Kurdistan Region Government - Iraq *In the Name of Allah* *Subject: Physics*
Ministry of Education
High Committee for the General Examinations
General Examinations for the Preparatory Schools (12th Grade)
The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

Fingerprint

A

Choose the right answers for the following questions: (two marks for each question)

1. Find the magnitude of $(\Delta\theta)$ and (ω) in the adjacent table:

Δs	r	$\Delta\theta$	v_t	ω
0.25 m	0.1 m	?	1.5 m/s	?

A) 2.5 rad, 15 rad/s B) 0.5 rad, 15 rad/s
C) 2.5 rad, 1.2 rad/s D) 15 rad, 2.5 rad/s

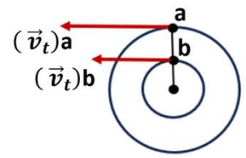
2. A car tire rotates with an average angular speed of 14π rad/s. in what time interval will the tire rotate 3.5 times?
A) 0.5 s B) 0.76 s C) 2 s D) 4.9 s

3. Determine the change in gravitational force between two masses if the distance between their centers is doubled:
A) It becomes four times B) It becomes three times
C) It becomes quarter of the original value D) It becomes half of the original value

4. If a spinning amusement-park ride has an angular speed of 1.2 rad/s, what is the centripetal acceleration of a person standing 12 m from the center of the ride?
A) 17.28 m/s² B) 1.728 m/s² C) 172 m/s² D) 1282 m/s²

5. A 90 kg person rides a spinning a measurement park ride that has an angular speed of 1.15 rad/s. If the distance of person is 11.5 m from the axis of rotation. What is the magnitude of the force that maintains the circular motion of the person? A) 1468.8 N B) 1268.8 N C)136.8 N D) 1368.8 N

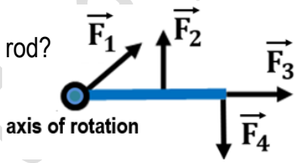
6. Which of the following is correct for the two points (a and b) for a merry- go-round rotating about a fixed axis as in the figure?



A) $(v_t)_b < (v_t)_a$ B) $\omega_a > \omega_b$
C) $(\Delta\theta)_a > (\Delta\theta)_b$ D) $(v_t)_a = (v_t)_b$

7. When a part of a sound wave travels from air into water, the wavelength of the sound increases. What happens to the frequency and the speed of the sound wave?
A) speed remains constant, and the frequency increases. B) frequency remains constant, and the speed decreases.
C) speed increases, and the frequency remain constant. D) speed increases, and the frequency decreases.

8. In the figure, There are four forces acting on the rod have the same magnitude $(F_1 = F_2 = F_3 = F_4)$ Which one of them produces the greatest torque on the rod?



A) $\vec{F}_1$ B) $\vec{F}_2$
C) $\vec{F}_3$ D) $\vec{F}_4$

9. .....the tendency of a body rotating about a fixed axis to resist a change in rotational motion.
A) Torque(τ) B) Angular momentum (L) C) Moment of inertia (I) D) Angular acceleration (α)

10. Identify which conditions of equilibrium hold for (a solid sphere rolling on incline)?
A) Translational equilibrium. B) Rotational equilibrium.
C) Translational and rotational equilibrium. D) None of the equilibrium conditions hold.

11. A wooden bucket filled with water is attached to a rope that is wound around a cylinder with a radius of 0.08 m. A crank with a turning radius of 0.3 m is attached to the end of the cylinder. If the minimum force that can be applied perpendicularly to the crank handle is 200 N to raise the bucket at constant speed find the force in the rope $(\vec{F}_T)$?
A) 75 N B) 35 N C) 750 N D) 350 N

12. A force of magnitude 4 N is applied tangentially to a disk of mass 5 kg and radius 0.2 m. The disk starts rotating from rest. How many revolutions does the disk complete after 2.51 s?
A) 2 rev B) 4 rev C) 8 rev D) 12 rev

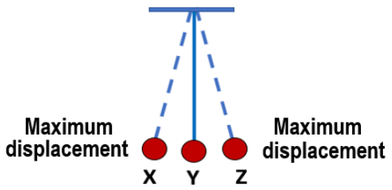
13. A 2 kg bicycle wheel with a radius of 0.3 m turns at a constant angular speed of 25 rad/s when a 0.3 kg reflector is at a distance of 0.19 m from the axle. What is the angular speed of the wheel when the reflector slides to a distance of 0.25 m from the axle? (Assume that the bicycle wheel is a ring)
A) 18 rad/s B) 19 rad/s C) 22 rad/s D) 24 rad/s

14. An object rolls along a horizontal surface at a constant linear speed without slipping. If the translational kinetic energy of the object is 37.5 J and its total kinetic energy is 52.5 J what is the shape of object?
A) ring B) disk C) hollow sphere D) solid sphere

15. A pendulum bob hangs from a string and moves with simple harmonic motion. What is the restoring force in the pendulum?
A) the total weight of the bob.
B) the component of the bob's weight tangent to the motion of the bob.
C) the component of the bob's weight perpendicular to the motion of the bob.
D) the elastic force of the stretched string.

16. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. In what form is the energy in the system when the mass is at a point between maximum displacement and equilibrium position?
A) elastic potential energy B) gravitational potential energy.
C) kinetic energy. D) kinetic energy and elastic potential energy

17. In the figure, A pendulum bob hangs from a string and moves with simple harmonic motion. If the pendulum bob moves from point (Y) to point (Z) in 0.1 s. What is the frequency of the pendulum?



A) 2.5 Hz B) 5 Hz
C) 7.5 Hz D) 10 Hz

18. Two successive crests of a wave are 2.4 m apart. Eight crests pass a given point every 12 what is the wave speed?
A) 1.6 m/s B) 0.8 m/s C) 1.8 m/s D) 9.6 m/s

19. The distance between node and next antinode in a standing wave on string equal:
A) $\frac{1}{4}\lambda$ B) $\frac{1}{2}\lambda$ C) λ D) 2λ

20. An interference pattern is formed by using green light, If the two slits are moved farther apart, what happens to the distance between the bright fringes?
A) increase B) decrease C) remain unchanged D) doubled

21. Breaking the sound barrier takes place when the speed of the plane.....: the speed of sound in air.
A) greater than B) equal to C) less than D) equal to half of

22. A parked ambulance emits a sound of frequency 1200 Hz. What frequency is detected by an observer inside another car moving with a velocity of 20 m/s.as the car moves towards the ambulance? (Use speed of sound in air is 340 m/s)
A) 1000 Hz B) 1129.4 Hz C) 1270.6 Hz D) 1700 Hz

23. If the intensity of lawn mower is 1×10^{-3} W/m² . What is relative intensity of the sound in decibel (dB)?
A) 0 dB B) 90 dB C) 120 dB D) 130 dB

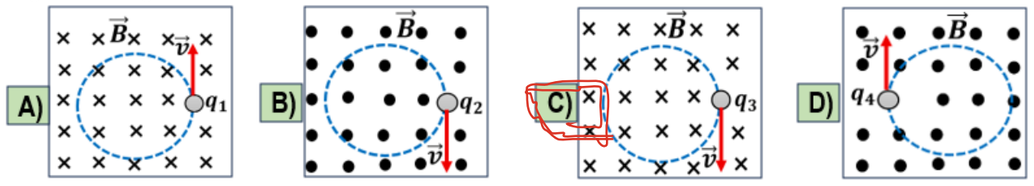
24. In which of the following of standing waves are produced when the number of nodes is equal to number of antinodes?
A) string B) pipe opened at both ends C) pipe closed at one end D) Both (A and B) are correct

25. The second harmonics of a guitar string has a frequency of 165 Hz. If the speed of waves on the strings is 120 m/s. What is the string's length? A) 0.36 m B) 0.73 m C) 1.1 m D) 1.4 m

26. Two long parallel wires (a and b), each of them is 2 m long, are separated by a distance of 0.5 m between their centers. The wires carry currents $(I_a = 10\ A)$ and $(I_b = 15\ A)$, in opposite directions. What is the magnitude of magnetic force acting on wire (b) as a result of magnetic field of wire (a)? $[\mu_o = 4\pi \times 10^{-7}\ T.m/A]$
A) 1.2×10^{-4} N B) 12×10^{-4} N C) 0.6×10^{-4} N D) 2.4×10^{-4} N

27. How can you increase the strength of a magnetic field inside a solenoid?
A) Increase the number of coils per unit length. B) Increase the current.
C) Place an iron rod inside the solenoid. D) All answers are correct.

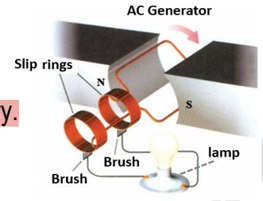
28. Four charges, each charge moves in a circular path in a magnetic field as shown in the figures, which of them is a negative charge?



29. A proton moves at a speed of 2×10^7 m/s at right angles to a magnetic field with a magnitude of the 0.1 T. Find the magnitude of the acceleration of the proton? [q_p=1.6 × 10^{-19} C, m_p=1.673 × 10^{-27} kg]
A) 2.05×10^{17} m/s² B) 1.91×10^{14} m/s² C) 2.5×10^{14} m/s² D) 0.01×10^{14} m/s²

30. Which of the following statements is true for sound waves?
A) They do not require a material medium through which to travel.
B) Their speed in a medium = frequency × wavelength.
C) The particles of the medium vibrate perpendicular to the direction the wave is traveling.
D) All answers are correct.

31. In the adjacent figure, an AC Generator is shown.an AC Generator can be converted to a DC Motor by:
A) Replacing the lamp with a galvanometer.
B) Replacing the two slip rings with a commutator and replacing the lamp with a battery.
C) Replacing the lamp with a battery.
D) All answers are incorrect.



32. A step-up transformer: A) $V_2 > V_1$ B) $N_2 > N_1$ C) $\frac{N_2}{N_1} > 1$ D) All the answers are correct

33. The galvanometer can be converted to a voltmeter by connecting a resistor of very.....to the galvanometer
A) high resistance in series B) high resistance in parallel C) low resistance in parallel D) low resistance in series

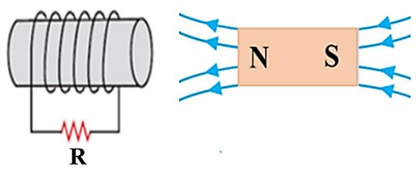
34. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of X_L = 600 Ω and a capacitor of impedance of X_C= 200 Ω. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
A) 45° B) 37° C) 30° D) 53°

35. An air solenoid of length 10 cm, cross sectional area 25 cm², and 400 turns Calculate the coefficient of self-induction of coil [$\mu_o = 4\pi \times 10^{-7}$ T.m/A]
A) 2 mH B) 5 mH C) 0.2 mH D) 0.5 mH

36. Volt (V) is equal to: A) $\frac{T}{m^2 . s}$ B) $\frac{T . m}{s}$ C) $\frac{T . m^2}{s}$ D) $T . m^2$

37. A loop with 40 turns and an area of 0.5 m² is rotating at 250 rad/s. The loop's axis of rotation is perpendicular to a uniform magnetic field with a strength of 0.04 T. what is the maximum emf induced?
A) 120 V B) 300 V C) 200 V D) 180 V

38. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?
A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.

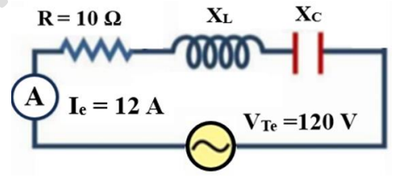


39. Which of the following relationship is correct between tangential acceleration (a_t) and angular acceleration (α) ?
A) $a_t = r\,\alpha$ B) $\alpha = \frac{r}{a_t}$ C) $r = \frac{\alpha}{a_t}$ D) $a_t = r^2\,\alpha$

40. Which of the following is directly proportional with frequency in AC circuits?
A) X_L B) X_C C) I_C D) Both (A and C) are correct

41. An inductive coil of resistance 20 Ω and self-inductance 0.4 H is connected in series with a capacitor of capacitance 200 μF and an AC source of effective voltage 200 V and frequency 60 Hz. Calculate the effective value of the alternating current. A) 10 A B) 6.4 A C) 1.44 A D) 8.62 A

42. In the electric circuit shown in the adjacent figure, Calculate the phase difference between the circuit current and the total potential difference:
A) 45° B) 53°
C) 180° D) 0°



43. The power in the secondary coil of a power station is 3 MW. The station sends the current to the city by means of lines of 120 Ω resistance under a potential difference 6×10^4 V. Calculate the transfer efficiency?
A) 96.9 % B) 95 % C) 99.9 % D) 90 %

44. When two light waves of same wavelength interfere, If the crest of one wave overlaps the trough of another wave, the two waves have a phase difference of: A) π rad B) 0 rad C) 2 π rad D) 4π rad

45. Light passes through a diffraction grating with 3550 lines/cm and forms a first-order maximum at an angle of, 12.07° What is the wavelength of the light? A) 895 nm B) 589 nm C) 859 nm D) 985 nm

46. Two uniformly solid cylinders of equal radii roll down an incline without slipping. The first cylinder has three times the mass of the second cylinder. The torque was exerted on the first cylinder is..... torque exerted on the second cylinder? A) twice B) three times C) four times D) five times

47. Which of the following is the unit of spring constant (K)? A) $\frac{N}{m^2}$ B) $\frac{m}{N}$ C) $\frac{N}{m}$ D) $\frac{m^2}{N}$

48. Which of the following factors changes when a sound gets louder for a certain source?
A) Intensity B) Relative intensity of the sound C) Amplitude D) All the answers are correct

49. Calculate the magnitude of the magnetic field at the center of a circular coil of 10 turns and radius 10 cm when a 20 A current passes through it [$\mu_o = 4\pi \times 10^{-7}$ T.m/A]?
A) 1.256×10^{-4} T B) 1.256×10^{-3} T C) 1.256×10^{-2} T D) 1.256×10^{-1} T

50. Which of the following is not correct about the Laser? A) Laser light is coherent and monochromatic.
B) The process of stimulated emission violates the principle of energy conservation.
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B

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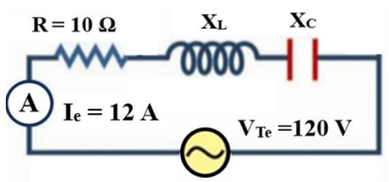

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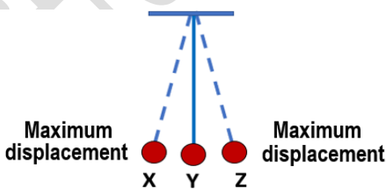

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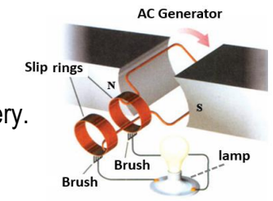

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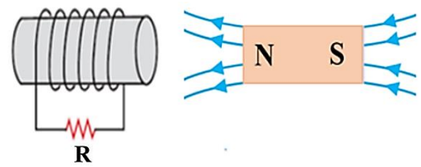

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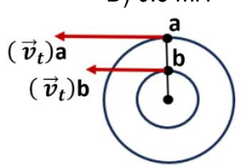

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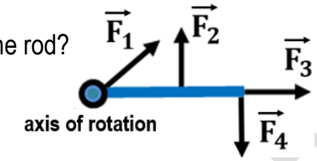

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D) All answers are correct.

36. Volt (V) is equal to: A) $\frac{T}{m^2 . S}$ B) $\frac{T . m}{S}$ C) $\frac{T . m^2}{S}$ D) $T . m^2$

37. Calculate the magnitude of the magnetic field at the center of a circular coil of 10 turns and radius 10 cm when a 20 A current passes through it $[\mu_o = 4\pi \times 10^{-7}\ T.m/A]$?
A) 1.256×10^{-4} T B) 1.256×10^{-3} T C) 1.256×10^{-2} T D) 1.256×10^{-1} T

38. In which of the following of standing waves are produced when the number of nodes is equal to number of antinodes?
A) string B) pipe opened at both ends C) pipe closed at one end D) Both (A and B) are correct

39. A parked ambulance emits a sound of frequency 1200 Hz. What frequency is detected by an observer inside another car moving with a velocity of 20 m/s.as the car moves towards the ambulance? (Use speed of sound in air is 340 m/s)
A) 1000 Hz B) 1129.4 Hz C) 1270.6 Hz D) 1700 Hz

40. Which of the following factors changes when a sound gets louder for a certain source?
A) Intensity B) Relative intensity of the sound C) Amplitude D) All the answers are correct

41. The second harmonics of a guitar string has a frequency of 165 Hz. If the speed of waves on the strings is 120 m/s. What is the string's length? A) 0.36 m B) 0.73 m C) 1.1 m D) 1.4 m

42. A 90 kg person rides a spinning a measurement park ride that has an angular speed of 1.15 rad/s. If the distance of person is 11.5 m from the axis of rotation. What is the magnitude of the force that maintains the circular motion of the person? A) 1468.8 N B) 1268.8 N C)136.8 N D) 1368.8 N

43. When two light waves of same wavelength interfere, If the crest of one wave overlaps the trough of another wave, the two waves have a phase difference of: A) π rad B) 0 rad C) 2 π rad D) 4π rad

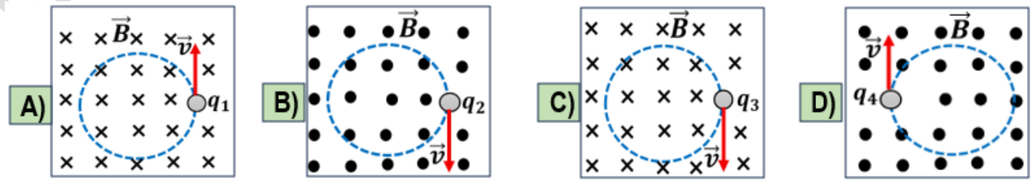
44. Find the magnitude of $(\Delta\theta)$ and (ω) in the adjacent table:
A) 2.5 rad, 15 rad/s B) 0.5 rad, 15 rad/s
C) 2.5 rad, 1.2 rad/s D) 15 rad, 2.5 rad/s

Δs	r	$\Delta\theta$	v_t	ω
0.25 m	0.1 m	?	1.5 m/s	?

45. Breaking the sound barrier takes place when the speed of the plane.....: the speed of sound in air.
A) greater than B) equal to C) less than D) equal to half of

46. Two long parallel wires (a and b), each of them is 2 m long, are separated by a distance of 0.5 m between their centers. The wires carry currents $(I_a = 10\ A)$ and $(I_b = 15\ A)$, in opposite directions. What is the magnitude of magnetic force acting on wire (b) as a result of magnetic field of wire (a)? $[\mu_o = 4\pi \times 10^{-7}\ T.m/A]$
A) 1.2×10^{-4} N B) 12×10^{-4} N C) 0.6×10^{-4} N D) 2.4×10^{-4} N

47. Four charges, each charge moves in a circular path in a magnetic field as shown in the figures, which of them is a negative charge?



48. Two uniformly solid cylinders of equal radii roll down an incline without slipping. The first cylinder has three times the mass of the second cylinder. The torque was exerted on the first cylinder is..... torque exerted on the second cylinder? A) twice B) three times C) four times D) five times

49. Which of the following relationship is correct between tangential acceleration (a_t) and angular acceleration (α) ?
A) $a_t = r\,\alpha$ B) $\alpha = \frac{r}{a_t}$ C) $r = \frac{\alpha}{a_t}$ D) $a_t = r^2\,\alpha$

50. A 2 kg bicycle wheel with a radius of 0.3 m turns at a constant angular speed of 25 rad/s when a 0.3 kg reflector is at a distance of 0.19 m from the axle. What is the angular speed of the wheel when the reflector slides to a distance of 0.25 m from the axle? (Assume that the bicycle wheel is a ring)
A) 18 rad/s B) 19 rad/s C) 22 rad/s D) 24 rad/s

Kurdistan Region Government - Iraq *In the Name of Allah* *Subject: Physics*
Ministry of Education
High Committee for the General Examinations
General Examinations for the Preparatory Schools (12th Grade)
The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

Fingerprint

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Choose the right answers for the following questions: (two marks for each question)

1. Volt (V) is equal to: A) $\frac{T}{m^2 . S}$ B) $\frac{T . m}{S}$ C) $\frac{T . m^2}{S}$ D) $T . m^2$

2. Which of the following is the unit of spring constant (K)? A) $\frac{N}{m^2}$ B) $\frac{m}{N}$ C) $\frac{N}{m}$ D) $\frac{m^2}{N}$

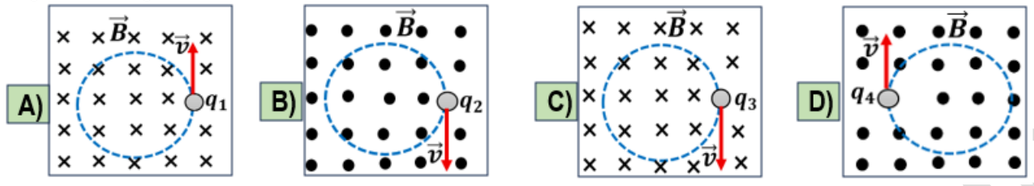
3. When a part of a sound wave travels from air into water, the wavelength of the sound increases. What happens to the frequency and the speed of the sound wave?
A) speed remains constant, and the frequency increases. B) frequency remains constant, and the speed decreases.
C) speed increases, and the frequency remain constant. D) speed increases, and the frequency decreases.

4. The second harmonics of a guitar string has a frequency of 165 Hz. If the speed of waves on the strings is 120 m/s. What is the string's length? A) 0.36 m B) 0.73 m C) 1.1 m D) 1.4 m

5. Determine the change in gravitational force between two masses if the distance between their centers is doubled:
A) It becomes four times B) It becomes three times
C) It becomes quarter of the original value D) It becomes half of the original value

6. If the intensity of lawn mower is $1 \times 10^{-3}\ W/m^2$. What is relative intensity of the sound in decibel (dB)?
A) 0 dB B) 90 dB C) 120 dB D) 130 dB

7. Four charges, each charge moves in a circular path in a magnetic field as shown in the figures, which of them is a negative charge?



8. Which of the following factors changes when a sound gets louder for a certain source?
A) Intensity B) Relative intensity of the sound C) Amplitude D) All the answers are correct

9. .....the tendency of a body rotating about a fixed axis to resist a change in rotational motion.
A) Torque(τ) B) Angular momentum (L) C) Moment of inertia (I) D) Angular acceleration (α)

10. The galvanometer can be converted to a voltmeter by connecting a resistor of very.....to the galvanometer
A) high resistance in series B) high resistance in parallel C) low resistance in parallel D) low resistance in series

11. A loop with 40 turns and an area of 0.5 m^2 is rotating at 250 rad/s. The loop's axis of rotation is perpendicular to a uniform magnetic field with a strength of 0.04 T. what is the maximum emf induced?
A) 120 V B) 300 V C) 200 V D) 180 V

12. Which of the following relationship is correct between tangential acceleration (a_t) and angular acceleration (α) ?
A) $a_t = r\,\alpha$ B) $\alpha = \frac{r}{a_t}$ C) $r = \frac{\alpha}{a_t}$ D) $a_t = r^2\,\alpha$

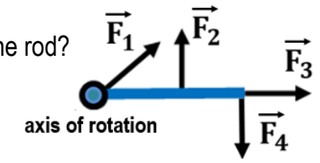
13. A step-up transformer: A) $V_2 > V_1$ B) $N_2 > N_1$ C) $\frac{N_2}{N_1} > 1$ D) All the answers are correct

14. If a spinning amusement-park ride has an angular speed of 1.2 rad/s, what is the centripetal acceleration of a person standing 12 m from the center of the ride?
A) 17.28 m/s² B) 1.728 m/s² C) 172 m/s² D) 1282 m/s²

15. A force of magnitude 4 N is applied tangentially to a disk of mass 5 kg and radius 0.2 m. The disk starts rotating from rest. How many revolutions does the disk complete after 2.51 s?
A) 2 rev B) 4 rev C) 8 rev D) 12 rev

16. Which of the following is directly proportional with frequency in AC circuits?
A) X_L B) X_C C) I_C D) Both (A and C) are correct

17. In the figure, There are four forces acting on the rod have the same magnitude ($F_1 = F_2 = F_3 = F_4$) Which one of them produces the greatest torque on the rod?
A) $\vec{F}_1$ B) $\vec{F}_2$
C) $\vec{F}_3$ D) $\vec{F}_4$



18. An air solenoid of length 10 cm, cross sectional area 25 cm^2, and 400 turns Calculate the coefficient of self-induction of coil [$\mu_o = 4\pi \times 10^{-7}$ T.m/A]
A) 2 mH B) 5 mH C) 0.2 mH D) 0.5 mH

19. How can you increase the strength of a magnetic field inside a solenoid?
A) Increase the number of coils per unit length. B) Increase the current.
C) Place an iron rod inside the solenoid. D) All answers are correct.

20. A car tire rotates with an average angular speed of 14π rad/s. in what time interval will the tire rotate 3.5 times?
A) 0.5 s B) 0.76 s C) 2 s D) 4.9 s

21. The power in the secondary coil of a power station is 3 MW. The station sends the current to the city by means of lines of 120 Ω resistance under a potential difference 6×10^4 V. Calculate the transfer efficiency?
A) 96.9 % B) 95 % C) 99.9 % D) 90 %

22. Light passes through a diffraction grating with 3550 lines/cm and forms a first-order maximum at an angle of, 12.07° What is the wavelength of the light? A) 895 nm B) 589 nm C) 859 nm D) 985 nm

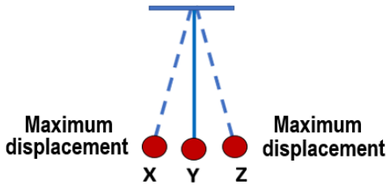
23. Two uniformly solid cylinders of equal radii roll down an incline without slipping. The first cylinder has three times the mass of the second cylinder. The torque was exerted on the first cylinder is..... torque exerted on the second cylinder? A) twice B) three times C) four times D) five times

24. A parked ambulance emits a sound of frequency 1200 Hz. What frequency is detected by an observer inside another car moving with a velocity of 20 m/s.as the car moves towards the ambulance? (Use speed of sound in air is 340 m/s)
A) 1000 Hz B) 1129.4 Hz C) 1270.6 Hz D) 1700 Hz

25. When two light waves of same wavelength interfere, If the crest of one wave overlaps the trough of another wave, the two waves have a phase difference of: A) π rad B) 0 rad C) 2 π rad D) 4π rad

26. Two successive crests of a wave are 2.4 m apart. Eight crests pass a given point every 12 what is the wave speed?
A) 1.6 m/s B) 0.8 m/s C) 1.8 m/s D) 9.6 m/s

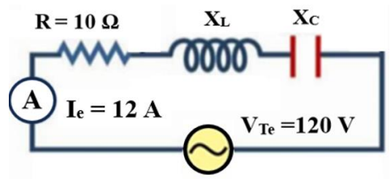
27. In the figure, A pendulum bob hangs from a string and moves with simple harmonic motion. If the pendulum bob moves from point (Y) to point (Z) in 0.1 s. What is the frequency of the pendulum?
A) 2.5 Hz B) 5 Hz
C) 7.5 Hz D) 10 Hz



28. Which of the following is <u>not correct</u> about the Laser? A) Laser light is coherent and monochromatic.
B) The process of stimulated emission violates the principle of energy conservation.
C) The active medium is an essential component of laser.
D) A laser source is a device converts electrical energy or chemical energy into coherent light.

29. Breaking the sound barrier takes place when the speed of the plane.....: the speed of sound in air.
A) greater than B) equal to C) less than D) equal to half of

30. In the electric circuit shown in the adjacent figure, Calculate the phase difference between the circuit current and the total potential difference:

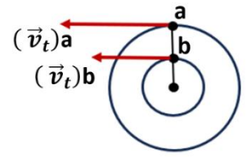


A) $45°$ B) $53°$
C) $180°$ D) $0°$

31. A pendulum bob hangs from a string and moves with simple harmonic motion. What is the restoring force in the pendulum?
A) the total weight of the bob.
B) the component of the bob's weight tangent to the motion of the bob.
C) the component of the bob's weight perpendicular to the motion of the bob.
D) the elastic force of the stretched string.

32. Identify which conditions of equilibrium hold for (a solid sphere rolling on incline)?
A) Translational equilibrium. B) Rotational equilibrium.
C) Translational and rotational equilibrium. D) None of the equilibrium conditions hold.

33. Which of the following is correct for the two points (a and b) for a merry- go-round rotating about a fixed axis as in the figure?



A) $(v_t)_b < (v_t)_a$ B) $\omega_a > \omega_b$
C) $(\Delta\theta)_a > (\Delta\theta)_b$ D) $(v_t)_a = (v_t)_b$

34. An inductive coil of resistance 20 Ω and self-inductance 0.4 H is connected in series with a capacitor of capacitance 200 μF and an AC source of effective voltage 200 V and frequency 60 Hz. Calculate the effective value of the alternating current. A) 10 A B) 6.4 A C) 1.44 A D) 8.62 A

35. Two long parallel wires (a and b), each of them is 2 m long, are separated by a distance of 0.5 m between their centers. The wires carry currents $(I_a = 10\ A)$ and $(I_b = 15\ A)$, in opposite directions. What is the magnitude of magnetic force acting on wire (b) as a result of magnetic field of wire (a)? $[\mu_o = 4\pi \times 10^{-7}\ T.m/A]$
A) 1.2×10^{-4} N B) 12×10^{-4} N C) 0.6×10^{-4} N D) 2.4×10^{-4} N

36. A 2 kg bicycle wheel with a radius of 0.3 m turns at a constant angular speed of 25 rad/s when a 0.3 kg reflector is at a distance of 0.19 m from the axle. What is the angular speed of the wheel when the reflector slides to a distance of 0.25 m from the axle? (Assume that the bicycle wheel is a ring)
A) 18 rad/s B) 19 rad/s C) 22 rad/s D) 24 rad/s

37. The distance between node and next antinode in a standing wave on string equal:
A) $\frac{1}{4}\lambda$ B) $\frac{1}{2}\lambda$ C) λ D) 2λ

38. An interference pattern is formed by using green light, If the two slits are moved farther apart, what happens to the distance between the bright fringes?
A) increase B) decrease C) remain unchanged D) doubled

39. Calculate the magnitude of the magnetic field at the center of a circular coil of 10 turns and radius 10 cm when a 20 A current passes through it $[\mu_o = 4\pi \times 10^{-7}\ T.m/A]$?
A) 1.256×10^{-4} T B) 1.256×10^{-3} T C) 1.256×10^{-2} T D) 1.256×10^{-1} T

40. An object rolls along a horizontal surface at a constant linear speed without slipping. If the translational kinetic energy of the object is 37.5 J and its total kinetic energy is 52.5 J what is the shape of object?
A) ring B) disk C) hollow sphere D) solid sphere

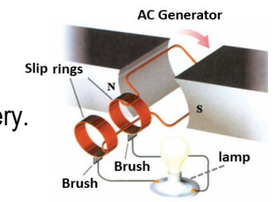
41. A 90 kg person rides a spinning a measurement park ride that has an angular speed of 1.15 rad/s. If the distance of person is 11.5 m from the axis of rotation. What is the magnitude of the force that maintains the circular motion of the person? A) 1468.8 N B) 1268.8 N C)136.8 N D) 1368.8 N

42. A wooden bucket filled with water is attached to a rope that is wound around a cylinder with a radius of 0.08 m. A crank with a turning radius of 0.3 m is attached to the end of the cylinder. If the minimum force that can be applied perpendicularly to the crank handle is 200 N to raise the bucket at constant speed find the force in the rope $(\vec{F}_T)$?
A) 75 N B) 35 N C) 750 N D) 350 N

43. A proton moves at a speed of 2×10^7 m/s at right angles to a magnetic field with a magnitude of the 0.1 T. Find the magnitude of the acceleration of the proton? [$q_p = 1.6 \times 10^{-19}$ C, $m_p = 1.673 \times 10^{-27}$ kg]
A) 2.05×10^{17} m/s^2 B) 1.91×10^{14} m/s^2 C) 2.5×10^{14} m/s^2 D) 0.01×10^{14} m/s^2

44. In which of the following of standing waves are produced when the number of nodes is equal to number of antinodes?
A) string B) pipe opened at both ends C) pipe closed at one end D) Both (A and B) are correct

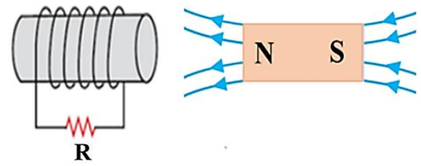
45. In the adjacent figure, an AC Generator is shown.an AC Generator can be converted to a DC Motor by:



A) Replacing the lamp with a galvanometer.
B) Replacing the two slip rings with a commutator and replacing the lamp with a battery.
C) Replacing the lamp with a battery.
D) All answers are incorrect.

46. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. In what form is the energy in the system when the mass is at a point between maximum displacement and equilibrium position?
A) elastic potential energy B) gravitational potential energy.
C) kinetic energy. D) kinetic energy and elastic potential energy

47. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?



A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.

48. Which of the following statements is true for sound waves?
A) They do not require a material medium through which to travel.
B) Their speed in a medium = frequency × wavelength.
C) The particles of the medium vibrate perpendicular to the direction the wave is traveling.
D) All answers are correct.

49. Find the magnitude of $(\Delta\theta)$ and (ω) in the adjacent table:
A) 2.5 rad, 15 rad/s B) 0.5 rad, 15 rad/s
C) 2.5 rad, 1.2 rad/s D) 15 rad, 2.5 rad/s

Δs	r	$\Delta\theta$	v_t	ω
0.25 m	0.1 m	?	1.5 m/s	?

50. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of X_L = 600 Ω and a capacitor of impedance of X_C= 200 Ω. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
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Kurdistan Region Government - Iraq
Ministry of Education
High Committee for the General Examinations
General Examinations for the Preparatory Schools (12th Grade)
The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

In the Name of Allah

Subject: Physics

Fingerprint

D

Choose the right answers for the following questions: (two marks for each question)

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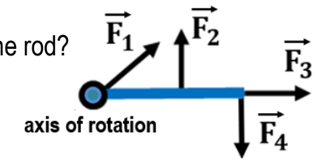

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6. Which of the following is the unit of spring constant (K)? A) $\frac{N}{m^2}$ B) $\frac{m}{N}$ C) $\frac{N}{m}$ D) $\frac{m^2}{N}$

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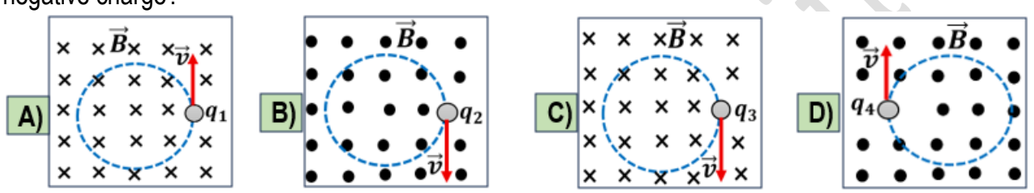

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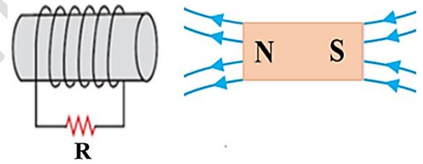

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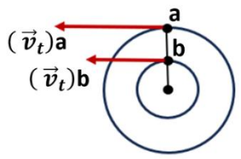
C) $(\Delta\theta)_a > (\Delta\theta)_b$ D) $(v_t)_a = (v_t)_b$



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19. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of X_L = 600 Ω and a capacitor of impedance of X_C= 200 Ω. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
A) $45°$ B) $37°$ C) $30°$ D) $53°$

20. How can you increase the strength of a magnetic field inside a solenoid?
A) Increase the number of coils per unit length. B) Increase the current.
C) Place an iron rod inside the solenoid. D) All answers are correct.

21. An air solenoid of length 10 cm, cross sectional area 25 cm^2, and 400 turns Calculate the coefficient of self-induction of coil [$\mu_o = 4\pi \times 10^{-7}$ T.m/A]
A) 2 mH B) 5 mH C) 0.2 mH D) 0.5 mH

22. A force of magnitude 4 N is applied tangentially to a disk of mass 5 kg and radius 0.2 m. The disk starts rotating from rest. How many revolutions does the disk complete after 2.51 s?
A) 2 rev B) 4 rev C) 8 rev D) 12 rev

23. Light passes through a diffraction grating with 3550 lines/cm and forms a first-order maximum at an angle of, 12.07° What is the wavelength of the light? A) 895 nm B) 589 nm C) 859 nm D) 985 nm

24. Identify which conditions of equilibrium hold for (a solid sphere rolling on incline)?
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25. If the intensity of lawn mower is $1 \times 10^{-3}\ \mathrm{W/m^2}$. What is relative intensity of the sound in decibel (dB)?
A) 0 dB B) 90 dB C) 120 dB D) 130 dB

26. Which of the following is directly proportional with frequency in AC circuits?
A) $\mathbf{X_L}$ B) $\mathbf{X_C}$ C) $\boldsymbol{I_C}$ D) Both (A and C) are correct

27. A step-up transformer: A) $V_2 > V_1$ B) $N_2 > N_1$ C) $\frac{N_2}{N_1} > 1$ D) All the answers are correct

28. Which of the following factors changes when a sound gets louder for a certain source?
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29. A pendulum bob hangs from a string and moves with simple harmonic motion. What is the restoring force in the pendulum?
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B) the component of the bob's weight tangent to the motion of the bob.
C) the component of the bob's weight perpendicular to the motion of the bob.
D) the elastic force of the stretched string.

30. The distance between node and next antinode in a standing wave on string equal:
A) $\frac{1}{4}\ \lambda$ B) $\frac{1}{2}\ \lambda$ C) λ D) $2\ \lambda$

31. An interference pattern is formed by using green light, If the two slits are moved farther apart, what happens to the distance between the bright fringes?
A) increase B) decrease C) remain unchanged D) doubled

32. Determine the change in gravitational force between two masses if the distance between their centers is doubled:
A) It becomes four times B) It becomes three times
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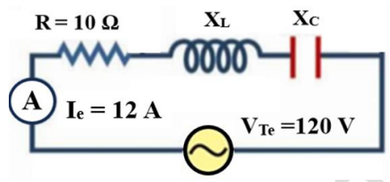
33. When two light waves of same wavelength interfere, If the crest of one wave overlaps the trough of another wave, the two waves have a phase difference of: A) π rad B) 0 rad C) 2 π rad D) 4π rad

34. Two successive crests of a wave are 2.4 m apart. Eight crests pass a given point every 12 what is the wave speed?
A) 1.6 m/s B) 0.8 m/s C) 1.8 m/s D) 9.6 m/s

35. In the electric circuit shown in the adjacent figure, Calculate the phase difference between the circuit current and the total potential difference:
A) $45°$ B) $53°$
C) $180°$ D) $0°$



36. A wooden bucket filled with water is attached to a rope that is wound around a cylinder with a radius of 0.08 m. A crank with a turning radius of 0.3 m is attached to the end of the cylinder. If the minimum force that can be applied perpendicularly to the crank handle is 200 N to raise the bucket at constant speed find the force in the rope $(\vec{F}_T)$?
A) 75 N B) 35 N C) 750 N D) 350 N

37. Find the magnitude of $(\Delta\theta)$ and (ω) in the adjacent table:
A) 2.5 rad, 15 rad/s B) 0.5 rad, 15 rad/s
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Δs	r	$\Delta\theta$	v_t	ω
0.25 m	0.1 m	?	1.5 m/s	?

38. The galvanometer can be converted to a voltmeter by connecting a resistor of very.....to the galvanometer
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40. In the figure, A pendulum bob hangs from a string and moves with simple harmonic motion. If the pendulum bob moves from point (Y) to point (Z) in 0.1 s. What is the frequency of the pendulum?
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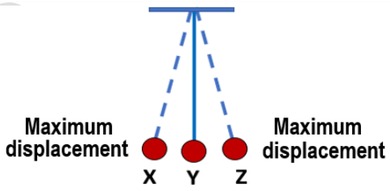

41. A 90 kg person rides a spinning a measurement park ride that has an angular speed of 1.15 rad/s. If the distance of person is 11.5 m from the axis of rotation. What is the magnitude of the force that maintains the circular motion of the person? A) 1468.8 N B) 1268.8 N C)136.8 N D) 1368.8 N

42. A car tire rotates with an average angular speed of 14π rad/s. in what time interval will the tire rotate 3.5 times?
A) 0.5 s B) 0.76 s C) 2 s D) 4.9 s

43. A loop with 40 turns and an area of 0.5 m^2 is rotating at 250 rad/s. The loop's axis of rotation is perpendicular to a uniform magnetic field with a strength of 0.04 T. what is the maximum emf induced?
A) 120 V B) 300 V C) 200 V D) 180 V

44. The power in the secondary coil of a power station is 3 MW. The station sends the current to the city by means of lines of 120 Ω resistance under a potential difference 6×10^4 V. Calculate the transfer efficiency?
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45. In the adjacent figure, an AC Generator is shown.an AC Generator can be converted to a DC Motor by:
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C) Replacing the lamp with a battery.
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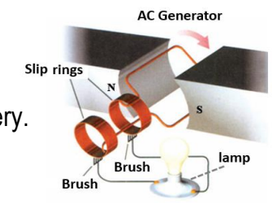

46. Two uniformly solid cylinders of equal radii roll down an incline without slipping. The first cylinder has three times the mass of the second cylinder. The torque was exerted on the first cylinder is..... torque exerted on the second cylinder? A) twice B) three times C) four times D) five times

47. If a spinning amusement-park ride has an angular speed of 1.2 rad/s, what is the centripetal acceleration of a person standing 12 m from the center of the ride?
A) 17.28 m/s^2 B) 1.728 m/s^2 C) 172 m/s^2 D) 1282 m/s^2

48. A 2 kg bicycle wheel with a radius of 0.3 m turns at a constant angular speed of 25 rad/s when a 0.3 kg reflector is at a distance of 0.19 m from the axle. What is the angular speed of the wheel when the reflector slides to a distance of 0.25 m from the axle? (Assume that the bicycle wheel is a ring)
A) 18 rad/s B) 19 rad/s C) 22 rad/s D) 24 rad/s

49. Which of the following statements is true for sound waves?
A) They do not require a material medium through which to travel.
B) Their speed in a medium = frequency × wavelength.
C) The particles of the medium vibrate perpendicular to the direction the wave is traveling.
D) All answers are correct.

50. Volt (V) is equal to: A) $\frac{\mathrm{T}}{\mathrm{m^2 . S}}$ B) $\frac{\mathrm{T . m}}{\mathrm{S}}$ C) $\frac{\mathrm{T . m^2}}{\mathrm{S}}$ D) $\mathrm{T . m^2}$

Kurdistan Region Government - Iraq *In the Name of Allah* *Subject: Physics*
Ministry of Education
High Committee for the General Examinations
General Examinations for the Preparatory Schools (12th Grade)
The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

Fingerprint

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Choose the right answers for the following questions: (two marks for each question)

1. In which of the following of standing waves are produced when the number of nodes is equal to number of antinodes?
A) string B) pipe opened at both ends C) pipe closed at one end D) Both (A and B) are correct

2. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. In what form is the energy in the system when the mass is at a point between maximum displacement and equilibrium position? A) elastic potential energy B) gravitational potential energy.
C) kinetic energy. D) kinetic energy and elastic potential energy

3. An object rolls along a horizontal surface at a constant linear speed without slipping. If the translational kinetic energy of the object is 37.5 J and its total kinetic energy is 52.5 J what is the shape of object?
A) ring B) disk C) hollow sphere D) solid sphere

4. A parked ambulance emits a sound of frequency 1200 Hz. What frequency is detected by an observer inside another car moving with a velocity of 20 m/s.as the car moves towards the ambulance? (Use speed of sound in air is 340 m/s)
A) 1000 Hz B) 1129.4 Hz C) 1270.6 Hz D) 1700 Hz

5. If the intensity of lawn mower is $1 \times 10^{-3}\ \mathrm{W/m^2}$. What is relative intensity of the sound in decibel (dB)?
A) 0 dB B) 90 dB C) 120 dB D) 130 dB

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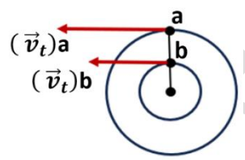
7. Determine the change in gravitational force between two masses if the distance between their centers is doubled:
A) It becomes four times B) It becomes three times
C) It becomes quarter of the original value D) It becomes half of the original value

8. Which of the following is correct for the two points (a and b) for a merry- go-round rotating about a fixed axis as in the figure?
A) $(v_t)_b < (v_t)_a$ B) $\omega_a > \omega_b$
C) $(\Delta\theta)_a > (\Delta\theta)_b$ D) $(v_t)_a = (v_t)_b$



9. Which of the following is not correct about the Laser? A) Laser light is coherent and monochromatic.
B) The process of stimulated emission violates the principle of energy conservation.
C) The active medium is an essential component of laser.
D) A laser source is a device converts electrical energy or chemical energy into coherent light.

10. Which of the following relationship is correct between tangential acceleration $(\boldsymbol{a_t})$ and angular acceleration $(\boldsymbol{\alpha})$?
A) $\boldsymbol{a_t = r\,\alpha}$ B) $\boldsymbol{\alpha = \frac{r}{a_t}}$ C) $\boldsymbol{r = \frac{\alpha}{a_t}}$ D) $\boldsymbol{a_t = r^2\,\alpha}$

11. A wooden bucket filled with water is attached to a rope that is wound around a cylinder with a radius of 0.08 m. A crank with a turning radius of 0.3 m is attached to the end of the cylinder. If the minimum force that can be applied perpendicularly to the crank handle is 200 N to raise the bucket at constant speed find the force in the rope $(\vec{F}_T)$?
A) 75 N B) 35 N C) 750 N D) 350 N

12. Volt (V) is equal to: A) $\frac{T}{m^2 . S}$ B) $\frac{T . m}{S}$ C) $\frac{T . m^2}{S}$ D) $T . m^2$

13. A loop with 40 turns and an area of 0.5 m^2 is rotating at 250 rad/s. The loop's axis of rotation is perpendicular to a uniform magnetic field with a strength of 0.04 T. what is the maximum emf induced?
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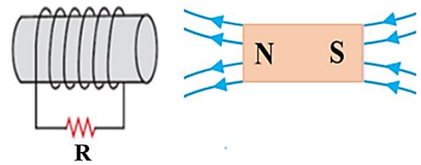
15. The galvanometer can be converted to a voltmeter by connecting a resistor of very…….to the galvanometer
A) high resistance in series B) high resistance in parallel C) low resistance in parallel D) low resistance in series

16. An interference pattern is formed by using green light, If the two slits are moved farther apart, what happens to the distance between the bright fringes?
A) increase B) decrease C) remain unchanged D) doubled

17. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?
A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.



18. A proton moves at a speed of 2×10^7 m/s at right angles to a magnetic field with a magnitude of the 0.1 T. Find the magnitude of the acceleration of the proton? [q_p=1.6 × 10^{-19} C, m_p=1.673 × 10^{-27} kg]
A) 2.05 × 10^{17} m/s² B) 1.91 × 10^{14} m/s² C) 2.5 × 10^{14} m/s² D) 0.01 × 10^{14} m/s²

19. Which of the following is directly proportional with frequency in AC circuits?
A) $\mathbf{X_L}$ B) $\mathbf{X_C}$ C) $\boldsymbol{I_C}$ D) Both (A and C) are correct

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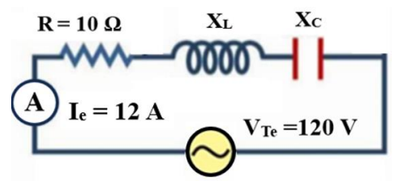
21. Identify which conditions of equilibrium hold for (a solid sphere rolling on incline)?
A) Translational equilibrium. B) Rotational equilibrium.
C) Translational and rotational equilibrium. D) None of the equilibrium conditions hold.

22. The second harmonics of a guitar string has a frequency of 165 Hz. If the speed of waves on the strings is 120 m/s. What is the string's length? A) 0.36 m B) 0.73 m C) 1.1 m D) 1.4 m

23. In the electric circuit shown in the adjacent figure, Calculate the phase difference between the circuit current and the total potential difference:
A) 45° B) 53°
C) 180° D) 0°



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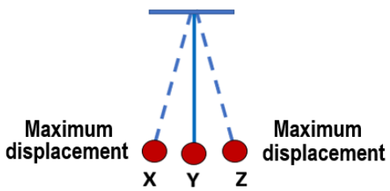

25. An inductive coil of resistance 20 Ω and self-inductance 0.4 H is connected in series with a capacitor of capacitance 200 μF and an AC source of effective voltage 200 V and frequency 60 Hz. Calculate the effective value of the alternating current. A) 10 A B) 6.4 A C) 1.44 A D) 8.62 A

26. When two light waves of same wavelength interfere, If the crest of one wave overlaps the trough of another wave, the two waves have a phase difference of: A) π rad B) 0 rad C) 2 π rad D) 4π rad

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0.25 m	0.1 m	?	1.5 m/s	?

28. Breaking the sound barrier takes place when the speed of the plane.....: the speed of sound in air.
A) greater than B) equal to C) less than D) equal to half of

29. The power in the secondary coil of a power station is 3 MW. The station sends the current to the city by means of lines of 120 Ω resistance under a potential difference 6×10^4 V. Calculate the transfer efficiency?
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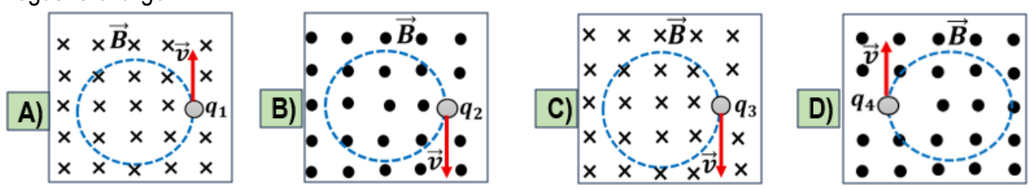
32. Four charges, each charge moves in a circular path in a magnetic field as shown in the figures, which of them is a negative charge?



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40. Which of the following is the unit of spring constant (K)? A) $\frac{N}{m^2}$ B) $\frac{m}{N}$ C) $\frac{N}{m}$ D) $\frac{m^2}{N}$

41. The distance between node and next antinode in a standing wave on string equal:
A) $\frac{1}{4}\lambda$ B) $\frac{1}{2}\lambda$ C) λ D) 2λ

42. When a part of a sound wave travels from air into water, the wavelength of the sound increases. What happens to the frequency and the speed of the sound wave?
A) speed remains constant, and the frequency increases. B) frequency remains constant, and the speed decreases.
C) speed increases, and the frequency remain constant. D) speed increases, and the frequency decreases.

43. In the figure, There are four forces acting on the rod have the same magnitude $(F_1 = F_2 = F_3 = F_4)$ Which one of them produces the greatest torque on the rod?
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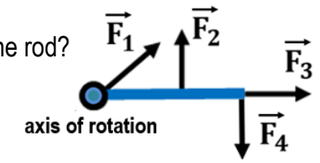

44. .....the tendency of a body rotating about a fixed axis to resist a change in rotational motion.
A) Torque(τ) B) Angular momentum (L) C) Moment of inertia (I) D) Angular acceleration (α)

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48. Two long parallel wires (a and b), each of them is 2 m long, are separated by a distance of 0.5 m between their centers. The wires carry currents $(I_a = 10\ \text{A})$ and $(I_b = 15\ \text{A})$, in opposite directions. What is the magnitude of magnetic force acting on wire (b) as a result of magnetic field of wire (a)? $[\mu_o = 4\pi \times 10^{-7}\ \text{T.m/A}]$
A) 1.2×10^{-4} N B) 12×10^{-4} N C) 0.6×10^{-4} N D) 2.4×10^{-4} N

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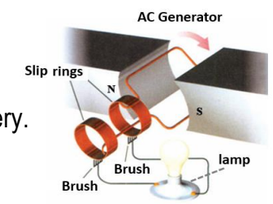

Kurdistan Region Government - Iraq
Ministry of Education
High Committee for the General Examinations
General Examinations for the Preparatory Schools (12th Grade)
The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

In the Name of Allah

Subject: Physics

Fingerprint

F

Choose the right answers for the following questions: (two marks for each question)

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A) $\boldsymbol{a_t = r\,\alpha}$ B) $\boldsymbol{\alpha = \frac{r}{a_t}}$ C) $\boldsymbol{r = \frac{\alpha}{a_t}}$ D) $\boldsymbol{a_t = r^2\,\alpha}$

4. Two uniformly solid cylinders of equal radii roll down an incline without slipping. The first cylinder has three times the mass of the second cylinder. The torque was exerted on the first cylinder is..... torque exerted on the second cylinder? A) twice B) three times C) four times D) five times

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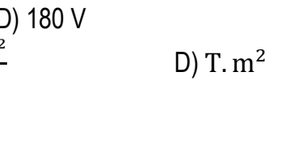

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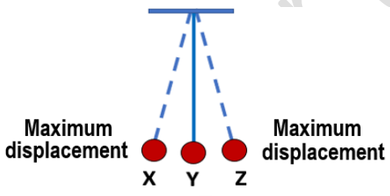
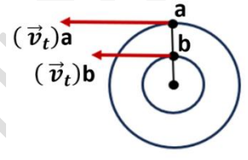
8. In the figure, A pendulum bob hangs from a string and moves with simple harmonic motion. If the pendulum bob moves from point (Y) to point (Z) in 0.1 s. What is the frequency of the pendulum?
A) 2.5 Hz B) 5 Hz
C) 7.5 Hz D) 10 Hz



9. The galvanometer can be converted to a voltmeter by connecting a resistor of very.....to the galvanometer
A) high resistance in series B) high resistance in parallel C) low resistance in parallel D) low resistance in series

10. Which of the following is correct for the two points (a and b) for a merry- go-round rotating about a fixed axis as in the figure?
A) $(v_t)_\mathrm{b} < (v_t)_\mathrm{a}$ B) $\omega_\mathrm{a} > \omega_\mathrm{b}$
C) $(\Delta\theta)_\mathrm{a} > (\Delta\theta)_\mathrm{b}$ D) $(v_t)_\mathrm{a} = (v_t)_\mathrm{b}$



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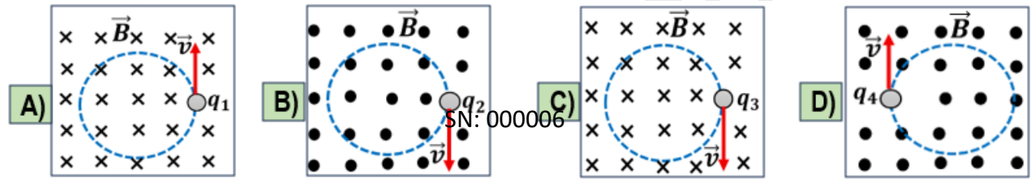
12. Volt (V) is equal to: A) $\frac{\mathrm{T}}{\mathrm{m^2\,.\,S}}$ B) $\frac{\mathrm{T\,.\,m}}{\mathrm{S}}$ C) $\frac{\mathrm{T.\,m^2}}{\mathrm{S}}$ D) $\mathrm{T.\,m^2}$

13. Four charges, each charge moves in a circular path in a magnetic field as shown in the figures, which of them is a negative charge?



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A) 17.28 m/s² B) 1.728 m/s² C) 172 m/s² D) 1282 m/s²

17. Find the magnitude of $(\Delta\theta)$ and (ω) in the adjacent table:
A) 2.5 rad, 15 rad/s B) 0.5 rad, 15 rad/s
C) 2.5 rad, 1.2 rad/s D) 15 rad, 2.5 rad/s

Δs	r	$\Delta\theta$	v_t	ω
0.25 m	0.1 m	?	1.5 m/s	?

18. Breaking the sound barrier takes place when the speed of the plane.....: the speed of sound in air.
A) greater than B) equal to C) less than D) equal to half of

19. The distance between node and next antinode in a standing wave on string equal:
A) $\frac{1}{4}\ \lambda$ B) $\frac{1}{2}\ \lambda$ C) λ D) $2\ \lambda$

20. Which of the following is directly proportional with frequency in AC circuits?
A) $\mathbf{X_L}$ B) $\mathbf{X_C}$ C) $\boldsymbol{I_C}$ D) Both (A and C) are correct

21. Determine the change in gravitational force between two masses if the distance between their centers is doubled:
A) It becomes four times B) It becomes three times
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22. .....the tendency of a body rotating about a fixed axis to resist a change in rotational motion.
A) Torque(τ) B) Angular momentum (L) C) Moment of inertia (I) D) Angular acceleration (α)

23. Light passes through a diffraction grating with 3550 lines/cm and forms a first-order maximum at an angle of, $\mathbf{12.07^\circ}$ What is the wavelength of the light? A) 895 nm B) 589 nm C) 859 nm D) 985 nm

24. Two successive crests of a wave are 2.4 m apart. Eight crests pass a given point every 12 what is the wave speed?
A) 1.6 m/s B) 0.8 m/s C) 1.8 m/s D) 9.6 m/s

25. Calculate the magnitude of the magnetic field at the center of a circular coil of 10 turns and radius 10 cm when a 20 A current passes through it $[\mu_\circ = 4\pi \times 10^{-7}\ \mathrm{T.m/A}]$?
A) 1.256×10^{-4} T B) 1.256×10^{-3} T C) 1.256×10^{-2} T D) 1.256×10^{-1} T

26. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?
A) From left to right, when the bar magnet is moved toward the coil.
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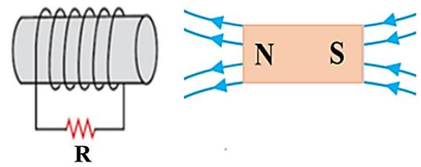

27. Which of the following factors changes when a sound gets louder for a certain source?
A) Intensity B) Relative intensity of the sound C) Amplitude D) All the answers are correct

28. When two light waves of same wavelength interfere, If the crest of one wave overlaps the trough of another wave, the two waves have a phase difference of: A) π rad B) 0 rad C) 2 π rad D) 4π rad

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A) 75 N B) 35 N C) 750 N D) 350 N

30. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of X_L = 600 Ω and a capacitor of impedance of X_C= 200 Ω. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
A) $45°$ B) $37°$ C) $30°$ D) $53°$

31. An object rolls along a horizontal surface at a constant linear speed without slipping. If the translational kinetic energy of the object is 37.5 J and its total kinetic energy is 52.5 J what is the shape of object?
A) ring B) disk C) hollow sphere D) solid sphere

32. A proton moves at a speed of 2×10^7 m/s at right angles to a magnetic field with a magnitude of the 0.1 T. Find the magnitude of the acceleration of the proton? [q_p=1.6 × 10^{-19} C, m_p=1.673 × 10^{-27} kg]
A) 2.05×10^{17} m/s^2 B) 1.91×10^{14} m/s^2 C) 2.5×10^{14} m/s^2 D) 0.01×10^{14} m/s^2

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35. The second harmonics of a guitar string has a frequency of 165 Hz. If the speed of waves on the strings is 120 m/s. What is the string's length? A) 0.36 m B) 0.73 m C) 1.1 m D) 1.4 m

36. An inductive coil of resistance 20 Ω and self-inductance 0.4 H is connected in series with a capacitor of capacitance 200 μF and an AC source of effective voltage 200 V and frequency 60 Hz. Calculate the effective value of the alternating current. A) 10 A B) 6.4 A C) 1.44 A D) 8.62 A

37. A force of magnitude 4 N is applied tangentially to a disk of mass 5 kg and radius 0.2 m. The disk starts rotating from rest. How many revolutions does the disk complete after 2.51 s?
A) 2 rev B) 4 rev C) 8 rev D) 12 rev

38. An air solenoid of length 10 cm, cross sectional area 25 cm^2, and 400 turns Calculate the coefficient of self-induction of coil $[\mu_o = 4\pi \times 10^{-7}\ \mathrm{T.m/A}]$
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A) the total weight of the bob.
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40. In which of the following of standing waves are produced when the number of nodes is equal to number of antinodes?
A) string B) pipe opened at both ends C) pipe closed at one end D) Both (A and B) are correct

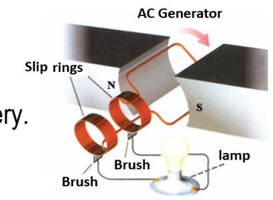
41. Two long parallel wires (a and b), each of them is 2 m long, are separated by a distance of 0.5 m between their centers. The wires carry currents $(I_a = 10\ A)$ and $(I_b = 15\ A)$, in opposite directions. What is the magnitude of magnetic force acting on wire (b) as a result of magnetic field of wire (a)? $[\mu_o = 4\pi \times 10^{-7}\ \mathrm{T.m/A}]$
A) 1.2 × 10^{-4} N B) 12 × 10^{-4} N C) 0.6 × 10^{-4} N D) 2.4 × 10^{-4} N

42. A parked ambulance emits a sound of frequency 1200 Hz. What frequency is detected by an observer inside another car moving with a velocity of 20 m/s.as the car moves towards the ambulance? (Use speed of sound in air is 340 m/s)
A) 1000 Hz B) 1129.4 Hz C) 1270.6 Hz D) 1700 Hz

43. A 2 kg bicycle wheel with a radius of 0.3 m turns at a constant angular speed of 25 rad/s when a 0.3 kg reflector is at a distance of 0.19 m from the axle. What is the angular speed of the wheel when the reflector slides to a distance of 0.25 m from the axle? (Assume that the bicycle wheel is a ring)
A) 18 rad/s B) 19 rad/s C) 22 rad/s D) 24 rad/s

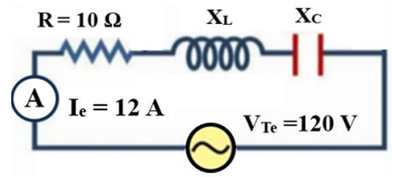
44. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. In what form is the energy in the system when the mass is at a point between maximum displacement and equilibrium position? A) elastic potential energy B) gravitational potential energy.
C) kinetic energy. D) kinetic energy and elastic potential energy

45. In the adjacent figure, an AC Generator is shown.an AC Generator can be converted to a DC Motor by:
A) Replacing the lamp with a galvanometer.
B) Replacing the two slip rings with a commutator and replacing the lamp with a battery.
C) Replacing the lamp with a battery.
D) All answers are incorrect.



