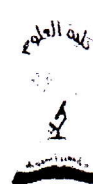




Assiut University
Faculty of Science
Physics Department

Final Exam 2020-2021
General Physics (1)
Total Degree 50%

Date: 23/6/2021
Time: 2 hours



Part I: Choose the correct answer for the following statements: (35 degrees)

- 1- According to Newton's first law, the object moves atacceleration unless acted upon by an external force:
A. Uniform B. Zero C. Non- uniform D. Negative
- 2- An action/reaction pair of forces:
A. point in the same direction. B. act on the same object.
C. are always long-range forces. D. act on two different objects
- 3- When you sit on a chair, the resultant force on you is
A. zero B. up. C. down. D. depending on your weight.
- 4- An object has completed two cycle in a circle of radius 14 cm, its displacement equalcm
A. zero B. 28 C. 88 D. 140
- 5- The average kinetic energy E of a gas molecule is given by the equation $E = \frac{3}{2} kT$ where T is the absolute (kelvin) temperature, what are the SI base units of k ?
A. $\text{kg}^{-1} \cdot \text{m}^{-1} \cdot \text{s}^2 \cdot \text{K}$ B. $\text{kg}^{-1} \cdot \text{m}^{-2} \cdot \text{s}^2 \cdot \text{K}$ C. $\text{kg} \cdot \text{m} \cdot \text{s}^{-2} \cdot \text{K}^{-1}$ D. $\text{kg} \cdot \text{m}^2 \cdot \text{s}^{-2} \cdot \text{K}^{-1}$
- 6- The apparent weight of a person standing in an elevator which is moving down with uniform acceleration will be:
A. Same as the weight B. Less than its weight
C. Twice the weight D. Greater than its weight
- 7- If a car is traveling in certain direction and slowing down, what is the direction of the car's acceleration?
A. The acceleration is B. Same direction of the car's motion
C. Opposite to the direction of the car's motion D. Neither of these
- 8- The required time to stop a car moving with velocity 20m/sec within a distance 40m is:
A. 2 sec B. 3sec C. 4 sec D. 5 sec
- 9- If the horizontal force component is 20N and $\theta = 30^\circ$, The Y-component is:
A. 8.7 N B. 10 N C. 11.5 N D. 17.3N

10-Equal forces F act on isolated bodies A and B. The mass of B is three times that of A.

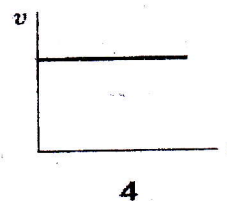
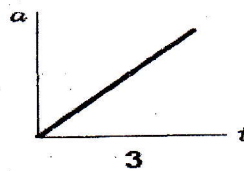
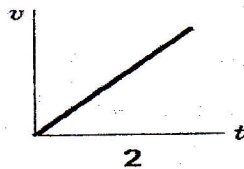
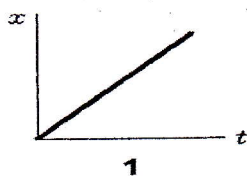
The magnitude of the acceleration of A is:

- A. Three times that of B B. $1/3$ that of B C. The same as B D. Nine times that of B

11- According to Newton's third law of motion, when a hammer strikes and exerts force on a nail, the nail

- A. disappears into the wood. B. exerts an equal force back on the hammer.
C. moves at a constant speed. D. creates a friction with the hammer.

12- Consider the following four graphs (note the axes carefully), Which of these represents motion at constant speed



- A. 4 only B. 3 & 4 only C. 1 & 2 D. 1 & 4

13-An object moving in the $+x$ axis experiences an acceleration of 2 m/s^2 . This means the object is

- A. traveling at 2 m in every second.
B. traveling at 2 m/s in every second.
C. changing its velocity by 2 m/s.
D. increasing its velocity by 2 m/s in every second.

14-In the CGS system, what are the fundamental units?

- A. Newton, centimeter, second B. kilogram, meter, second
C. gram, centimeter, minute D. gram, centimeter, second

15-Suppose that an object travels from one point in space to another. Make a comparison between the displacement and the distance traveled.

- A. The displacement is either greater than or equal to the distance traveled.
B. The displacement is always equal to the distance traveled.
C. The displacement is either less than or equal to the distance traveled.
D. The displacement can be either greater than, smaller than, or equal to the distance traveled.

16-Suppose a ball is thrown straight up. What is its acceleration just before it reaches its highest point

- A. zero B. slightly less than g C. exactly g D. slightly greater than g

17- The slope of a position versus time graph gives

- A. position. B. velocity. C. acceleration. D. displacement.

