

46) Light passes from a material with index of refraction 1.3 into one with an index of refraction 1.2. Compared to the incident ray, the refracted ray....

- | | |
|--------------------------------|----------------------|
| A. bends toward the normal. | B. is undeflected. |
| C. bends away from the normal. | D. none of the above |

47) A beam of light of wavelength 550 nm traveling in air is incident on a slab of transparent material. The incident beam makes an angle of 40° with the normal, and the refracted beam makes an angle of 26° with the normal. Find the index of refraction of the material.

- | | | | |
|---------|------|---------|---------|
| A. 1.47 | B. 1 | C. 1.68 | D. 0.68 |
|---------|------|---------|---------|

48) A point charge $+Q$ is located on the x axis at $x = a$, and a second point charge $-Q$ is located on the x axis at $x = -a$. A Gaussian surface with radius $r = 2a$ is centered at the origin. The flux through this Gaussian surface is

- A. zero because the negative flux over one hemisphere is equal to the positive flux over the other.
- B. greater than zero.
- C. zero because at every point on the surface the electric field has no component perpendicular to the surface.
- D. zero because the electric field is zero at every point on the surface.

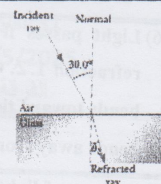
49) Light is refracted through a diamond. If the angle of incidence is 30° , and the angle of refraction is 12° , what is the index of refraction?

- | | | | |
|---------|--------|--------|--------|
| A. 0.41 | B. 2.4 | C. 1.3 | D. 1.8 |
|---------|--------|--------|--------|

50) Assume that a certain spherical mirror has a focal length of $+10.0\text{ cm}$. Locate and describe the image for object distances of 5.0 cm .

- A. Virtue, bigger, located on the back side of the mirror, and upright image at $q = -16.7\text{ cm}$.
- B. Real, smaller, located on the front side of the mirror, and inverted image at $q = +16.7\text{ cm}$.
- C. Virtue, bigger, located on the back side of the mirror, and upright image at $q = -10.0\text{ cm}$.
- D. Real, smaller, located on the front side of the mirror, and inverted image at $q = +10.0\text{ cm}$.

41) A light ray of wavelength 589 nm traveling through air is incident on a smooth, flat slab of crown glass at an angle of 30° to the normal, as sketched in Figure. Find the angle of refraction. (Consider the index of refraction of crown glass equal 1.52).



- A. 49.5° B. 39.2° C. 19.2° D. 30.0°

42) When the object is very far from the concave mirror "at infinity", the image is:

- A. real, inverted, very small, and at the focal point.
 B. real, inverted, reduced in size, and lies between the focal point and the center of curvature.
 C. real, inverted, equal the object and beside it.
 D. real, inverted, magnified, and lies at distance larger than the center of curvature.

43) When the object is located so that the center of curvature lies between the object and a concave mirror surface, the image is:

- A. real, inverted, very small, and at the focal point.
 B. real, inverted, reduced in size, and lies between the focal point and the center of curvature.
 C. real, inverted, equal the object and beside it.
 D. real, inverted, magnified, and lies at distance larger than the center of curvature.

44) Gauss's Law can be always used to calculate the electric field of a system of:

- A. Discrete charges B. Continuous charge distribution having symmetry.
 C. All the above D. None of the above

45) The critical angle is:

- A. the angle of refraction in an optically denser medium where angle of incidence is 90° in an optically less dense medium.
 B. the angle of incidence in an optically denser medium where angle of refraction is 90° in an optically less dense medium.
 C. the angle of incidence in an optically less dense medium where angle of refraction is 90° in an optically denser medium.
 D. none of the above

35) Two campers wish to start a fire during the day. One camper is nearsighted and one is farsighted. Whose glasses should be used to focus the Sun's rays onto some paper to start the fire?

- | | |
|---------------------------|----------------------------|
| A. either camper. | B. the nearsighted camper. |
| C. the farsighted camper. | D. none of the above. |

36) Find the critical angle for an air-water boundary. (The index of refraction of water is 1.33.).

- | | | | |
|---------------|------------------|-----------------|---------------|
| A. 90° | B. 0.752° | C. 48.8° | D. 45° |
|---------------|------------------|-----------------|---------------|

37) A laser in a compact disc player generates light that has a wavelength of 780 nm in air. Find the speed of this light once it enters the plastic of a compact disc ($n = 1.55$).

- | | | | |
|----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| A. $3.0 \times 10^8 \text{ m/s}$ | B. $3.94 \times 10^8 \text{ m/s}$ | C. $1.94 \times 10^8 \text{ m/s}$ | D. $0.52 \times 10^8 \text{ m/s}$ |
|----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|

38) In the Figure, five light rays enter a glass prism from the left. How many of these rays undergo total internal reflection at the slanted surface of the prism?



- | | | | |
|------|------|------|------|
| A. 1 | B. 2 | C. 3 | D. 5 |
|------|------|------|------|

39) A diverging lens of focal length 10.0 cm forms images of objects placed 5.0 cm , find the image distance and describe the image.

