PHYSICS II      DATE: JUNE 2009

1. A  $5\Omega$  resistor and a  $8\Omega$  resistor are connected in parallel, and the combination is connected across a  $120\text{V}$  dc line. The currents in  $5\Omega$  and  $8\Omega$  are respectively (A)  $15\text{A}$  &  $24\text{A}$  (B)  $11\text{A}$  &  $28\text{A}$  (C)  $24\text{A}$  &  $15\text{A}$  (D)  $28\text{A}$  &  $11\text{A}$
2. What is the equivalent resistance of the network



- (A)  $6\Omega$  (B)  $5\Omega$  (C)  $4\Omega$  (D)  $10\Omega$

3. A moving coil meter has a resistance of  $5.0\Omega$  and full-scale deflection is produced by a current of  $1.0\text{mA}$ . What value of resistance has to be connected to the moving coil meter and how should it be adapted for use as an ammeter reading up to  $2\text{A}$

- (A)  $0.00251\Omega$  (B)  $0.00351\Omega$  (C)  $0.00451\Omega$  (D)  $0.00551\Omega$

4. A steady uniform current of  $5\text{mA}$  flows axially along a metal cylinder of cross-sectional area  $0.2\text{mm}^2$ , length  $5\text{m}$  and resistivity  $3 \times 10^{-5}\Omega\text{m}$ . What is the potential difference between the ends of the cylinder

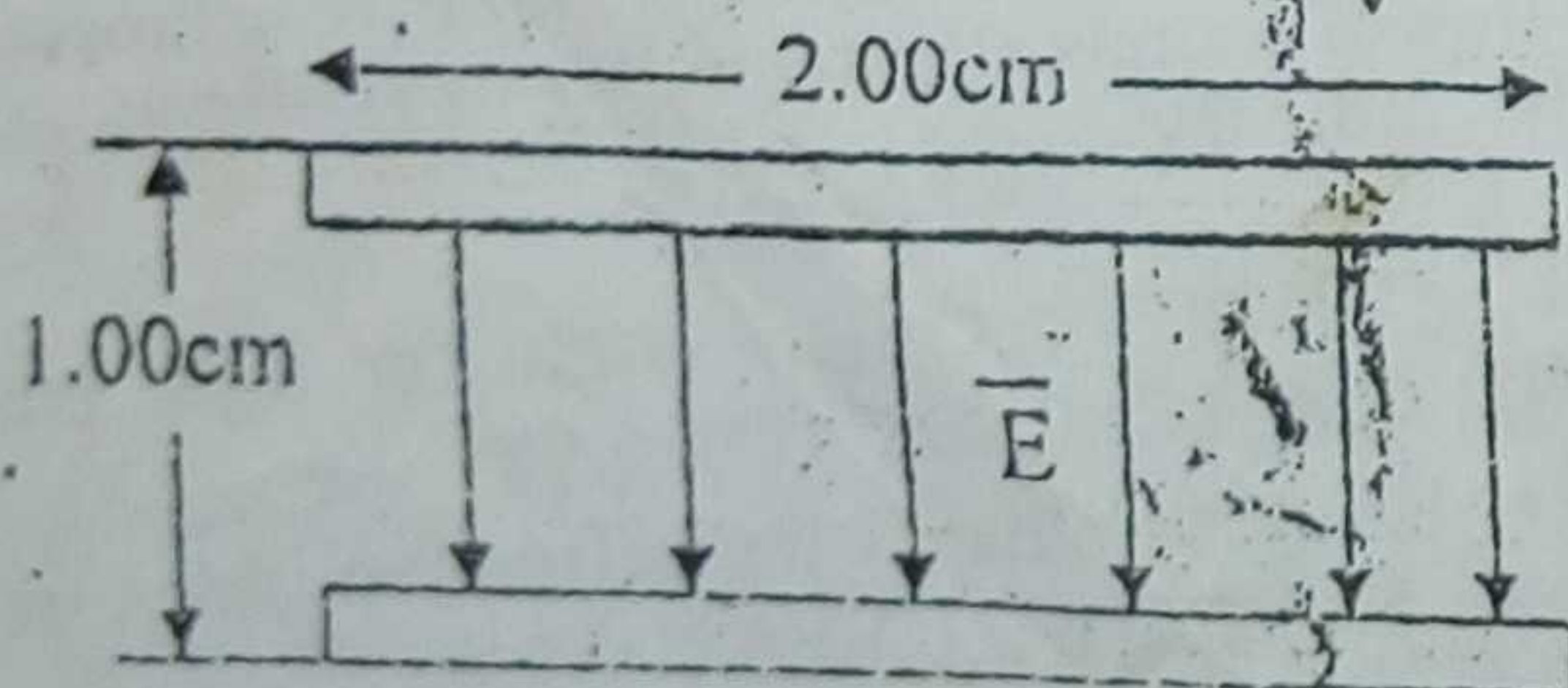
- (A)  $3.5\text{V}$  (B)  $3.75\text{V}$  (C)  $4.0\text{V}$  (D)  $4.5\text{V}$

5. Which of the following statement is/are true

- a. A millimeter can be used as an ammeter if it is placed in series with a shunt.  
b. A millimeter can be used as an ammeter if it is placed in series with a multiplier.  
c. A millimeter can be used as an ammeter if it is placed in parallel with a multiplier.  
d. A millimeter can be used as a voltmeter if placed in parallel with a shunt.  
e. A millimeter can be used as an ammeter if it is placed in parallel with a shunt.

- (A) i & iii (B) iii & iv (C) ii & v (D) ii only.