18- 55 mi/h is how many m/s? (1 mi = 1609 m.)

- A. 25 m/s B. 49 m/s C. 90 m/s D. 120 m/s

19- A ball is thrown straight up with a speed of 36 m/s. How long does it take to return to its starting point?

- A. 3.67 s B. 7.35 s C. 11.0 s D. 14.7 s

20- Which one of the following is an example of a vector quantity?

- A. distance B. velocity C. mass D. area

21- In the absence of an external force, a moving object will

- A. stop immediately. B. slow down and eventually come to a stop.
C. go faster and faster. D. move with constant velocity.

22- The acceleration of an object is inversely proportional to

- A) the net force acting on it. B) its position.
C) its velocity. D) its mass.

23 - Action-reaction forces are

- A. equal in magnitude and point in the same direction.
B. equal in magnitude but point in opposite directions.
C. unequal in magnitude but point in the same direction.
D. unequal in magnitude and point in opposite directions

24- Mass and weight

- A. both measure the same thing. B. are exactly equal.
C. are two different quantities. D. are both measured in kilograms.

25- The force that keeps you from sliding on an icy sidewalk is

- A. weight. B. kinetic friction. C. static friction. D. normal force.

26- An object sits on a frictionless surface. A 16 N force is applied to the object, and it accelerates at 2 m/s^2 . What is the mass of the object?

- A. 4 kg B. 8 kg C. 32 kg D. 78 N

27- Starting from rest, a 4-kg body reaches a speed of 8 m/s in 2 s. What is the net force acting on the body?

- A. 4 N B. 8 N C) 16 N D) 32 N

28- The average speed of a moving object during a given interval of time is always:

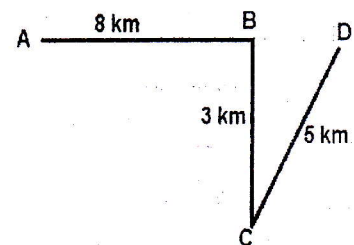
- A. The magnitude of its average velocity over the interval
- B. The distance covered during the time interval divided by the time interval
- C. one-half its speed at the end of the interval
- D. its acceleration multiplied by the time interval

29- What is a normal force?

- A. The same as a frictional force
- B. It is a force that acts perpendicular to the contact surface
- C. It is equivalent to the weight of an object.
- D. It is equivalent to inertia.

30- A Lorry takes 15 minutes to travel along the path ABCD. The average speed of the lorry is:

- A. 48 km/h
- B. 22 km/h
- C. 64 km/h
- D. 4 km/h



31- in the previous problem the average velocity of the lorry is:

- A. 48 km/h
- B. 22 km/h
- C. 64 km/h
- D. 4 km/h

32- An object dropped from the window of a tall building hits the ground in 12 s. If its acceleration is 9.8 m/s^2 , the height of the window above the ground is:

- A. 29.4 m
- B. 58.8 m
- C. 118
- D. 706 m

33- What is the mass of an object that weighs 250 N on the surface of the Earth where the acceleration due to gravity is 9.8 m/s^2 ?

- A. 250 kg
- B. 24.5 kg
- C. 25.5 kg
- D. 2,450 kg

34- A freely falling body has a constant acceleration of 9.8 m/s^2 . This means that:

- A. the body falls 9.8 m during each second
- B. the body falls 9.8 m during the first second only
- C. the speed of the body increases by 9.8 m/s during each second
- D. the acceleration of the body increases by 9.8 m/s^2 during each second

35- If $A = 12\hat{i} - 16\hat{j}$ and $B = -24\hat{i} + 10\hat{j}$, what is the magnitude of the vector $C = 2A - B$?

- A. 42
- B. 14
- C. 64
- D. 90

(15 degree)

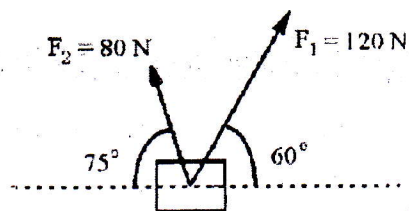
Diagram showing a particle of mass $m = 10 \text{ kg}$ being pulled by a force $F = 70.7 \text{ N}$ at an angle of 45° to the horizontal. The particle moves a distance Δx to the right, reaching a final velocity v_f . The weight mg acts vertically downwards.

- What is value of the normal force n ?
- Calculate the acceleration of the block.
- What is the final velocity after moving the distance $\Delta x = 5 \text{ m}$.