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|--|
| A. $q = -7.5 \text{ cm}$. The image is virtual, smaller than the object, and upright. |
| B. $q = -5 \text{ cm}$. The image is virtual, upright, and reduced in size. |
| C. $q = -3.33 \text{ cm}$. The image is virtual, upright, and reduced in size. |
| D. $q = \infty$. The image is real, inverted, much magnified and at infinity. |

40) A converging lens of focal length 10.0 cm forms images of objects placed 10.0 cm , find the image distance and describe the image.

- | |
|---|
| E. $q = +15 \text{ cm}$. The image is real, inverted, and reduced in size. |
| F. $q = -15 \text{ cm}$. The image is virtual, inverted, and reduced in size. |
| G. $q = -10 \text{ cm}$. The image is virtual, upright, enlarged, and in the front side. |
| H. $q = \infty$. The image is real, inverted, much magnified and at infinity. |

27) The near point of a particular farsighted person is 56 cm. What should the focal length be in a lens prescribed to correct this problem?

- A. + 16.67 cm B. -16.67 cm C. + 50.0 cm D. - 50.0 cm

28) A particular nearsighted person is unable to see objects clearly when they are beyond 2.5 m away (the far point of this particular eye). What should the focal length be in a lens prescribed to correct this problem?

- A. + 0.28 m B. -0.28 m C. + 2.5 m D. - 2.5 m

29) The converging lens equation can be expressed as:

- A. $\frac{1}{p} + \frac{1}{q} = -\frac{1}{f}$ B. $\frac{1}{p} - \frac{1}{q} = \frac{1}{f}$
C. $\frac{1}{p} + \frac{1}{q} = \frac{1}{f}$ D. $-\frac{1}{p} + \frac{1}{q} = \frac{1}{f}$

30) The diverging lens equation can be expressed as:

- A. $\frac{1}{p} + \frac{1}{q} = -\frac{1}{f}$ B. $\frac{1}{p} - \frac{1}{q} = \frac{1}{f}$
C. $\frac{1}{p} + \frac{1}{q} = \frac{1}{f}$ D. $-\frac{1}{p} + \frac{1}{q} = \frac{1}{f}$

31) A set of coins is embedded in a spherical plastic paperweight having a radius of 3.0 cm. The index of refraction of the plastic is $n_1 = 1.50$. One coin is located 2.0 cm from the edge of the sphere as in the Figure. Find the position of the image of the coin.



- A. $q = -1.09 \text{ cm}$ B. $q = +1.09 \text{ cm}$ C. $q = -1.7 \text{ cm}$ D. $q = +1.7 \text{ cm}$

32) You wish to reflect sunlight from a mirror onto some paper under a pile of wood in order to start a fire. Which would be the best choice for the type of mirror?

- A. flat. B. concave. C. convex. D. none of them

33) If the ray strikes the convex mirror at its center,

- A. it is reflected away from the focal point F . B. it is reflected parallel to the principal axis.
C. it is reflected back on itself. D. it is reflected obeying the law of reflection.

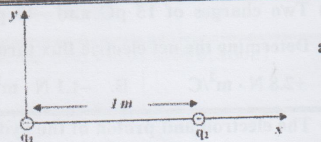
34) If the ray travels toward the center of curvature C on the back side of the convex mirror,

- A. it is reflected away from the focal point F . B. it is reflected parallel to the principal axis.
C. it is reflected back on itself. D. it is reflected obeying the law of reflection.

20) Object A has a charge of $2\mu\text{C}$, and object B has a charge of $6\mu\text{C}$. Which statement is true about the electric forces on the objects?

- A. $\vec{F}_{AB} = \vec{F}_{BA}$ B. $\vec{F}_{AB} = 3\vec{F}_{BA}$ C. $\vec{F}_{AB} = -3\vec{F}_{BA}$ D. $\vec{F}_{AB} = -\vec{F}_{BA}$

21) The figure below shows two charged particles fixed in place: a particle of charge $q_1 = -8\mu\text{C}$ at the origin and particle of charge $q_2 = -2\mu\text{C}$ at $x = 1\text{ m}$. At what point between them can a proton be placed so that the net force on it is zero?



- A. $2/3\text{ m}$ from q_1 B. $3/2\text{ m}$ from q_1 C. -0.5 m from q_2 D. 0.2 m from q_2

22) The potential difference between two points is 100 V . If a particle with a charge of 2 C is transported from one of these points to the other, the magnitude of the work done is:

- A. 200 J B. 100 J C. 50 J D. 2 J

23) Identical $2.0\mu\text{C}$ charges are located on the vertices of a square with sides that are 2.0 m in length. Determine the electric potential at the center of the square.

- A. 38 kV B. 76 kV C. 51 kV D. 64 kV

24) When a positive charge is released and moves along an electric field line, it moves to a position of:

- A. lower potential B. higher potential
C. higher potential energy D. None of them

25) Which of the following is not true for an equipotential surface?

- A. The potential difference between any two points on the equipotential surface is zero.
B. The electric field is always perpendicular to the equipotential surface.
C. The electric field is always parallel to the equipotential surface.
D. No work is done in moving the charge along the equipotential surface.