6. If a uniform electric field exist in the region between two opposite charged plane parallel plate. If an electron is released as shown below. In what direction will it travel



- (A) Towards the upper plate  
(B) Towards the lower plate  
(C) parallel to the plate  
(D) Does not move

7. Find the critical angle of water-air boundary, if the index of refraction of water is  $1.33$

- (A)  $1^\circ$  (B)  $1.3^\circ$  (C)  $49^\circ$  (D)  $94^\circ$

8. Which of this following is not a property of the electric lines of force?

- (A) It always starts on the negative charge and end on the positive charge.

4



- (B) Magnitude of the charge is proportional to the number of electric field lines that originate or terminate on a charge.
- (C) The direction of the field at a point is along the tangent to the line of force.
- (D) The electrical field lines does not cross one another.
9. The electrical conductance  $C$  is defined as
- (A) The reciprocal of the resistivity (B) The reciprocal of the current density.
- (C) The reciprocal of the electric field.
10. The process by which two or more waves traveling through the same medium at the same time meet and having superimposed displacement is called
- (A) Interference (B) Diffraction (C) Reflection (D) Refraction
11. Which of the following is true of magnetism?
- (A) Iron filings ~~are~~ <sup>cling</sup> mainly around the ends of a bar magnet.
- (B) The freely suspended bar magnet comes to rest in the geographic north-south direction (C) Likes poles attract (D) Lodestone is non-magnetic oxide.
12. A Sinusoidal wave travelling along a string is described by  $y(x, t) = 0.0327 \sin(72.1x - 2.72t)$ . What is the amplitude of the wave? All constants are in SI Units (A) 72.1m (B) 0.0327m (C) 2.72m (D) 0.0871m
13. What is the wavelength of the above described wave (A) 2.31m (B) 0.433m (C) 0.0871m (D) 0.0327m
14. The wave equation is given as follows when  $v=c$  (A)  $\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}$  (B)  $\frac{1}{c} \frac{\partial^2 y}{\partial t^2} = \frac{\partial^2 y}{\partial x^2}$  (C)  $c^2 \frac{\partial^2 y}{\partial t^2} = \frac{\partial^2 y}{\partial x^2}$  (D)  $\frac{\partial^2 y}{\partial x^2} = \frac{\partial^2 y}{\partial t^2}$
15. Two identical sinusoidal waves moving in opposite directions produces (A) progressive waves (B) standing waves (C) diffracted waves (D) refracted waves
16. Sunlight reflects off the smooth surface of an unoccupied swimming pool. At what angle of reflection is the light completely polarized?  $n(\text{air})=1.00$  and  $n(\text{water})=1.33$  (A)  $36.9^\circ$  (B)  $53.1^\circ$  (C)  $19.47^\circ$  (D)  $1.33^\circ$
17. Locate the image produced by an incident ray with  $n_1=1.0$  that is refracted on a medium  $n_2=2.0$  with radius of curvature 10cm, if the object distance is 20cm. (A) -20cm (B) +20cm (C) -40cm (D) +40cm
18. Which of these statements is true (I) Prisms are used in optical instruments (II) Used in measuring the refractive index of glass (III) Used in separating colours emitted by glowing objects (A) I only (B) II & III only (C) I & II (D) I, II and III
19. Which of the following is not a particle emitted during radioactive processes (A) alpha particles (B) beta particles (C) neon rays (D) gamma rays
20. Which of the following statements is false about semiconductors (I) their resistance is between the high value of insulators and the low value of metals (II) examples of semiconductors are Si and Ge (III) they are useless to the electronic industry (A) I (B) II (C) III (D) None of the above
21. The refractive index of diamond is 2.42. What is the critical angle for light passing from diamond to air?  $n(\text{air}) = 1.00$  (A)  $0.413^\circ$  (B)  $24.4^\circ$  (C)  $0.292^\circ$  (D)  $16.98^\circ$
22. The speed of light in a certain glass is  $1.91 \times 10^8$  m/s. What is the refractive index of the glass? (Speed of light in Vacuum =  $3 \times 10^8$  m/s) (A) 1.57 (B) 0.64 (C) 1.5 (D) 2.4
23. A pool of water ( $n=4/3$ ) is 60cm deep. Find its apparent depth when viewed vertically through air. (A) 2.2cm (B) 57.8cm (C) 105cm (D) 45cm
24. The nucleus of an atom is made up of protons and neutrons which are collectively known as (A) nuclear (B) nucleons (C) cations (D) anions
25. What is the potential drop across an electric hot plate that draws 5.0A when its hot resistance is 24ohms? (A) 4.8V (B) 100V (C) 0.12KV (D) 0.08KV

$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$   
 $\frac{1}{R_{eq}} = \frac{1}{10} + \frac{1}{20} + \frac{1}{30}$   
 $\frac{1}{R_{eq}} = \frac{3}{30} + \frac{1.5}{30} + \frac{2}{30}$   
 $\frac{1}{R_{eq}} = \frac{6.5}{30}$   
 $R_{eq} = \frac{30}{6.5} = 4.615 \Omega$   
 $V_{R_1} = \frac{R_1}{R_{eq}} \cdot V = \frac{10}{4.615} \cdot 10 = 21.67 V$   
 $V_{R_2} = \frac{R_2}{R_{eq}} \cdot V = \frac{20}{4.615} \cdot 10 = 43.33 V$   
 $V_{R_3} = \frac{R_3}{R_{eq}} \cdot V = \frac{30}{4.615} \cdot 10 = 65 V$