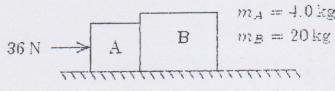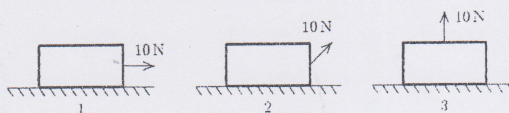30) A particle moves along the x axis. Its position is given by the equation $x = 2 + 3t - 4t^2$ with x in meters and t in seconds. Determine its velocity when it returns to the position it had at t = 0.

A. 0.75 m/s   B. 3 m/s   C. −0.75 m/s   D. −3 m/s

31) A fish swimming in a horizontal plane has velocity $v_i = (4\hat{\imath} + 1\hat{\jmath})$ m/s at a point in the ocean. After the fish swims with constant acceleration for 20.0 s and its velocity is $v_f = (20\hat{\imath} - 5\hat{\jmath})$ m/s. What are the components of the acceleration?

A. $(0.8\hat{\imath} - 0.3\hat{\jmath})$ m/s²   B. $(8\hat{\imath} - 3\hat{\jmath})$ m/s²   C. $(4\hat{\imath} + 1.5\hat{\jmath})$ m/s²   D. $(-4\hat{\imath} + 1.5\hat{\jmath})$ m/s²

32) A projectile is fired in such a way that its horizontal range is equal to three times its maximum height. What is the angle of projection?

A. 45°   B. 53.1°   C. 62°   D. 71.1°

33) A cube of aluminum has an edge length of 20 cm. what is the increase in its temperature if the internal energy of the cube increases by 47000 cal. (Aluminum density is 2.7 g/cm³ Aluminum specific heat is 0.217 cal/g°C)

A. 5 °C   B. 20 °C   C. 100 °C   D. 10 °C

34) How many calories are required to change one gram of 0°C ice to 100°C steam? (The water latent heat of fusion is 80 cal/g, the water latent heat of vaporization is 540 cal/g and the specific heat of water is 1 cal/g°C.)

A. 100   B. 540   C. 620   D. 720

35) If a thermometer in Celsius reads the same value as Fahrenheit thermometer (T(°C)=T(°F)). What is this value?

A. 40   B. −40   C. 574   D. −574

36) A gasoline engine absorbs 2500 J of heat and performs 1000 J of mechanical work in each cycle. The amount of heat expelled in each cycle is?

A. 1500 J   B. 1000 J   C. 3500 J   D. -1500 J

37) Each of four particles move along an x axis. Their coordinates (in meters) as functions of time (in seconds) are given by

particle 1: x(t) = 3.5 − 2.7t³
particle 2: x(t) = 3.5 + 2.7t³
particle 3: x(t) = 3.5 + 2.7t²
particle 4: x(t) = 3.5 − 3.4t − 2.7t²

Which of these particles have constant acceleration?

A. Only 1 and 2   B. All four   C. Only 3 and 4   D. Only 2 and 3

38) Two blocks (A and B) are in contact on a horizontal frictionless surface. A 36 N constant force is applied to A as shown. What magnitude of the contact force of A on B is: mA = 4.0kg, mB = 20kg

$m_A = 4.0$ kg
$m_B = 20$ kg
36 N → A | B

A. 1.5N   B. 6 N   C. 30N   D. 36N

39) The coordinate of a particle in meters is given by x(t) = 16t − 3t³, where the time t is in seconds. The particle is momentarily at rest at t =

A. 0.75 s   B. 1.3 s   C. 5.3 s   D. 7.3 s

40) A crate rests on a horizontal surface and a woman pulls on it with a 10-N force. Rank the situations shown below according to the magnitude of the normal force exerted by the surface on the crate, least to greatest.

10 N (horizontal, diagram 1)
10 N (at angle, diagram 2)
10 N (vertical, diagram 3)

A. 3, 2, 1   B. 1, 2, 3   C. 2, 3, 1   D. 3, 1, 2

End of Questions Good Luck (Dr. Ghada Abbady Dr. Mohamed Elesaily Dr. Hadeer El-Hawary)

3 |

| A. 460	B. -460	C. 273	D. -273

17) While working in a research lab, you find that it takes 400 J of heat to increase the temperature of 0.12 kg of a material by 30 K. What is the specific heat of the material?

A. 111.11 J/kg.K   B. 110 J/g°C   C. 10 J/kg.K   D. 10 J/ g°C

18) Which temperature scale never has negative value?

A. Fahrenheit   B. Celsius   C. Kelvin   D. Non of mentioned

19) An isothermal process is a type of thermodynamic process in which the ... of a system remains constant.

A. temperature   B. pressure   C. volume   D. heat energy

20) In the process of melting, thermal energy is :.

A. taken in   B. given out   C. remains constant   D. A or C

## Q2- Choose the correct answer (30 marks- 1.5 mark each)

21) A 5.00 kg object placed on a frictionless, horizontal table is connected to a cable that passes over a pulley and then is fastened to a hanging 9.00 kg object. So, the tension in the string if the acceleration of the two objects = 6.3 m/s² equals:

A. 5.15 N   B. 3.15 N   C. 31.5 N   D. 10.15 N

22) A 900 kg race car makes one circular lap around a track of radius 50 m in 11 s. What is the car's centripetal acceleration?