2- Two forces are acting on an object as shown in the Figure.

a- What is the magnitude of the resultant?

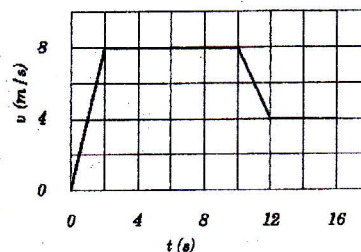
b- What is the direction of the resultant?



3- Consider the motion of the object whose velocity-time graph is given in the diagram.

a- What is the acceleration of the object between times $t=0$ and $t=2$?

b- What is the acceleration of the object between times $t=10$ and $t=12$?



With My Best regards



General Physics 2 (P105)
2nd semester 2020-2021
Final Exam (80 Marks)

Exam date: Wednesday, 02/06/2021
Exam Time: 2 hours

"يتم طمس (تسويد) الإجابة المختارة من قبل الطالب باستخدام القلم الجاف فقط"

First part (I):(50 Marks)

1st Question:

(20 Marks)

1. The energy required to bring a charge $q = -8.8 \text{ nC}$ from far away to 5.5 cm from a point charge Q is 13 mJ. What is the potential at the final position of q ?
 - a) -112 MV
 - b) -1.5 MV
 - c) -0.66 MV
 - d) +1.5 MV
2. Which electric field would produce a 10 N force in the +x-direction on a charge of -10 nC?
 - a) $-1.0 \times 10^{-7} \text{ N/C}$
 - b) $-1.0 \times 10^9 \text{ N/C}$
 - c) $1.0 \times 10^{10} \text{ N/C}$
 - d) $1.0 \times 10^{11} \text{ N/C}$
3. An atomic nucleus contains 56 protons, for iron. Which force would this nucleus apply on an electron at a distance of $10 \times 10^{-12} \text{ m}$?
 - a) $0.65 \times 10^{-4} \text{ N}$
 - b) $0.02 \times 10^{-4} \text{ N}$
 - c) $1.3 \times 10^{-4} \text{ N}$
 - d) $72.8 \times 10^{-4} \text{ N}$
4. A storm cloud is 2 km above the surface of Earth. The lower surface of the cloud is approximately 2 km² in area. What is the approximate capacitance of this storm cloud–Earth system?
 - a) $9 \times 10^{-15} \text{ F}$
 - b) $9 \times 10^{-9} \text{ F}$
 - c) $17.7 \times 10^{-15} \text{ F}$
 - d) $17.7 \times 10^{-9} \text{ F}$
5. If you double the voltage across the plates of a capacitor, how is the stored energy affected?
 - a) Stored energy will decrease two times.
 - b) Stored energy will decrease four times.
 - c) Stored energy will increase two times.
 - d) Stored energy will increase four times.

6. A capacitor with neoprene rubber ($k = 6.7$) as the dielectric stores 0.185 mJ of energy with a voltage of 50 V across the plates. If the area of the plates is 500 cm^2 , what is the plate separation?
 - a) $20 \text{ }\mu\text{m}$
 - b) 20 m
 - c) $80 \text{ }\mu\text{m}$
 - d) 80 m
7. An electric field 15 N/C applies a force $-3 \times 10^{-6} \text{ N}$ on a particle. What is the charge on the particle?
 - a) $-2.0 \times 10^{-7} \text{ C}$
 - b) $2.0 \times 10^{-7} \text{ C}$
 - c) $2.0 \times 10^{-8} \text{ C}$
 - d) $2.0 \times 10^{-9} \text{ C}$
8. You move a charge q from $r_i = 20 \text{ cm}$ to $r_f = 40 \text{ cm}$ from a fixed charge $Q_i = 10 \text{ nC}$. What is the difference in potential for these two positions?
 - a) $-2.2 \times 10^2 \text{ V}$
 - b) $-1.7 \times 10^3 \text{ V}$
 - c) $-2.2 \times 10^4 \text{ V}$
 - d) $-1.7 \times 10^2 \text{ V}$
9. How much work is required from an outside agent to move an electron from $r_i = 0 \text{ cm}$ to $r_f = 20 \text{ cm}$ in an electric field 50 N/C ?
 - a) $1.6 \times 10^{-15} \text{ J}$
 - b) $1.6 \times 10^{-16} \text{ J}$
 - c) $1.6 \times 10^{-20} \text{ J}$
 - d) $1.6 \times 10^{-18} \text{ J}$
10. How does current depend on resistance in Ohm's law?
 - a) Current is directly proportional to the resistance.
 - b) Current is inversely proportional to the resistance.
 - c) Current is proportional to the square of the resistance.
 - d) Current is inversely proportional to the square of the resistance.
11. If you double the current through a resistor, by what factor does the power dissipated by the resistor change?
 - a) Power increases by a factor of two.
 - b) Power increases by a factor of four.
 - c) Power increases by a factor of eight.
 - d) Power increases by a factor of 16.
12. To measure the power consumed by your laptop computer, you place an ammeter in series with its DC power supply. When the screen is off, the computer draws 0.40 A of current. When the screen is on at full brightness, it draws 0.90 A of current. Knowing the DC power supply delivers 16 V , how much power is used by the screen?
 - a) The power used by the screen is -8.0 W .
 - b) The power used by the screen is 0.3 W .