46. The power in the secondary coil of a power station is 3 MW. The station sends the current to the city by means of lines of 120 Ω resistance under a potential difference 6 × 10^4 V. Calculate the transfer efficiency?
A) 96.9 % B) 95 % C) 99.9 % D) 90 %

47. In the electric circuit shown in the adjacent figure, Calculate the phase difference between the circuit current and the total potential difference:
A) $45°$ B) $53°$
C) $180°$ D) $0°$



48. A 90 kg person rides a spinning a measurement park ride that has an angular speed of 1.15 rad/s. If the distance of person is 11.5 m from the axis of rotation. What is the magnitude of the force that maintains the circular motion of the person? A) 1468.8 N B) 1268.8 N C)136.8 N D) 1368.8 N

49. When a part of a sound wave travels from air into water, the wavelength of the sound increases. What happens to the frequency and the speed of the sound wave?
A) speed remains constant, and the frequency increases. B) frequency remains constant, and the speed decreases.
C) speed increases, and the frequency remain constant. D) speed increases, and the frequency decreases.

50. A step-up transformer: A) $V_2 > V_1$ B) $N_2 > N_1$ C) $\frac{N_2}{N_1} > 1$ D) All the answers are correct

Kurdistan Region Government - Iraq *In the Name of Allah* *Subject: Physics*
Ministry of Education
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The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

Fingerprint

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Choose the right answers for the following questions: (two marks for each question)

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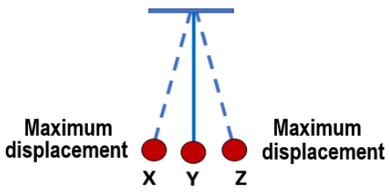

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9. Two uniformly solid cylinders of equal radii roll down an incline without slipping. The first cylinder has three times the mass of the second cylinder. The torque was exerted on the first cylinder is……. torque exerted on the second cylinder? A) twice B) three times C) four times D) five times

10. Identify which conditions of equilibrium hold for (a solid sphere rolling on incline)?
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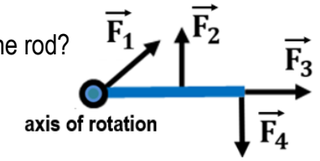

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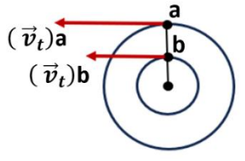

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25. If the intensity of lawn mower is 1×10^{-3} W/m^2 . What is relative intensity of the sound in decibel (dB)?
A) 0 dB B) 90 dB C) 120 dB D) 130 dB

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A) $a_t = r\,\alpha$ B) $\alpha = \frac{r}{a_t}$ C) $r = \frac{\alpha}{a_t}$ D) $a_t = r^2\,\alpha$

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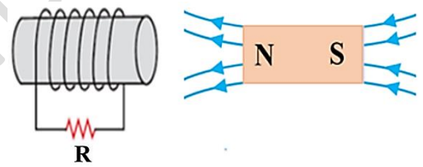

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A) ring B) disk C) hollow sphere D) solid sphere

46. When a part of a sound wave travels from air into water, the wavelength of the sound increases. What happens to the frequency and the speed of the sound wave?
A) speed remains constant, and the frequency increases. B) frequency remains constant, and the speed decreases.
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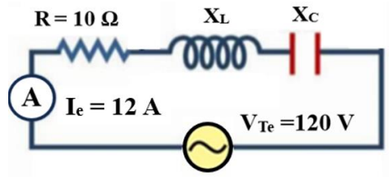
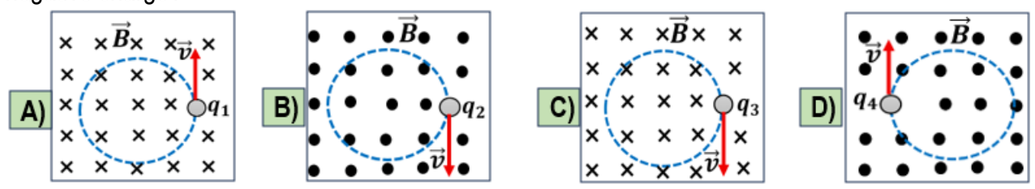
47. In the electric circuit shown in the adjacent figure, Calculate the phase difference between the circuit current and the total potential difference:
A) 45° B) 53°
C) 180° D) 0°



48. Four charges, each charge moves in a circular path in a magnetic field as shown in the figures, which of them is a negative charge?



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50. In the adjacent figure, an AC Generator is shown.an AC Generator can be converted to a DC Motor by:
A) Replacing the lamp with a galvanometer.
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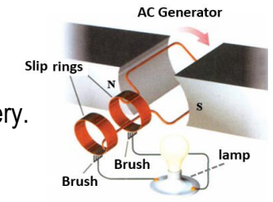


Kurdistan Region Government - Iraq *In the Name of Allah* *Subject: Physics*
Ministry of Education
High Committee for the General Examinations
General Examinations for the Preparatory Schools (12th Grade)
The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

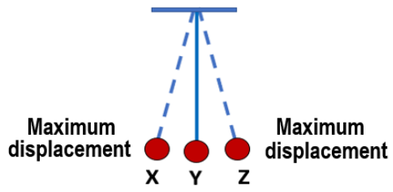
Fingerprint

H

Choose the right answers for the following questions: (two marks for each question)

1. Which of the following statements is true for sound waves?
A) They do not require a material medium through which to travel.
B) Their speed in a medium = frequency × wavelength.
C) The particles of the medium vibrate perpendicular to the direction the wave is traveling.
D) All answers are correct.

2. In the figure, A pendulum bob hangs from a string and moves with simple harmonic motion. If the pendulum bob moves from point (Y) to point (Z) in 0.1 s. What is the frequency of the pendulum?
A) 2.5 Hz B) 5 Hz
C) 7.5 Hz D) 10 Hz



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A) increase B) decrease C) remain unchanged D) doubled

4. Which of the following is correct for the two points (a and b) for a merry- go-round rotating about a fixed axis as in the figure?
A) $(v_t)_b < (v_t)_a$ B) $\omega_a > \omega_b$
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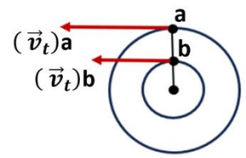

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A) 1.6 m/s B) 0.8 m/s C) 1.8 m/s D) 9.6 m/s

6. Two uniformly solid cylinders of equal radii roll down an incline without slipping. The first cylinder has three times the mass of the second cylinder. The torque was exerted on the first cylinder is……. torque exerted on the second cylinder? A) twice B) three times C) four times D) five times

7. When two light waves of same wavelength interfere, If the crest of one wave overlaps the trough of another wave, the two waves have a phase difference of: A) π rad B) 0 rad C) 2 π rad D) 4π rad

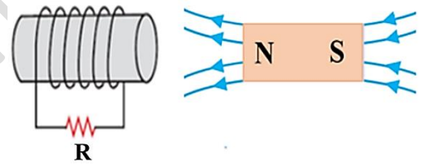
8. An air solenoid of length 10 cm, cross sectional area 25 cm^2, and 400 turns Calculate the coefficient of self-induction of coil [$\mu_o = 4\pi \times 10^{-7}$ T.m/A]
A) 2 mH B) 5 mH C) 0.2 mH D) 0.5 mH

9. Calculate the magnitude of the magnetic field at the center of a circular coil of 10 turns and radius 10 cm when a 20 A current passes through it [$\mu_o = 4\pi \times 10^{-7}$ T.m/A]?
A) 1.256×10^{-4} T B) 1.256×10^{-3} T C) 1.256×10^{-2} T D) 1.256×10^{-1} T

10. Light passes through a diffraction grating with 3550 lines/cm and forms a first-order maximum at an angle of, 12.07° What is the wavelength of the light? A) 895 nm B) 589 nm C) 859 nm D) 985 nm

11. Which of the following is <u>not correct</u> about the Laser? A) Laser light is coherent and monochromatic.
B) The process of stimulated emission violates the principle of energy conservation.
C) The active medium is an essential component of laser.
D) A laser source is a device converts electrical energy or chemical energy into coherent light.

12. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?
A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.



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13. Which of the following relationship is correct between tangential acceleration (a_t) and angular acceleration (α) ?
A) $a_t = r\,\alpha$ B) $\alpha = \frac{r}{a_t}$ C) $r = \frac{\alpha}{a_t}$ D) $a_t = r^2\,\alpha$

14. The distance between node and next antinode in a standing wave on string equal:
A) $\frac{1}{4}\,\lambda$ B) $\frac{1}{2}\,\lambda$ C) λ D) $2\,\lambda$

15. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. In what form is the energy in the system when the mass is at a point between maximum displacement and equilibrium position? A) elastic potential energy B) gravitational potential energy.
C) kinetic energy. D) kinetic energy and elastic potential energy

16. A wooden bucket filled with water is attached to a rope that is wound around a cylinder with a radius of 0.08 m. A crank with a turning radius of 0.3 m is attached to the end of the cylinder. If the minimum force that can be applied perpendicularly to the crank handle is 200 N to raise the bucket at constant speed find the force in the rope ($\vec{F}_T$)?
A) 75 N B) 35 N C) 750 N D) 350 N

17. Which of the following is directly proportional with frequency in AC circuits?
A) X_L B) X_C C) I_C D) Both (A and C) are correct

18. An inductive coil of resistance 20 Ω and self-inductance 0.4 H is connected in series with a capacitor of capacitance 200 μF and an AC source of effective voltage 200 V and frequency 60 Hz. Calculate the effective value of the alternating current. A) 10 A B) 6.4 A C) 1.44 A D) 8.62 A

19. Which of the following is the unit of spring constant (K)? A) $\frac{N}{m^2}$ B) $\frac{m}{N}$ C) $\frac{N}{m}$ D) $\frac{m^2}{N}$

20. In which of the following of standing waves are produced when the number of nodes is equal to number of antinodes?
A) string B) pipe opened at both ends C) pipe closed at one end D) Both (A and B) are correct

21. A force of magnitude 4 N is applied tangentially to a disk of mass 5 kg and radius 0.2 m. The disk starts rotating from rest. How many revolutions does the disk complete after 2.51 s?
A) 2 rev B) 4 rev C) 8 rev D) 12 rev

22. In the electric circuit shown in the adjacent figure, Calculate the phase difference between the circuit current and the total potential difference:
A) 45° B) 53°
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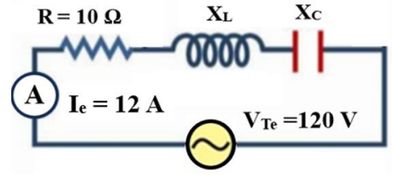
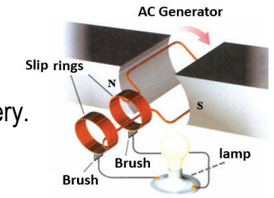


23. How can you increase the strength of a magnetic field inside a solenoid?
A) Increase the number of coils per unit length. B) Increase the current.
C) Place an iron rod inside the solenoid. D) All answers are correct.

24. Volt (V) is equal to: A) $\frac{T}{m^2 . s}$ B) $\frac{T . m}{s}$ C) $\frac{T . m^2}{s}$ D) $T . m^2$

25. In the adjacent figure, an AC Generator is shown.an AC Generator can be converted to a DC Motor by:



A) Replacing the lamp with a galvanometer.
B) Replacing the two slip rings with a commutator and replacing the lamp with a battery.
C) Replacing the lamp with a battery.
D) All answers are incorrect.

26. A step-up transformer: A) $V_2 > V_1$ B) $N_2 > N_1$ C) $\frac{N_2}{N_1} > 1$ D) All the answers are correct

27. When a part of a sound wave travels from air into water, the wavelength of the sound increases. What happens to the frequency and the speed of the sound wave?
A) speed remains constant, and the frequency increases. B) frequency remains constant, and the speed decreases.
C) speed increases, and the frequency remain constant. D) speed increases, and the frequency decreases.

28. Which of the following factors changes when a sound gets louder for a certain source?
A) Intensity B) Relative intensity of the sound C) Amplitude D) All the answers are correct

29. The power in the secondary coil of a power station is 3 MW. The station sends the current to the city by means of lines of 120 Ω resistance under a potential difference 6×10^4 V. Calculate the transfer efficiency?
A) 96.9 % B) 95 % C) 99.9 % D) 90 %

30. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of X_L = 600 Ω and a capacitor of impedance of X_C= 200 Ω. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
A) $45°$ B) $37°$ C) $30°$ D) $53°$

31. The galvanometer can be converted to a voltmeter by connecting a resistor of very…….....to the galvanometer
A) high resistance in series B) high resistance in parallel C) low resistance in parallel D) low resistance in series

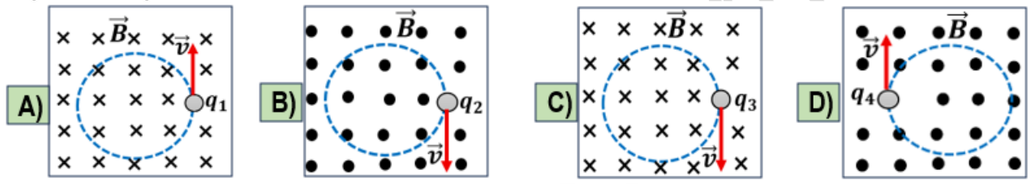
32. Determine the change in gravitational force between two masses if the distance between their centers is doubled:
A) It becomes four times B) It becomes three times
C) It becomes quarter of the original value D) It becomes half of the original value

33. If a spinning amusement-park ride has an angular speed of 1.2 rad/s, what is the centripetal acceleration of a person standing 12 m from the center of the ride?
A) 17.28 m/s^2 B) 1.728 m/s^2 C) 172 m/s^2 D) 1282 m/s^2

34. ……..the tendency of a body rotating about a fixed axis to resist a change in rotational motion.
A) Torque(τ) B) Angular momentum (L) C) Moment of inertia (I) D) Angular acceleration (α)

35. Breaking the sound barrier takes place when the speed of the plane……: the speed of sound in air.
A) greater than B) equal to C) less than D) equal to half of

36. Four charges, each charge moves in a circular path in a magnetic field as shown in the figures, which of them is a negative charge?



37. A 2 kg bicycle wheel with a radius of 0.3 m turns at a constant angular speed of 25 rad/s when a 0.3 kg reflector is at a distance of 0.19 m from the axle. What is the angular speed of the wheel when the reflector slides to a distance of 0.25 m from the axle? (Assume that the bicycle wheel is a ring)
A) 18 rad/s B) 19 rad/s C) 22 rad/s D) 24 rad/s

38. Find the magnitude of $(\Delta\theta)$ and (ω) in the adjacent table:
A) 2.5 rad, 15 rad/s B) 0.5 rad, 15 rad/s
C) 2.5 rad, 1.2 rad/s D) 15 rad, 2.5 rad/s

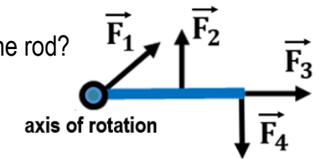
Δs	r	$\Delta\theta$	v_t	ω
0.25 m	0.1 m	?	1.5 m/s	?

39. A 90 kg person rides a spinning a measurement park ride that has an angular speed of 1.15 rad/s. If the distance of person is 11.5 m from the axis of rotation. What is the magnitude of the force that maintains the circular motion of the person? A) 1468.8 N B) 1268.8 N C)136.8 N D) 1368.8 N

40. Identify which conditions of equilibrium hold for (a solid sphere rolling on incline)?
A) Translational equilibrium. B) Rotational equilibrium.
C) Translational and rotational equilibrium. D) None of the equilibrium conditions hold.

41. If the intensity of lawn mower is 1×10^{-3} W/m^2 . What is relative intensity of the sound in decibel (dB)?
A) 0 dB B) 90 dB C) 120 dB D) 130 dB

42. In the figure, There are four forces acting on the rod have the same magnitude $(F_1 = F_2 = F_3 = F_4)$ Which one of them produces the greatest torque on the rod?
A) $\vec{F}_1$ B) $\vec{F}_2$
C) $\vec{F}_3$ D) $\vec{F}_4$



43. An object rolls along a horizontal surface at a constant linear speed without slipping. If the translational kinetic energy of the object is 37.5 J and its total kinetic energy is 52.5 J what is the shape of object?
A) ring B) disk C) hollow sphere D) solid sphere

44. The second harmonics of a guitar string has a frequency of 165 Hz. If the speed of waves on the strings is 120 m/s. What is the string's length? A) 0.36 m B) 0.73 m C) 1.1 m D) 1.4 m

45. Two long parallel wires (a and b), each of them is 2 m long, are separated by a distance of 0.5 m between their centers. The wires carry currents $(I_a = 10\ A)$ and $(I_b = 15\ A)$, in opposite directions. What is the magnitude of magnetic force acting on wire (b) as a result of magnetic field of wire (a)? $[\mu_o = 4\pi \times 10^{-7}\ T.m/A]$
A) 1.2×10^{-4} N B) 12×10^{-4} N C) 0.6×10^{-4} N D) 2.4×10^{-4} N

46. A loop with 40 turns and an area of 0.5 m^2 is rotating at 250 rad/s. The loop's axis of rotation is perpendicular to a uniform magnetic field with a strength of 0.04 T. what is the maximum emf induced?
A) 120 V B) 300 V C) 200 V D) 180 V

47. A car tire rotates with an average angular speed of 14π rad/s. in what time interval will the tire rotate 3.5 times?
A) 0.5 s B) 0.76 s C) 2 s D) 4.9 s

48. A pendulum bob hangs from a string and moves with simple harmonic motion. What is the restoring force in the pendulum?
A) the total weight of the bob.
B) the component of the bob's weight tangent to the motion of the bob.
C) the component of the bob's weight perpendicular to the motion of the bob.
D) the elastic force of the stretched string.

49. A parked ambulance emits a sound of frequency 1200 Hz. What frequency is detected by an observer inside another car moving with a velocity of 20 m/s.as the car moves towards the ambulance? (Use speed of sound in air is 340 m/s)
A) 1000 Hz B) 1129.4 Hz C) 1270.6 Hz D) 1700 Hz

50. A proton moves at a speed of 2×10^7 m/s at right angles to a magnetic field with a magnitude of the 0.1 T. Find the magnitude of the acceleration of the proton? [q_p=1.6 × 10^{-19} C, m_p=1.673 × 10^{-27} kg]
A) 2.05×10^{17} m/s^2 B) 1.91×10^{14} m/s^2 C) 2.5×10^{14} m/s^2 D) 0.01×10^{14} m/s^2

Kurdistan Region Government - Iraq
Ministry of Education
High Committee for the General Examinations
General Examinations for the Preparatory Schools (12th Grade)
The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

In the Name of Allah

Subject: Physics

Fingerprint

Choose the right answers for the following questions: (two marks for each question)

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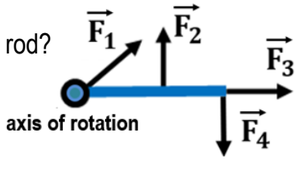

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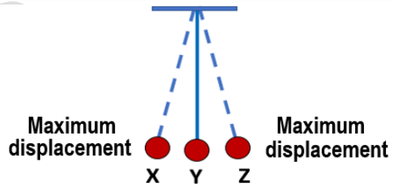

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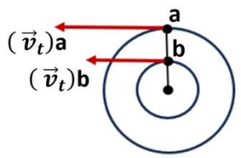

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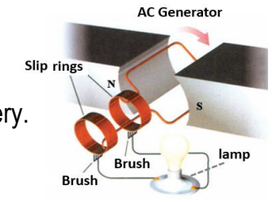

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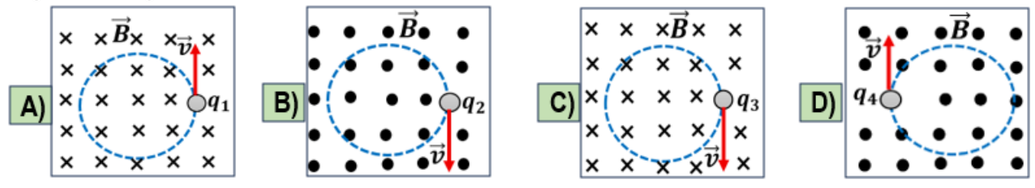

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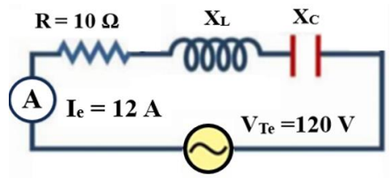
A) 0.5 s B) 0.76 s C) 2 s D) 4.9 s

28. The galvanometer can be converted to a voltmeter by connecting a resistor of very.....to the galvanometer
A) high resistance in series B) high resistance in parallel C) low resistance in parallel D) low resistance in series

29. A pendulum bob hangs from a string and moves with simple harmonic motion. What is the restoring force in the pendulum?
A) the total weight of the bob.
B) the component of the bob's weight tangent to the motion of the bob.
C) the component of the bob's weight perpendicular to the motion of the bob.
D) the elastic force of the stretched string.

30. In the electric circuit shown in the adjacent figure, Calculate the phase difference between the circuit current and the total potential difference:
A) 45° B) 53°
C) 180° D) 0°



31. Breaking the sound barrier takes place when the speed of the plane.....: the speed of sound in air.
A) greater than B) equal to C) less than D) equal to half of

32. An object rolls along a horizontal surface at a constant linear speed without slipping. If the translational kinetic energy of the object is 37.5 J and its total kinetic energy is 52.5 J what is the shape of object?
A) ring B) disk C) hollow sphere D) solid sphere

33. Which of the following factors changes when a sound gets louder for a certain source?
A) Intensity B) Relative intensity of the sound C) Amplitude D) All the answers are correct

34. When two light waves of same wavelength interfere, If the crest of one wave overlaps the trough of another wave, the two waves have a phase difference of: A) π rad B) 0 rad C) 2 π rad D) 4π rad

35. Which of the following statements is true for sound waves?
A) They do not require a material medium through which to travel.
B) Their speed in a medium = frequency × wavelength.
C) The particles of the medium vibrate perpendicular to the direction the wave is traveling.
D) All answers are correct.

36. In which of the following of standing waves are produced when the number of nodes is equal to number of antinodes?
A) string B) pipe opened at both ends C) pipe closed at one end D) Both (A and B) are correct

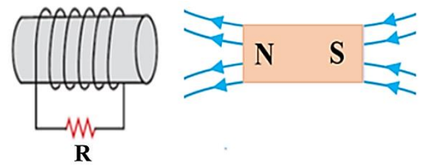
37. Volt (V) is equal to: A) $\frac{\mathrm{T}}{\mathrm{m^2 \,.\, s}}$ B) $\frac{\mathrm{T\,.\,m}}{\mathrm{s}}$ C) $\frac{\mathrm{T.\,m^2}}{\mathrm{s}}$ D) $\mathrm{T.\,m^2}$

38. Identify which conditions of equilibrium hold for (a solid sphere rolling on incline)?
A) Translational equilibrium. B) Rotational equilibrium.
C) Translational and rotational equilibrium. D) None of the equilibrium conditions hold.

39. Which of the following is not correct about the Laser? A) Laser light is coherent and monochromatic.
B) The process of stimulated emission violates the principle of energy conservation.
C) The active medium is an essential component of laser.
D) A laser source is a device converts electrical energy or chemical energy into coherent light.

40. Two long parallel wires (a and b), each of them is 2 m long, are separated by a distance of 0.5 m between their centers. The wires carry currents $(\mathrm{I_a} = 10\ \mathrm{A})$ and $(\mathrm{I_b} = 15\ \mathrm{A})$, in opposite directions. What is the magnitude of magnetic force acting on wire (b) as a result of magnetic field of wire (a)? $[\mu_o = 4\pi \times 10^{-7}\ \mathrm{T.m/A}]$
A) 1.2×10^{-4} N B) 12×10^{-4} N C) 0.6×10^{-4} N D) 2.4×10^{-4} N

41. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?
A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.



42. Determine the change in gravitational force between two masses if the distance between their centers is doubled:
A) It becomes four times B) It becomes three times
C) It becomes quarter of the original value D) It becomes half of the original value

43. An inductive coil of resistance 20 Ω and self-inductance 0.4 H is connected in series with a capacitor of capacitance 200 μF and an AC source of effective voltage 200 V and frequency 60 Hz. Calculate the effective value of the alternating current. A) 10 A B) 6.4 A C) 1.44 A D) 8.62 A

44. A 90 kg person rides a spinning a measurement park ride that has an angular speed of 1.15 rad/s. If the distance of person is 11.5 m from the axis of rotation. What is the magnitude of the force that maintains the circular motion of the person? A) 1468.8 N B) 1268.8 N C)136.8 N D) 1368.8 N

45. The distance between node and next antinode in a standing wave on string equal:
A) $\frac{1}{4}\ \lambda$ B) $\frac{1}{2}\ \lambda$ C) λ D) $2\ \lambda$

46. An air solenoid of length 10 cm, cross sectional area 25 $\mathrm{cm^2}$, and 400 turns Calculate the coefficient of self-induction of coil $[\mu_o = 4\pi \times 10^{-7}\ \mathrm{T.m/A}]$
A) 2 mH B) 5 mH C) 0.2 mH D) 0.5 mH

47. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $\mathrm{X_L}$ = 600 Ω and a capacitor of impedance of $\mathrm{X_C}$= 200 Ω. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
A) 45° B) 37° C) 30° D) 53°

48. The second harmonics of a guitar string has a frequency of 165 Hz. If the speed of waves on the strings is 120 m/s. What is the string's length? A) 0.36 m B) 0.73 m C) 1.1 m D) 1.4 m

49. A proton moves at a speed of 2×10^7 m/s at right angles to a magnetic field with a magnitude of the 0.1 T. Find the magnitude of the acceleration of the proton? [q_p=1.6×10^{-19} C, m_p=1.673×10^{-27} kg]
A) 2.05×10^{17} m/s² B) 1.91×10^{14} m/s² C) 2.5×10^{14} m/s² D) 0.01×10^{14} m/s²

50. A loop with 40 turns and an area of 0.5 $\mathrm{m^2}$ is rotating at 250 rad/s. The loop's axis of rotation is perpendicular to a uniform magnetic field with a strength of 0.04 T. what is the maximum emf induced?
A) 120 V B) 300 V C) 200 V D) 180 V

Kurdistan Region Government - Iraq *In the Name of Allah* *Subject: Physics*
Ministry of Education
High Committee for the General Examinations
General Examinations for the Preparatory Schools (12th Grade)
The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

Fingerprint

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Choose the right answers for the following questions: (two marks for each question)

1. The galvanometer can be converted to a voltmeter by connecting a resistor of very…….to the galvanometer
A) high resistance in series B) high resistance in parallel C) low resistance in parallel D) low resistance in series

2. Two long parallel wires (a and b), each of them is 2 m long, are separated by a distance of 0.5 m between their centers. The wires carry currents ($I_a = 10$ A) and ($I_b = 15$ A), in opposite directions. What is the magnitude of magnetic force acting on wire (b) as a result of magnetic field of wire (a)? [$\mu_o = 4\pi \times 10^{-7}$ T.m/A]
A) 1.2×10^{-4} N B) 12×10^{-4} N C) 0.6×10^{-4} N D) 2.4×10^{-4} N

3. A pendulum bob hangs from a string and moves with simple harmonic motion. What is the restoring force in the pendulum?
A) the total weight of the bob.
B) the component of the bob's weight tangent to the motion of the bob.
C) the component of the bob's weight perpendicular to the motion of the bob.
D) the elastic force of the stretched string.

4. Which of the following is directly proportional with frequency in AC circuits?
A) $\mathbf{X_L}$ B) $\mathbf{X_C}$ C) $\boldsymbol{I_C}$ D) Both (A and C) are correct

5. Find the magnitude of ($\Delta\theta$) and (ω) in the adjacent table:
A) 2.5 rad, 15 rad/s B) 0.5 rad, 15 rad/s
C) 2.5 rad, 1.2 rad/s D) 15 rad, 2.5 rad/s

Δs	r	$\Delta\theta$	v_t	ω
0.25 m	0.1 m	?	1.5 m/s	?

6. When a part of a sound wave travels from air into water, the wavelength of the sound increases. What happens to the frequency and the speed of the sound wave?
A) speed remains constant, and the frequency increases. B) frequency remains constant, and the speed decreases.
C) speed increases, and the frequency remain constant. D) speed increases, and the frequency decreases.

7. The distance between node and next antinode in a standing wave on string equal:
A) $\frac{1}{4}\lambda$ B) $\frac{1}{2}\lambda$ C) λ D) 2λ

8. A force of magnitude 4 N is applied tangentially to a disk of mass 5 kg and radius 0.2 m. The disk starts rotating from rest. How many revolutions does the disk complete after 2.51 s?
A) 2 rev B) 4 rev C) 8 rev D) 12 rev

9. Determine the change in gravitational force between two masses if the distance between their centers is doubled:
A) It becomes four times B) It becomes three times
C) It becomes quarter of the original value D) It becomes half of the original value

10. If a spinning amusement-park ride has an angular speed of 1.2 rad/s, what is the centripetal acceleration of a person standing 12 m from the center of the ride?
A) 17.28 m/s^2 B) 1.728 m/s^2 C) 172 m/s^2 D) 1282 m/s^2

11. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?
A) From left to right, when the bar magnet is moved toward the coil.
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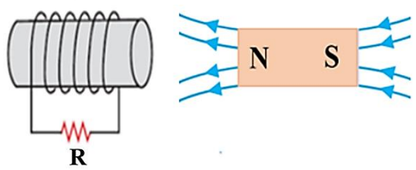
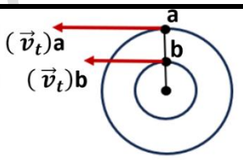
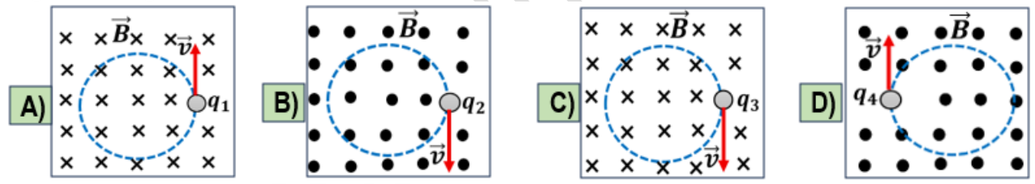


12. Which of the following is correct for the two points (a and b) for a merry- go-round rotating about a fixed axis as in the figure?
A) $(v_t)_b < (v_t)_a$ B) $\omega_a > \omega_b$
C) $(\Delta\theta)_a > (\Delta\theta)_b$ D) $(v_t)_a = (v_t)_b$



13. Four charges, each charge moves in a circular path in a magnetic field as shown in the figures, which of them is a negative charge?