A. 0.366 m/s²   B. 16.3 m/s²   C. 63.3 m/s²   D. 163.6 m/s²

23) A block of mass is placed on a ramp inclined at an angle $\theta = 40°$ with the horizontal. The minimum required coefficient of static friction μ_s between the block and the surface if the block is not to slide down the ramp is:

A. 1.19   B. 0.84   C. 0.77   D. 0.64

24) In the shown figure, the force pushes a block weighing 10 N against a vertical wall. The coefficient of static friction between the wall and the block is $\mu_s = 0.5$. What is the minimum value of the force required to keep the block at rest?

A. 5 N   B. 10 N   C. 20 N   D. 40 N

25) In the shown figure, the two forces F₁=10 N and F₂=5 N are used to move a 2 kg object at a constant velocity along a horizontal floor. The magnitude of the friction force affecting the object is:

A. 6.25 N   B. 10 N   C. 12.5 N   D. 14.3 N

26) A plane drops a package of supplies to a party of explorers, as shown. If the plane is traveling horizontally at 40.0 m/s and is 100 m above the ground, where does the package strike the ground relative to the point at which it is released?

A. 4.52 m   B. 17.778 m   C. 92.6 m   D. 181 m

27) Given the displacement vectors $\vec{A} = (-3\hat{\imath} - 4\hat{\jmath} + 4\hat{k})\ m, \vec{B} = (-2\hat{\imath} + 3\hat{\jmath} - 7\hat{k})m$. Find the magnitudes of the vector $\vec{D} = 2\vec{A} - \vec{B}$.

A. $\vec{D} = -4\hat{\imath} - 11\hat{\jmath} + 15\hat{k}$ B. $\vec{D} = -8\hat{\imath} - 5\hat{\jmath} + \hat{k}$ C. $\vec{D} = -4\hat{\imath} - 11\hat{\jmath} + \hat{k}$ D. $\vec{D} = -8\hat{\imath} - 5\hat{\jmath} + 15\hat{k}$

28) An object moving with uniform acceleration has a velocity of 12.0 cm/s in the positive x direction whe x coordinate is 3 cm. If its x coordinate 2 s later is -5 cm, what is its acceleration?

A. $-16.0\ cm/s^2$ B. $16.0\ cm/s^2$ C. $-32.0\ cm/s^2$ D. $32.0\ cm/s^2$

29) A particle moves along the x axis. Its position is given by the equation $x = 2 + 3t - 4t^2$ with x in meters and t in seconds. Determine its position when it changes direction.

A. $2.0\ m$ B. $2.56\ m$ C. $4.0\ m$ D. $4.12\ m$

2 |

Assiut University
Department of Physics
First Semester 2024/2025
Date: 05/01/2025

كلية العلوم

جامعة أسيوط

Course: General Physics I
Code: P100
Final Exam (50 Marks)
Time: 2 hours
Exam in Three Pages


Q1- Choose the correct answer (20 marks- 1 mark each)

1) Calculate the mass of an atom of iron molar mass $A_{Fe} = 55.9\ gm/mol$, $N_A = 6.02 \times 10^{23} atom/mol$

   A. $4.5 \times 10^{-23} gm$ B. $4.5 \times 10^{23} gm$ C. $9.3 \times 10^{23}\ gm$ D. $9.3 \times 10^{-23}\ gm$

2) 1m is equivalent to 3.281 ft. A cube with an edge of 1.5 ft has a volume of
   A. $10.48\ m^3$ B. $0.0955\ m^3$ C. $0.1048\ m^3$ D. $9.6 \times 10^2\ m^3$

3) Of the following SI units, the only derived unit is ....
   A. Kelvin   B. Kilogram   C. Volt   D. Second

4) The position of a particle moving along the x axis is given by $x = (21 + 22t - 6.0t^2)$ m, where t is in s. What is the average velocity during the time interval $t = 1.0$ s to $t = 3.0$ s?
   A. - 4.0 m/s   B. - 2.0 m/s   C. 2.0 m/s   D. 4.0 m/s

5) The acceleration of an object is directly proportional to the .... acting on it and inversely proportional to its ... .
   A. net force - mass   B. mass - net force   C. velocity – displacement   D. displacement - velocity

6) A stone is thrown with an initial upward velocity of 7.0 m/s and experiences negligible air resistance. How far the stone will be after 0.50 s? (g=9.8 m/s²)
   A. $2.275\ m$ B. $4.9\ m$ C. $2.75\ m$ D. $4.49\ m$

7) For the shown Atwood machine $m_1 > m_2$, which relation is correct?