- c) The power used by the screen is 3.2 W.
d) The power used by the screen is 8.0 W.
13. What are the SI units for electric current?
a) C/s
b) e/s
c) - e/s
d) C/s²
14. Which equation for electric power is incorrect?
a) $P = I^2 R$
b) $P = \frac{V}{R^2}$
c) $P = IV$
d) $P = \frac{V^2}{R}$
15. How does a resistor dissipate power?
a) A resistor dissipates power in the form of heat.
b) A resistor dissipates power in the form of sound.
c) A resistor dissipates power in the form of light.
d) A resistor dissipates power in the form of charge.
16. What could cause Ohm's law to break down?
a) If small amount of current flows through a resistor, the resistor will heat up so much that it will change state, in violation of Ohm's law.
b) If excessive amount of current flows through a resistor, the resistor will heat up so much that it will change state, in violation of Ohm's law.
c) If small amount of current flows through a resistor, the resistor will not heat up so much and it will not change its state, in violation of Ohm's law.
d) If excessive amount of current flows through a resistor, the resistor will heat up so much that it will not change its state, in violation of Ohm's law.
17. Three charges are on a line. The left charge is $q_1 = 2.0$ nC. The middle charge is $q_2 = 5.0$ nC. The right charge is $q_3 = -3.0$ nC. The left and right charges are 2.0 cm from the middle charge. What is the force on the middle charge?
a) -5.6×10^{-4} N to the left
b) -1.12×10^{-4} N to the left
c) 1.12×10^{-4} N to the right
d) 5.6×10^{-4} N to the right
18. A constant electric field is 4.5×10^5 N/C \hat{j} . In which direction is the force on a -20 nC charge placed in this field?
a) The direction of the force is in the -X direction.
b) The direction of the force is in the +X direction.
c) The direction of the force is in the -y direction.
d) The direction of the force is in the +y direction.

19. Two uniform electric fields are superimposed. The first electric field is $E_1 = (14 \text{ N/C})\hat{i}$. The second electric field is $E_2 = (7.0 \text{ N/C})\hat{j}$. With respect to the positive x-axis, at which angle will a positive test charge accelerate in this combined field?
- a) 26.5°
 - b) 53°
 - c) 90°
 - d) 108°
20. An electron moves in an electric field. Does it move toward regions of higher potential or lower potential? Explain.
- a) It moves toward regions of higher potential because its charge is negative.
 - b) It moves toward regions of lower potential because its charge is negative.
 - c) It moves toward regions of higher potential because its charge is positive.
 - d) It moves toward regions of lower potential because its charge is positive.

2nd Question:

(30 Marks)

21. A glass rod is rubbed with a piece of silk. During the process, the glass rod acquires a positive charge and the silk
- a) Acquires a positive charge also.
 - b) Acquires a negative charge.
 - c) Remains neutral.
 - d) It depends on how hard the rod was rubbed.
22. Materials in which the electrons are bound very tightly to the nuclei are referred to as
- a) Insulators.
 - b) Conductors.
 - c) Semiconductors.
 - d) Superconductors
23. What are the units of the Coulomb constant k , which appears in Coulomb's law?
- a) N.m/C
 - b) N/C
 - c) $\text{N}^2.\text{m/C}^2$
 - d) $\text{N.m}^2/\text{C}^2$
24. Two point charges, separated by 1.5 cm, have charge values of 2.0 and $-4.0 \mu\text{C}$, respectively. What is the magnitude of the electric force between them?
- a) 400 N
 - b) 360 N
 - c) 320 N
 - d) 160 N