26) What is the maximum magnification that is possible with a lens having a focal length of 10 cm , and what is the magnification of this lens when the eye is relaxed?

- A. $M_{\max} = 3.5$ and $M_{\min} = 2.5$ B. $M_{\max} = -3.5$ and $M_{\min} = -2.5$
C. $M_{\max} = 2.5$ and $M_{\min} = 1.5$ D. $M_{\max} = -2.5$ and $M_{\min} = -1.5$

14) The magnitude of the electric force on a proton placed in an electric field of $2 \times 10^4 \text{ N/C}$ directed along the positive x-direction is

- A. $3.2 \times 10^{15} \text{ N}$ B. $3.2 \times 10^{-15} \text{ N}$ C. $9.2 \times 10^{-8} \text{ N}$ D. $9.2 \times 10^8 \text{ N}$

15) Two charges of 15 pC and -40 pC are inside a cube with sides that are 0.40-m length. Determine the net electric flux through the surface of the cube.

- A. $+2.8 \text{ N} \cdot \text{m}^2/\text{C}$ B. $-1.1 \text{ N} \cdot \text{m}^2/\text{C}$ C. $+1.1 \text{ N} \cdot \text{m}^2/\text{C}$ D. $-2.8 \text{ N} \cdot \text{m}^2/\text{C}$

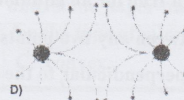
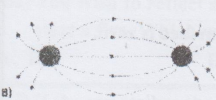
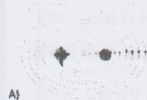
16) The electron and proton of the hydrogen atom are separated by a distance of approximately $5.3 \times 10^{-11} \text{ m}$, the magnitude of the electric force between the two particles ($e = 1.6 \times 10^{-19} \text{ C}$)

- A. $8.2 \times 10^{-8} \text{ N}$ B. $3.6 \times 10^{-47} \text{ N}$ C. $8.2 \times 10^{-15} \text{ N}$ D. $3.6 \times 10^{47} \text{ N}$

17) Two concentric imaginary spherical surfaces of radius R and $2R$ respectively surround a positive point charge Q located at the center of the surfaces. When compared to the electric flux Φ_1 through the surface of radius R , the electric flux Φ_2 through the surface of radius $2R$ is

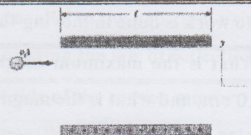
- A. $\Phi_2 = \frac{1}{4} \Phi_1$ B. $\Phi_2 = \Phi_1$ C. $\Phi_2 = \frac{1}{2} \Phi_1$ D. $\Phi_2 = 2 \Phi_1$

18) Which of the following represents the electric field map due to a combination of one positive and one negative charge?



19) An electron enters the region of a uniform electric field, as shown in the figure below, with $v_i = 3 \times 10^6 \text{ m/s}$ and $E = 200 \text{ N/C}$. The horizontal length of the plates is $L = 0.1 \text{ m}$. Find the time it takes to travel through the region of the electric field?

($e = 1.6 \times 10^{-19} \text{ C}$ & $m_e = 9.11 \times 10^{-31} \text{ kg}$)



- A. $3.33 \times 10^{-8} \text{ s}$ B. $1.50 \times 10^8 \text{ s}$ C. $1.25 \times 10^{-4} \text{ s}$ D. $5.9 \times 10^{-3} \text{ s}$

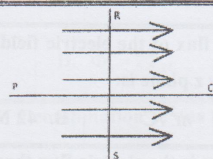
6) Electric potential difference is measured in			
A. coulombs per joule		B. volts per coulomb	
C. joules per coulomb		D. newtons per coulomb	
7) Which one of the diagrams below is <u>not</u> a possible for electric field lines configuration?			
A. 	B. 	C. 	D. 
8) The electric field between two charged, parallel metal plates is 6500 N/C. The plates are 12 cm apart. What is the electric potential difference between them?			
A. 7.8×10^{-2} V	B. 7.8×10^2 V	C. 7.8×10^4 V	D. 7.8×10^5 V
9) The flux of the electric field $(24 \text{ N/C})\hat{i} + (30 \text{ N/C})\hat{j} + (16 \text{ N/C})\hat{k}$ through a 2.0 m^2 portion of the y z plane is:			
A. $32 \text{ N} \cdot \text{m}^2 / \text{C}$	B. $42 \text{ N} \cdot \text{m}^2 / \text{C}$	C. $48 \text{ N} \cdot \text{m}^2 / \text{C}$	D. $60 \text{ N} \cdot \text{m}^2 / \text{C}$
10) What is the electric flux through a sphere that has a radius of 1.00 m and carries a charge of $+1.00 \mu\text{C}$ at its center?			
A. $1.13 \times 10^5 \text{ N} \cdot \text{m}^2 / \text{C}$		B. $1.13 \times 10^{11} \text{ N} \cdot \text{m}^2 / \text{C}$	
C. $2.81 \times 10^4 \text{ N} \cdot \text{m}^2 / \text{C}$		D. $-2.81 \times 10^4 \text{ N} \cdot \text{m}^2 / \text{C}$	
11) Two identical charges, 2.0 m apart, exert forces of magnitude 4.0 N on each other. The value of either charge is ($K_e = 9 \times 10^9 \text{ N} \cdot \text{m}^2 / \text{C}^2$)			
A. $1.8 \times 10^{-9} \text{ C}$		B. $4.2 \times 10^{-5} \text{ C}$	
C. $2.1 \times 10^{-5} \text{ C}$		D. $1.9 \times 10^5 \text{ C}$	
12) Two-point charges, $(8 \times 10^{-9} \text{ C})$ and $(-2 \times 10^{-9} \text{ C})$ are separated by 4 m. The electric field magnitude (in units of V/m) midway between them is			
A. 18	B. 4.5	C. 13.5	D. 22.5
13) The speed of light changes when it goes from ethyl alcohol ($n_1 = 1.361$) to carbon tetrachloride ($n_2 = 1.461$). The ratio of the speed v_2 in carbon tetrachloride to the speed v_1 in ethyl alcohol, v_2/v_1 , is:			
A. 1.07	B. 1.99	C. 0.93	D. 0.76