   A. $T - m_1 g = m_1 a$ B. $m_1 g - T = m_1 a$ C. $m_1 g = m_1 a - T$ D. $T = m_1 g$

8) Find the acceleration of Atwood's machine in which $m_1 = 3kg$, $m_2 = 6$ kg.
   A. $0.67\ m/s^2$ B. $3.267\ m/s^2$ C. $13.2\ m/s^2$ D. $39.2\ m/s^2$

9) "An object at rest remains at rest and an object in motion will continue in motion with a constant velocity, unless it experiences a net external force."
   A. Newton 1st law   B. Newton 2nd law   C. Newton 3rd law   D. None of mentioned

10) A long jumper leaves the ground at an angle of 20.0° above the horizontal and at a speed of 11.0m/s. How far does he jump in the horizontal direction?
   A. $0.722\ m$ B. $3.33\ m$ C. $6.13\ m$ D. $7.93\ m$

11) The action force is .... in magnitude to the reaction force and .... in direction
   A. equal - same   B. double - same   C. equal - opposite   D. double - opposite

12) Pulling up on a rope, you lift a 4 kg bucket of water from a well with an acceleration of 2 m/s². What is the tension in the rope attached to the bucket?
   A. 8 N   B. 32 N   C. 40 N   D. 48 N

13) Find the dimensional formula of coefficient of viscosity ((Force × Distance)/(Area × Velocity))
   A. ML^2T^{-3} B. $M L^{-3}$ C. $ML^{-1}T^{-1}$ D. dimensionless

14) A pure substance would evaporate or liquefied at its ...
   A. boiling point   B. melting point   C. condensation point   D. sublimation point

15) The coefficient of volume expansion can be expressed as
   A. $3\frac{\Delta L/L}{\Delta T}$ B. $\frac{\Delta T/V}{\Delta V}$ C. $\frac{\Delta T\ V}{\Delta V}$ D. None of mentioned

16) What is the value of the "absolute zero" (0 K) of temperature on the Fahrenheit scale approximately?

ج١١٥

13- If $F = 4.0$ N and $m = 2.0$ kg, what is the magnitude a of the acceleration for the block shown below? The surface is frictionless.
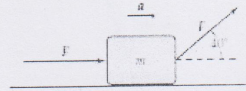
A. 3.5 m/s²	B. 4.4 m/s²	C. 5.3 m/s²	D. 1.53 m/s²

14- Two blocks (A and B) are in contact on a horizontal frictionless surface. A 36 N constant force is applied to A as shown. What the magnitude of the contact force of A on B is:
mA = 4.0kg, mB = 20kg
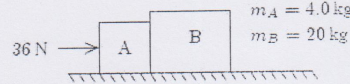
A. 1.5N	B. 6 N	C. 30N	D. 36N

15- The coordinate of an object is given as a function of time by $x = 4t^2 - 3t^3$, where x is in meters and it is in seconds. Its average acceleration over the interval from $t = 0$ to $t = 2$ s is:

A. −4 m/s²	B. 4 m/s²	C. 10 m/s²	D. −10 m/s²

4

3- A long-jumper leaves the ground at an angle of 20° above the horizontal and at a speed of 11 m/s. determines the jump's range?

A. 7.93 m	B. 4.22 m	C. 12.3m	D. 3.97 m

4- A long-jumper leaves the ground at an angle of 20° above the horizontal and at a speed of 11 m/s. what is the maximum height reached?

A. 0.72 m	B. 1.44 m	C. 0.72 m	D. 2.11 m

5- Consider two vectors $\mathbf{A}=3\hat{i}-2\hat{j}$, $\mathbf{B}=6\hat{i}-2\hat{j}$. Calculate the vector $\mathbf{C}=3\mathbf{A}-\mathbf{B}$, the magnitude of vector $\mathbf{C}$ equal?

A. 4	B. -1	C. 5	D. 1

6- Consider two vectors $\mathbf{A}=3\hat{i}-2\hat{j}$, $\mathbf{B}=6\hat{i}-2\hat{j}$. Calculate the vector $\mathbf{C}=3\mathbf{A}-\mathbf{B}$, what is the direction of the vector $\mathbf{C}$?

A. -53°	B. 53°	C. -307°	D. 360°

7- For a biological sample in a 1 m radius centrifuge to have a centripetal acceleration of 25g its speed must be approximately:

A. 16m/s	B. 11m/s	C. 122m/s	D. 25m/s

8- A car rounds a 20 m radius curve at 10m/s. The magnitude of its acceleration is:

A. 5.0m/s^2	B. 40m/s^2	C. 0.20m/s^2	D. 400m/s^2

9- A particle moves along the x axis from x_i to x_f. Of the following values of the initial and final coordinates, which results in a negative displacement?

A. $x_i=-4m$, $x_f=-8m$	B. $x_i=4m$, $x_f=6m$	C. $x_i=-4m$, $x_f=2m$	D. $x_i=-4m$, $x_f=-2m$

10- Each of four particles move along an x axis. Their coordinates (in meters) as functions of time (in seconds) are given by

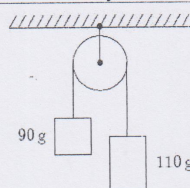particle 1: $x(t)=3.5-2.7t^3$
particle 2: $x(t)=3.5+2.7t^3$
particle 3: $x(t)=3.5+2.7t^2$
particle 4: $x(t)=3.5-3.4t-2.7t^2$

Which of these particles have constant acceleration?

| A. Only 1 and 2	B. All four	C. Only 3 and 4	D. Only 2 and 3

11- Two blocks are connected by a string and pulley as shown. Assuming that the string and pulley are massless, the magnitude of the acceleration of each block is:

90 g

110 g.