25. A 1.0-C charge is 15 m from a second charge, and the force between them is 1.0 N . What is the magnitude of the second charge?
- 25 C
 - $25\text{ }\mu\text{C}$
 - 25 mC
 - 25 nC
26. What are the magnitude and direction of the electric field at a distance of 1.50 m from a 50.0-nC charge?
- 20 N/C toward the charge
 - 200 N/C away from the charge
 - 20 N/C away from the charge
 - 200 N/C toward the charge
27. Two point charges of $+3.0\text{ }\mu\text{C}$ and $-7.0\text{ }\mu\text{C}$ are placed at $x = 0$ and $x = 0.20\text{ m}$. What is the magnitude of the electric field at the point midway between them?
- $9.0 \times 10^6\text{ N/C}$
 - $3.6 \times 10^6\text{ N/C}$
 - $1.8 \times 10^6\text{ N/C}$
 - $4.5 \times 10^6\text{ N/C}$
28. A solid sphere of radius 40.0 cm has a total positive charge of $26.0\text{ }\mu\text{C}$ uniformly distributed throughout its volume, the magnitude of the electric field at distance 60 cm from the center of the sphere is:
- 645 kN/C
 - 365 kN/C
 - 1.46 MN/C
 - 200 MN/C
29. A surface on which all points are at the same potential is referred to as
- a constant electric force surface.
 - a constant electric field surface.
 - an equipotential surface.
 - an equivoltage surface.
30. A negative charge is moved from point A to point B along an equipotential surface.
- The negative charge performs work in moving from point A to point B.
 - Work is required to move the negative charge from point A to point B
 - Work is both required and performed in moving the negative charge from point A to point B
 - No work is required to move the negative charge from point A to point B
31. It takes 50 J of energy to move 10 C of charge from point A to point B. What is the potential difference between points A and B?
- 500 V
 - 50 V
 - 5.0 V
 - 0.50 V

32. Two capacitors, $C_1=25.0 \mu\text{F}$ and $C_2=5.00 \mu\text{F}$, are connected in parallel and charged with a 100V power supply, the total energy stored in the two capacitors.
- 150 J
 - 15 J
 - 0.15 J
 - 1.5 J
33. A $4.12 \mu\text{F}$ parallel-plate capacitor has a plate area of $2,000 \text{ cm}^2$ and a plate separation of $100 \mu\text{m}$. What dielectric is between the plates?
- 233.
 - 466.
 - 699.
 - 1,000
34. If it takes 10 mJ to move a charge q from $x_i = 25 \text{ cm}$ to $x_f = -25 \text{ cm}$ in an electric field of $(-20 \text{ N/C})\hat{i}$, what is the charge q ?
- 1.0 mC
 - +0.25 mC
 - +1.0 mC
 - +400 mC
35. Which of the following is not a vector?
- electric force
 - electric field
 - electric potential
 - electric line of force

Second Part (II) Mid Term and Oral Exam

(30 Marks)

3rd Question: State True or False on the following

(30 Marks)

36. The Electric force between two charges is directly proportional to the distance between them.
- True
 - False
37. The electric Field lines resulting from two opposite charges can form a closed loop.
- True
 - False
38. A cylindrical wire has a radius r and length L , if both r and L are doubled, the resistance of the wire is decreased.
- True
 - False
39. Capacitance is a positive quantity, and directly proportional to potential difference.
- True
 - False
40. An equipotential surface must be parallel to the electric field at any point.
- True
 - False
41. The capacitance of an isolated sphere is proportional to its radius.
- True
 - False
42. An equipotential surface must be parallel to the electric field at any point.
- True
 - False
43. Electric flux (Φ) is represented by the number of electric field lines penetrating some surface.
- True
 - False

44. Based on the definition of the electric Field E , if the charge Q is positive the electric field E is radially directed inward toward the Q .
 - a. True
 - b. False
45. The electric field E at point located at midway between positive charges each of it equal to Q , is maximum.
 - a. True
 - b. False
46. If the net flux through a gaussian surface is zero, the number of electric field lines entering the surface equals the number leaving the surface.
 - a. True
 - b. False
47. A spherical balloon contains a positive charge at its center, the balloon is inflated to a greater volume while the charge remains at the center, The electric potential at the surface of the balloon increase.
 - a. True
 - b. False
48. Two capacitors are identical. the smallest equivalent capacitance for the combination can be obtained by connected them in Parallel.
 - a. True
 - b. False
49. For nonohmic materials. as the applied voltage increases, the resistance of the diode is increased.
 - a. True
 - b. False
50. The 30 W bulb carries the greater current but the 60W bulb has the higher resistance.
 - a. True
 - b. False