The exam is written in eighth (8) pages

Choose the correct answer:

(50 Marks)

1) Two-point charges $10\ \mu\text{C}$ and $-10\ \mu\text{C}$ are placed at a certain distance. What is the electric potential of their midpoint?			
A. Some positive value		B. Some negative value	
C. Zero		D. Depends on the medium	
2) Calculate electric potential due to a point charge of $10\ \mu\text{C}$ at 8 cm away from the charge.			
A. $1.125 \times 10^7\ \text{V}$	B. $1.125 \times 10^6\ \text{V}$	C. $2.25 \times 10^7\ \text{V}$	D. $0.62 \times 10^7\ \text{V}$
3) According to the diagram, If the arrows are the direction of the electric field. The equipotential points are			
A. S and R	B. P and Q	C. S and Q	D. P and R
4) 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....			
A. Increase		B. Decrease	
C. Remains constant		D. Depends on the medium.	
5) When a hard rubber rod is given a negative charge by rubbing it with wool:			
A. Positive charges are transferred from rod to wool.			
B. Negative charges are transferred from rod to wool.			
C. Positive charges are transferred from wool to rod.			
D. Negative charges are transferred from wool to rod.			

		تتميز بانخفاض الخصوبة والوفيات مرتفعة
T	F	٢٠ التحديث (التحضر) يعني حدوث تطور في مجال التحديث والتقنية والتكنولوجيا
T	F	٢١ من أسباب تفشي الفساد تبعية بعض الجهات الرقابية للسلطة التنفيذية.
T	F	٢٢ تؤدي الممارسات السلبية للحكومات السابقة إلى إضعاف الثقة في قدرة الأنظمة السياسية.
T	F	٢٣ من الأسباب الاجتماعية لتفشي الفساد الخلل في نظم المراتب والأجور بالجهاز الإداري بالدولة.
T	F	٢٤ يؤدي ضعف الرقابة على الصناديق الخاصة إلى زيادة فرص ارتكاب الفساد.
T	F	٢٥ يُعرف الفساد بأنه انتهاك القوانين ومخالفة الواجبات الوظيفية لتحقيق مكاسب عامة.

السؤال الثاني/ اختر الإجابة الصحيحة من بين الإجابات المذكورة: (٥ درجة)

- ٢٦- عدم وضوح الاختصاصات داخل كل وحدة إدارية هو أحد الأسباب لانتشار الفساد.
(أ- الاجتماعية ب- الإدارية ج- السياسية)
- ٢٧- تعدد وتعقد الإجراءات الإدارية في تقديم الخدمات هو أحد الأسباب لانتشار الفساد.
(أ- السياسية ب- الاقتصادية ج- الإدارية)
- ٢٨- يعتبر من الأسباب الإدارية لانتشار الفساد.
(أ- ضعف القيم والضوابط الأخلاقية في المجتمع ب- تكسب الموظفين دون حاجة فعلية لهم ج- أ، ب معاً)
- ٢٩- يؤدي إلى الحد من انتشار الفساد
(أ- الإخلال بمبدأ الرقابة المتبادلة بين سلطات الدولة الثلاث ب- التزام الدولة بدورها في تقديم خدماتها للمواطنين ج- أ، ب معاً)
- ٣٠- يؤدي إلى انتشار الفساد السياسي.
(أ- غياب الديمقراطية في نظام الحكم ب- حرية تداول المعلومات ج- ليس أيًا مما سبق)
- ٣١- من مظاهر الفساد المالي..... (أ- النهب الضريبي ب- الرشوة ج- جميع ما سبق).
- ٣٢- يتمثل الفساد في المخالفات التي تقع من الموظف العام بسبب أو بمناسبة تأدية وظيفته.
(أ- السياسي ب- الإداري ج- لا شيء مما سبق)
- ٣٣- من مظاهر الفساد الإداري.....
(أ- الإهمال والتقصير وعدم أداء العمل بالدقة والأمانة ب- تعقيد الإجراءات الإدارية ج- أ، ب معاً)
- ٣٤- ارتكاب الموظف العام لأفعال مخلة بالآداب العامة في أماكن العمل هو أحد مظاهر الفساد
(أ- السياسي ب- المالي ج- لا شيء مما سبق)
- ٣٥- زعزعة الثقة في الحكم ومصداقيته هو أحد آثار الفساد على المستوى.....
(أ- السياسي ب- الاقتصادي ج- لا شيء مما سبق)
- ٣٦- من آثار الفساد على المستوى السياسي.....
(أ- التأثير على قدرة النظام على احترام حقوق الإنسان ب- زعزعة الاستقرار الاقتصادي ج- جميع ما سبق)