A. 0.98 m/s^2	B. 0.049 m/s^2	C. 0.0098 m/s^2	D. 0.54 m/s^2

12- A car travels in an oval path as shown below. $\mathbf{v}_A=25$ m/s, West, and $\mathbf{v}_B=20$ m/s, North. The ratio of the magnitude of the centripetal acceleration at B to that at A, is:

500 m

400 m
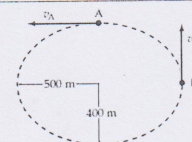
A. 0.512	B. 0.8	C. 1.25	D. 1.56

A. two	B. three	C. four	D. five

15- The coefficient of linear expansion can be expressed as

A. $\frac{\Delta L/L}{\Delta T}$	B. $\frac{\Delta T/L}{\Delta L}$	C. $\frac{\Delta T\, L}{\Delta L}$	D. None of mentioned

16- To convert the temperature from Celsius scale to Fahrenheit scale, the temperature in Fahrenheit is …

A. $\frac{9}{5}\times T(^\circ C)+32$	B. $T(^\circ C)+273$	C. $\frac{5}{9}\times(T(^\circ F)-32)$	D. None of mentioned

17- The unit for coefficient of linear expansion is

| A. J/kg	B. $cal/g^\circ C$	C. K^{-1}	D. None of mentioned

18- A ball is in free fall. Its acceleration is:

A. upward during ascent and downward during descent	B. downward during ascent and upward during descent	C. downward during both ascent and descent	D. upward during both ascent and descent

19- The vectors $\bar a$, $\bar b$, and $\bar c$ are related by $\bar c=\bar b-\bar a$. Which diagram below illustrates this relationship?

A.   B.   C.   D.
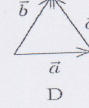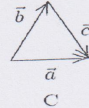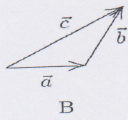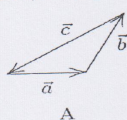
20- The block shown moves with constant velocity on a horizontal surface. Two of the forces on it are shown. A frictional force exerted by the surface is the only other horizontal force on the block. The frictional force is:
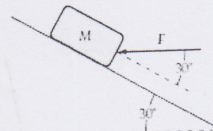
3 N   5 N
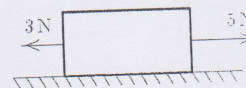
A. 0	B. 2N, rightward	C. 8N, upward	D. 2N, leftward

Q2- Choose the correct answer (30 marks- 2 mark each)

1- The coordinate of a particle in meters is given by $x(t)=16t-3t^3$, where the time t is in seconds. The particle is momentarily at rest at t =

A. 0.75 s	B. 1.3 s	C. 5.3 s	D. 7.3 s

2- A block is pushed up a frictionless 30° incline by an applied force as shown. If $F=25$ N and $M=3$ kg, what is the magnitude of the resulting acceleration of the block?

A. 2.9 m/s^2	B. 3.5 m/s^2	C. 4.6 m/s^2	D. 2.3 m/s^2

2

Q1- Choose the correct answer (20 marks- 1 mark each):

1- For a moving car, if the forward force of its engine is 8000 N, air resistance on it is 3000 N, and the force of friction on it is 4000 N, the net force on the car is:

A. 9000 N	B. 15000 N	C. 1000 N	D. 7000 N

2- During a short interval of time the speed v in m/s of an automobile is given by $v = at^2 + bt^3$, where the time t is in seconds. The units of (a) is

A. m/s^4	B. m/s^3	C. m/s	D. m/s^2

3- The thickness of a 200-page book is 1.0 cm. The thickness of one sheet of this book can be estimated as:

A. 0.001 mm	B. 0.01mm	C. 0.1mm	D. 1 mm

4- If no net force acts on a moving object, it will:

A. have zero acceleration	B. stop immediately	C. accelerate	D. stop slowly

5- When a cannon shoots a cannonball with force 2.5 F_b, the cannon recoils with force 2.5 Fc such that:

| A. Fc = F_b	B. Fc is much larger than Fb	C. Fc is much smaller than Fb	D. Fc = 0

6- A stone thrown from the top of a tall building follows a path that is:

A. made of two straight line segments	B. a straight line	C. circular	D. parabolic

7- The inertia of a body tends to cause the body to:

A. resist any change in its motion	B. speed up	C. slow down	D. decelerate due to friction

8- A crate rests on a horizontal surface and a woman pulls on it with a 10-N force. Rank the situations shown below according to the magnitude of the normal force exerted by the surface on the crate, least to greatest.
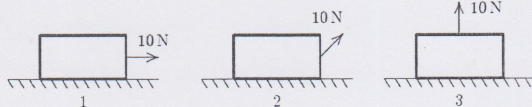
A. 3, 2, 1	B. 1, 2, 3	C. 2, 3, 1	D. 3, 1, 2

9- A car travels east at constant velocity. The net force on the car is:

A. up	B. zero	C. decreased	D. increased

10- A 400 N steel ball is suspended by a light rope from the ceiling. The tension in the rope is:

A. 800N	B. 400N	C. zero	D. 4000 N

11- "If two bodies are each in thermal equilibrium with third body, then they are also in equilibrium with each other." is the … law of thermodynamic

A. zeroth	B. first	C. second	D. third

12- If a system is in….., no heat flow will take place.