14. In which of the following of standing waves are produced when the number of nodes is equal to number of antinodes?
A) string B) pipe opened at both ends C) pipe closed at one end D) Both (A and B) are correct

15. A 2 kg bicycle wheel with a radius of 0.3 m turns at a constant angular speed of 25 rad/s when a 0.3 kg reflector is at a distance of 0.19 m from the axle. What is the angular speed of the wheel when the reflector slides to a distance of 0.25 m from the axle? (Assume that the bicycle wheel is a ring)
A) 18 rad/s B) 19 rad/s C) 22 rad/s D) 24 rad/s

16. How can you increase the strength of a magnetic field inside a solenoid?
A) Increase the number of coils per unit length. B) Increase the current.
C) Place an iron rod inside the solenoid. D) All answers are correct.

17. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of X_L = 600 Ω and a capacitor of impedance of X_C= 200 Ω. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
A) 45° B) 37° C) 30° D) 53°

18. If the intensity of lawn mower is 1×10^{-3} W/m^2 . What is relative intensity of the sound in decibel (dB)?
A) 0 dB B) 90 dB C) 120 dB D) 130 dB

19. Two successive crests of a wave are 2.4 m apart. Eight crests pass a given point every 12 what is the wave speed?
A) 1.6 m/s B) 0.8 m/s C) 1.8 m/s D) 9.6 m/s

20. Which of the following is <u>not correct</u> about the Laser? A) Laser light is coherent and monochromatic.
B) The process of stimulated emission violates the principle of energy conservation.
C) The active medium is an essential component of laser.
D) A laser source is a device converts electrical energy or chemical energy into coherent light.

21. An object rolls along a horizontal surface at a constant linear speed without slipping. If the translational kinetic energy of the object is 37.5 J and its total kinetic energy is 52.5 J what is the shape of object?
A) ring B) disk C) hollow sphere D) solid sphere

22. Identify which conditions of equilibrium hold for (a solid sphere rolling on incline)?
A) Translational equilibrium. B) Rotational equilibrium.
C) Translational and rotational equilibrium. D) None of the equilibrium conditions hold.

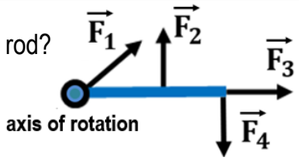
23. A step-up transformer: A) $V_2 > V_1$ B) $N_2 > N_1$ C) $\frac{N_2}{N_1} > 1$ D) All the answers are correct

24. ……the tendency of a body rotating about a fixed axis to resist a change in rotational motion.
A) Torque(τ) B) Angular momentum (L) C) Moment of inertia (I) D) Angular acceleration (α)

25. A car tire rotates with an average angular speed of 14π rad/s. in what time interval will the tire rotate 3.5 times?
A) 0.5 s B) 0.76 s C) 2 s D) 4.9 s

26. In the figure, There are four forces acting on the rod have the same magnitude $(F_1 = F_2 = F_3 = F_4)$ Which one of them produces the greatest torque on the rod?

A) $\vec{F}_1$ B) $\vec{F}_2$
C) $\vec{F}_3$ D) $\vec{F}_4$



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28. An inductive coil of resistance 20 Ω and self-inductance 0.4 H is connected in series with a capacitor of capacitance 200 μF and an AC source of effective voltage 200 V and frequency 60 Hz. Calculate the effective value of the alternating current. A) 10 A B) 6.4 A C) 1.44 A D) 8.62 A

29. Light passes through a diffraction grating with 3550 lines/cm and forms a first-order maximum at an angle of, $\mathbf{12.07}^\circ$ What is the wavelength of the light? A) 895 nm B) 589 nm C) 859 nm D) 985 nm

30. Breaking the sound barrier takes place when the speed of the plane.....: the speed of sound in air.
A) greater than B) equal to C) less than D) equal to half of

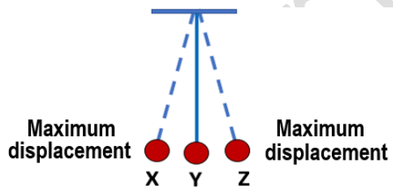
31. When two light waves of same wavelength interfere, If the crest of one wave overlaps the trough of another wave, the two waves have a phase difference of: A) π rad B) 0 rad C) 2 π rad D) 4π rad

32. Which of the following factors changes when a sound gets louder for a certain source?
A) Intensity B) Relative intensity of the sound C) Amplitude D) All the answers are correct

33. Which of the following is the unit of spring constant (K)? A) $\frac{N}{m^2}$ B) $\frac{m}{N}$ C) $\frac{N}{m}$ D) $\frac{m^2}{N}$

34. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. In what form is the energy in the system when the mass is at a point between maximum displacement and equilibrium position? A) elastic potential energy B) gravitational potential energy.
C) kinetic energy. D) kinetic energy and elastic potential energy

35. In the figure, A pendulum bob hangs from a string and moves with simple harmonic motion. If the pendulum bob moves from point (Y) to point (Z) in 0.1 s. What is the frequency of the pendulum?
A) 2.5 Hz B) 5 Hz
C) 7.5 Hz D) 10 Hz



36. A parked ambulance emits a sound of frequency 1200 Hz. What frequency is detected by an observer inside another car moving with a velocity of 20 m/s.as the car moves towards the ambulance? (Use speed of sound in air is 340 m/s)
A) 1000 Hz B) 1129.4 Hz C) 1270.6 Hz D) 1700 Hz

37. A loop with 40 turns and an area of 0.5 m^2 is rotating at 250 rad/s. The loop's axis of rotation is perpendicular to a uniform magnetic field with a strength of 0.04 T. what is the maximum emf induced?
A) 120 V B) 300 V C) 200 V D) 180 V

38. A proton moves at a speed of 2×10^7 m/s at right angles to a magnetic field with a magnitude of the 0.1 T. Find the magnitude of the acceleration of the proton? [q_p=1.6 × 10^{-19} C, m_p=1.673 × 10^{-27} kg]
A) 2.05×10^{17} m/s² B) 1.91×10^{14} m/s² C) 2.5×10^{14} m/s² D) 0.01×10^{14} m/s²

39. Which of the following relationship is correct between tangential acceleration $(\boldsymbol{a_t})$ and angular acceleration $(\boldsymbol{\alpha})$?
A) $\boldsymbol{a_t = r\,\alpha}$ B) $\boldsymbol{\alpha = \frac{r}{a_t}}$ C) $\boldsymbol{r = \frac{\alpha}{a_t}}$ D) $\boldsymbol{a_t = r^2\,\alpha}$

40. Two uniformly solid cylinders of equal radii roll down an incline without slipping. The first cylinder has three times the mass of the second cylinder. The torque was exerted on the first cylinder is..... torque exerted on the second cylinder? A) twice B) three times C) four times D) five times

41. Which of the following statements is true for sound waves?
A) They do not require a material medium through which to travel.
B) Their speed in a medium = frequency × wavelength.
C) The particles of the medium vibrate perpendicular to the direction the wave is traveling.
D) All answers are correct.

42. An interference pattern is formed by using green light, If the two slits are moved farther apart, what happens to the distance between the bright fringes?
A) increase B) decrease C) remain unchanged D) doubled

43. Calculate the magnitude of the magnetic field at the center of a circular coil of 10 turns and radius 10 cm when a 20 A current passes through it [$\mu_o = 4\pi \times 10^{-7}$ T.m/A]?
A) 1.256×10^{-4} T B) 1.256×10^{-3} T C) 1.256×10^{-2} T D) 1.256×10^{-1} T

44. A wooden bucket filled with water is attached to a rope that is wound around a cylinder with a radius of 0.08 m. A crank with a turning radius of 0.3 m is attached to the end of the cylinder. If the minimum force that can be applied perpendicularly to the crank handle is 200 N to raise the bucket at constant speed find the force in the rope $(\vec{F}_T)$?
A) 75 N B) 35 N C) 750 N D) 350 N

45. In the electric circuit shown in the adjacent figure, Calculate the phase difference between the circuit current and the total potential difference:
A) 45° B) 53°
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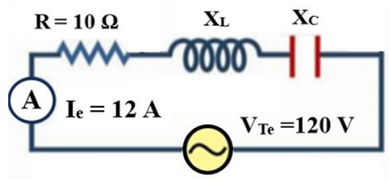
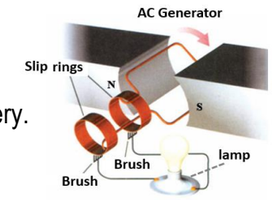


46. Volt (V) is equal to: A) $\frac{T}{m^2 . S}$ B) $\frac{T . m}{S}$ C) $\frac{T . m^2}{S}$ D) $T . m^2$

47. The second harmonics of a guitar string has a frequency of 165 Hz. If the speed of waves on the strings is 120 m/s. What is the string's length? A) 0.36 m B) 0.73 m C) 1.1 m D) 1.4 m

48. The power in the secondary coil of a power station is 3 MW. The station sends the current to the city by means of lines of 120 Ω resistance under a potential difference 6×10^4 V. Calculate the transfer efficiency?
A) 96.9 % B) 95 % C) 99.9 % D) 90 %

49. In the adjacent figure, an AC Generator is shown.an AC Generator can be converted to a DC Motor by:
A) Replacing the lamp with a galvanometer.
B) Replacing the two slip rings with a commutator and replacing the lamp with a battery.
C) Replacing the lamp with a battery.
D) All answers are incorrect.



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Kurdistan Region Government - Iraq *In the Name of Allah* *Subject: Physics*
Ministry of Education
High Committee for the General Examinations
General Examinations for the Preparatory Schools (12th Grade)
The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

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Choose the right answers for the following questions: (two marks for each question)

1. A 2 kg bicycle wheel with a radius of 0.3 m turns at a constant angular speed of 25 rad/s when a 0.3 kg reflector is at a distance of 0.19 m from the axle. What is the angular speed of the wheel when the reflector slides to a distance of 0.25 m from the axle? (Assume that the bicycle wheel is a ring)
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A) $(v_t)_b < (v_t)_a$ B) $\omega_a > \omega_b$
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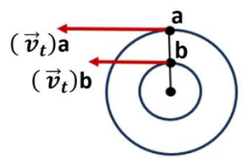

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7. If a spinning amusement-park ride has an angular speed of 1.2 rad/s, what is the centripetal acceleration of a person standing 12 m from the center of the ride?
A) 17.28 m/s² B) 1.728 m/s² C) 172 m/s² D) 1282 m/s²

8. The galvanometer can be converted to a voltmeter by connecting a resistor of very.....to the galvanometer
A) high resistance in series B) high resistance in parallel C) low resistance in parallel D) low resistance in series

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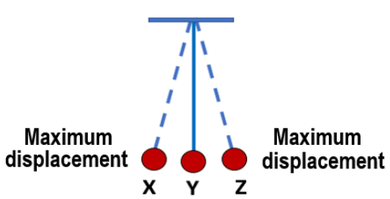

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A) 2 rev B) 4 rev C) 8 rev D) 12 rev

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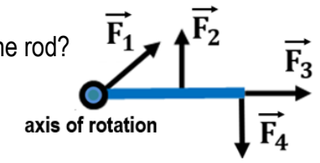
A) speed remains constant, and the frequency increases. B) frequency remains constant, and the speed decreases.
C) speed increases, and the frequency remain constant. D) speed increases, and the frequency decreases.

15. Two successive crests of a wave are 2.4 m apart. Eight crests pass a given point every 12 what is the wave speed?
A) 1.6 m/s B) 0.8 m/s C) 1.8 m/s D) 9.6 m/s

16. In the figure, There are four forces acting on the rod have the same magnitude $(F_1 = F_2 = F_3 = F_4)$ Which one of them produces the greatest torque on the rod?
A) $\vec{F}_1$ B) $\vec{F}_2$
C) $\vec{F}_3$ D) $\vec{F}_4$



17. When two light waves of same wavelength interfere, If the crest of one wave overlaps the trough of another wave, the two waves have a phase difference of: A) π rad B) 0 rad C) 2 π rad D) 4π rad

18. The second harmonics of a guitar string has a frequency of 165 Hz. If the speed of waves on the strings is 120 m/s. What is the string's length? A) 0.36 m B) 0.73 m C) 1.1 m D) 1.4 m

19. A 90 kg person rides a spinning a measurement park ride that has an angular speed of 1.15 rad/s. If the distance of person is 11.5 m from the axis of rotation. What is the magnitude of the force that maintains the circular motion of the person? A) 1468.8 N B) 1268.8 N C)136.8 N D) 1368.8 N

20. Determine the change in gravitational force between two masses if the distance between their centers is doubled:
A) It becomes four times B) It becomes three times
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A) Increase the number of coils per unit length. B) Increase the current.
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22. Calculate the magnitude of the magnetic field at the center of a circular coil of 10 turns and radius 10 cm when a 20 A current passes through it $[\mu_o = 4\pi \times 10^{-7}\ \mathrm{T.m/A}]$?
A) 1.256×10^{-4} T B) 1.256×10^{-3} T C) 1.256×10^{-2} T D) 1.256×10^{-1} T

23. A parked ambulance emits a sound of frequency 1200 Hz. What frequency is detected by an observer inside another car moving with a velocity of 20 m/s.as the car moves towards the ambulance? (Use speed of sound in air is 340 m/s)
A) 1000 Hz B) 1129.4 Hz C) 1270.6 Hz D) 1700 Hz

24. A loop with 40 turns and an area of 0.5 m² is rotating at 250 rad/s. The loop's axis of rotation is perpendicular to a uniform magnetic field with a strength of 0.04 T. what is the maximum emf induced?
A) 120 V B) 300 V C) 200 V D) 180 V

25. In which of the following of standing waves are produced when the number of nodes is equal to number of antinodes?
A) string B) pipe opened at both ends C) pipe closed at one end D) Both (A and B) are correct

26. A pendulum bob hangs from a string and moves with simple harmonic motion. What is the restoring force in the pendulum?
A) the total weight of the bob.
B) the component of the bob's weight tangent to the motion of the bob.
C) the component of the bob's weight perpendicular to the motion of the bob.
D) the elastic force of the stretched string.

27. .....the tendency of a body rotating about a fixed axis to resist a change in rotational motion.
A) Torque(τ) B) Angular momentum (L) C) Moment of inertia (I) D) Angular acceleration (α)

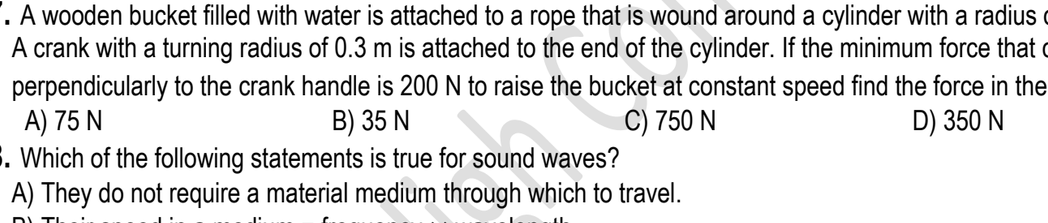
28. Volt (V) is equal to: A) $\frac{T}{m^2 . s}$ B) $\frac{T . m}{s}$ C) $\frac{T . m^2}{s}$ D) $T . m^2$

29. Two uniformly solid cylinders of equal radii roll down an incline without slipping. The first cylinder has three times the mass of the second cylinder. The torque was exerted on the first cylinder is..... torque exerted on the second cylinder? A) twice B) three times C) four times D) five times

30. Light passes through a diffraction grating with 3550 lines/cm and forms a first-order maximum at an angle of, 12.07° What is the wavelength of the light? A) 895 nm B) 589 nm C) 859 nm D) 985 nm

31. The power in the secondary coil of a power station is 3 MW. The station sends the current to the city by means of lines of 120 Ω resistance under a potential difference 6×10^4 V. Calculate the transfer efficiency?
A) 96.9 % B) 95 % C) 99.9 % D) 90 %

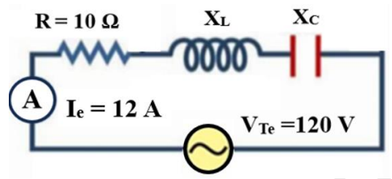
32. Four charges, each charge moves in a circular path in a magnetic field as shown in the figures, which of them is a negative charge?



33. An object rolls along a horizontal surface at a constant linear speed without slipping. If the translational kinetic energy of the object is 37.5 J and its total kinetic energy is 52.5 J what is the shape of object?
A) ring B) disk C) hollow sphere D) solid sphere

34. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of X_L = 600 Ω and a capacitor of impedance of X_C= 200 Ω. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
A) $45°$ B) $37°$ C) $30°$ D) $53°$

35. In the electric circuit shown in the adjacent figure, Calculate the phase difference between the circuit current and the total potential difference:
A) $45°$ B) $53°$
C) $180°$ D) $0°$



36. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?
A) From left to right, when the bar magnet is moved toward the coil.
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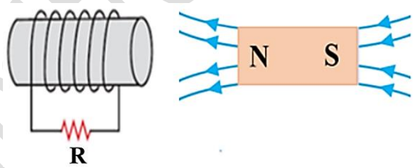
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.



37. A wooden bucket filled with water is attached to a rope that is wound around a cylinder with a radius of 0.08 m. A crank with a turning radius of 0.3 m is attached to the end of the cylinder. If the minimum force that can be applied perpendicularly to the crank handle is 200 N to raise the bucket at constant speed find the force in the rope $(\vec{F}_T)$?
A) 75 N B) 35 N C) 750 N D) 350 N

38. Which of the following statements is true for sound waves?
A) They do not require a material medium through which to travel.
B) Their speed in a medium = frequency × wavelength.
C) The particles of the medium vibrate perpendicular to the direction the wave is traveling.
D) All answers are correct.

39. If the intensity of lawn mower is 1×10^{-3} W/m^2 . What is relative intensity of the sound in decibel (dB)?
A) 0 dB B) 90 dB C) 120 dB D) 130 dB

40. A proton moves at a speed of 2×10^7 m/s at right angles to a magnetic field with a magnitude of the 0.1 T. Find the magnitude of the acceleration of the proton? [q_p=1.6 × 10^{-19} C, m_p=1.673 × 10^{-27} kg]
A) 2.05×10^{17} m/s^2 B) 1.91×10^{14} m/s^2 C) 2.5×10^{14} m/s^2 D) 0.01×10^{14} m/s^2

41. Identify which conditions of equilibrium hold for (a solid sphere rolling on incline)?
A) Translational equilibrium. B) Rotational equilibrium.
C) Translational and rotational equilibrium. D) None of the equilibrium conditions hold.

42. In the adjacent figure, an AC Generator is shown.an AC Generator can be converted to a DC Motor by:
A) Replacing the lamp with a galvanometer.
B) Replacing the two slip rings with a commutator and replacing the lamp with a battery.
C) Replacing the lamp with a battery.
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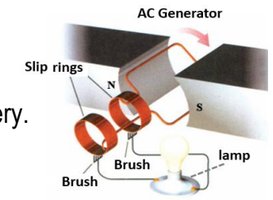

43. Which of the following relationship is correct between tangential acceleration (a_t) and angular acceleration (α) ?
A) $a_t = r\,\alpha$ B) $\alpha = \frac{r}{a_t}$ C) $r = \frac{\alpha}{a_t}$ D) $a_t = r^2\,\alpha$

44. Find the magnitude of $(\Delta\theta)$ and (ω) in the adjacent table:
A) 2.5 rad, 15 rad/s B) 0.5 rad, 15 rad/s
C) 2.5 rad, 1.2 rad/s D) 15 rad, 2.5 rad/s

Δs	r	$\Delta\theta$	v_t	ω
0.25 m	0.1 m	?	1.5 m/s	?

45. An air solenoid of length 10 cm, cross sectional area 25 cm^2, and 400 turns Calculate the coefficient of self-induction of coil [$\mu_o = 4\pi \times 10^{-7}$ T.m/A]
A) 2 mH B) 5 mH C) 0.2 mH D) 0.5 mH

46. Two long parallel wires (a and b), each of them is 2 m long, are separated by a distance of 0.5 m between their centers. The wires carry currents $(I_a = 10\ A)$ and $(I_b = 15\ A)$, in opposite directions. What is the magnitude of magnetic force acting on wire (b) as a result of magnetic field of wire (a)? [$\mu_o = 4\pi \times 10^{-7}$ T.m/A]
A) 1.2×10^{-4} N B) 12×10^{-4} N C) 0.6×10^{-4} N D) 2.4×10^{-4} N

47. A car tire rotates with an average angular speed of 14π rad/s. in what time interval will the tire rotate 3.5 times?
A) 0.5 s B) 0.76 s C) 2 s D) 4.9 s

48. An interference pattern is formed by using green light, If the two slits are moved farther apart, what happens to the distance between the bright fringes?
A) increase B) decrease C) remain unchanged D) doubled

49. Which of the following is the unit of spring constant (K)? A) $\frac{N}{m^2}$ B) $\frac{m}{N}$ C) $\frac{N}{m}$ D) $\frac{m^2}{N}$

50. Which of the following is <u>not correct</u> about the Laser? A) Laser light is coherent and monochromatic.
B) The process of stimulated emission violates the principle of energy conservation.
C) The active medium is an essential component of laser.
D) A laser source is a device converts electrical energy or chemical energy into coherent light.

Kurdistan Region Government - Iraq *In the Name of Allah* *Subject: Physics*
Ministry of Education
High Committee for the General Examinations
General Examinations for the Preparatory Schools (12th Grade)
The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

Fingerprint

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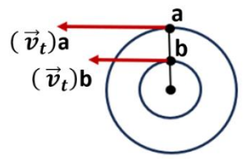
Choose the right answers for the following questions: (two marks for each question)

1. Which of the following is correct for the two points (a and b) for a merry- go-round rotating about a fixed axis as in the figure?

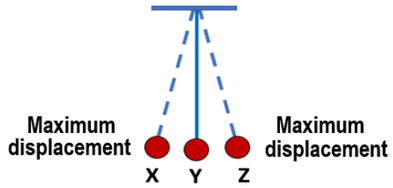


A) $(v_t)_b < (v_t)_a$ B) $\omega_a > \omega_b$
C) $(\Delta\theta)_a > (\Delta\theta)_b$ D) $(v_t)_a = (v_t)_b$

2. If the intensity of lawn mower is $1 \times 10^{-3}\ W/m^2$. What is relative intensity of the sound in decibel (dB)?
A) 0 dB B) 90 dB C) 120 dB D) 130 dB

3. Identify which conditions of equilibrium hold for (a solid sphere rolling on incline)?
A) Translational equilibrium. B) Rotational equilibrium.
C) Translational and rotational equilibrium. D) None of the equilibrium conditions hold.

4. In the figure, A pendulum bob hangs from a string and moves with simple harmonic motion. If the pendulum bob moves from point (Y) to point (Z) in 0.1 s. What is the frequency of the pendulum?



A) 2.5 Hz B) 5 Hz
C) 7.5 Hz D) 10 Hz

5. Two successive crests of a wave are 2.4 m apart. Eight crests pass a given point every 12 what is the wave speed?
A) 1.6 m/s B) 0.8 m/s C) 1.8 m/s D) 9.6 m/s

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7. The distance between node and next antinode in a standing wave on string equal:
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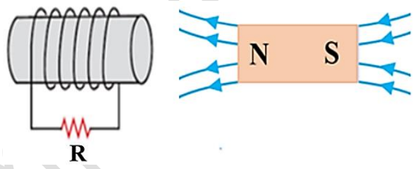

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A) ring B) disk C) hollow sphere D) solid sphere

10. Which of the following is directly proportional with frequency in AC circuits?
A) X_L B) X_C C) I_C D) Both (A and C) are correct

11. Breaking the sound barrier takes place when the speed of the plane.....: the speed of sound in air.
A) greater than B) equal to C) less than D) equal to half of

12. The power in the secondary coil of a power station is 3 MW. The station sends the current to the city by means of lines of 120 Ω resistance under a potential difference 6×10^4 V. Calculate the transfer efficiency?
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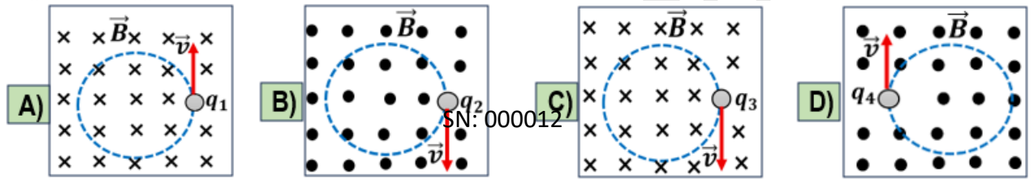

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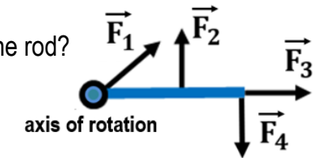

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24. Which of the following factors changes when a sound gets louder for a certain source?
A) Intensity B) Relative intensity of the sound C) Amplitude D) All the answers are correct

25. A force of magnitude 4 N is applied tangentially to a disk of mass 5 kg and radius 0.2 m. The disk starts rotating from rest. How many revolutions does the disk complete after 2.51 s?
A) 2 rev B) 4 rev C) 8 rev D) 12 rev

26. Which of the following is <u>not correct</u> about the Laser? A) Laser light is coherent and monochromatic.
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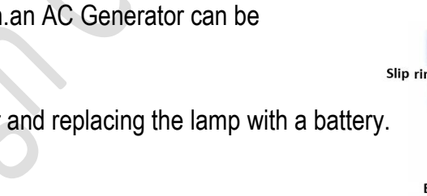

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33. The galvanometer can be converted to a voltmeter by connecting a resistor of very…….....to the galvanometer
A) high resistance in series B) high resistance in parallel C) low resistance in parallel D) low resistance in series

34. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. In what form is the energy in the system when the mass is at a point between maximum displacement and equilibrium position? A) elastic potential energy B) gravitational potential energy.
C) kinetic energy. D) kinetic energy and elastic potential energy

35. When two light waves of same wavelength interfere, If the crest of one wave overlaps the trough of another wave, the two waves have a phase difference of: A) π rad B) 0 rad C) 2 π rad D) 4π rad

36. A wooden bucket filled with water is attached to a rope that is wound around a cylinder with a radius of 0.08 m. A crank with a turning radius of 0.3 m is attached to the end of the cylinder. If the minimum force that can be applied perpendicularly to the crank handle is 200 N to raise the bucket at constant speed find the force in the rope $(\vec{F}_T)$?
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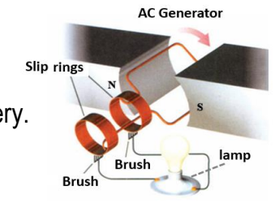

38. Determine the change in gravitational force between two masses if the distance between their centers is doubled:
A) It becomes four times B) It becomes three times
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39. A 2 kg bicycle wheel with a radius of 0.3 m turns at a constant angular speed of 25 rad/s when a 0.3 kg reflector is at a distance of 0.19 m from the axle. What is the angular speed of the wheel when the reflector slides to a distance of 0.25 m from the axle? (Assume that the bicycle wheel is a ring)
A) 18 rad/s B) 19 rad/s C) 22 rad/s D) 24 rad/s

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A) string B) pipe opened at both ends C) pipe closed at one end D) Both (A and B) are correct

41. An interference pattern is formed by using green light, If the two slits are moved farther apart, what happens to the distance between the bright fringes?
A) increase B) decrease C) remain unchanged D) doubled

42. If a spinning amusement-park ride has an angular speed of 1.2 rad/s, what is the centripetal acceleration of a person standing 12 m from the center of the ride?
A) 17.28 m/s^2 B) 1.728 m/s^2 C) 172 m/s^2 D) 1282 m/s^2

43. When a part of a sound wave travels from air into water, the wavelength of the sound increases. What happens to the frequency and the speed of the sound wave?
A) speed remains constant, and the frequency increases. B) frequency remains constant, and the speed decreases.
C) speed increases, and the frequency remain constant. D) speed increases, and the frequency decreases.

44. A 90 kg person rides a spinning a measurement park ride that has an angular speed of 1.15 rad/s. If the distance of person is 11.5 m from the axis of rotation. What is the magnitude of the force that maintains the circular motion of the person? A) 1468.8 N B) 1268.8 N C)136.8 N D) 1368.8 N

45. A step-up transformer: A) $\mathrm{V_2 > V_1}$ B) $\mathrm{N_2 > N_1}$ C) $\frac{\mathrm{N_2}}{\mathrm{N_1}} > 1$ D) All the answers are correct

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A) 1.256×10^{-4} T B) 1.256×10^{-3} T C) 1.256×10^{-2} T D) 1.256×10^{-1} T

49. A loop with 40 turns and an area of 0.5 m^2 is rotating at 250 rad/s. The loop's axis of rotation is perpendicular to a uniform magnetic field with a strength of 0.04 T. what is the maximum emf induced?
A) 120 V B) 300 V C) 200 V D) 180 V

50. An inductive coil of resistance 20 Ω and self-inductance 0.4 H is connected in series with a capacitor of capacitance 200 μF and an AC source of effective voltage 200 V and frequency 60 Hz. Calculate the effective value of the alternating current. A) 10 A B) 6.4 A C) 1.44 A D) 8.62 A

Kurdistan Region Government - Iraq
Ministry of Education
High Committee for the General Examinations
General Examinations for the Preparatory Schools (12th Grade)
The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

In the Name of Allah

Subject: Physics

Fingerprint

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SN: 000013

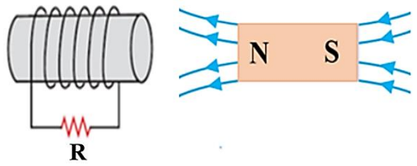
Choose the right answers for the following questions: (two marks for each question)

1. Two uniformly solid cylinders of equal radii roll down an incline without slipping. The first cylinder has three times the mass of the second cylinder. The torque was exerted on the first cylinder is……. torque exerted on the second cylinder? A) twice B) three times C) four times D) five times

2. If a spinning amusement-park ride has an angular speed of 1.2 rad/s, what is the centripetal acceleration of a person standing 12 m from the center of the ride?
A) 17.28 m/s^2 B) 1.728 m/s^2 C) 172 m/s^2 D) 1282 m/s^2

3. Two long parallel wires (a and b), each of them is 2 m long, are separated by a distance of 0.5 m between their centers. The wires carry currents $(I_a = 10\ A)$ and $(I_b = 15\ A)$, in opposite directions. What is the magnitude of magnetic force acting on wire (b) as a result of magnetic field of wire (a)? $[\mu_o = 4\pi \times 10^{-7}\ T.m/A]$
A) 1.2×10^{-4} N B) 12×10^{-4} N C) 0.6×10^{-4} N D) 2.4×10^{-4} N

4. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?
A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.