جامعة أسيوط	امتحان مقرر: القضايا المجتمعية	اليوم والتاريخ: ٢٠٢٥ / ٥ / ٢٢
كلية العلوم	الفصل الدراسي الأول	الزمن / ساعتان
كود المقرر: 50 م. ج	العام الجامعي ٢٠٢٤ / ٢٠٢٥	عدد الصفحات (٣)

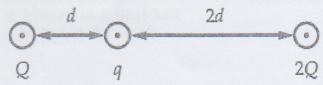
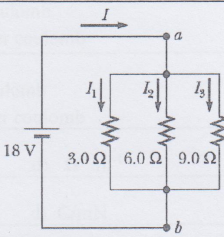
السؤال الأول/ ضع علامة صح (T) أمام العبارة الصحيحة، وعلامة خطأ (F) أمام العبارة غير الصحيحة: (50 درجة)

الرقم	العبارة	العلامة
١	زيادة عدد المواليد وانخفاض معدل الوفيات من أسباب مشكلة الزيادة السكانية في مصر	T F
٢	التمية عملية إرادية موجهة.	T F
٣	تتميز التنمية البشرية بنظرتها التكاملية والشمولية لجوانب وأبعاد التنمية	T F
٤	تعتبر مشكلة الزيادة السكانية عن عدم التوازن بين عدد السكان والموارد والخدمات.	T F
٥	اتجهت الصين إلى تطبيق سياسة الطفل الواحد بطريقة إجبارية عام ١٩٧٩.	T F
٦	انخفاض معدلات وفيات الرضع يمثل أحد خصائص المشكلة السكانية في مصر.	T F
٧	العماد البيئي لرؤية مصر ٢٠٣٠ يهدف إلى تأمين بيئة معيشية أفضل.	T F
٨	تتعدد عوامل نمو الدراسات السكانية منها زيادة سكان العالم والنمو الصناعي.	T F
٩	تسعى الإستراتيجية القومية للسكان والتنمية ٢٠١٥م-٢٠٣٠م لتحقيق التوازن بين عاملي النمو السكاني وتوافر الموارد الطبيعية	T F
١٠	تتناول الديموغرافية النظرية البحتة العلاقات الكمية بين الظواهر الديموغرافية فيما بينها	T F
١١	الضغط السكاني هو الوضع الذي يتصف بوجود بالتوازن بين حجم السكان والموارد المتاحة.	T F
١٢	السياسة السكانية هي الإجراءات الصريحة أو العلنية التي تتخذها حكومة ما للتأثير في حجم السكان ونموهم وتركيبهم	T F
١٣	محور التدخل التشريعي يستهدف وضع إطار تشريعي وتنظيمي حاكم للسياسات المتخذة لضبط النمو السكاني .	T F
١٤	من مجالات التربية السكانية فهم خصائص علم الديموغرافية (علم السكان)	T F
١٥	يعتبر نمو وتقدم البحث العلمي والإحصاء أحد عوامل نمو الدراسات السكانية	T F
١٦	يغد العمل على تضيق الفجوة بين المعرفة بتنظيم الأسرة والممارسة الفعلية للتنظيم أحد أهم حلول الزيادة السكانية	T F
١٧	تكوين السكان يعني عدد الأفراد في مكان معين محدد.	T F
١٨	تتبلور مشكلة الزيادة السكانية في مصر في بعدين أساسين.	T F
١٩	التحول الديموجرافي هو العملية الخاصة بتحول السكان من حالة تكون فيها الخصوبة والوفيات منخفضة إلى حالة أخرى	T F