A. depression	B. freezing	C. thermal equilibrium	D. isochoric

13- On a day when the temperature reaches 50°F, what is the temperature in degrees Celsius?

| A. 42℃	B. 14℃	C. 10℃	D. 4℃

14- For a solid, the average coefficient of volume expansion is … times the average linear expansion coefficient.

Second Question: Shaded sign (√) or (x) for the next sentences on answer sheet:

|	
36- To increase the electrical capacitance for capacitors, they are connected in series	
37-The unit of the magnetic flux is Tesla/m^2	
38-The resistance of a conductor increases with increasing its length	
39- Farad is equal coulomb/ volt.	
40- Resistance is a vector quantity	
41-For positive Charge (q), the magnetic force (F) is opposite to the direction of ($\underline{v}$ x $\underline{B}$)	
42-The electric force on a charged particle is independent of the particle's speed.	
43-one Tesla = N/Amp.m	
44-The vector product for ($\hat{i}x\hat{k} = \hat{j}$)	
45-Gauss's Law relating the net electric flux through opened surface and the charge enclosed by the surface.	
46-The number of electric field lines entering the surface equals the number leaving it, the net flux through a Gaussian surface is zero	
47-If the surface is changed to a cube, the electric flux through the surface changes	
48-Volume Charge Density (ρ) is the charge per unit area	
49-Ideal battery: A battery that has no internal resistance	
50-The Sum of the potential differences across all elements around any closed circuits loop must be zero	

Questions Finished
With my best wishes

4

25- The electrical conductivity (σ) is equal:

a- Resistivity   b- inverse of resistivity   c- inverse of resistance   d- None of them

26- The equation of current density for conductor (J) is:

a- nev b- $nevA$ c- $I.A$ d- None of them

27- The physical methods to charge a body are:

a-By rubbing   b- Conducting   c-Inductance   d- all the previous

28 - The algebraic sum of potential difference for a closed circuit is zero according to:

a- Kirchhoff's second rule   b- Kirchhoff's first rule   c- Amper's law   d- Joul's law

29 -What are the magnitude and direction of the electric field at a distance of 1.50 m from a 50.0-nC charge?

a- 20 N/C away from the charge   b- 20 N/C toward the charge

c- 200 N/C away from the charge   d- 200 N/C toward the charge

30- A 3 μF capacitor is connected in series with a 6 μF capacitor and a 12V battery for a long time. The charge on the 3 μF capacitor is:

a- 24 μC   b- 36 μC   c- 48 μC   d- 6 μC

31- The electric flux Φ through surface plane is (zero) when the electric filed E crossing it is:

a- Parallel ($\parallel$) to the surface   b- Perpendicular ($\perp$) to the surface

c- having an angle 45° with the surface   d- having an angle 30° with the surface

32- If a dielectric material is inserted between capacitor plates, then:

a- The charge on the capacitor increases   b- The capacitance increases

c-The charge on the capacitor decreases   d- The capacitance decreases

33- A parallel-plate capacitor has plates of area 0.50 m^2 separated by a distance of 2.0 mm.
The capacitor's capacitance is: (ε_0= 8.85 x 10^{-12} C^2/N.m^2)

a- 250 F   b- 50 F   c- 2.2 x 10^{-9} F   d- 4.4 x 10^{-10} F

34- The capacitance of a parallel-plate capacitor with plate area A and plate separation d is given by:

a- $\varepsilon_0 d/A$ b- $\varepsilon_0 d/2A$ c- $\varepsilon_0 A/d$ d- $\varepsilon_0 A/2d$

35- If an electric charge is placed in an electric field, there is an electric force acting on it as shown in the opposite figure. The charge of the particle is:

a- Negative   b- Positive   c- zero   d- Neutral

Follow next pag

3
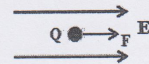
13-A rectangular area is oriented in a uniform Electric field directed left to right in the figures shown below. Which figure gives greatest electric flux through the area?
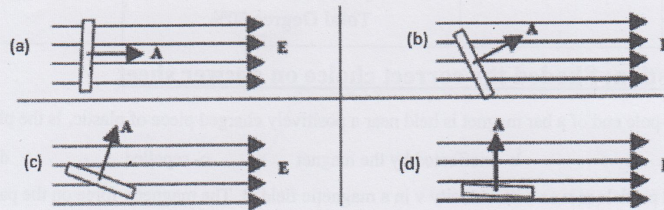
14- In the next equation $qvBsin\theta$, θ is the angle between the magnetic field and...................

a- The velocity of the charge   b- The area vector   c-The voltage   d- None of them

15- The total amount of charge that passes through a wire's full cross section at any point per unit of time is referred to as

a- Voltage   b- Electric potential   c- Current   d- Watt

16- What current is flowing if 0.67 C of charge pass a point in 0.30 s?

a- 0.2A   b- 0.67A   c- 0.3A   d- 2.23 A

17- The resistance of a wire is defined as

a- (current)*(voltage).   b- (current)/(voltage).   c- (voltage)/(current   d-None of them

18- What is the potential difference required to cause (4A) of current intensity to flow through a resistance of power 330 W?