5. A wooden bucket filled with water is attached to a rope that is wound around a cylinder with a radius of 0.08 m. A crank with a turning radius of 0.3 m is attached to the end of the cylinder. If the minimum force that can be applied perpendicularly to the crank handle is 200 N to raise the bucket at constant speed find the force in the rope $(\vec{F}_T)$?
A) 75 N B) 35 N C) 750 N D) 350 N

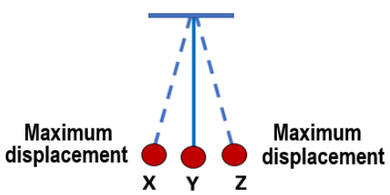
6. A pendulum bob hangs from a string and moves with simple harmonic motion. What is the restoring force in the pendulum?
A) the total weight of the bob.
B) the component of the bob's weight tangent to the motion of the bob.
C) the component of the bob's weight perpendicular to the motion of the bob.
D) the elastic force of the stretched string.

7. Identify which conditions of equilibrium hold for (a solid sphere rolling on incline)?
A) Translational equilibrium. B) Rotational equilibrium.
C) Translational and rotational equilibrium. D) None of the equilibrium conditions hold.

8. In which of the following of standing waves are produced when the number of nodes is equal to number of antinodes?
A) string B) pipe opened at both ends C) pipe closed at one end D) Both (A and B) are correct

9. A parked ambulance emits a sound of frequency 1200 Hz. What frequency is detected by an observer inside another car moving with a velocity of 20 m/s.as the car moves towards the ambulance? (Use speed of sound in air is 340 m/s)
A) 1000 Hz B) 1129.4 Hz C) 1270.6 Hz D) 1700 Hz

10. In the figure, A pendulum bob hangs from a string and moves with simple harmonic motion. If the pendulum bob moves from point (Y) to point (Z) in 0.1 s. What is the frequency of the pendulum?
A) 2.5 Hz B) 5 Hz
C) 7.5 Hz D) 10 Hz



11. A proton moves at a speed of 2×10^7 m/s at right angles to a magnetic field with a magnitude of the 0.1 T. Find the magnitude of the acceleration of the proton? [q_p=1.6 × 10^{-19} C, m_p=1.673 × 10^{-27} kg]
A) 2.05×10^{17} m/s^2 B) 1.91×10^{14} m/s^2 C) 2.5×10^{14} m/s^2 D) 0.01×10^{14} m/s^2

12. The galvanometer can be converted to a voltmeter by connecting a resistor of very……to the galvanometer
A) high resistance in series B) high resistance in parallel C) low resistance in parallel D) low resistance in series

13. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of X_L = 600 Ω and a capacitor of impedance of X_C= 200 Ω. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
A) 45° B) 37° C) 30° D) 53°

14. Which of the following is the unit of spring constant (K)? A) $\frac{N}{m^2}$ B) $\frac{m}{N}$ C) $\frac{N}{m}$ D) $\frac{m^2}{N}$

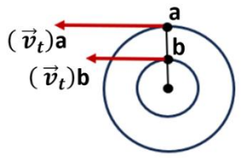
15. An interference pattern is formed by using green light, If the two slits are moved farther apart, what happens to the distance between the bright fringes?
A) increase B) decrease C) remain unchanged D) doubled

16. A step-up transformer: A) $V_2 > V_1$ B) $N_2 > N_1$ C) $\frac{N_2}{N_1} > 1$ D) All the answers are correct

17. An inductive coil of resistance 20 Ω and self-inductance 0.4 H is connected in series with a capacitor of capacitance 200 μF and an AC source of effective voltage 200 V and frequency 60 Hz. Calculate the effective value of the alternating current. A) 10 A B) 6.4 A C) 1.44 A D) 8.62 A

18. The second harmonics of a guitar string has a frequency of 165 Hz. If the speed of waves on the strings is 120 m/s. What is the string's length? A) 0.36 m B) 0.73 m C) 1.1 m D) 1.4 m

19. Which of the following is correct for the two points (a and b) for a merry- go-round rotating about a fixed axis as in the figure?
A) $(v_t)_b < (v_t)_a$ B) $\omega_a > \omega_b$
C) $(\Delta\theta)_a > (\Delta\theta)_b$ D) $(v_t)_a = (v_t)_b$



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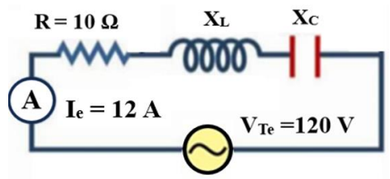
21. Breaking the sound barrier takes place when the speed of the plane……: the speed of sound in air.
A) greater than B) equal to C) less than D) equal to half of

22. In the electric circuit shown in the adjacent figure, Calculate the phase difference between the circuit current and the total potential difference:
A) 45° B) 53°
C) 180° D) 0°



23. Determine the change in gravitational force between two masses if the distance between their centers is doubled:
A) It becomes four times B) It becomes three times
C) It becomes quarter of the original value D) It becomes half of the original value

24. An object rolls along a horizontal surface at a constant linear speed without slipping. If the translational kinetic energy of the object is 37.5 J and its total kinetic energy is 52.5 J what is the shape of object?
A) ring B) disk C) hollow sphere D) solid sphere

25. Calculate the magnitude of the magnetic field at the center of a circular coil of 10 turns and radius 10 cm when a 20 A current passes through it $[\mu_o = 4\pi \times 10^{-7}\ T.m/A]$?
A) 1.256×10^{-4} T B) 1.256×10^{-3} T C) 1.256×10^{-2} T D) 1.256×10^{-1} T

26. An air solenoid of length 10 cm, cross sectional area 25 cm^2, and 400 turns Calculate the coefficient of self-induction of coil $[\mu_o = 4\pi \times 10^{-7}\ T.m/A]$

A) 2 mH B) 5 mH C) 0.2 mH D) 0.5 mH

27. A force of magnitude 4 N is applied tangentially to a disk of mass 5 kg and radius 0.2 m. The disk starts rotating from rest. How many revolutions does the disk complete after 2.51 s?

A) 2 rev B) 4 rev C) 8 rev D) 12 rev

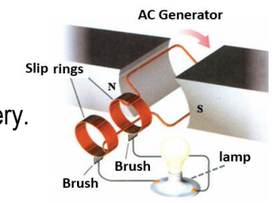
28. A 90 kg person rides a spinning a measurement park ride that has an angular speed of 1.15 rad/s. If the distance of person is 11.5 m from the axis of rotation. What is the magnitude of the force that maintains the circular motion of the person? A) 1468.8 N B) 1268.8 N C)136.8 N D) 1368.8 N

29. Which of the following factors changes when a sound gets louder for a certain source?

A) Intensity B) Relative intensity of the sound C) Amplitude D) All the answers are correct

30. In the adjacent figure, an AC Generator is shown.an AC Generator can be converted to a DC Motor by:

A) Replacing the lamp with a galvanometer.
B) Replacing the two slip rings with a commutator and replacing the lamp with a battery.
C) Replacing the lamp with a battery.
D) All answers are incorrect.



31. The distance between node and next antinode in a standing wave on string equal:

A) $\frac{1}{4}\ \lambda$ B) $\frac{1}{2}\ \lambda$ C) λ D) $2\ \lambda$

32. Find the magnitude of $(\Delta\theta)$ and (ω) in the adjacent table:

A) 2.5 rad, 15 rad/s B) 0.5 rad, 15 rad/s
C) 2.5 rad, 1.2 rad/s D) 15 rad, 2.5 rad/s

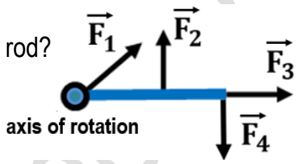
Δs	r	$\Delta\theta$	v_t	ω
0.25 m	0.1 m	?	1.5 m/s	?

33. The power in the secondary coil of a power station is 3 MW. The station sends the current to the city by means of lines of 120 Ω resistance under a potential difference 6×10^4 V. Calculate the transfer efficiency?

A) 96.9 % B) 95 % C) 99.9 % D) 90 %

34. In the figure, There are four forces acting on the rod have the same magnitude $(F_1 = F_2 = F_3 = F_4)$ Which one of them produces the greatest torque on the rod?

A) $\vec{F}_1$ B) $\vec{F}_2$
C) $\vec{F}_3$ D) $\vec{F}_4$



35. How can you increase the strength of a magnetic field inside a solenoid?

A) Increase the number of coils per unit length. B) Increase the current.
C) Place an iron rod inside the solenoid. D) All answers are correct.

36. Two successive crests of a wave are 2.4 m apart. Eight crests pass a given point every 12 what is the wave speed?

A) 1.6 m/s B) 0.8 m/s C) 1.8 m/s D) 9.6 m/s

37. Which of the following statements is true for sound waves?

A) They do not require a material medium through which to travel.
B) Their speed in a medium = frequency × wavelength.
C) The particles of the medium vibrate perpendicular to the direction the wave is traveling.
D) All answers are correct.

38. A car tire rotates with an average angular speed of 14π rad/s. in what time interval will the tire rotate 3.5 times?

A) 0.5 s B) 0.76 s C) 2 s D) 4.9 s

39. Light passes through a diffraction grating with 3550 lines/cm and forms a first-order maximum at an angle of, $\mathbf{12.07}^\circ$ What is the wavelength of the light? A) 895 nm B) 589 nm C) 859 nm D) 985 nm

40. If the intensity of lawn mower is $1 \times 10^{-3}\ W/m^2$. What is relative intensity of the sound in decibel (dB)?

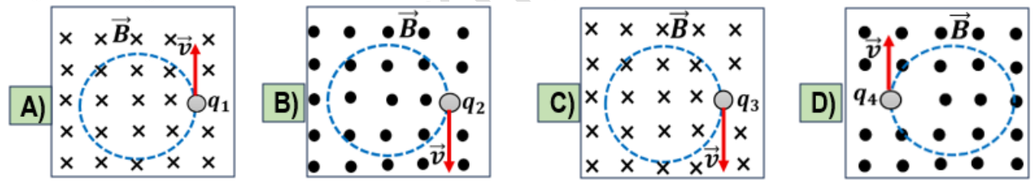
A) 0 dB B) 90 dB C) 120 dB D) 130 dB

41. .....the tendency of a body rotating about a fixed axis to resist a change in rotational motion.

A) Torque(τ) B) Angular momentum (L) C) Moment of inertia (I) D) Angular acceleration (α)

42. When two light waves of same wavelength interfere, If the crest of one wave overlaps the trough of another wave, the two waves have a phase difference of: A) π rad B) 0 rad C) 2 π rad D) 4π rad

43. Four charges, each charge moves in a circular path in a magnetic field as shown in the figures, which of them is a negative charge?



44. Which of the following is not correct about the Laser? A) Laser light is coherent and monochromatic.
B) The process of stimulated emission violates the principle of energy conservation.
C) The active medium is an essential component of laser.
D) A laser source is a device converts electrical energy or chemical energy into coherent light.

45. Volt (V) is equal to: A) $\frac{T}{m^2 . s}$ B) $\frac{T . m}{s}$ C) $\frac{T . m^2}{s}$ D) $T . m^2$

46. When a part of a sound wave travels from air into water, the wavelength of the sound increases. What happens to the frequency and the speed of the sound wave?

A) speed remains constant, and the frequency increases. B) frequency remains constant, and the speed decreases.
C) speed increases, and the frequency remain constant. D) speed increases, and the frequency decreases.

47. Which of the following relationship is correct between tangential acceleration (a_t) and angular acceleration (α) ?

A) $a_t = r\,\alpha$ B) $\alpha = \frac{r}{a_t}$ C) $r = \frac{\alpha}{a_t}$ D) $a_t = r^2\,\alpha$

48. Which of the following is directly proportional with frequency in AC circuits?

A) X_L B) X_C C) I_C D) Both (A and C) are correct

49. A 2 kg bicycle wheel with a radius of 0.3 m turns at a constant angular speed of 25 rad/s when a 0.3 kg reflector is at a distance of 0.19 m from the axle. What is the angular speed of the wheel when the reflector slides to a distance of 0.25 m from the axle? (Assume that the bicycle wheel is a ring)

A) 18 rad/s B) 19 rad/s C) 22 rad/s D) 24 rad/s

50. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. In what form is the energy in the system when the mass is at a point between maximum displacement and equilibrium position? A) elastic potential energy B) gravitational potential energy.
C) kinetic energy. D) kinetic energy and elastic potential energy

Kurdistan Region Government - Iraq | *In the Name of Allah* | *Subject: Physics*

Ministry of Education

High Committee for the General Examinations

General Examinations for the Preparatory Schools (12th Grade)

The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

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2. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?
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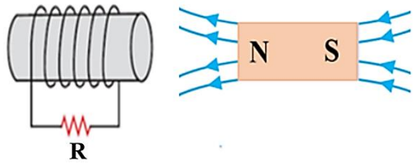

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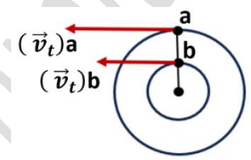

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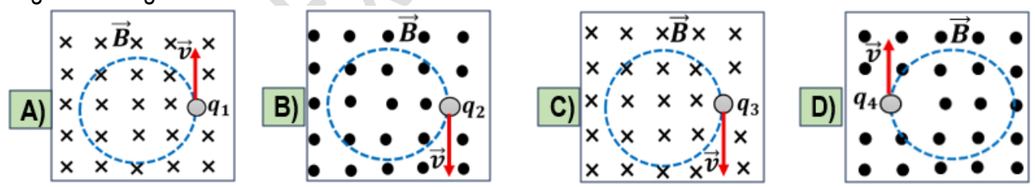

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A) 1.2×10^{-4} N B) 12×10^{-4} N C) 0.6×10^{-4} N D) 2.4×10^{-4} N

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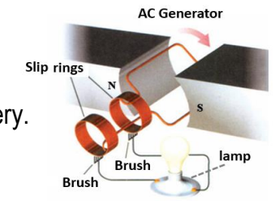

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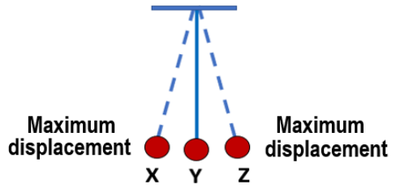
A) 2.5 Hz B) 5 Hz

C) 7.5 Hz D) 10 Hz



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A) 2 mH B) 5 mH C) 0.2 mH D) 0.5 mH

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A) $\boldsymbol{a_t = r\,\alpha}$ B) $\boldsymbol{\alpha = \frac{r}{a_t}}$ C) $\boldsymbol{r = \frac{\alpha}{a_t}}$ D) $\boldsymbol{a_t = r^2\,\alpha}$

36. An inductive coil of resistance 20 Ω and self-inductance 0.4 H is connected in series with a capacitor of capacitance 200 μF and an AC source of effective voltage 200 V and frequency 60 Hz. Calculate the effective value of the alternating current. A) 10 A B) 6.4 A C) 1.44 A D) 8.62 A

37. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of X_L = 600 Ω and a capacitor of impedance of X_C= 200 Ω. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:

A) $45°$ B) $37°$ C) $30°$ D) $53°$

38. Calculate the magnitude of the magnetic field at the center of a circular coil of 10 turns and radius 10 cm when a 20 A current passes through it [$\mu_o = 4\pi \times 10^{-7}$ T.m/A]?

A) 1.256×10^{-4} T B) 1.256×10^{-3} T C) 1.256×10^{-2} T D) 1.256×10^{-1} T

39. Identify which conditions of equilibrium hold for (a solid sphere rolling on incline)?

A) Translational equilibrium. B) Rotational equilibrium.

C) Translational and rotational equilibrium. D) None of the equilibrium conditions hold.

40. How can you increase the strength of a magnetic field inside a solenoid?

A) Increase the number of coils per unit length. B) Increase the current.

C) Place an iron rod inside the solenoid. D) All answers are correct.

41. A pendulum bob hangs from a string and moves with simple harmonic motion. What is the restoring force in the pendulum?

A) the total weight of the bob.

B) the component of the bob's weight tangent to the motion of the bob.

C) the component of the bob's weight perpendicular to the motion of the bob.

D) the elastic force of the stretched string.

42. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. In what form is the energy in the system when the mass is at a point between maximum displacement and equilibrium position?

A) elastic potential energy B) gravitational potential energy.

C) kinetic energy. D) kinetic energy and elastic potential energy

43. A 90 kg person rides a spinning a measurement park ride that has an angular speed of 1.15 rad/s. If the distance of person is 11.5 m from the axis of rotation. What is the magnitude of the force that maintains the circular motion of the person? A) 1468.8 N B) 1268.8 N C)136.8 N D) 1368.8 N

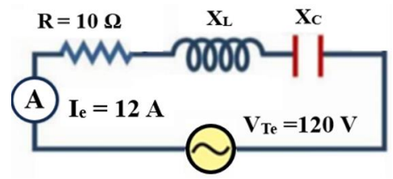
44. If the intensity of lawn mower is 1×10^{-3} W/m^2 . What is relative intensity of the sound in decibel (dB)?

A) 0 dB B) 90 dB C) 120 dB D) 130 dB

45. In the electric circuit shown in the adjacent figure, Calculate the phase difference between the circuit current and the total potential difference:

A) $45°$ B) $53°$

C) $180°$ D) $0°$



46. The second harmonics of a guitar string has a frequency of 165 Hz. If the speed of waves on the strings is 120 m/s. What is the string's length? A) 0.36 m B) 0.73 m C) 1.1 m D) 1.4 m

47. In the figure, There are four forces acting on the rod have the same magnitude $(F_1 = F_2 = F_3 = F_4)$ Which one of them produces the greatest torque on the rod?

A) $\vec{F}_1$ B) $\vec{F}_2$

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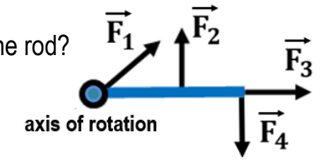

48. Which of the following factors changes when a sound gets louder for a certain source?

A) Intensity B) Relative intensity of the sound C) Amplitude D) All the answers are correct

49. A wooden bucket filled with water is attached to a rope that is wound around a cylinder with a radius of 0.08 m. A crank with a turning radius of 0.3 m is attached to the end of the cylinder. If the minimum force that can be applied perpendicularly to the crank handle is 200 N to raise the bucket at constant speed find the force in the rope $(\vec{F}_T)$?

A) 75 N B) 35 N C) 750 N D) 350 N

50. A step-up transformer: A) $V_2 > V_1$ B) $N_2 > N_1$ C) $\frac{N_2}{N_1} > 1$ D) All the answers are correct

Kurdistan Region Government - Iraq *In the Name of Allah* *Subject: Physics*
Ministry of Education
High Committee for the General Examinations
General Examinations for the Preparatory Schools (12th Grade)
The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

Fingerprint

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Choose the right answers for the following questions: (two marks for each question)

1. Determine the change in gravitational force between two masses if the distance between their centers is doubled:
A) It becomes four times B) It becomes three times
C) It becomes quarter of the original value D) It becomes half of the original value

2. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. In what form is the energy in the system when the mass is at a point between maximum displacement and equilibrium position? A) elastic potential energy B) gravitational potential energy.
C) kinetic energy. D) kinetic energy and elastic potential energy

3. Which of the following is the unit of spring constant (K)? A) $\frac{N}{m^2}$ B) $\frac{m}{N}$ C) $\frac{N}{m}$ D) $\frac{m^2}{N}$

4. Two successive crests of a wave are 2.4 m apart. Eight crests pass a given point every 12 what is the wave speed?
A) 1.6 m/s B) 0.8 m/s C) 1.8 m/s D) 9.6 m/s

5. The second harmonics of a guitar string has a frequency of 165 Hz. If the speed of waves on the strings is 120 m/s. What is the string's length? A) 0.36 m B) 0.73 m C) 1.1 m D) 1.4 m

6. .....the tendency of a body rotating about a fixed axis to resist a change in rotational motion.
A) Torque(τ) B) Angular momentum (L) C) Moment of inertia (I) D) Angular acceleration (α)

7. Which of the following relationship is correct between tangential acceleration (a_t) and angular acceleration (α) ?
A) $a_t = r\,\alpha$ B) $\alpha = \frac{r}{a_t}$ C) $r = \frac{\alpha}{a_t}$ D) $a_t = r^2\,\alpha$

8. A proton moves at a speed of 2×10^7 m/s at right angles to a magnetic field with a magnitude of the 0.1 T. Find the magnitude of the acceleration of the proton? [q_p=1.6 × 10^{-19} C, m_p=1.673 × 10^{-27} kg]
A) 2.05×10^{17} m/s² B) 1.91×10^{14} m/s² C) 2.5×10^{14} m/s² D) 0.01×10^{14} m/s²

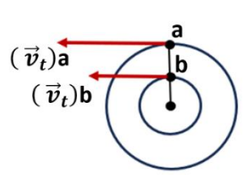
9. The distance between node and next antinode in a standing wave on string equal:
A) $\frac{1}{4}\,\lambda$ B) $\frac{1}{2}\,\lambda$ C) λ D) $2\,\lambda$

10. If a spinning amusement-park ride has an angular speed of 1.2 rad/s, what is the centripetal acceleration of a person standing 12 m from the center of the ride?
A) 17.28 m/s² B) 1.728 m/s² C) 172 m/s² D) 1282 m/s²

11. A 2 kg bicycle wheel with a radius of 0.3 m turns at a constant angular speed of 25 rad/s when a 0.3 kg reflector is at a distance of 0.19 m from the axle. What is the angular speed of the wheel when the reflector slides to a distance of 0.25 m from the axle? (Assume that the bicycle wheel is a ring)
A) 18 rad/s B) 19 rad/s C) 22 rad/s D) 24 rad/s

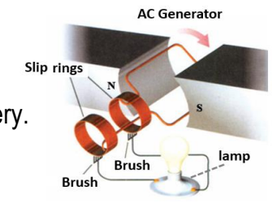
12. Which of the following statements is true for sound waves?
A) They do not require a material medium through which to travel.
B) Their speed in a medium = frequency × wavelength.
C) The particles of the medium vibrate perpendicular to the direction the wave is traveling.
D) All answers are correct.

13. Which of the following is correct for the two points (a and b) for a merry- go-round rotating about a fixed axis as in the figure?
A) $(v_t)_b < (v_t)_a$ B) $\omega_a > \omega_b$
C) $(\Delta\theta)_a > (\Delta\theta)_b$ D) $(v_t)_a = (v_t)_b$



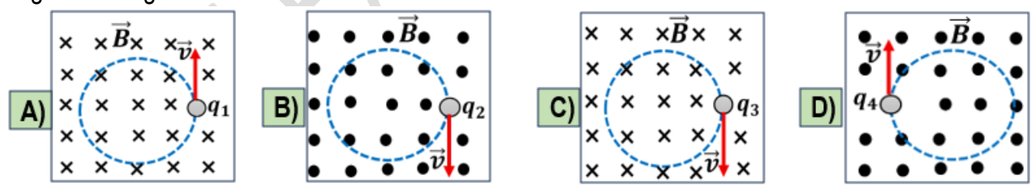
14. When two light waves of same wavelength interfere, If the crest of one wave overlaps the trough of another wave, the two waves have a phase difference of: A) π rad B) 0 rad C) 2 π rad D) 4π rad

15. In the adjacent figure, an AC Generator is shown.an AC Generator can be converted to a DC Motor by:
A) Replacing the lamp with a galvanometer.
B) Replacing the two slip rings with a commutator and replacing the lamp with a battery.
C) Replacing the lamp with a battery.
D) All answers are incorrect.

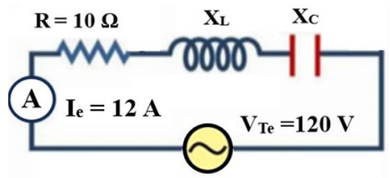


16. Breaking the sound barrier takes place when the speed of the plane.....: the speed of sound in air.
A) greater than B) equal to C) less than D) equal to half of

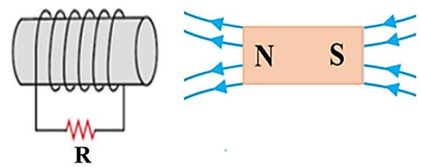
17. Four charges, each charge moves in a circular path in a magnetic field as shown in the figures, which of them is a negative charge?



18. In the electric circuit shown in the adjacent figure, Calculate the phase difference between the circuit current and the total potential difference:
A) 45° B) 53°
C) 180° D) 0°



19. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?
A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.



20. The galvanometer can be converted to a voltmeter by connecting a resistor of very.....to the galvanometer
A) high resistance in series B) high resistance in parallel C) low resistance in parallel D) low resistance in series

21. Calculate the magnitude of the magnetic field at the center of a circular coil of 10 turns and radius 10 cm when a 20 A current passes through it [$\mu_o = 4\pi \times 10^{-7}$ T.m/A]?
A) 1.256×10^{-4} T B) 1.256×10^{-3} T C) 1.256×10^{-2} T D) 1.256×10^{-1} T

22. A wooden bucket filled with water is attached to a rope that is wound around a cylinder with a radius of 0.08 m. A crank with a turning radius of 0.3 m is attached to the end of the cylinder. If the minimum force that can be applied perpendicularly to the crank handle is 200 N to raise the bucket at constant speed find the force in the rope $(\vec{F}_T)$?
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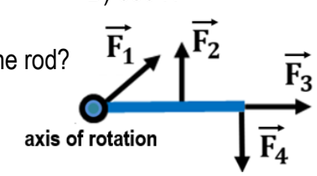

24. A parked ambulance emits a sound of frequency 1200 Hz. What frequency is detected by an observer inside another car moving with a velocity of 20 m/s.as the car moves towards the ambulance? (Use speed of sound in air is 340 m/s)
A) 1000 Hz B) 1129.4 Hz C) 1270.6 Hz D) 1700 Hz

25. When a part of a sound wave travels from air into water, the wavelength of the sound increases. What happens to the frequency and the speed of the sound wave?
A) speed remains constant, and the frequency increases. B) frequency remains constant, and the speed decreases.
C) speed increases, and the frequency remain constant. D) speed increases, and the frequency decreases.

26. The power in the secondary coil of a power station is 3 MW. The station sends the current to the city by means of lines of 120 Ω resistance under a potential difference 6×10^4 V. Calculate the transfer efficiency?
A) 96.9 % B) 95 % C) 99.9 % D) 90 %

27. A step-up transformer: A) $V_2 > V_1$ B) $N_2 > N_1$ C) $\frac{N_2}{N_1} > 1$ D) All the answers are correct

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A) Intensity B) Relative intensity of the sound C) Amplitude D) All the answers are correct

30. An interference pattern is formed by using green light, If the two slits are moved farther apart, what happens to the distance between the bright fringes?
A) increase B) decrease C) remain unchanged D) doubled

31. Two long parallel wires (a and b), each of them is 2 m long, are separated by a distance of 0.5 m between their centers. The wires carry currents $(I_a = 10\ A)$ and $(I_b = 15\ A)$, in opposite directions. What is the magnitude of magnetic force acting on wire (b) as a result of magnetic field of wire (a)? $[\mu_o = 4\pi \times 10^{-7}\ T.m/A]$
A) 1.2×10^{-4} N B) 12×10^{-4} N C) 0.6×10^{-4} N D) 2.4×10^{-4} N

32. A car tire rotates with an average angular speed of 14π rad/s. in what time interval will the tire rotate 3.5 times?
A) 0.5 s B) 0.76 s C) 2 s D) 4.9 s

33. A pendulum bob hangs from a string and moves with simple harmonic motion. What is the restoring force in the pendulum?
A) the total weight of the bob.
B) the component of the bob's weight tangent to the motion of the bob.
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34. Which of the following is <u>not correct</u> about the Laser? A) Laser light is coherent and monochromatic.
B) The process of stimulated emission violates the principle of energy conservation.
C) The active medium is an essential component of laser.
D) A laser source is a device converts electrical energy or chemical energy into coherent light.

35. A force of magnitude 4 N is applied tangentially to a disk of mass 5 kg and radius 0.2 m. The disk starts rotating from rest. How many revolutions does the disk complete after 2.51 s?
A) 2 rev B) 4 rev C) 8 rev D) 12 rev

36. Which of the following is directly proportional with frequency in AC circuits?
A) $\mathbf{X_L}$ B) $\mathbf{X_C}$ C) $\boldsymbol{I_C}$ D) Both (A and C) are correct

37. Find the magnitude of $(\Delta\theta)$ and (ω) in the adjacent table:
A) 2.5 rad, 15 rad/s B) 0.5 rad, 15 rad/s
C) 2.5 rad, 1.2 rad/s D) 15 rad, 2.5 rad/s

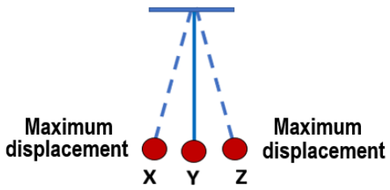
Δs	r	$\Delta\theta$	v_t	ω
0.25 m	0.1 m	?	1.5 m/s	?

38. How can you increase the strength of a magnetic field inside a solenoid?
A) Increase the number of coils per unit length. B) Increase the current.
C) Place an iron rod inside the solenoid. D) All answers are correct.

39. An object rolls along a horizontal surface at a constant linear speed without slipping. If the translational kinetic energy of the object is 37.5 J and its total kinetic energy is 52.5 J what is the shape of object?
A) ring B) disk C) hollow sphere D) solid sphere

40. Two uniformly solid cylinders of equal radii roll down an incline without slipping. The first cylinder has three times the mass of the second cylinder. The torque was exerted on the first cylinder is……. torque exerted on the second cylinder? A) twice B) three times C) four times D) five times

41. In the figure, A pendulum bob hangs from a string and moves with simple harmonic motion. If the pendulum bob moves from point (Y) to point (Z) in 0.1 s. What is the frequency of the pendulum?
A) 2.5 Hz B) 5 Hz
C) 7.5 Hz D) 10 Hz



42. If the intensity of lawn mower is $1 \times 10^{-3}\ W/m^2$. What is relative intensity of the sound in decibel (dB)?
A) 0 dB B) 90 dB C) 120 dB D) 130 dB

43. In which of the following of standing waves are produced when the number of nodes is equal to number of antinodes?
A) string B) pipe opened at both ends C) pipe closed at one end D) Both (A and B) are correct

44. An air solenoid of length 10 cm, cross sectional area 25 cm², and 400 turns Calculate the coefficient of self-induction of coil $[\mu_o = 4\pi \times 10^{-7}\ T.m/A]$
A) 2 mH B) 5 mH C) 0.2 mH D) 0.5 mH

45. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of X_L = 600 Ω and a capacitor of impedance of X_C= 200 Ω. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
A) $45°$ B) $37°$ C) $30°$ D) $53°$

46. Light passes through a diffraction grating with 3550 lines/cm and forms a first-order maximum at an angle of, $\mathbf{12.07}^\circ$ What is the wavelength of the light? A) 895 nm B) 589 nm C) 859 nm D) 985 nm

47. A loop with 40 turns and an area of 0.5 m² is rotating at 250 rad/s. The loop's axis of rotation is perpendicular to a uniform magnetic field with a strength of 0.04 T. what is the maximum emf induced?
A) 120 V B) 300 V C) 200 V D) 180 V

48. Identify which conditions of equilibrium hold for (a solid sphere rolling on incline)?
A) Translational equilibrium. B) Rotational equilibrium.
C) Translational and rotational equilibrium. D) None of the equilibrium conditions hold.