13.	A force of 10 N acts on a charge of $5.0 \mu\text{C}$ when it is placed in a uniform electric field. What is the magnitude of this electric field? a) 50 MN/C b) 2.0 MN/C c) 0.50 MN/C d) 1000 MN/C
14.	Two small charged objects attract each other with a force F when separated by a distance d . If the charge on each object is reduced to half of its original value and the distance between them is doubled the force becomes: a) $F/2$ b) $F/16$ c) $F/4$ d) F
15.	The electric field between two charged, parallel metal plates is 6500 N/C. The plates are 12 cm apart. What is the electric potential difference between them? a) $7.8 \times 10^{-2} \text{ V}$ b) $7.8 \times 10^2 \text{ V}$ c) $7.8 \times 10^4 \text{ V}$ d) $7.8 \times 10^5 \text{ V}$
16.	The SI units of Which of $1/4\pi\epsilon_0$ are a) NC^2 b) N.m/C c) $\text{N.m}^2/\text{C}^2$ d) C/N.m^2
17.	Electric field is measured in a) coulombs per joule b) volts per coulomb c) joules per coulomb d) Newtons per coulomb
18.	Electric potential difference is measured in a) coulombs per joule b) volts per coulomb c) joules per coulomb d) Newtons per coulomb
19.	The resistivity is measured in a) $\Omega\text{.m}$ b) Ω/m c) $\text{m}.\Omega$ d) $\Omega^{-1}.\text{m}^{-1}$
20.	The electric flux is measured in a) $\text{N/m}^2\text{C}$ b) N/mC c) $\text{C/m}^2\text{N}$ d) C/mN
21.	Charges of the opposite sign are repulsive. a) True b) False
22.	For the positive charge, the electric field E points radially outward from the positive charge a) True b) False
23.	If the volume of the surface surrounds a point charge q is doubled, the flux also is doubled. a) True b) False
24.	Calculate the resistance per unit length of a 22-gauge Nichrome wire which has a radius of 0.321 mm and resistivity $1.5 \times 10^{-6} \Omega\text{.m}$. a) $6.4 \Omega\text{.m}$ b) $6.4 \Omega/\text{m}$ c) $4.6 \Omega\text{.m}$ d) $4.6 \Omega/\text{m}$
25.	The Dimensional of electric force is a) Kg. m/sec b) Kg. m/sec^2 c) $\text{Kg. m}^2/\text{sec}$ d) Kg/m.sec^2

Best wishes,,,,,,

Dr. Ghada Salaheldin

6.	In the figure, if $Q = 30 \mu\text{C}$, $q = 5.0 \mu\text{C}$, and $d = 30 \text{ cm}$, what is the magnitude of the electrostatic force on q? a) 15 N b) 23 N c) zero d) 7.5 N	
7.	A battery has an emf of 12.0 V and an internal resistance of 0.05Ω. Its terminals are connected to the load resistance of 3.0Ω. a) Find the current in the circuit and the terminal voltage of the battery? b) Calculate the power delivered to the internal resistance of the battery? a) $I=3.93\text{ A}$, $\Delta V=11.8\text{ V}$, $P_r=0.772\text{ W}$ b) $I=3.93\text{ A}$, $\Delta V=11.8\text{ V}$, $P_r=46.3\text{ W}$ c) $I=3.93\text{ A}$, $\Delta V=11.8\text{ V}$, $P_r=47.072\text{ W}$ d) $I=3.93\text{ A}$, $\Delta V=11.5\text{ V}$, $P_r=0.772\text{ W}$	
8.	Three resistors are connected in parallel as shown. A potential difference of 18V is maintained between points a and b. a) Find the current in each resistor? b) Calculate the equivalent resistance of the circuit? a) $I_1=6\text{ A}$, $I_2=3\text{ A}$, $I_3=2\text{ A}$, $R_{eq}=1.636\Omega$ b) $I_1=6\text{ A}$, $I_2=3\text{ A}$, $I_3=2\text{ A}$, $R_{eq}=18\Omega$ c) $I_1=3\text{ A}$, $I_2=2\text{ A}$, $I_3=6\text{ A}$, $R_{eq}=1.636\Omega$ d) $I_1=3\text{ A}$, $I_2=2\text{ A}$, $I_3=6\text{ A}$, $R_{eq}=18\Omega$	
9.	Two charges of $5\mu\text{C}$ and the distance between them is 2.5 cm. what is the electric force between them. a) 40 N b) 400 N c) 360 N d) 0.036 N	
10.	What are the magnitude and direction of the electric field at a distance of 0.5 m from a 5 nC charge? a) 20 N/C away from the charge b) 180 N/C toward the charge c) 180 N/C away from the charge d) 20 N/C toward the charge	
11.	Two 1 C charges have a force between them of 1 N. How far apart are they. a) 94.87 km b) 94.87 m c) $9 \times 10^9 \text{ m}$ d) $9 \times 10^6 \text{ m}$	
12.	What is the maximum electric flux that can be produced by a uniform electric field of magnitude $E=10 \text{ N/C}$ through a circular surface of radius 0.1 m. a) $\pi/100 \text{ N.m}^2/\text{C}$ b) $\pi/10 \text{ N.m}^2/\text{C}$ c) $1 \text{ N.m}^2/\text{C}$ d) $10 \text{ N.m}^2/\text{C}$	



Faculty of Science
Department of Physics

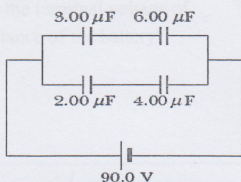
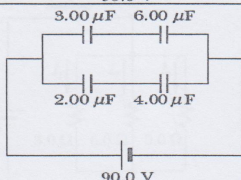
Undergraduate
Final Exam
2nd semester 2024-2025
Course: General Physics (2)
Code: P105
Section: Biotechnology
Time: 2 hours
Date: 18-5-2025