a- 12.1 V   b- 82.5 V   c- 334 V   d- 1320 V

19- A coulomb per second is the same as

a-Watt   b- Amper   c-Volt-second   d- Volt/second

20- Three resistors of 2, 4 and 6 Ω are connected parallel. The equivalent resistance is:

a- 11/12 Ω   b- 0 Ω   c-12/11 Ω   d- 12 Ω

21-When two or more capacitors are connected in parallel to a battery,

a- The voltage across each capacitor is the same.   b- The voltage across each capacitor is different
c- each capacitor carries the same amount of charge.   d- all of the given answers

22- What charge appears on the plates of a 4-μF capacitor when it is charged to 200V?

a- 150 μC   b- 400 μC   c-800 μC   d- 200 μC

23- Which of the following statement is correct

a-1μF=10⁻⁶F   b- 1pF=10⁻¹²F   c-1pF=μμF   d- all are correct

24- The magnitude of electric field which is resulting from various charge distribution on a line is equal

a- $E = \frac{k\lambda}{2r}$ b- $E = \frac{\sigma}{2}$ c- $E = \frac{2k\lambda}{r}$ d- $E = \frac{2\sigma}{\varepsilon_0}$

Follow next pag

2

First Question: Shaded the correct choice on answer sheet

1- The north-pole end of a bar magnet is held near a positively charged piece of plastic, Is the plastic

a- attracted   b- unaffected by the magnet   c- repelled   d- None of them

2- A charged particle moves with velocity v in a magnetic field B. The magnetic force on the particle is maximum when (**v**) is:
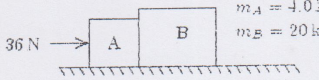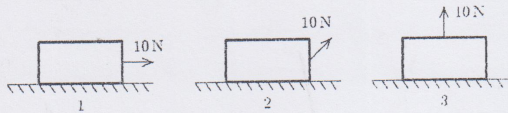
a- parallel (//) to B   b- perpendicular ($\perp$) to B   c- zero   d- None of them

3- A negatively charged rod is brought near one end of an uncharged metal bar. The end of the metal bar farthest from the charged rod will be charged

a- Positive   b- Negative   c- Neutral   d-None of them

4- The equation for the electric flux is

a- $\varphi = \vec{E}.\vec{A}$ b- $\varphi = \vec{E}.\vec{Q}$ c- $q = \vec{E}.\vec{A}$ d- $V = \vec{E}.\vec{d}$

5- A sphere has a volume 0.033 m^3 and total charge of 1.67μC, then its volume charge density (ρ) is:

a- 35μC/ m^3 b- 50.6 μC/ m^3 c- 25 μC/ m^3 d- 5.1 μC/ m^3

6- The unit of K_e (coulomb's constant) is:

a- $N^2.C^2$ b- $N \cdot m/C$ c- $N^2 \cdot m^2/C^2$ d- $N \cdot m^2/C^2$

7- When a glass rod is given a positive charge by rubbing it with silk, it means that:

a- positive charges are transferred from rod to silk.   b- negative charges are transferred from rod to silk

c- positive charges are transferred from silk to rod.   d- negative charges are transferred from silk to rod.

8- The conductors which obeys ohm's law are called:

a- Supper conductors   b- Semi-conductors

c- Ohmic   d- Non- ohmic

9- A 5 C charge is 10m from a -2 C charge. The electrostatic force on the positive charge is: (K_e=9x10^{9}N.m^2/C^2)

a- 9×10^8 N toward the negative charge.   b- 9×10^8 N away from the negative charge.

c- 9×10^9 N toward the negative charge.   d- 9×10^9 N away from the negative charge

10- The maximum electric flux φ_E that can be produced by a uniform electric field of magnitude 20 N/C through a circular surface of radius 2 m is:(area of circle $= \pi r^2$)

a- 80π N.m^2/C   b- π /80 N.m^2/C   c- 8 N.m^2/C   d- 10 N.m^2/C

11- Charge is:

a- quantized   b- conserved   c-Invariant   d- all of the given answers

12- Which of the following is not a vector?

a- Electric force   b- Electric field   c- Electric charge   d- Electric line of force

Follow next pag

30) A particle moves along the x axis. Its position is given by the equation $x = 2 + 3t - 4t^2$ with x in meters and t in seconds. Determine its velocity when it returns to the position it had at t = 0.

A. $0.75\ m/s$ B. $3\ m/s$ C. $-0.75\ m/s$ D. $-3\ m/s$

31) A fish swimming in a horizontal plane has velocity $v_i = (4\hat{i} + 1\hat{j})\ m/s$ at a point in the ocean. After the fish swims with constant acceleration for 20.0 s and its velocity is $v_f = (20\hat{i} - 5\hat{j})\ m/s$. What are the components of the acceleration?

A. $(0.8\hat{i} - 0.3\hat{j})\ m/s^2$ B. $(8\hat{i} - 3\hat{j})\ m/s^2$ C. $(4\hat{i} + 1.5\hat{j})\ m/s^2$ D. $(-4\hat{i} + 1.5\hat{j})\ m/s^2$

32) A projectile is fired in such a way that its horizontal range is equal to three times its maximum height. What is the angle of projection?