49. Volt (V) is equal to: A) $\frac{T}{m^2 . S}$ B) $\frac{T . m}{S}$ C) $\frac{T . m^2}{S}$ D) $T . m^2$

50. An inductive coil of resistance 20 Ω and self-inductance 0.4 H is connected in series with a capacitor of capacitance 200 μF and an AC source of effective voltage 200 V and frequency 60 Hz. Calculate the effective value of the alternating current. A) 10 A B) 6.4 A C) 1.44 A D) 8.62 A

Kurdistan Region Government - Iraq
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General Examinations for the Preparatory Schools (12th Grade)
The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

In the Name of Allah

Subject: Physics

Fingerprint

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Choose the right answers for the following questions: (two marks for each question)

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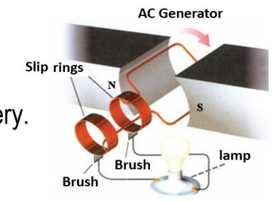

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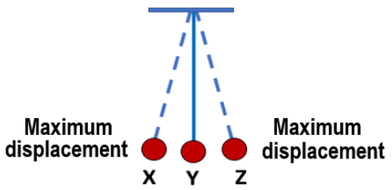

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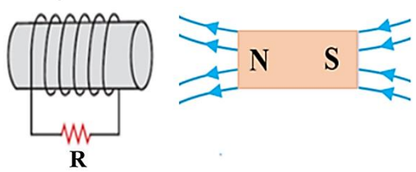

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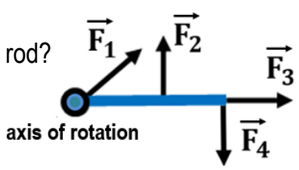

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A) 96.9 % B) 95 % C) 99.9 % D) 90 %

18. Calculate the magnitude of the magnetic field at the center of a circular coil of 10 turns and radius 10 cm when a 20 A current passes through it $[\mu_o = 4\pi \times 10^{-7}\ \mathrm{T.m/A}]$?
A) 1.256×10^{-4} T B) 1.256×10^{-3} T C) 1.256×10^{-2} T D) 1.256×10^{-1} T

19. ……the tendency of a body rotating about a fixed axis to resist a change in rotational motion.
A) Torque(τ) B) Angular momentum (L) C) Moment of inertia (I) D) Angular acceleration (α)

20. Which of the following is directly proportional with frequency in AC circuits?
A) X_L B) X_C C) I_C D) Both (A and C) are correct

21. Two long parallel wires (a and b), each of them is 2 m long, are separated by a distance of 0.5 m between their centers. The wires carry currents $(I_a = 10\ A)$ and $(I_b = 15\ A)$, in opposite directions. What is the magnitude of magnetic force acting on wire (b) as a result of magnetic field of wire (a)? $[\mu_o = 4\pi \times 10^{-7}\ \mathrm{T.m/A}]$
A) 1.2×10^{-4} N B) 12×10^{-4} N C) 0.6×10^{-4} N D) 2.4×10^{-4} N

22. Identify which conditions of equilibrium hold for (a solid sphere rolling on incline)?
A) Translational equilibrium. B) Rotational equilibrium.
C) Translational and rotational equilibrium. D) None of the equilibrium conditions hold.

23. Breaking the sound barrier takes place when the speed of the plane……: the speed of sound in air.
A) greater than B) equal to C) less than D) equal to half of

24. A wooden bucket filled with water is attached to a rope that is wound around a cylinder with a radius of 0.08 m. A crank with a turning radius of 0.3 m is attached to the end of the cylinder. If the minimum force that can be applied perpendicularly to the crank handle is 200 N to raise the bucket at constant speed find the force in the rope $(\vec{F}_T)$?
A) 75 N B) 35 N C) 750 N D) 350 N

25. A 2 kg bicycle wheel with a radius of 0.3 m turns at a constant angular speed of 25 rad/s when a 0.3 kg reflector is at a distance of 0.19 m from the axle. What is the angular speed of the wheel when the reflector slides to a distance of 0.25 m from the axle? (Assume that the bicycle wheel is a ring)
A) 18 rad/s B) 19 rad/s C) 22 rad/s D) 24 rad/s

26. Which of the following relationship is correct between tangential acceleration $(\boldsymbol{a_t})$ and angular acceleration $(\boldsymbol{\alpha})$?
A) $\boldsymbol{a_t = r\,\alpha}$ B) $\boldsymbol{\alpha = \frac{r}{a_t}}$ C) $\boldsymbol{r = \frac{\alpha}{a_t}}$ D) $\boldsymbol{a_t = r^2\,\alpha}$

27. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. In what form is the energy in the system when the mass is at a point between maximum displacement and equilibrium position?
A) elastic potential energy B) gravitational potential energy.
C) kinetic energy. D) kinetic energy and elastic potential energy

28. Determine the change in gravitational force between two masses if the distance between their centers is doubled:
A) It becomes four times B) It becomes three times
C) It becomes quarter of the original value D) It becomes half of the original value

29. A step-up transformer: A) $V_2 > V_1$ B) $N_2 > N_1$ C) $\frac{N_2}{N_1} > 1$ D) All the answers are correct

30. When a part of a sound wave travels from air into water, the wavelength of the sound increases. What happens to the frequency and the speed of the sound wave?
A) speed remains constant, and the frequency increases. B) frequency remains constant, and the speed decreases.
C) speed increases, and the frequency remain constant. D) speed increases, and the frequency decreases.

31. An air solenoid of length 10 cm, cross sectional area 25 cm^2, and 400 turns Calculate the coefficient of self-induction of coil [$\mu_o = 4\pi \times 10^{-7}$ T.m/A]
A) 2 mH B) 5 mH C) 0.2 mH D) 0.5 mH

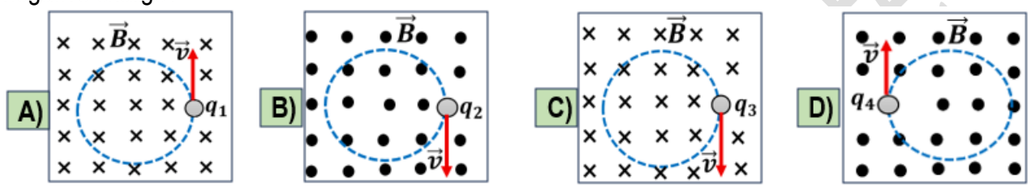
32. An object rolls along a horizontal surface at a constant linear speed without slipping. If the translational kinetic energy of the object is 37.5 J and its total kinetic energy is 52.5 J what is the shape of object?
A) ring B) disk C) hollow sphere D) solid sphere

33. Which of the following statements is true for sound waves?
A) They do not require a material medium through which to travel.
B) Their speed in a medium = frequency × wavelength.
C) The particles of the medium vibrate perpendicular to the direction the wave is traveling.
D) All answers are correct.

34. Which of the following is the unit of spring constant (K)? A) $\frac{N}{m^2}$ B) $\frac{m}{N}$ C) $\frac{N}{m}$ D) $\frac{m^2}{N}$

35. If the intensity of lawn mower is 1×10^{-3} W/m^2 . What is relative intensity of the sound in decibel (dB)?
A) 0 dB B) 90 dB C) 120 dB D) 130 dB

36. Four charges, each charge moves in a circular path in a magnetic field as shown in the figures, which of them is a negative charge?



37. If a spinning amusement-park ride has an angular speed of 1.2 rad/s, what is the centripetal acceleration of a person standing 12 m from the center of the ride?
A) 17.28 m/s^2 B) 1.728 m/s^2 C) 172 m/s^2 D) 1282 m/s^2

38. Two successive crests of a wave are 2.4 m apart. Eight crests pass a given point every 12 what is the wave speed?
A) 1.6 m/s B) 0.8 m/s C) 1.8 m/s D) 9.6 m/s

39. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of X_L = 600 Ω and a capacitor of impedance of X_C= 200 Ω. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
A) 45° B) 37° C) 30° D) 53°

40. Which of the following factors changes when a sound gets louder for a certain source?
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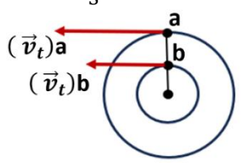
41. Volt (V) is equal to: A) $\frac{T}{m^2 . S}$ B) $\frac{T . m}{S}$ C) $\frac{T . m^2}{S}$ D) T. m^2

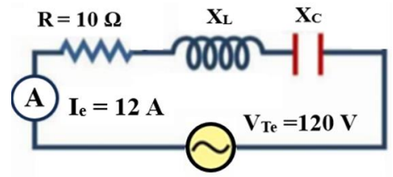
42. Which of the following is correct for the two points (a and b) for a merry- go-round rotating about a fixed axis as in the figure?
A) $(v_t)_b < (v_t)_a$ B) $\omega_a > \omega_b$
C) $(\Delta\theta)_a > (\Delta\theta)_b$ D) $(v_t)_a = (v_t)_b$



43. The second harmonics of a guitar string has a frequency of 165 Hz. If the speed of waves on the strings is 120 m/s. What is the string's length? A) 0.36 m B) 0.73 m C) 1.1 m D) 1.4 m

44. A parked ambulance emits a sound of frequency 1200 Hz. What frequency is detected by an observer inside another car moving with a velocity of 20 m/s.as the car moves towards the ambulance? (Use speed of sound in air is 340 m/s)
A) 1000 Hz B) 1129.4 Hz C) 1270.6 Hz D) 1700 Hz

45. In the electric circuit shown in the adjacent figure, Calculate the phase difference between the circuit current and the total potential difference:
A) 45° B) 53°
C) 180° D) 0°



46. A pendulum bob hangs from a string and moves with simple harmonic motion. What is the restoring force in the pendulum?
A) the total weight of the bob.
B) the component of the bob's weight tangent to the motion of the bob.
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47. How can you increase the strength of a magnetic field inside a solenoid?
A) Increase the number of coils per unit length. B) Increase the current.
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48. A proton moves at a speed of 2 × 10^7 m/s at right angles to a magnetic field with a magnitude of the 0.1 T. Find the magnitude of the acceleration of the proton? [q_p=1.6 × 10^{-19} C, m_p=1.673 × 10^{-27} kg]
A) 2.05 × 10^{17} m/s^2 B) 1.91 × 10^{14} m/s^2 C) 2.5 × 10^{14} m/s^2 D) 0.01 × 10^{14} m/s^2

49. A force of magnitude 4 N is applied tangentially to a disk of mass 5 kg and radius 0.2 m. The disk starts rotating from rest. How many revolutions does the disk complete after 2.51 s?
A) 2 rev B) 4 rev C) 8 rev D) 12 rev

50. Light passes through a diffraction grating with 3550 lines/cm and forms a first-order maximum at an angle of, $\boldsymbol{12.07^\circ}$ What is the wavelength of the light? A) 895 nm B) 589 nm C) 859 nm D) 985 nm

Kurdistan Region Government - Iraq *In the Name of Allah* *Subject: Physics*
Ministry of Education
High Committee for the General Examinations
General Examinations for the Preparatory Schools (12th Grade)
The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

Fingerprint

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Choose the right answers for the following questions: (two marks for each question)

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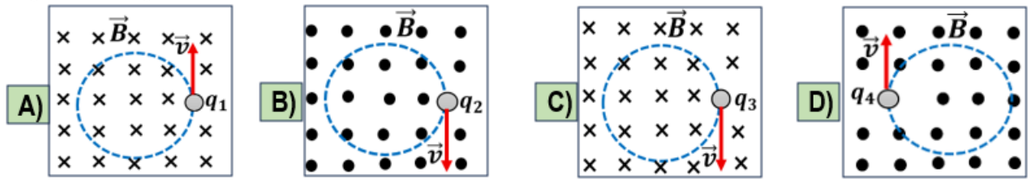
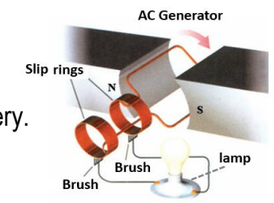


2. In the adjacent figure, an AC Generator is shown.an AC Generator can be converted to a DC Motor by:
A) Replacing the lamp with a galvanometer.
B) Replacing the two slip rings with a commutator and replacing the lamp with a battery.
C) Replacing the lamp with a battery.
D) All answers are incorrect.



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A) They do not require a material medium through which to travel.
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C) The particles of the medium vibrate perpendicular to the direction the wave is traveling.
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4. When two light waves of same wavelength interfere, If the crest of one wave overlaps the trough of another wave, the two waves have a phase difference of: A) π rad B) 0 rad C) 2 π rad D) 4π rad

5. Volt (V) is equal to: A) $\frac{T}{m^2 . S}$ B) $\frac{T . m}{S}$ C) $\frac{T . m^2}{S}$ D) $T . m^2$

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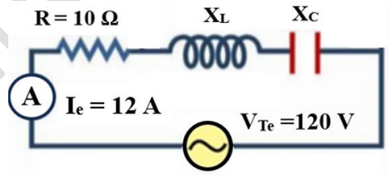

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15. Which of the following is <u>not correct</u> about the Laser? A) Laser light is coherent and monochromatic.
B) The process of stimulated emission violates the principle of energy conservation.
C) The active medium is an essential component of laser.
D) A laser source is a device converts electrical energy or chemical energy into coherent light.

16. An inductive coil of resistance 20 Ω and self-inductance 0.4 H is connected in series with a capacitor of capacitance 200 μF and an AC source of effective voltage 200 V and frequency 60 Hz. Calculate the effective value of the alternating current. A) 10 A B) 6.4 A C) 1.44 A D) 8.62 A

17. A loop with 40 turns and an area of 0.5 m² is rotating at 250 rad/s. The loop's axis of rotation is perpendicular to a uniform magnetic field with a strength of 0.04 T. what is the maximum emf induced?
A) 120 V B) 300 V C) 200 V D) 180 V

18. The power in the secondary coil of a power station is 3 MW. The station sends the current to the city by means of lines of 120 Ω resistance under a potential difference 6×10^4 V. Calculate the transfer efficiency?
A) 96.9 % B) 95 % C) 99.9 % D) 90 %

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A) 1.2×10^{-4} N B) 12×10^{-4} N C) 0.6×10^{-4} N D) 2.4×10^{-4} N

25. In which of the following of standing waves are produced when the number of nodes is equal to number of antinodes?
A) string B) pipe opened at both ends C) pipe closed at one end D) Both (A and B) are correct

26. A car tire rotates with an average angular speed of 14π rad/s. in what time interval will the tire rotate 3.5 times?
A) 0.5 s B) 0.76 s C) 2 s D) 4.9 s

27. Breaking the sound barrier takes place when the speed of the plane.....: the speed of sound in air.
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A) the total weight of the bob.
B) the component of the bob's weight tangent to the motion of the bob.
C) the component of the bob's weight perpendicular to the motion of the bob.
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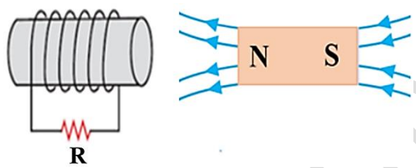
30. The galvanometer can be converted to a voltmeter by connecting a resistor of very.....to the galvanometer
A) high resistance in series B) high resistance in parallel C) low resistance in parallel D) low resistance in series

31. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. In what form is the energy in the system when the mass is at a point between maximum displacement and equilibrium position?
A) elastic potential energy B) gravitational potential energy.
C) kinetic energy. D) kinetic energy and elastic potential energy

32. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?
A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.



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A) Torque(τ) B) Angular momentum (L) C) Moment of inertia (I) D) Angular acceleration (α)

35. In the figure, There are four forces acting on the rod have the same magnitude $(F_1 = F_2 = F_3 = F_4)$ Which one of them produces the greatest torque on the rod?
A) $\vec{F}_1$ B) $\vec{F}_2$
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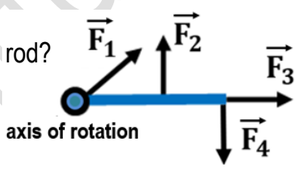

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A) ring B) disk C) hollow sphere D) solid sphere

37. A 90 kg person rides a spinning a measurement park ride that has an angular speed of 1.15 rad/s. If the distance of person is 11.5 m from the axis of rotation. What is the magnitude of the force that maintains the circular motion of the person? A) 1468.8 N B) 1268.8 N C)136.8 N D) 1368.8 N

38. Two uniformly solid cylinders of equal radii roll down an incline without slipping. The first cylinder has three times the mass of the second cylinder. The torque was exerted on the first cylinder is……. torque exerted on the second cylinder? A) twice B) three times C) four times D) five times

39. An interference pattern is formed by using green light, If the two slits are moved farther apart, what happens to the distance between the bright fringes?
A) increase B) decrease C) remain unchanged D) doubled

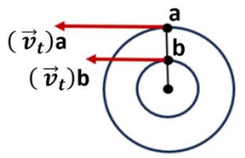
40. A step-up transformer: A) $V_2 > V_1$ B) $N_2 > N_1$ C) $\frac{N_2}{N_1} > 1$ D) All the answers are correct

41. Which of the following is directly proportional with frequency in AC circuits?
A) $\mathbf{X_L}$ B) $\mathbf{X_C}$ C) $\boldsymbol{I_C}$ D) Both (A and C) are correct

42. Find the magnitude of $(\Delta\theta)$ and (ω) in the adjacent table:
A) 2.5 rad, 15 rad/s B) 0.5 rad, 15 rad/s
C) 2.5 rad, 1.2 rad/s D) 15 rad, 2.5 rad/s

Δs	r	$\Delta\theta$	v_t	ω
0.25 m	0.1 m	?	1.5 m/s	?

43. Which of the following is correct for the two points (a and b) for a merry- go-round rotating about a fixed axis as in the figure?
A) $(v_t)_b < (v_t)_a$ B) $\omega_a > \omega_b$
C) $(\Delta\theta)_a > (\Delta\theta)_b$ D) $(v_t)_a = (v_t)_b$



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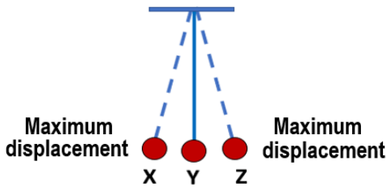
45. In the figure, A pendulum bob hangs from a string and moves with simple harmonic motion. If the pendulum bob moves from point (Y) to point (Z) in 0.1 s. What is the frequency of the pendulum?
A) 2.5 Hz B) 5 Hz
C) 7.5 Hz D) 10 Hz



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A) 0 dB B) 90 dB C) 120 dB D) 130 dB

47. The distance between node and next antinode in a standing wave on string equal:
A) $\frac{1}{4}\lambda$ B) $\frac{1}{2}\lambda$ C) λ D) 2λ

48. Two successive crests of a wave are 2.4 m apart. Eight crests pass a given point every 12 what is the wave speed?
A) 1.6 m/s B) 0.8 m/s C) 1.8 m/s D) 9.6 m/s

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Kurdistan Region Government - Iraq *In the Name of Allah* *Subject: Physics*
Ministry of Education
High Committee for the General Examinations
General Examinations for the Preparatory Schools (12th Grade)
The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

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Choose the right answers for the following questions: (two marks for each question)

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A) $a_t = r\,\alpha$ B) $\alpha = \frac{r}{a_t}$ C) $r = \frac{\alpha}{a_t}$ D) $a_t = r^2\,\alpha$

2. A car tire rotates with an average angular speed of 14π rad/s. in what time interval will the tire rotate 3.5 times?
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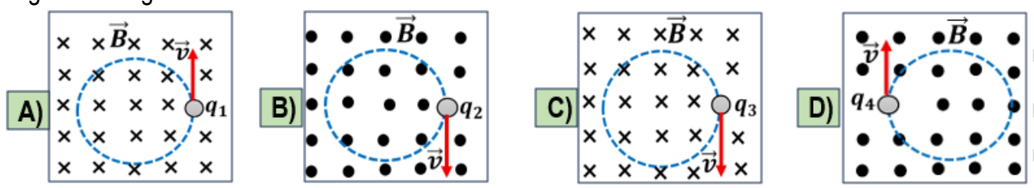
A) 120 V B) 300 V C) 200 V D) 180 V

8. Four charges, each charge moves in a circular path in a magnetic field as shown in the figures, which of them is a negative charge?



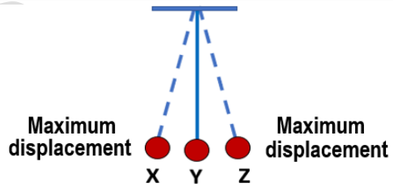
9. A step-up transformer: A) $V_2 > V_1$ B) $N_2 > N_1$ C) $\frac{N_2}{N_1} > 1$ D) All the answers are correct

10. An inductive coil of resistance 20 Ω and self-inductance 0.4 H is connected in series with a capacitor of capacitance 200 μF and an AC source of effective voltage 200 V and frequency 60 Hz. Calculate the effective value of the alternating current. A) 10 A B) 6.4 A C) 1.44 A D) 8.62 A

11. A force of magnitude 4 N is applied tangentially to a disk of mass 5 kg and radius 0.2 m. The disk starts rotating from rest. How many revolutions does the disk complete after 2.51 s?
A) 2 rev B) 4 rev C) 8 rev D) 12 rev

12. The distance between node and next antinode in a standing wave on string equal:
A) $\frac{1}{4}\,\lambda$ B) $\frac{1}{2}\,\lambda$ C) λ D) $2\,\lambda$

13. In the figure, A pendulum bob hangs from a string and moves with simple harmonic motion. If the pendulum bob moves from point (Y) to point (Z) in 0.1 s. What is the frequency of the pendulum?
A) 2.5 Hz B) 5 Hz
C) 7.5 Hz D) 10 Hz



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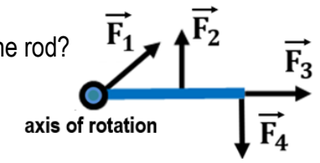

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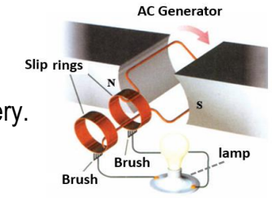

17. The galvanometer can be converted to a voltmeter by connecting a resistor of very.....to the galvanometer
A) high resistance in series B) high resistance in parallel C) low resistance in parallel D) low resistance in series

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B) the component of the bob's weight tangent to the motion of the bob.
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20. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of X_L = 600 Ω and a capacitor of impedance of X_C= 200 Ω. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
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A) 1.256×10^{-4} T B) 1.256×10^{-3} T C) 1.256×10^{-2} T D) 1.256×10^{-1} T

22. Which of the following is <u>not correct</u> about the Laser? A) Laser light is coherent and monochromatic.
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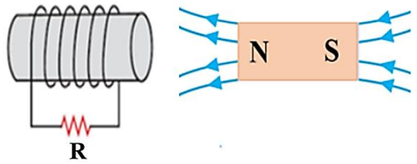

A) From left to right, when the bar magnet is moved toward the coil.
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24. Light passes through a diffraction grating with 3550 lines/cm and forms a first-order maximum at an angle of, 12.07° What is the wavelength of the light? A) 895 nm B) 589 nm C) 859 nm D) 985 nm

25. .....the tendency of a body rotating about a fixed axis to resist a change in rotational motion.
A) Torque(τ) B) Angular momentum (L) C) Moment of inertia (I) D) Angular acceleration (α)

26. Identify which conditions of equilibrium hold for (a solid sphere rolling on incline)?
A) Translational equilibrium. B) Rotational equilibrium.
C) Translational and rotational equilibrium. D) None of the equilibrium conditions hold.

27. Find the magnitude of $(\Delta\theta)$ and (ω) in the adjacent table:
A) 2.5 rad, 15 rad/s B) 0.5 rad, 15 rad/s
C) 2.5 rad, 1.2 rad/s D) 15 rad, 2.5 rad/s

Δs	r	$\Delta\theta$	v_t	ω
0.25 m	0.1 m	?	1.5 m/s	?

28. Which of the following statements is true for sound waves?
A) They do not require a material medium through which to travel.
B) Their speed in a medium = frequency × wavelength.
C) The particles of the medium vibrate perpendicular to the direction the wave is traveling.
D) All answers are correct.

29. How can you increase the strength of a magnetic field inside a solenoid?
A) Increase the number of coils per unit length. B) Increase the current.
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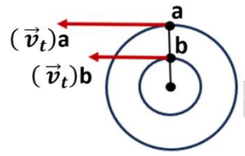
30. Which of the following is correct for the two points (a and b) for a merry- go-round rotating about a fixed axis as in the figure?



A) $(v_t)_b < (v_t)_a$ B) $\omega_a > \omega_b$
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31. In which of the following of standing waves are produced when the number of nodes is equal to number of antinodes?
A) string B) pipe opened at both ends C) pipe closed at one end D) Both (A and B) are correct

32. A wooden bucket filled with water is attached to a rope that is wound around a cylinder with a radius of 0.08 m. A crank with a turning radius of 0.3 m is attached to the end of the cylinder. If the minimum force that can be applied perpendicularly to the crank handle is 200 N to raise the bucket at constant speed find the force in the rope $(\vec{F}_T)$?
A) 75 N B) 35 N C) 750 N D) 350 N

33. Which of the following is the unit of spring constant (K)? A) $\frac{N}{m^2}$ B) $\frac{m}{N}$ C) $\frac{N}{m}$ D) $\frac{m^2}{N}$

34. A 90 kg person rides a spinning a measurement park ride that has an angular speed of 1.15 rad/s. If the distance of person is 11.5 m from the axis of rotation. What is the magnitude of the force that maintains the circular motion of the person? A) 1468.8 N B) 1268.8 N C)136.8 N D) 1368.8 N

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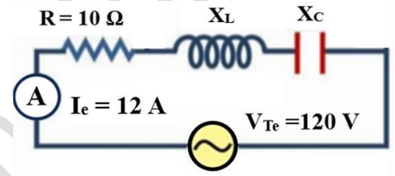

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41. An object rolls along a horizontal surface at a constant linear speed without slipping. If the translational kinetic energy of the object is 37.5 J and its total kinetic energy is 52.5 J what is the shape of object?
A) ring B) disk C) hollow sphere D) solid sphere

42. The second harmonics of a guitar string has a frequency of 165 Hz. If the speed of waves on the strings is 120 m/s. What is the string's length? A) 0.36 m B) 0.73 m C) 1.1 m D) 1.4 m

43. A 2 kg bicycle wheel with a radius of 0.3 m turns at a constant angular speed of 25 rad/s when a 0.3 kg reflector is at a distance of 0.19 m from the axle. What is the angular speed of the wheel when the reflector slides to a distance of 0.25 m from the axle? (Assume that the bicycle wheel is a ring)
A) 18 rad/s B) 19 rad/s C) 22 rad/s D) 24 rad/s

44. Two long parallel wires (a and b), each of them is 2 m long, are separated by a distance of 0.5 m between their centers. The wires carry currents $(I_a = 10\ A)$ and $(I_b = 15\ A)$, in opposite directions. What is the magnitude of magnetic force acting on wire (b) as a result of magnetic field of wire (a)? $[\mu_o = 4\pi \times 10^{-7}\ T.m/A]$
A) 1.2×10^{-4} N B) 12×10^{-4} N C) 0.6×10^{-4} N D) 2.4×10^{-4} N

45. Which of the following factors changes when a sound gets louder for a certain source?
A) Intensity B) Relative intensity of the sound C) Amplitude D) All the answers are correct

46. A proton moves at a speed of 2×10^7 m/s at right angles to a magnetic field with a magnitude of the 0.1 T. Find the magnitude of the acceleration of the proton? [$q_p = 1.6 \times 10^{-19}$ C, $m_p = 1.673 \times 10^{-27}$ kg]
A) 2.05×10^{17} m/s² B) 1.91×10^{14} m/s² C) 2.5×10^{14} m/s² D) 0.01×10^{14} m/s²

47. When a part of a sound wave travels from air into water, the wavelength of the sound increases. What happens to the frequency and the speed of the sound wave?
A) speed remains constant, and the frequency increases. B) frequency remains constant, and the speed decreases.
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48. An interference pattern is formed by using green light, If the two slits are moved farther apart, what happens to the distance between the bright fringes?
A) increase B) decrease C) remain unchanged D) doubled

49. When two light waves of same wavelength interfere, If the crest of one wave overlaps the trough of another wave, the two waves have a phase difference of: A) π rad B) 0 rad C) 2 π rad D) 4π rad

50. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. In what form is the energy in the system when the mass is at a point between maximum displacement and equilibrium position? A) elastic potential energy B) gravitational potential energy.
C) kinetic energy. D) kinetic energy and elastic potential energy

Kurdistan Region Government - Iraq *In the Name of Allah* *Subject: Physics*
Ministry of Education
High Committee for the General Examinations
General Examinations for the Preparatory Schools (12th Grade)
The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

Fingerprint

S

Choose the right answers for the following questions: (two marks for each question)

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Δs	r	$\Delta\theta$	v_t	ω
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6. A loop with 40 turns and an area of 0.5 m² is rotating at 250 rad/s. The loop's axis of rotation is perpendicular to a uniform magnetic field with a strength of 0.04 T. what is the maximum emf induced?
A) 120 V B) 300 V C) 200 V D) 180 V

7. Volt (V) is equal to: A) $\frac{\mathrm{T}}{\mathrm{m^2 . s}}$ B) $\frac{\mathrm{T . m}}{\mathrm{s}}$ C) $\frac{\mathrm{T . m^2}}{\mathrm{s}}$ D) $\mathrm{T . m^2}$

8. A car tire rotates with an average angular speed of 14π rad/s. in what time interval will the tire rotate 3.5 times?
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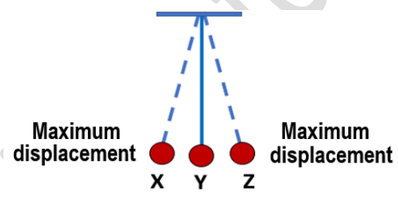

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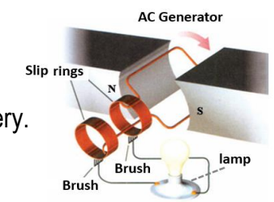

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A) 17.28 m/s² B) 1.728 m/s² C) 172 m/s² D) 1282 m/s²

16. Determine the change in gravitational force between two masses if the distance between their centers is doubled:
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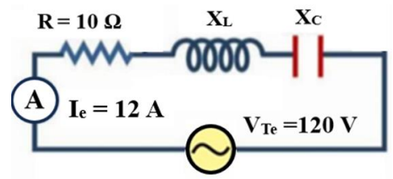

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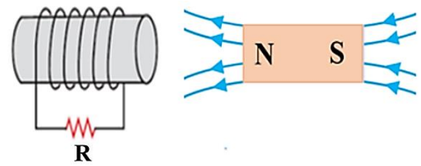

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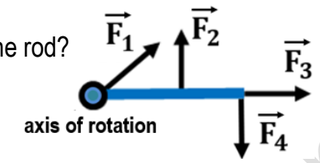

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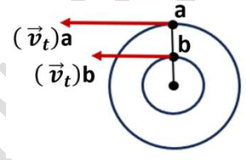

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42. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. In what form is the energy in the system when the mass is at a point between maximum displacement and equilibrium position? A) elastic potential energy B) gravitational potential energy.
C) kinetic energy. D) kinetic energy and elastic potential energy

43. Which of the following statements is true for sound waves?
A) They do not require a material medium through which to travel.
B) Their speed in a medium = frequency × wavelength.
C) The particles of the medium vibrate perpendicular to the direction the wave is traveling.
D) All answers are correct.