Assiut University

Constants: $k_e = 9 \times 10^9 \text{ Nm}^2/\text{C}^2$, $\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2/\text{Nm}^2$, $e = 1.6 \times 10^{-19} \text{ C}$

In the following statements choose the correct option (25 points, 2 points for each)

1.	For the system of capacitors shown in following figure, find The equivalent capacitance of the system, a) $C_{eq} = 15 \mu\text{F}$ b) $C_{eq} = 2 \mu\text{F}$ c) $C_{eq} = 3.33 \mu\text{F}$ d) $C_{eq} = 1.33 \mu\text{F}$	
2.	For the system of capacitors shown in following figure, find the total energy stored by the group. a) $E = 0.027 \text{ J}$ b) $E = 0.0135 \text{ J}$ c) $E = 0.27 \text{ mJ}$ d) $E = 1.35 \times 10^{-4} \text{ J}$	
3.	Consider two point charges (q_1 and q_2) that are separated by a distance $2r$ and the force between them is F_1 . If the distance between them is increased to $5r$, then the force between them F_2 is given as: a) $F_2 = 5/2 F_1$ b) $F_2 = 4/25 F_1$ c) $F_2 = 2/5 F_1$ d) $F_2 = 25/4 F_1$	
4.	Two point charges of -4 and $-6 \mu\text{C}$ are 10 cm apart in air. The magnitude of the electric field midway between the two charges is approximately a) $7.2 \times 10^6 \text{ N/C}$ b) $3.6 \times 10^7 \text{ N/C}$ c) $1.8 \times 10^6 \text{ N/C}$ d) $3.6 \times 10^5 \text{ N/C}$	
5.	Three resistors of 12 , 12 , and 6.0Ω are connected in parallel. A 12-V battery is connected to the combination. What is the current through the $6.0\text{-}\Omega$ resistor? a) 1.0 A b) 2.0 A c) 3.0 A d) 4.0 A	

$$\mathbf{a} = (2.00\hat{\mathbf{i}} + 5.00\hat{\mathbf{j}}) \text{ m/s}^2$$

a. 5.39 N

b. 16.16 N

c. 18.24 N

d. 32.31 N

(a) 4 m/s^2

(b) 16 m/s^2

(c) -32 m/s^2

(d) -48 m/s^2

a. $T = 1.02 \text{ s}$

b. $T = 2.04 \text{ s}$ c. $T = 3.06 \text{ s}$

d. $T = 4.08 \text{ s}$

a. 20.4 m

b. 55.1 m

c. 10.2 m

d. 45.9m

a. $v = 30 \text{ m/s}$

b. $v = 37.1 \text{ m/s}$

c. $v = -41.04 \text{ m/s}$

d. $v = -37.1 \text{ m/s}$

a. $T = 3.83 \text{ s}$

b. $T = 7.24 \text{ s}$

c. $T = 5.83 \text{ s}$

d. $T = 4.16 \text{ s}$

a) Smaller

b) greater

c) equal

d) No correct answer

- a. $a_y = 1.64 \text{ m/s}^2$ b. $a_y = 3.27 \text{ m/s}^2$
 c. $a_y = -3.27 \text{ m/s}^2$ d. $a_y = 1.63 \text{ m/s}^2$
35. In Atwood's machine if $m_1 = 3\text{kg}$, $m_2 = 3\text{kg}$.

Find the Tension

- a. $T = \text{zero N}$ b. $T = 13.06 \text{ N}$
 c. $T = 26.1 \text{ N}$ d. $T = 29.4 \text{ N}$

36. A particle starts linear motion with an initial velocity (V_i) = 3 m/s and accelerates at constant acceleration (a) = 8m/s^2 . The final speed (V_f) after displacement of (1m) is:

- a) $\sqrt{3} \text{ m/s}$ b. $\sqrt{5} \text{ m/s}$ c. 3 m/s d. 5 m/s

37- When the gas is expansion, the work done is

- a. Negative b. positive c. equals zero d. none of all

38-A segment of steel railroad track has a length of 30 m when the temperature is 10.0°C . What is its length when the temperature is 40.0°C , where $\alpha = 11 \times 10^{-6}$

- a. $99 \times 10^{-4} \text{ m}$ b. 0.099 m c. 30.0099 m d. 30.009 m

39- The temperature of a sample of copper with a mass of 25 gm changed from 20°C to 40°C when absorbed 50 calories of heat energy. What is the specific heat of copper.