A. 45°   B. 53.1°   C. 62°   D. 71.1°

33) A cube of aluminum has an edge length of 20 cm. what is the increase in its temperature if the internal energy of the cube increases by 47000 cal. (Aluminum density is 2.7 g/cm^3 Aluminum specific heat is 0.217 cal/g°C)

A. 5 °C   B. 20 °C   C. 100 °C   D. 10 °C

34) How many calories are required to change one gram of 0°C ice to 100°C steam? (The water latent heat of fusion is 80 cal/g, the water latent heat of vaporization is 540 cal/g and the specific heat of water is 1 cal/g°C.)

A. 100   B. 540   C. 620   D. 720

35) If a thermometer in Celsius reads the same value as Fahrenheit thermometer (T(°C)=T(°F)). What is this value?

A. 40   B. −40   C. 574   D. −574

36) A gasoline engine absorbs 2500 J of heat and performs 1000 J of mechanical work in each cycle. The amount of heat expelled in each cycle is?

A. 1500 J   B. 1000 J   C. 3500 J   D. -1500 J

37) Each of four particles move along an x axis. Their coordinates (in meters) as functions of time (in seconds) are given by

particle 1: $x(t) = 3.5 - 2.7t^3$
particle 2: $x(t) = 3.5 + 2.7t^3$
particle 3: $x(t) = 3.5 + 2.7t^2$
particle 4: $x(t) = 3.5 - 3.4t - 2.7t^2$

Which of these particles have constant acceleration?

A. Only 1 and 2   B. All four   C. Only 3 and 4   D. Only 2 and 3

38) Two blocks (A and B) are in contact on a horizontal frictionless surface. A 36 N constant force is applied to A as shown. What the magnitude of the contact force of A on B is: mA = 4.0kg, mB = 20kg

$m_A = 4.0\ kg$
$m_B = 20\ kg$
36 N → A B

A. 1.5N   B. 6 N   C. 30N   D. 36N

39) The coordinate of a particle in meters is given by $x(t) = 16t - 3t^3$, where the time t is in seconds. The particle is momentarily at rest at t =

A. 0.75 s   B. 1.3 s   C. 5.3 s   D. 7.3 s

40) A crate rests on a horizontal surface and a woman pulls on it with a 10-N force. Rank the situations shown below according to the magnitude of the normal force exerted by the surface on the crate, least to greatest.

10 N →   1   10 N ↗   2   ↑ 10 N   3

A. 3, 2, 1   B. 1, 2, 3   C. 2, 3, 1   D. 3, 1, 2

End of Questions Good Luck (Dr. Ghada Abbady Dr. Mohamed Elesaily Dr. Hadeer El-Hawary)
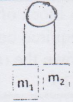
3 |

| A. 460 | B. -460 | C. 273 | D. -273 |

17) While working in a research lab, you find that it takes 400 J of heat to increase the temperature of 0.12 kg of a material by 30 K. What is the specific heat of the material?

| A. 111.11 J/kg.K | B. 110 J/g°C | C. 10 J/kg.K | D. 10 J/ g°C |

18) Which temperature scale never has negative value?

| A. Fahrenheit | B. Celsius | C. Kelvin | D. Non of mentioned |

19) An isothermal process is a type of thermodynamic process in which the ... of a system remains constant.

| A. temperature | B. pressure | C. volume | D. heat energy |

20) In the process of melting, thermal energy is ..

| A. taken in | B. given out | C. remains constant | D. A or C |

Q2- Choose the correct answer (30 marks- 1.5 mark each)

21) A 5.00 kg object placed on a frictionless, horizontal table is connected to a cable that passes over a pulley and then is fastened to a hanging 9.00 kg object. So, the tension in the string if the acceleration of the two objects = 6.3 m/s² equals:

| A. 5.15 N | B. 3.15 N | C. 31.5 N | D. 10.15 N |

22) A 900 kg race car makes one circular lap around a track of radius 50 m in 11 s. What is the car's centripetal acceleration?

| A. 0.366 m/s² | B. 16.3 m/s² | C. 63.3 m/s² | D. 163.6 m/s³ |

23) A block of mass is placed on a ramp inclined at an angle $\theta = 40°$ with the horizontal. The minimum required coefficient of static friction μ_s between the block and the surface if the block is not to slide down the ramp is:

| A. 1.19 | B. 0.84 | C. 0.77 | D. 0.64 |

24) In the shown figure, the force pushes a block weighing 10 N against a vertical wall. The coefficient of static friction between the wall and the block is $\mu_s = 0.5$. What is the minimum value of the force required to keep the block at rest?

| A. 5 N | B. 10 N | C. 20 N | D. 40 N |

25) In the shown figure, the two forces F_1=10 N and F_2=5 N are used to move a 2 kg object at a constant velocity along a horizontal floor. The magnitude of the friction force affecting the object is:

| A. 6.25 N | B. 10 N | C. 12.5 N | D. 14.3 N |

26) A plane drops a package of supplies to a party of explorers, as shown. If the plane is traveling horizontally at 40.0 m/s and is 100 m above the ground, where does the package strike the ground relative to the point at which it is released?

| A. 4.52 m | B. 17.778 m | C. 92.6 m | D. 181 m |

27) Given the displacement vectors $\vec{A} = (-3\hat{\imath} - 4\hat{\jmath} + 4\hat{k})\,m$, $\vec{B} = (-2\hat{\imath} + 3\hat{\jmath} - 7\hat{k})m$. Find the magnitudes of the vector $\vec{D} = 2\vec{A} - \vec{B}$.