44. Two successive crests of a wave are 2.4 m apart. Eight crests pass a given point every 12 what is the wave speed?
A) 1.6 m/s B) 0.8 m/s C) 1.8 m/s D) 9.6 m/s

45. .....the tendency of a body rotating about a fixed axis to resist a change in rotational motion.
A) Torque(τ) B) Angular momentum (L) C) Moment of inertia (I) D) Angular acceleration (α)

46. A force of magnitude 4 N is applied tangentially to a disk of mass 5 kg and radius 0.2 m. The disk starts rotating from rest. How many revolutions does the disk complete after 2.51 s?
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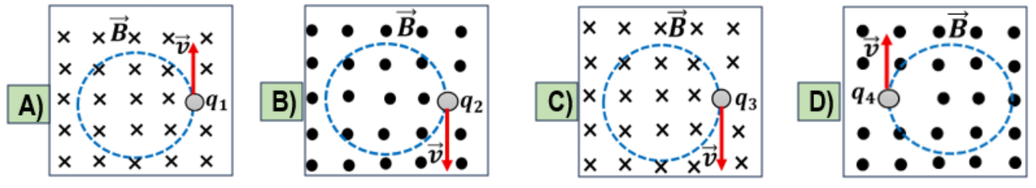
47. An inductive coil of resistance 20 Ω and self-inductance 0.4 H is connected in series with a capacitor of capacitance 200 μF and an AC source of effective voltage 200 V and frequency 60 Hz. Calculate the effective value of the alternating current. A) 10 A B) 6.4 A C) 1.44 A D) 8.62 A

48. A step-up transformer: A) $V_2 > V_1$ B) $N_2 > N_1$ C) $\frac{N_2}{N_1} > 1$ D) All the answers are correct

49. A wooden bucket filled with water is attached to a rope that is wound around a cylinder with a radius of 0.08 m. A crank with a turning radius of 0.3 m is attached to the end of the cylinder. If the minimum force that can be applied perpendicularly to the crank handle is 200 N to raise the bucket at constant speed find the force in the rope $(\vec{F}_T)$?
A) 75 N B) 35 N C) 750 N D) 350 N

50. Four charges, each charge moves in a circular path in a magnetic field as shown in the figures, which of them is a negative charge?



Kurdistan Region Government - Iraq
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High Committee for the General Examinations
General Examinations for the Preparatory Schools (12th Grade)
The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

In the Name of Allah

Subject: Physics

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Choose the right answers for the following questions: (two marks for each question)

1. When two light waves of same wavelength interfere, If the crest of one wave overlaps the trough of another wave, the two waves have a phase difference of: A) π rad B) 0 rad C) 2 π rad D) 4π rad

2. Identify which conditions of equilibrium hold for (a solid sphere rolling on incline)?
A) Translational equilibrium. B) Rotational equilibrium.
C) Translational and rotational equilibrium. D) None of the equilibrium conditions hold.

3. When a part of a sound wave travels from air into water, the wavelength of the sound increases. What happens to the frequency and the speed of the sound wave?
A) speed remains constant, and the frequency increases. B) frequency remains constant, and the speed decreases.
C) speed increases, and the frequency remain constant. D) speed increases, and the frequency decreases.

4. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. In what form is the energy in the system when the mass is at a point between maximum displacement and equilibrium position? A) elastic potential energy B) gravitational potential energy.
C) kinetic energy. D) kinetic energy and elastic potential energy

5. A car tire rotates with an average angular speed of 14π rad/s. in what time interval will the tire rotate 3.5 times?
A) 0.5 s B) 0.76 s C) 2 s D) 4.9 s

6. Which of the following is <u>not correct</u> about the Laser? A) Laser light is coherent and monochromatic.
B) The process of stimulated emission violates the principle of energy conservation.
C) The active medium is an essential component of laser.
D) A laser source is a device converts electrical energy or chemical energy into coherent light.

7. In the adjacent figure, an AC Generator is shown.an AC Generator can be converted to a DC Motor by:
A) Replacing the lamp with a galvanometer.
B) Replacing the two slip rings with a commutator and replacing the lamp with a battery.
C) Replacing the lamp with a battery.
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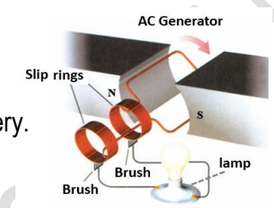

8. If a spinning amusement-park ride has an angular speed of 1.2 rad/s, what is the centripetal acceleration of a person standing 12 m from the center of the ride?
A) 17.28 m/s² B) 1.728 m/s² C) 172 m/s² D) 1282 m/s²

9. The second harmonics of a guitar string has a frequency of 165 Hz. If the speed of waves on the strings is 120 m/s. What is the string's length? A) 0.36 m B) 0.73 m C) 1.1 m D) 1.4 m

10. Which of the following statements is true for sound waves?
A) They do not require a material medium through which to travel.
B) Their speed in a medium = frequency × wavelength.
C) The particles of the medium vibrate perpendicular to the direction the wave is traveling.
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11. The galvanometer can be converted to a voltmeter by connecting a resistor of very…….....to the galvanometer
A) high resistance in series B) high resistance in parallel C) low resistance in parallel D) low resistance in series

12. If the intensity of lawn mower is $1 \times 10^{-3}\ \mathrm{W/m^2}$. What is relative intensity of the sound in decibel (dB)?
A) 0 dB B) 90 dB C) 120 dB D) 130 dB

13. Light passes through a diffraction grating with 3550 lines/cm and forms a first-order maximum at an angle of, 12.07° What is the wavelength of the light? A) 895 nm B) 589 nm C) 859 nm D) 985 nm

14. The distance between node and next antinode in a standing wave on string equal:
A) $\frac{1}{4}\ \lambda$ B) $\frac{1}{2}\ \lambda$ C) λ D) 2 λ

15. .....the tendency of a body rotating about a fixed axis to resist a change in rotational motion.
A) Torque(τ) B) Angular momentum (L) C) Moment of inertia (I) D) Angular acceleration (α)

16. A step-up transformer: A) $V_2 > V_1$ B) $N_2 > N_1$ C) $\frac{N_2}{N_1} > 1$ D) All the answers are correct

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18. An air solenoid of length 10 cm, cross sectional area 25 cm², and 400 turns Calculate the coefficient of self-induction of coil $[\mu_o = 4\pi \times 10^{-7}\ \mathrm{T.m/A}]$
A) 2 mH B) 5 mH C) 0.2 mH D) 0.5 mH

19. A parked ambulance emits a sound of frequency 1200 Hz. What frequency is detected by an observer inside another car moving with a velocity of 20 m/s.as the car moves towards the ambulance? (Use speed of sound in air is 340 m/s)
A) 1000 Hz B) 1129.4 Hz C) 1270.6 Hz D) 1700 Hz

20. A loop with 40 turns and an area of 0.5 m² is rotating at 250 rad/s. The loop's axis of rotation is perpendicular to a uniform magnetic field with a strength of 0.04 T. what is the maximum emf induced?
A) 120 V B) 300 V C) 200 V D) 180 V

21. Two uniformly solid cylinders of equal radii roll down an incline without slipping. The first cylinder has three times the mass of the second cylinder. The torque was exerted on the first cylinder is……. torque exerted on the second cylinder? A) twice B) three times C) four times D) five times

22. An interference pattern is formed by using green light, If the two slits are moved farther apart, what happens to the distance between the bright fringes?
A) increase B) decrease C) remain unchanged D) doubled

23. Calculate the magnitude of the magnetic field at the center of a circular coil of 10 turns and radius 10 cm when a 20 A current passes through it $[\mu_o = 4\pi \times 10^{-7}\ \mathrm{T.m/A}]$?
A) 1.256×10^{-4} T B) 1.256×10^{-3} T C) 1.256×10^{-2} T D) 1.256×10^{-1} T

24. Determine the change in gravitational force between two masses if the distance between their centers is doubled:
A) It becomes four times B) It becomes three times
C) It becomes quarter of the original value D) It becomes half of the original value

25. Which of the following is directly proportional with frequency in AC circuits?
A) $\mathbf{X_L}$ B) $\mathbf{X_C}$ C) $\boldsymbol{I_C}$ D) Both (A and C) are correct

26. Find the magnitude of $(\Delta\theta)$ and (ω) in the adjacent table:
A) 2.5 rad, 15 rad/s B) 0.5 rad, 15 rad/s
C) 2.5 rad, 1.2 rad/s D) 15 rad, 2.5 rad/s

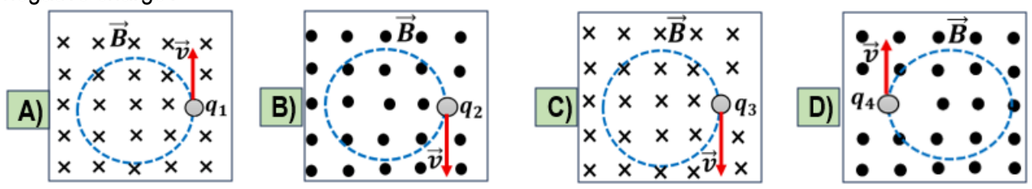
Δs	r	$\Delta\theta$	v_t	ω
0.25 m	0.1 m	?	1.5 m/s	?

27. An object rolls along a horizontal surface at a constant linear speed without slipping. If the translational kinetic energy of the object is 37.5 J and its total kinetic energy is 52.5 J what is the shape of object?
A) ring B) disk C) hollow sphere D) solid sphere

28. The power in the secondary coil of a power station is 3 MW. The station sends the current to the city by means of lines of 120 Ω resistance under a potential difference 6×10^4 V. Calculate the transfer efficiency?
A) 96.9 % B) 95 % C) 99.9 % D) 90 %

29. Two successive crests of a wave are 2.4 m apart. Eight crests pass a given point every 12 what is the wave speed?
A) 1.6 m/s B) 0.8 m/s C) 1.8 m/s D) 9.6 m/s

30. Four charges, each charge moves in a circular path in a magnetic field as shown in the figures, which of them is a negative charge?



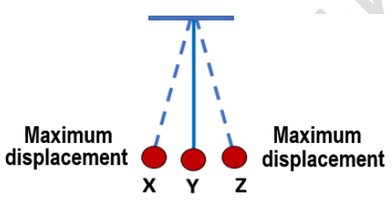
31. An inductive coil of resistance 20 Ω and self-inductance 0.4 H is connected in series with a capacitor of capacitance 200 μF and an AC source of effective voltage 200 V and frequency 60 Hz. Calculate the effective value of the alternating current. A) 10 A B) 6.4 A C) 1.44 A D) 8.62 A

32. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of X_L = 600 Ω and a capacitor of impedance of X_C= 200 Ω. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
A) $45°$ B) $37°$ C) $30°$ D) $53°$

33. Breaking the sound barrier takes place when the speed of the plane.....: the speed of sound in air.
A) greater than B) equal to C) less than D) equal to half of

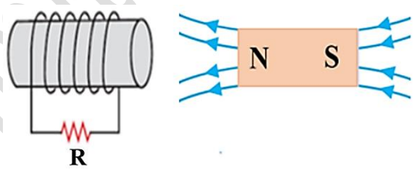
34. A pendulum bob hangs from a string and moves with simple harmonic motion. What is the restoring force in the pendulum?
A) the total weight of the bob.
B) the component of the bob's weight tangent to the motion of the bob.
C) the component of the bob's weight perpendicular to the motion of the bob.
D) the elastic force of the stretched string.

35. In the figure, A pendulum bob hangs from a string and moves with simple harmonic motion. If the pendulum bob moves from point (Y) to point (Z) in 0.1 s. What is the frequency of the pendulum?
A) 2.5 Hz B) 5 Hz
C) 7.5 Hz D) 10 Hz

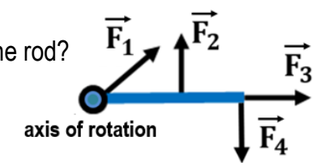


36. Which of the following relationship is correct between tangential acceleration (a_t) and angular acceleration (α) ?
A) $a_t = r\,\alpha$ B) $\alpha = \frac{r}{a_t}$ C) $r = \frac{\alpha}{a_t}$ D) $a_t = r^2\,\alpha$

37. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?
A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.



38. In the figure, There are four forces acting on the rod have the same magnitude $(F_1 = F_2 = F_3 = F_4)$ Which one of them produces the greatest torque on the rod?
A) $\vec{F}_1$ B) $\vec{F}_2$
C) $\vec{F}_3$ D) $\vec{F}_4$

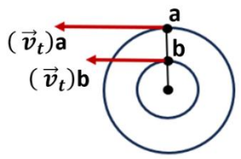


39. Which of the following factors changes when a sound gets louder for a certain source?
A) Intensity B) Relative intensity of the sound C) Amplitude D) All the answers are correct

40. A force of magnitude 4 N is applied tangentially to a disk of mass 5 kg and radius 0.2 m. The disk starts rotating from rest. How many revolutions does the disk complete after 2.51 s?
A) 2 rev B) 4 rev C) 8 rev D) 12 rev

41. Which of the following is the unit of spring constant (K)? A) $\frac{N}{m^2}$ B) $\frac{m}{N}$ C) $\frac{N}{m}$ D) $\frac{m^2}{N}$

42. Which of the following is correct for the two points (a and b) for a merry- go-round rotating about a fixed axis as in the figure?
A) $(v_t)_b < (v_t)_a$ B) $\omega_a > \omega_b$
C) $(\Delta\theta)_a > (\Delta\theta)_b$ D) $(v_t)_a = (v_t)_b$



43. Two long parallel wires (a and b), each of them is 2 m long, are separated by a distance of 0.5 m between their centers. The wires carry currents $(I_a = 10\ A)$ and $(I_b = 15\ A)$, in opposite directions. What is the magnitude of magnetic force acting on wire (b) as a result of magnetic field of wire (a)? $[\mu_o = 4\pi \times 10^{-7}\ T.m/A]$
A) 1.2×10^{-4} N B) 12×10^{-4} N C) 0.6×10^{-4} N D) 2.4×10^{-4} N

44. A 90 kg person rides a spinning a measurement park ride that has an angular speed of 1.15 rad/s. If the distance of person is 11.5 m from the axis of rotation. What is the magnitude of the force that maintains the circular motion of the person? A) 1468.8 N B) 1268.8 N C)136.8 N D) 1368.8 N

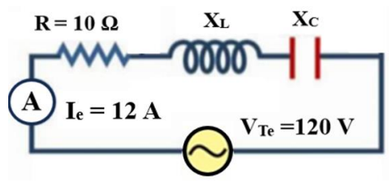
45. How can you increase the strength of a magnetic field inside a solenoid?
A) Increase the number of coils per unit length. B) Increase the current.
C) Place an iron rod inside the solenoid. D) All answers are correct.

46. In which of the following of standing waves are produced when the number of nodes is equal to number of antinodes?
A) string B) pipe opened at both ends C) pipe closed at one end D) Both (A and B) are correct

47. A 2 kg bicycle wheel with a radius of 0.3 m turns at a constant angular speed of 25 rad/s when a 0.3 kg reflector is at a distance of 0.19 m from the axle. What is the angular speed of the wheel when the reflector slides to a distance of 0.25 m from the axle? (Assume that the bicycle wheel is a ring)
A) 18 rad/s B) 19 rad/s C) 22 rad/s D) 24 rad/s

48. Volt (V) is equal to: A) $\frac{T}{m^2 . S}$ B) $\frac{T . m}{S}$ C) $\frac{T . m^2}{S}$ D) $T . m^2$

49. In the electric circuit shown in the adjacent figure, Calculate the phase difference between the circuit current and the total potential difference:
A) $45°$ B) $53°$
C) $180°$ D) $0°$



50. A proton moves at a speed of 2×10^7 m/s at right angles to a magnetic field with a magnitude of the 0.1 T. Find the magnitude of the acceleration of the proton? [q_p=1.6 × 10^{-19} C, m_p=1.673 × 10^{-27} kg]
A) 2.05×10^{17} m/s² B) 1.91×10^{14} m/s² C) 2.5×10^{14} m/s² D) 0.01×10^{14} m/s²

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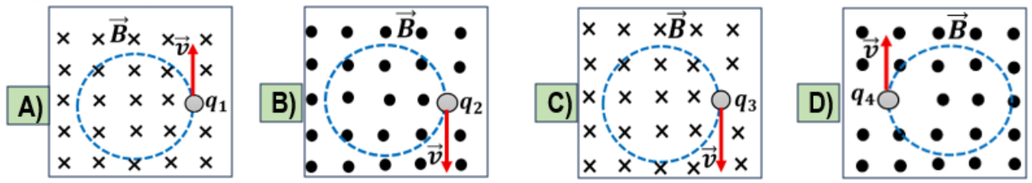

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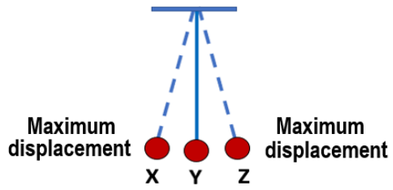

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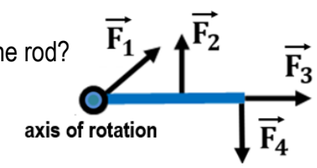

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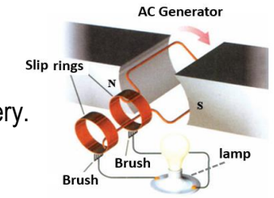

A) Replacing the lamp with a galvanometer.
B) Replacing the two slip rings with a commutator and replacing the lamp with a battery.
C) Replacing the lamp with a battery.
D) All answers are incorrect.

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C) speed increases, and the frequency remain constant. D) speed increases, and the frequency decreases.

27. If a spinning amusement-park ride has an angular speed of 1.2 rad/s, what is the centripetal acceleration of a person standing 12 m from the center of the ride?
A) 17.28 m/s^2 B) 1.728 m/s^2 C) 172 m/s^2 D) 1282 m/s^2

28. The second harmonics of a guitar string has a frequency of 165 Hz. If the speed of waves on the strings is 120 m/s. What is the string's length? A) 0.36 m B) 0.73 m C) 1.1 m D) 1.4 m

29. A loop with 40 turns and an area of 0.5 m^2 is rotating at 250 rad/s. The loop's axis of rotation is perpendicular to a uniform magnetic field with a strength of 0.04 T. what is the maximum emf induced?
A) 120 V B) 300 V C) 200 V D) 180 V

30. Which of the following is <u>not correct</u> about the Laser? A) Laser light is coherent and monochromatic.
B) The process of stimulated emission violates the principle of energy conservation.
C) The active medium is an essential component of laser.
D) A laser source is a device converts electrical energy or chemical energy into coherent light.

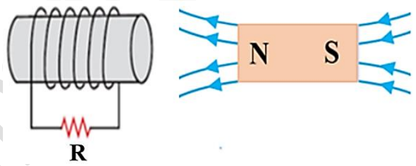
31. .....the tendency of a body rotating about a fixed axis to resist a change in rotational motion.
A) Torque(τ) B) Angular momentum (L) C) Moment of inertia (I) D) Angular acceleration (α)

32. An interference pattern is formed by using green light, If the two slits are moved farther apart, what happens to the distance between the bright fringes?
A) increase B) decrease C) remain unchanged D) doubled

33. Volt (V) is equal to: A) $\frac{T}{m^2 . S}$ B) $\frac{T . m}{S}$ C) $\frac{T . m^2}{S}$ D) $T . m^2$

34. Light passes through a diffraction grating with 3550 lines/cm and forms a first-order maximum at an angle of, 12.07° What is the wavelength of the light? A) 895 nm B) 589 nm C) 859 nm D) 985 nm

35. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?



A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.

36. Find the magnitude of $(\Delta\theta)$ and (ω) in the adjacent table:
A) 2.5 rad, 15 rad/s B) 0.5 rad, 15 rad/s
C) 2.5 rad, 1.2 rad/s D) 15 rad, 2.5 rad/s

Δs	r	$\Delta\theta$	v_t	ω
0.25 m	0.1 m	?	1.5 m/s	?

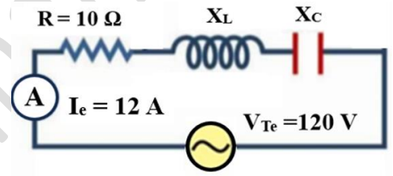
37. How can you increase the strength of a magnetic field inside a solenoid?
A) Increase the number of coils per unit length. B) Increase the current.
C) Place an iron rod inside the solenoid. D) All answers are correct.

38. The galvanometer can be converted to a voltmeter by connecting a resistor of very.....to the galvanometer
A) high resistance in series B) high resistance in parallel C) low resistance in parallel D) low resistance in series

39. The distance between node and next antinode in a standing wave on string equal:
A) $\frac{1}{4}\lambda$ B) $\frac{1}{2}\lambda$ C) λ D) 2λ

40. A car tire rotates with an average angular speed of 14π rad/s. in what time interval will the tire rotate 3.5 times?
A) 0.5 s B) 0.76 s C) 2 s D) 4.9 s

41. In the electric circuit shown in the adjacent figure, Calculate the phase difference between the circuit current and the total potential difference:



A) 45° B) 53°
C) 180° D) 0°

42. Identify which conditions of equilibrium hold for (a solid sphere rolling on incline)?
A) Translational equilibrium. B) Rotational equilibrium.
C) Translational and rotational equilibrium. D) None of the equilibrium conditions hold.

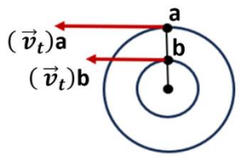
43. Which of the following is directly proportional with frequency in AC circuits?
A) X_L B) X_C C) I_C D) Both (A and C) are correct

44. When two light waves of same wavelength interfere, If the crest of one wave overlaps the trough of another wave, the two waves have a phase difference of: A) π rad B) 0 rad C) 2 π rad D) 4π rad

45. Which of the following statements is true for sound waves?
A) They do not require a material medium through which to travel.
B) Their speed in a medium = frequency × wavelength.
C) The particles of the medium vibrate perpendicular to the direction the wave is traveling.
D) All answers are correct.

46. The power in the secondary coil of a power station is 3 MW. The station sends the current to the city by means of lines of 120 Ω resistance under a potential difference 6×10^4 V. Calculate the transfer efficiency?
A) 96.9 % B) 95 % C) 99.9 % D) 90 %

47. Which of the following is correct for the two points (a and b) for a merry- go-round rotating about a fixed axis as in the figure?



A) $(v_t)_b < (v_t)_a$ B) $\omega_a > \omega_b$
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48. Two long parallel wires (a and b), each of them is 2 m long, are separated by a distance of 0.5 m between their centers. The wires carry currents $(I_a = 10\ A)$ and $(I_b = 15\ A)$, in opposite directions. What is the magnitude of magnetic force acting on wire (b) as a result of magnetic field of wire (a)? $[\mu_o = 4\pi \times 10^{-7}\ T.m/A]$
A) 1.2×10^{-4} N B) 12×10^{-4} N C) 0.6×10^{-4} N D) 2.4×10^{-4} N

49. Which of the following factors changes when a sound gets louder for a certain source?
A) Intensity B) Relative intensity of the sound C) Amplitude D) All the answers are correct

50. A 2 kg bicycle wheel with a radius of 0.3 m turns at a constant angular speed of 25 rad/s when a 0.3 kg reflector is at a distance of 0.19 m from the axle. What is the angular speed of the wheel when the reflector slides to a distance of 0.25 m from the axle? (Assume that the bicycle wheel is a ring)
A) 18 rad/s B) 19 rad/s C) 22 rad/s D) 24 rad/s

Kurdistan Region Government - Iraq *In the Name of Allah* *Subject: Physics*
Ministry of Education
High Committee for the General Examinations
General Examinations for the Preparatory Schools (12th Grade)
The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

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Choose the right answers for the following questions: (two marks for each question)

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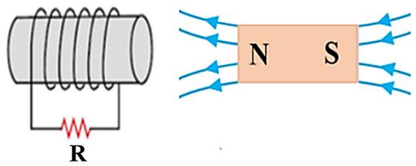

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5. Two successive crests of a wave are 2.4 m apart. Eight crests pass a given point every 12 what is the wave speed?
A) 1.6 m/s B) 0.8 m/s C) 1.8 m/s D) 9.6 m/s

6. Breaking the sound barrier takes place when the speed of the plane.....: the speed of sound in air.
A) greater than B) equal to C) less than D) equal to half of

7. If the intensity of lawn mower is $1 \times 10^{-3}\ \mathrm{W/m^2}$. What is relative intensity of the sound in decibel (dB)?
A) 0 dB B) 90 dB C) 120 dB D) 130 dB

8. If a spinning amusement-park ride has an angular speed of 1.2 rad/s, what is the centripetal acceleration of a person standing 12 m from the center of the ride?
A) 17.28 m/s² B) 1.728 m/s² C) 172 m/s² D) 1282 m/s²

9. How can you increase the strength of a magnetic field inside a solenoid?
A) Increase the number of coils per unit length. B) Increase the current.
C) Place an iron rod inside the solenoid. D) All answers are correct.

10. A wooden bucket filled with water is attached to a rope that is wound around a cylinder with a radius of 0.08 m. A crank with a turning radius of 0.3 m is attached to the end of the cylinder. If the minimum force that can be applied perpendicularly to the crank handle is 200 N to raise the bucket at constant speed find the force in the rope $(\vec{F}_T)$?
A) 75 N B) 35 N C) 750 N D) 350 N

11. Which of the following is directly proportional with frequency in AC circuits?
A) $\mathbf{X_L}$ B) $\mathbf{X_C}$ C) $\boldsymbol{I_C}$ D) Both (A and C) are correct

12. When two light waves of same wavelength interfere, If the crest of one wave overlaps the trough of another wave, the two waves have a phase difference of: A) π rad B) 0 rad C) 2 π rad D) 4π rad

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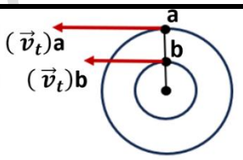
14. Which of the following is correct for the two points (a and b) for a merry- go-round rotating about a fixed axis as in the figure?
A) $(v_t)_b < (v_t)_a$ B) $\omega_a > \omega_b$
C) $(\Delta\theta)_a > (\Delta\theta)_b$ D) $(v_t)_a = (v_t)_b$



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15. When a part of a sound wave travels from air into water, the wavelength of the sound increases. What happens to the frequency and the speed of the sound wave?
A) speed remains constant, and the frequency increases. B) frequency remains constant, and the speed decreases.
C) speed increases, and the frequency remain constant. D) speed increases, and the frequency decreases.

16. Two uniformly solid cylinders of equal radii roll down an incline without slipping. The first cylinder has three times the mass of the second cylinder. The torque was exerted on the first cylinder is..... torque exerted on the second cylinder? A) twice B) three times C) four times D) five times

17. Which of the following relationship is correct between tangential acceleration $(\boldsymbol{a_t})$ and angular acceleration $(\boldsymbol{\alpha})$?
A) $\boldsymbol{a_t = r\,\alpha}$ B) $\boldsymbol{\alpha = \frac{r}{a_t}}$ C) $\boldsymbol{r = \frac{\alpha}{a_t}}$ D) $\boldsymbol{a_t = r^2\,\alpha}$

18. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of X_L = 600 Ω and a capacitor of impedance of X_C= 200 Ω. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
A) 45° B) 37° C) 30° D) 53°

19. A proton moves at a speed of 2×10^7 m/s at right angles to a magnetic field with a magnitude of the 0.1 T. Find the magnitude of the acceleration of the proton? [q_p=1.6 × 10^{-19} C, m_p=1.673 × 10^{-27} kg]
A) 2.05×10^{17} m/s² B) 1.91×10^{14} m/s² C) 2.5×10^{14} m/s² D) 0.01×10^{14} m/s²

20. A loop with 40 turns and an area of 0.5 m² is rotating at 250 rad/s. The loop's axis of rotation is perpendicular to a uniform magnetic field with a strength of 0.04 T. what is the maximum emf induced?
A) 120 V B) 300 V C) 200 V D) 180 V

21. Which of the following factors changes when a sound gets louder for a certain source?
A) Intensity B) Relative intensity of the sound C) Amplitude D) All the answers are correct

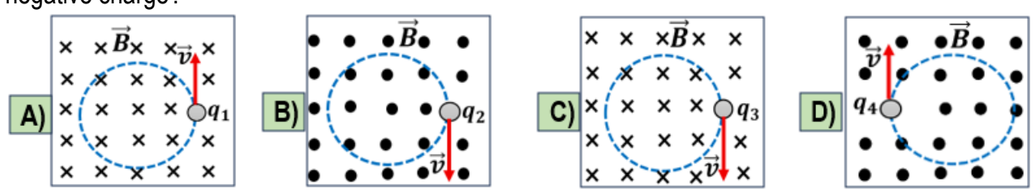
22. A force of magnitude 4 N is applied tangentially to a disk of mass 5 kg and radius 0.2 m. The disk starts rotating from rest. How many revolutions does the disk complete after 2.51 s?
A) 2 rev B) 4 rev C) 8 rev D) 12 rev

23. A 2 kg bicycle wheel with a radius of 0.3 m turns at a constant angular speed of 25 rad/s when a 0.3 kg reflector is at a distance of 0.19 m from the axle. What is the angular speed of the wheel when the reflector slides to a distance of 0.25 m from the axle? (Assume that the bicycle wheel is a ring)
A) 18 rad/s B) 19 rad/s C) 22 rad/s D) 24 rad/s

24. An air solenoid of length 10 cm, cross sectional area 25 cm², and 400 turns Calculate the coefficient of self-induction of coil [$\mu_o = 4\pi \times 10^{-7}$ T.m/A]
A) 2 mH B) 5 mH C) 0.2 mH D) 0.5 mH

25. .....the tendency of a body rotating about a fixed axis to resist a change in rotational motion.
A) Torque(τ) B) Angular momentum (L) C) Moment of inertia (I) D) Angular acceleration (α)

26. Four charges, each charge moves in a circular path in a magnetic field as shown in the figures, which of them is a negative charge?



27. Find the magnitude of $(\Delta\theta)$ and (ω) in the adjacent table:
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0.25 m	0.1 m	?	1.5 m/s	?