- a) $0.1 \text{ J/kg}^\circ\text{C}$ b) $418.6 \text{ J/kg}^\circ\text{C}$ c) $418.6 \text{ cal/kg}^\circ\text{C}$ d) $418.6 \text{ J/gm}^\circ\text{C}$

40-The isobaric proses meaning

- a. Constant temperature b. constant volume
 c. constant pressure d. constant heat quantity

41- In adiabatic proses

- a. $T = \text{Constant}$ b. $V = \text{constant}$
 c. $P = \text{constant}$ d. $Q = \text{constant}$

42. If the initial speed of the projectile is 10 m/s and using $\theta = 30^\circ$, find the horizontal range (R)

- a. $R = 3.8 \text{ m}$ b. $R = 8.84 \text{ m}$
 c. $R = 11.4 \text{ m}$ d. $R = 34.2 \text{ m}$

43. If the initial speed of the projectile is 15 m/s and using $\theta = 45^\circ$, find the maximum height (h)

- a. $h = 9.18 \text{ m}$ b. $h = 20.27 \text{ m}$
 c. $h = 11.48 \text{ m}$ d. $h = 5.74 \text{ m}$

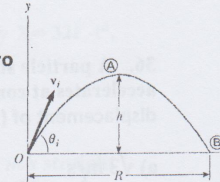
Q2) In the following statements choose the correct option (25 points one point for each)

26-What mass of a material with density ρ is required to make a hollow spherical shell with inner radius r_1 and outer radius r_2

- a- $M_s = \frac{4}{3} \pi \rho (r_2^3 - r_1^3)$ b. $M_s = \frac{4}{3} \pi \rho (r_2 + r_1)^3$
c. $M_s = \frac{4}{3} \pi \rho (r_2 - r_1)^3$ d. $M_s = \frac{4}{3} \pi \rho (r_2^3 + r_1^3)$

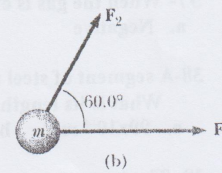
27- At which point of this figure, the vertical component of the velocity (v_y) is zero

- a. Point A b. Point B
c. Points A and B d. Points O and B



28-Two forces F_1 and F_2 act on a 5.00-kg object. If $F_1 = 20 \text{ N}$ and $F_2 = 15 \text{ N}$, find the accelerations vector.

- a. $\underline{a} = 20\mathbf{i} + 15\mathbf{j}$ b. $\underline{a} = 4\mathbf{i} + 3\mathbf{j}$
c. $\underline{a} = 27.5\mathbf{i} + 13\mathbf{j}$ d. $\underline{a} = 5.5\mathbf{i} + 2.6\mathbf{j}$



29- Using Q28 the magnitude of the acceleration is.

- a. $a = 5 \text{ m/s}^2$ b- $a = 6.09 \text{ m/s}^2$
c. $a = 25 \text{ m/s}^2$ d. $a = 30.42 \text{ m/s}^2$

30- Using Q28 the direction of the acceleration is.

- a- $\theta = 53.13^\circ$ b- $\theta = 115.3^\circ$
c. $\theta = 64.6^\circ$ d. $\theta = 25.3^\circ$

31- A fly collides with the windshield of a fast moving bus. Which of the following is true.

- a. The bus experiences by greater force than the fly.
b. The fly experiences by greater force than the bus.
c. Neither the bus nor the fly experiences by the force .
d. Both the bus and the fly experience by the same force .

32. A ball is thrown upward. While the ball is in free fall, does its acceleration

- a. Increases b- Decreases
c- Increases and then decreases d. Neither of these

33- A particle moves in a circular path of radius r with speed v , then increase its radius to $2r$ while the speed remains the same. The centripetal acceleration has changed by a factor

- a. 0.25 b- 0.5
c- 2 d- 4

34. In Atwood's machine if $m_1 = 4\text{kg}$, $m_2 = 2\text{kg}$. Find the acceleration

14	If no external forces act on a moving object, it will continue moving at the same velocity	()
15	Friction forces is always parallel to the contact surfac	()
16	The X-component of the velocity remains constant in the parabolic path of a projectile	()
17	The radial acceleration arises from the change in speed	()
18	Classical mechanics deals with objects have speeds equal the speed of light	()
19	The mass of each atom of a particle equals the total mass of the particle per number of atoms	()
20	The acceleration of a freely falling object depends on its initial motion of the object	()
21	μ_k and μ_s depended on the natural of contact between the surfaces	()
22	μ_k is larger than μ_s	()
23	When the gas is pressured, the sign of the work is positive	()
24	In the isothermal proses, the pressure is constant	()
25	The direction of the kinetic friction has the same direction of the external force acts on an object.	()



Q1) Put letter (T) for true statements and letter (F) for false statements.
(25 points one point for each)

1	The linear expansion coefficient equals one third of the volume expansion coefficient	()
2	Heat: The amount of energy transferred from one body to another due to a difference in temperature between them.	()
3	If the systems are in thermal equilibrium, no heat flow will take place.	()
4	If two object of matter are at the same temperature, they have the same total energy.	()
5	Heat Capacity : is the quantity of heat required to change the temperature of 1 gram of a substance by 1°C.	()
6	1 kilojoule = 4186 Calories	()
7	Latent heat (L): is defined as the heat quantity required to change the phase of 1 g of a substance without changing its temperature or pressure.	()
8	When a gas converted to a liquid, energy is released	()
9	An object's acceleration is inversely proportional to the net force	()
10	A newton is the force that gives a body of mass 1kg an acceleration of 1 m/s ²	()
11	If two equal forces act on a stationary book in opposite directions, we can say , it is in static equilibrium	()
12	Newton's first law of motion is applied to moving objects with acceleration.	()
13	μ_k and μ_s depended on the area of contact between the surfaces	()