| A. $\vec{D} = -4\hat{\imath} - 11\hat{\jmath} + 15\hat{k}$ | B. $\vec{D} = -8\hat{\imath} - 5\hat{\jmath} + \hat{k}$ | C. $\vec{D} = -4\hat{\imath} - 11\hat{\jmath} + \hat{k}$ | D. $\vec{D} = -8\hat{\imath} - 5\hat{\jmath} + 15\hat{k}$ |

28) An object moving with uniform acceleration has a velocity of 12.0 cm/s in the positive x direction whe x coordinate is 3 cm. If its x coordinate 2 s later is -5 cm, what is its acceleration?

| A. $-16.0\ cm/s^2$ | B. $16.0\ cm/s^2$ | C. $-32.0\ cm/s^2$ | D. $32.0\ cm/s^2$ |

29) A particle moves along the x axis. Its position is given by the equation $x = 2 + 3t - 4t^2$ with x in meters and t in seconds. Determine its position when it changes direction.

| A. $2.0\ m$ | B. $2.56\ m$ | C. $4.0\ m$ | D. $4.12\ m$ |

2 |

Assiut University
Department of Physics
First Semester 2024/2025
Date: 05/01/2025

كلية العلوم

جامعة اسيوط

Course: General Physics I
Code: P100
Final Exam (50 Marks)
Time: 2 hours
Exam in Three Pages

Q1- Choose the correct answer (20 marks- 1 mark each)

1) Calculate the mass of an atom of iron molar mass $A_{Fe} = 55.9 \, gm/mol$, $N_A = 6.02 \times 10^{23} atom/mol$

  A. $4.5 \times 10^{-23} gm$ B. $4.5 \times 10^{23} gm$ C. $9.3 \times 10^{23} \, gm$ D. $9.3 \times 10^{-23} \, gm$

2) 1m is equivalent to 3.281 ft. A cube with an edge of 1.5 ft has a volume of
  A. $10.48 \, m^3$ B. $0.0955 \, m^3$ C. $0.1048 \, m^3$ D. $9.6 \times 10^2 \, m^3$

3) Of the following SI units, the only derived unit is ....
  A. Kelvin   B. Kilogram   C. Volt   D. Second

4) The position of a particle moving along the x axis is given by $x = (21 + 22t - 6.0t^2)$ m, where t is in s. What is the average velocity during the time interval t = 1.0 s to t = 3.0 s?
  A. - 4.0 m/s   B. - 2.0 m/s   C. 2.0 m/s   D. 4.0 m/s

5) The acceleration of an object is directly proportional to the .... acting on it and inversely proportional to its ... .
  A. net force - mass   B. mass - net force   C. velocity – displacement   D. displacement - velocity

6) A stone is thrown with an initial upward velocity of 7.0 m/s and experiences negligible air resistance. How far the stone will be after 0.50 s? (g=9.8 m/s^2)
  A. $2.275 \, m$ B. $4.9 \, m$ C. $2.75 \, m$ D. $4.49 \, m$

7) For the shown Atwood machine $m_1 > m_2$, which relation is correct?

  A. $T - m_1 g = m_1 a$ B. $m_1 g - T = m_1 a$ C. $m_1 g = m_1 a - T$ D. $T = m_1 g$

8) Find the acceleration of Atwood's machine in which $m_1 = 3kg$, $m_2 = 6 kg$.
  A. $0.67 \, m/s^2$ B. $3.267 \, m/s^2$ C. $13.2 \, m/s^2$ D. $39.2 \, m/s^2$

9) "An object at rest remains at rest and an object in motion will continue in motion with a constant velocity, unless it experiences a net external force."
  A. Newton 1st law   B. Newton 2nd law   C. Newton 3rd law   D. None of mentioned

10) A long jumper leaves the ground at an angle of 20.0° above the horizontal and at a speed of 11.0m/s. How far does he jump in the horizontal direction?
  A. $0.722 \, m$ B. $3.33 \, m$ C. $6.13 \, m$ D. $7.93 \, m$

11) The action force is .... in magnitude to the reaction force and .... in direction
  A. equal - same   B. double - same   C. equal - opposite   D. double - opposite

12) Pulling up on a rope, you lift a 4 kg bucket of water from a well with an acceleration of 2 m/s². What is the tension in the rope attached to the bucket?
  A. 8 N   B. 32 N   C. 40 N   D. 48 N

13) Find the dimensional formula of coefficient of viscosity ((Force × Distance)/(Area × Velocity))
  A. $ML^2 T^{-3}$ B. $M L^{-3}$ C. $ML^{-1} T^{-1}$ D. dimensionless

14) A pure substance would evaporate or liquefied at its ...
  A. boiling point   B. melting point   C. condensation point   D. sublimation point

15) The coefficient of volume expansion can be expressed as
  A. $3 \frac{\Delta L/L}{\Delta T}$ B. $\frac{\Delta T/V}{\Delta V}$ C. $\frac{\Delta T \, V}{\Delta V}$ D. None of mentioned

16) What is the value of the "absolute zero" (0 K) of temperature on the Fahrenheit scale approximately?