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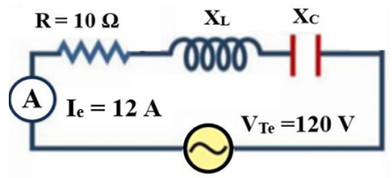

29. Calculate the magnitude of the magnetic field at the center of a circular coil of 10 turns and radius 10 cm when a 20 A current passes through it $[\mu_o = 4\pi \times 10^{-7}\ \text{T.m/A}]$?
A) 1.256×10^{-4} T B) 1.256×10^{-3} T C) 1.256×10^{-2} T D) 1.256×10^{-1} T

30. Which of the following is <u>not correct</u> about the Laser? A) Laser light is coherent and monochromatic.
B) The process of stimulated emission violates the principle of energy conservation.
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31. The galvanometer can be converted to a voltmeter by connecting a resistor of very…….....to the galvanometer
A) high resistance in series B) high resistance in parallel C) low resistance in parallel D) low resistance in series

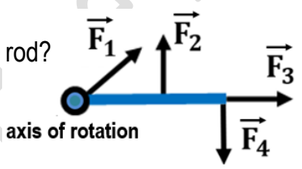
32. Two long parallel wires (a and b), each of them is 2 m long, are separated by a distance of 0.5 m between their centers. The wires carry currents $(I_a = 10\ A)$ and $(I_b = 15\ A)$, in opposite directions. What is the magnitude of magnetic force acting on wire (b) as a result of magnetic field of wire (a)? $[\mu_o = 4\pi \times 10^{-7}\ \text{T.m/A}]$
A) 1.2×10^{-4} N B) 12×10^{-4} N C) 0.6×10^{-4} N D) 2.4×10^{-4} N

33. Which of the following is the unit of spring constant (K)? A) $\frac{N}{m^2}$ B) $\frac{m}{N}$ C) $\frac{N}{m}$ D) $\frac{m^2}{N}$

34. An inductive coil of resistance 20 Ω and self-inductance 0.4 H is connected in series with a capacitor of capacitance 200 μF and an AC source of effective voltage 200 V and frequency 60 Hz. Calculate the effective value of the alternating current. A) 10 A B) 6.4 A C) 1.44 A D) 8.62 A

35. The distance between node and next antinode in a standing wave on string equal:
A) $\frac{1}{4}\ \lambda$ B) $\frac{1}{2}\ \lambda$ C) λ D) $2\ \lambda$

36. In the figure, There are four forces acting on the rod have the same magnitude $(F_1 = F_2 = F_3 = F_4)$ Which one of them produces the greatest torque on the rod?
A) $\vec{F}_1$ B) $\vec{F}_2$
C) $\vec{F}_3$ D) $\vec{F}_4$



37. A parked ambulance emits a sound of frequency 1200 Hz. What frequency is detected by an observer inside another car moving with a velocity of 20 m/s.as the car moves towards the ambulance? (Use speed of sound in air is 340 m/s)
A) 1000 Hz B) 1129.4 Hz C) 1270.6 Hz D) 1700 Hz

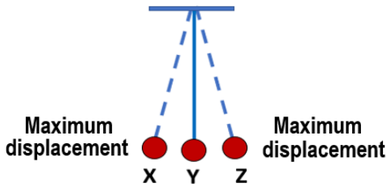
38. Which of the following statements is true for sound waves?
A) They do not require a material medium through which to travel.
B) Their speed in a medium = frequency × wavelength.
C) The particles of the medium vibrate perpendicular to the direction the wave is traveling.
D) All answers are correct.

39. An object rolls along a horizontal surface at a constant linear speed without slipping. If the translational kinetic energy of the object is 37.5 J and its total kinetic energy is 52.5 J what is the shape of object?
A) ring B) disk C) hollow sphere D) solid sphere

40. In which of the following of standing waves are produced when the number of nodes is equal to number of antinodes?
A) string B) pipe opened at both ends C) pipe closed at one end D) Both (A and B) are correct

41. Light passes through a diffraction grating with 3550 lines/cm and forms a first-order maximum at an angle of, 12.07° What is the wavelength of the light? A) 895 nm B) 589 nm C) 859 nm D) 985 nm

42. In the figure, A pendulum bob hangs from a string and moves with simple harmonic motion. If the pendulum bob moves from point (Y) to point (Z) in 0.1 s. What is the frequency of the pendulum?
A) 2.5 Hz B) 5 Hz
C) 7.5 Hz D) 10 Hz



43. A 90 kg person rides a spinning a measurement park ride that has an angular speed of 1.15 rad/s. If the distance of person is 11.5 m from the axis of rotation. What is the magnitude of the force that maintains the circular motion of the person? A) 1468.8 N B) 1268.8 N C)136.8 N D) 1368.8 N

44. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. In what form is the energy in the system when the mass is at a point between maximum displacement and equilibrium position?
A) elastic potential energy B) gravitational potential energy.
C) kinetic energy. D) kinetic energy and elastic potential energy

45. Volt (V) is equal to: A) $\frac{T}{m^2 . s}$ B) $\frac{T . m}{s}$ C) $\frac{T . m^2}{s}$ D) $T . m^2$

46. An interference pattern is formed by using green light, If the two slits are moved farther apart, what happens to the distance between the bright fringes?
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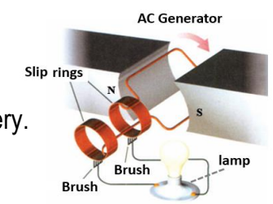
47. Determine the change in gravitational force between two masses if the distance between their centers is doubled:
A) It becomes four times B) It becomes three times
C) It becomes quarter of the original value D) It becomes half of the original value

48. A pendulum bob hangs from a string and moves with simple harmonic motion. What is the restoring force in the pendulum?
A) the total weight of the bob.
B) the component of the bob's weight tangent to the motion of the bob.
C) the component of the bob's weight perpendicular to the motion of the bob.
D) the elastic force of the stretched string.

49. In the adjacent figure, an AC Generator is shown.an AC Generator can be converted to a DC Motor by:
A) Replacing the lamp with a galvanometer.
B) Replacing the two slip rings with a commutator and replacing the lamp with a battery.
C) Replacing the lamp with a battery.
D) All answers are incorrect.



50. A step-up transformer: A) $V_2 > V_1$ B) $N_2 > N_1$ C) $\frac{N_2}{N_1} > 1$ D) All the answers are correct

Kurdistan Region Government - Iraq *In the Name of Allah* *Subject: Physics*
Ministry of Education
High Committee for the General Examinations
General Examinations for the Preparatory Schools (12th Grade)
The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

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Choose the right answers for the following questions: (two marks for each question)

1. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. In what form is the energy in the system when the mass is at a point between maximum displacement and equilibrium position? A) elastic potential energy B) gravitational potential energy. C) kinetic energy. D) kinetic energy and elastic potential energy

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5. Two successive crests of a wave are 2.4 m apart. Eight crests pass a given point every 12 what is the wave speed?
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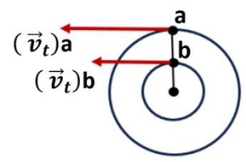

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8. When two light waves of same wavelength interfere, If the crest of one wave overlaps the trough of another wave, the two waves have a phase difference of: A) π rad B) 0 rad C) 2 π rad D) 4π rad

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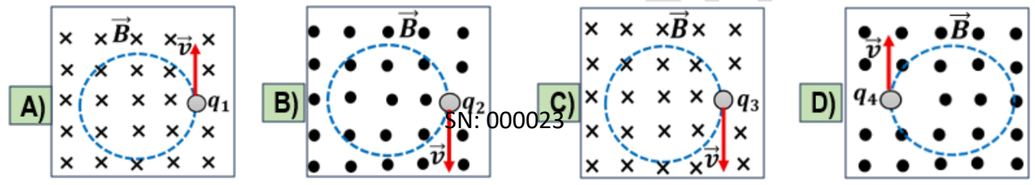

15. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of X_L = 600 Ω and a capacitor of impedance of X_C= 200 Ω. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
A) 45° B) 37° C) 30° D) 53°

16. A force of magnitude 4 N is applied tangentially to a disk of mass 5 kg and radius 0.2 m. The disk starts rotating from rest. How many revolutions does the disk complete after 2.51 s?
A) 2 rev B) 4 rev C) 8 rev D) 12 rev

17. In the figure, There are four forces acting on the rod have the same magnitude $(F_1 = F_2 = F_3 = F_4)$ Which one of them produces the greatest torque on the rod?
A) $\vec{F}_1$ B) $\vec{F}_2$
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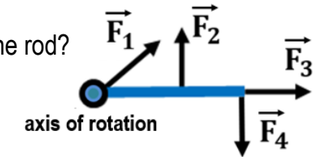

18. Which of the following statements is true for sound waves?
A) They do not require a material medium through which to travel.
B) Their speed in a medium = frequency × wavelength.
C) The particles of the medium vibrate perpendicular to the direction the wave is traveling.
D) All answers are correct.

19. A parked ambulance emits a sound of frequency 1200 Hz. What frequency is detected by an observer inside another car moving with a velocity of 20 m/s.as the car moves towards the ambulance? (Use speed of sound in air is 340 m/s)
A) 1000 Hz B) 1129.4 Hz C) 1270.6 Hz D) 1700 Hz

20. Which of the following relationship is correct between tangential acceleration $(\boldsymbol{a_t})$ and angular acceleration $(\boldsymbol{\alpha})$?
A) $\boldsymbol{a_t = r\,\alpha}$ B) $\boldsymbol{\alpha = \frac{r}{a_t}}$ C) $\boldsymbol{r = \frac{\alpha}{a_t}}$ D) $\boldsymbol{a_t = r^2\,\alpha}$

21. An object rolls along a horizontal surface at a constant linear speed without slipping. If the translational kinetic energy of the object is 37.5 J and its total kinetic energy is 52.5 J what is the shape of object?
A) ring B) disk C) hollow sphere D) solid sphere

22. A proton moves at a speed of 2×10^7 m/s at right angles to a magnetic field with a magnitude of the 0.1 T. Find the magnitude of the acceleration of the proton? [q_p=1.6 × 10^{-19} C, m_p=1.673 × 10^{-27} kg]
A) 2.05×10^{17} m/s^2 B) 1.91×10^{14} m/s^2 C) 2.5×10^{14} m/s^2 D) 0.01×10^{14} m/s^2

23. Two long parallel wires (a and b), each of them is 2 m long, are separated by a distance of 0.5 m between their centers. The wires carry currents $(I_a = 10\ A)$ and $(I_b = 15\ A)$, in opposite directions. What is the magnitude of magnetic force acting on wire (b) as a result of magnetic field of wire (a)? $[\mu_o = 4\pi \times 10^{-7}\ \mathrm{T.m/A}]$
A) 1.2 × 10^{-4} N B) 12 × 10^{-4} N C) 0.6 × 10^{-4} N D) 2.4 × 10^{-4} N

24. An interference pattern is formed by using green light, If the two slits are moved farther apart, what happens to the distance between the bright fringes?
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25. A loop with 40 turns and an area of 0.5 m^2 is rotating at 250 rad/s. The loop's axis of rotation is perpendicular to a uniform magnetic field with a strength of 0.04 T. what is the maximum emf induced?
A) 120 V B) 300 V C) 200 V D) 180 V

26. A pendulum bob hangs from a string and moves with simple harmonic motion. What is the restoring force in the pendulum?
A) the total weight of the bob.
B) the component of the bob's weight tangent to the motion of the bob.
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27. The power in the secondary coil of a power station is 3 MW. The station sends the current to the city by means of lines of 120 Ω resistance under a potential difference 6×10^4 V. Calculate the transfer efficiency?
A) 96.9 % B) 95 % C) 99.9 % D) 90 %

28. In the electric circuit shown in the adjacent figure, Calculate the phase difference between the circuit current and the total potential difference:
A) $45°$ B) $53°$
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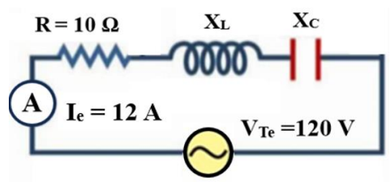

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A) Increase the number of coils per unit length. B) Increase the current.
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A) high resistance in series B) high resistance in parallel C) low resistance in parallel D) low resistance in series

33. A step-up transformer: A) $V_2 > V_1$ B) $N_2 > N_1$ C) $\frac{N_2}{N_1} > 1$ D) All the answers are correct

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35. Calculate the magnitude of the magnetic field at the center of a circular coil of 10 turns and radius 10 cm when a 20 A current passes through it [$\mu_o = 4\pi \times 10^{-7}$ T.m/A]?
A) 1.256×10^{-4} T B) 1.256×10^{-3} T C) 1.256×10^{-2} T D) 1.256×10^{-1} T

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37. Breaking the sound barrier takes place when the speed of the plane.....: the speed of sound in air.
A) greater than B) equal to C) less than D) equal to half of

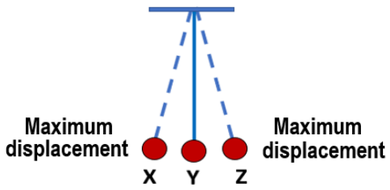
38. Which of the following factors changes when a sound gets louder for a certain source?
A) Intensity B) Relative intensity of the sound C) Amplitude D) All the answers are correct

39. Find the magnitude of $(\Delta\theta)$ and (ω) in the adjacent table:
A) 2.5 rad, 15 rad/s B) 0.5 rad, 15 rad/s
C) 2.5 rad, 1.2 rad/s D) 15 rad, 2.5 rad/s

Δs	r	$\Delta\theta$	v_t	ω
0.25 m	0.1 m	?	1.5 m/s	?

40. If a spinning amusement-park ride has an angular speed of 1.2 rad/s, what is the centripetal acceleration of a person standing 12 m from the center of the ride?
A) 17.28 m/s^2 B) 1.728 m/s^2 C) 172 m/s^2 D) 1282 m/s^2

41. In the figure, A pendulum bob hangs from a string and moves with simple harmonic motion. If the pendulum bob moves from point (Y) to point (Z) in 0.1 s. What is the frequency of the pendulum?
A) 2.5 Hz B) 5 Hz
C) 7.5 Hz D) 10 Hz



42. A 2 kg bicycle wheel with a radius of 0.3 m turns at a constant angular speed of 25 rad/s when a 0.3 kg reflector is at a distance of 0.19 m from the axle. What is the angular speed of the wheel when the reflector slides to a distance of 0.25 m from the axle? (Assume that the bicycle wheel is a ring)
A) 18 rad/s B) 19 rad/s C) 22 rad/s D) 24 rad/s

43. A car tire rotates with an average angular speed of 14π rad/s. in what time interval will the tire rotate 3.5 times?
A) 0.5 s B) 0.76 s C) 2 s D) 4.9 s

44. Light passes through a diffraction grating with 3550 lines/cm and forms a first-order maximum at an angle of, $\mathbf{12.07^\circ}$ What is the wavelength of the light? A) 895 nm B) 589 nm C) 859 nm D) 985 nm

45. In which of the following of standing waves are produced when the number of nodes is equal to number of antinodes?
A) string B) pipe opened at both ends C) pipe closed at one end D) Both (A and B) are correct

46. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?
A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.

47. The distance between node and next antinode in a standing wave on string equal:
A) $\frac{1}{4}\lambda$ B) $\frac{1}{2}\lambda$ C) λ D) 2λ

48. In the adjacent figure, an AC Generator is shown.an AC Generator can be converted to a DC Motor by:
A) Replacing the lamp with a galvanometer.
B) Replacing the two slip rings with a commutator and replacing the lamp with a battery.
C) Replacing the lamp with a battery.
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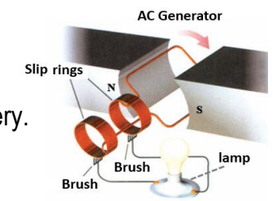

49. A wooden bucket filled with water is attached to a rope that is wound around a cylinder with a radius of 0.08 m. A crank with a turning radius of 0.3 m is attached to the end of the cylinder. If the minimum force that can be applied perpendicularly to the crank handle is 200 N to raise the bucket at constant speed find the force in the rope $(\vec{F}_T)$?
A) 75 N B) 35 N C) 750 N D) 350 N

50. An inductive coil of resistance 20 Ω and self-inductance 0.4 H is connected in series with a capacitor of capacitance 200 μF and an AC source of effective voltage 200 V and frequency 60 Hz. Calculate the effective value of the alternating current. A) 10 A B) 6.4 A C) 1.44 A D) 8.62 A

Kurdistan Region Government - Iraq *In the Name of Allah* *Subject: Physics*
Ministry of Education
High Committee for the General Examinations
General Examinations for the Preparatory Schools (12th Grade)
The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

Fingerprint

X

Choose the right answers for the following questions: (two marks for each question)

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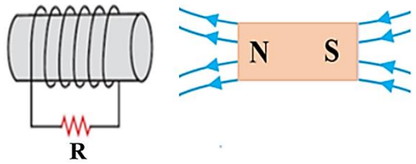

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2. How can you increase the strength of a magnetic field inside a solenoid?
A) Increase the number of coils per unit length. B) Increase the current.
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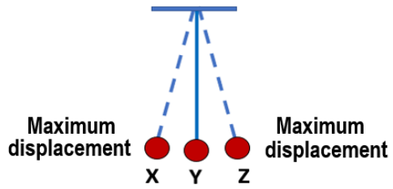
3. Volt (V) is equal to: A) $\frac{T}{m^2 . S}$ B) $\frac{T . m}{S}$ C) $\frac{T . m^2}{S}$ D) $T . m^2$

4. In the figure, A pendulum bob hangs from a string and moves with simple harmonic motion. If the pendulum bob moves from point (Y) to point (Z) in 0.1 s. What is the frequency of the pendulum?



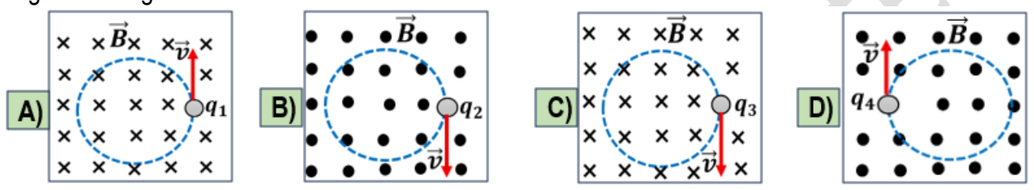
A) 2.5 Hz B) 5 Hz
C) 7.5 Hz D) 10 Hz

5. Which of the following is the unit of spring constant (K)? A) $\frac{N}{m^2}$ B) $\frac{m}{N}$ C) $\frac{N}{m}$ D) $\frac{m^2}{N}$

6. Breaking the sound barrier takes place when the speed of the plane.....: the speed of sound in air.
A) greater than B) equal to C) less than D) equal to half of

7. Two uniformly solid cylinders of equal radii roll down an incline without slipping. The first cylinder has three times the mass of the second cylinder. The torque was exerted on the first cylinder is……. torque exerted on the second cylinder? A) twice B) three times C) four times D) five times

8. Four charges, each charge moves in a circular path in a magnetic field as shown in the figures, which of them is a negative charge?



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10. A 2 kg bicycle wheel with a radius of 0.3 m turns at a constant angular speed of 25 rad/s when a 0.3 kg reflector is at a distance of 0.19 m from the axle. What is the angular speed of the wheel when the reflector slides to a distance of 0.25 m from the axle? (Assume that the bicycle wheel is a ring)
A) 18 rad/s B) 19 rad/s C) 22 rad/s D) 24 rad/s

11. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. In what form is the energy in the system when the mass is at a point between maximum displacement and equilibrium position? A) elastic potential energy B) gravitational potential energy.
C) kinetic energy. D) kinetic energy and elastic potential energy

12. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of X_L = 600 Ω and a capacitor of impedance of X_C = 200 Ω. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
A) $45°$ B) $37°$ C) $30°$ D) $53°$

13. If the intensity of lawn mower is $1 \times 10^{-3}\ W/m^2$. What is relative intensity of the sound in decibel (dB)?
A) 0 dB B) 90 dB C) 120 dB D) 130 dB

14. A 90 kg person rides a spinning a measurement park ride that has an angular speed of 1.15 rad/s. If the distance of person is 11.5 m from the axis of rotation. What is the magnitude of the force that maintains the circular motion of the person? A) 1468.8 N B) 1268.8 N C)136.8 N D) 1368.8 N

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18. An interference pattern is formed by using green light, If the two slits are moved farther apart, what happens to the distance between the bright fringes?
A) increase B) decrease C) remain unchanged D) doubled

19. When a part of a sound wave travels from air into water, the wavelength of the sound increases. What happens to the frequency and the speed of the sound wave?
A) speed remains constant, and the frequency increases. B) frequency remains constant, and the speed decreases.
C) speed increases, and the frequency remain constant. D) speed increases, and the frequency decreases.

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22. Determine the change in gravitational force between two masses if the distance between their centers is doubled:
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A) 75 N B) 35 N C) 750 N D) 350 N

25. Two successive crests of a wave are 2.4 m apart. Eight crests pass a given point every 12 what is the wave speed?
A) 1.6 m/s B) 0.8 m/s C) 1.8 m/s D) 9.6 m/s

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A) 2 rev B) 4 rev C) 8 rev D) 12 rev

33. Identify which conditions of equilibrium hold for (a solid sphere rolling on incline)?
A) Translational equilibrium. B) Rotational equilibrium.
C) Translational and rotational equilibrium. D) None of the equilibrium conditions hold.

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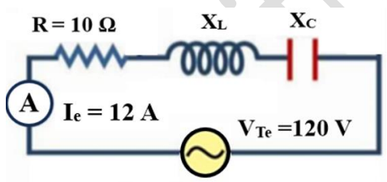

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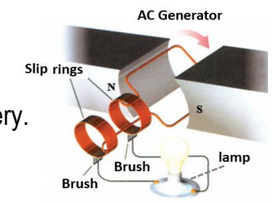

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46. .....the tendency of a body rotating about a fixed axis to resist a change in rotational motion.
A) Torque(τ) B) Angular momentum (L) C) Moment of inertia (I) D) Angular acceleration (α)

47. In the figure, There are four forces acting on the rod have the same magnitude $(F_1 = F_2 = F_3 = F_4)$ Which one of them produces the greatest torque on the rod?
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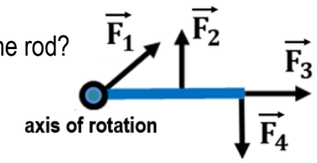

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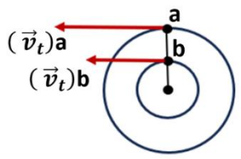
50. Which of the following is correct for the two points (a and b) for a merry- go-round rotating about a fixed axis as in the figure?
A) $(v_t)_b < (v_t)_a$ B) $\omega_a > \omega_b$
C) $(\Delta\theta)_a > (\Delta\theta)_b$ D) $(v_t)_a = (v_t)_b$



Kurdistan Region Government - Iraq *In the Name of Allah* *Subject: Physics*
Ministry of Education
High Committee for the General Examinations
General Examinations for the Preparatory Schools (12th Grade)
The Academic Year (2025-2026) 1st Attempt / Time: 3:30 hours

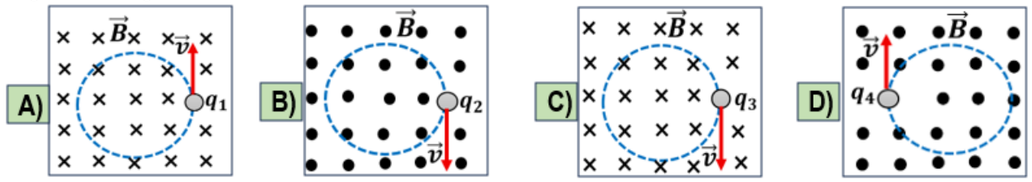
Fingerprint

Y

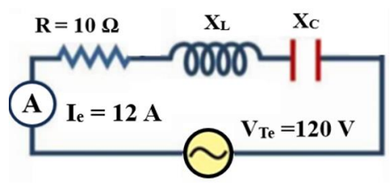
Choose the right answers for the following questions: (two marks for each question)

1. A loop with 40 turns and an area of 0.5 m^2 is rotating at 250 rad/s. The loop's axis of rotation is perpendicular to a uniform magnetic field with a strength of 0.04 T. what is the maximum emf induced?
A) 120 V B) 300 V C) 200 V D) 180 V

2. Four charges, each charge moves in a circular path in a magnetic field as shown in the figures, which of them is a negative charge?



3. In the electric circuit shown in the adjacent figure, Calculate the phase difference between the circuit current and the total potential difference:
A) 45° B) 53°
C) 180° D) 0°



4. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of X_L = 600 Ω and a capacitor of impedance of X_C= 200 Ω. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
A) 45° B) 37° C) 30° D) 53°

5. An inductive coil of resistance 20 Ω and self-inductance 0.4 H is connected in series with a capacitor of capacitance 200 μF and an AC source of effective voltage 200 V and frequency 60 Hz. Calculate the effective value of the alternating current. A) 10 A B) 6.4 A C) 1.44 A D) 8.62 A

6. A force of magnitude 4 N is applied tangentially to a disk of mass 5 kg and radius 0.2 m. The disk starts rotating from rest. How many revolutions does the disk complete after 2.51 s?
A) 2 rev B) 4 rev C) 8 rev D) 12 rev

7. Two successive crests of a wave are 2.4 m apart. Eight crests pass a given point every 12 what is the wave speed?
A) 1.6 m/s B) 0.8 m/s C) 1.8 m/s D) 9.6 m/s

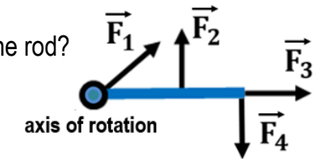
8. Which of the following statements is true for sound waves?
A) They do not require a material medium through which to travel.
B) Their speed in a medium = frequency × wavelength.
C) The particles of the medium vibrate perpendicular to the direction the wave is traveling.
D) All answers are correct.

9. Which of the following is the unit of spring constant (K)? A) $\frac{N}{m^2}$ B) $\frac{m}{N}$ C) $\frac{N}{m}$ D) $\frac{m^2}{N}$

10. A parked ambulance emits a sound of frequency 1200 Hz. What frequency is detected by an observer inside another car moving with a velocity of 20 m/s.as the car moves towards the ambulance? (Use speed of sound in air is 340 m/s)
A) 1000 Hz B) 1129.4 Hz C) 1270.6 Hz D) 1700 Hz

11. A 2 kg bicycle wheel with a radius of 0.3 m turns at a constant angular speed of 25 rad/s when a 0.3 kg reflector is at a distance of 0.19 m from the axle. What is the angular speed of the wheel when the reflector slides to a distance of 0.25 m from the axle? (Assume that the bicycle wheel is a ring)
A) 18 rad/s B) 19 rad/s C) 22 rad/s D) 24 rad/s

12. In the figure, There are four forces acting on the rod have the same magnitude ($F_1 = F_2 = F_3 = F_4$) Which one of them produces the greatest torque on the rod?
A) $\vec{F}_1$ B) $\vec{F}_2$
C) $\vec{F}_3$ D) $\vec{F}_4$



13. The galvanometer can be converted to a voltmeter by connecting a resistor of very.....to the galvanometer
A) high resistance in series B) high resistance in parallel C) low resistance in parallel D) low resistance in series

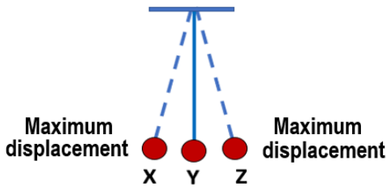
14. A 90 kg person rides a spinning a measurement park ride that has an angular speed of 1.15 rad/s. If the distance of person is 11.5 m from the axis of rotation. What is the magnitude of the force that maintains the circular motion of the person? A) 1468.8 N B) 1268.8 N C)136.8 N D) 1368.8 N

15. Breaking the sound barrier takes place when the speed of the plane.....: the speed of sound in air.
A) greater than B) equal to C) less than D) equal to half of

16. Determine the change in gravitational force between two masses if the distance between their centers is doubled:
A) It becomes four times B) It becomes three times
C) It becomes quarter of the original value D) It becomes half of the original value

17. Identify which conditions of equilibrium hold for (a solid sphere rolling on incline)?
A) Translational equilibrium. B) Rotational equilibrium.
C) Translational and rotational equilibrium. D) None of the equilibrium conditions hold.

18. In the figure, A pendulum bob hangs from a string and moves with simple harmonic motion. If the pendulum bob moves from point (Y) to point (Z) in 0.1 s. What is the frequency of the pendulum?
A) 2.5 Hz B) 5 Hz
C) 7.5 Hz D) 10 Hz



19. .....the tendency of a body rotating about a fixed axis to resist a change in rotational motion.
A) Torque(τ) B) Angular momentum (L) C) Moment of inertia (I) D) Angular acceleration (α)

20. If a spinning amusement-park ride has an angular speed of 1.2 rad/s, what is the centripetal acceleration of a person standing 12 m from the center of the ride?
A) 17.28 m/s^2 B) 1.728 m/s^2 C) 172 m/s^2 D) 1282 m/s^2

21. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. In what form is the energy in the system when the mass is at a point between maximum displacement and equilibrium position? A) elastic potential energy B) gravitational potential energy.
C) kinetic energy. D) kinetic energy and elastic potential energy

22. Two uniformly solid cylinders of equal radii roll down an incline without slipping. The first cylinder has three times the mass of the second cylinder. The torque was exerted on the first cylinder is..... torque exerted on the second cylinder? A) twice B) three times C) four times D) five times

23. When two light waves of same wavelength interfere, If the crest of one wave overlaps the trough of another wave, the two waves have a phase difference of: A) π rad B) 0 rad C) 2 π rad D) 4π rad

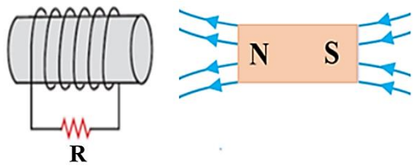
24. A wooden bucket filled with water is attached to a rope that is wound around a cylinder with a radius of 0.08 m. A crank with a turning radius of 0.3 m is attached to the end of the cylinder. If the minimum force that can be applied perpendicularly to the crank handle is 200 N to raise the bucket at constant speed find the force in the rope ($\vec{F}_T$)?
A) 75 N B) 35 N C) 750 N D) 350 N

25. Light passes through a diffraction grating with 3550 lines/cm and forms a first-order maximum at an angle of, 12.07° What is the wavelength of the light? A) 895 nm B) 589 nm C) 859 nm D) 985 nm

26. The power in the secondary coil of a power station is 3 MW. The station sends the current to the city by means of lines of 120 Ω resistance under a potential difference 6×10^4 V. Calculate the transfer efficiency?
A) 96.9 % B) 95 % C) 99.9 % D) 90 %

27. An air solenoid of length 10 cm, cross sectional area 25 cm^2, and 400 turns Calculate the coefficient of self-induction of coil $[\mu_o = 4\pi \times 10^{-7}\ \mathrm{T.m/A}]$
A) 2 mH B) 5 mH C) 0.2 mH D) 0.5 mH

28. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?
A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.



29. Find the magnitude of $(\Delta\theta)$ and (ω) in the adjacent table:
A) 2.5 rad, 15 rad/s B) 0.5 rad, 15 rad/s
C) 2.5 rad, 1.2 rad/s D) 15 rad, 2.5 rad/s

Δs	r	$\Delta\theta$	v_t	ω
0.25 m	0.1 m	?	1.5 m/s	?

30. A proton moves at a speed of 2×10^7 m/s at right angles to a magnetic field with a magnitude of the 0.1 T. Find the magnitude of the acceleration of the proton? [q_p=1.6 × 10^{-19} C, m_p=1.673 × 10^{-27} kg]
A) 2.05×10^{17} m/s² B) 1.91×10^{14} m/s² C) 2.5×10^{14} m/s² D) 0.01×10^{14} m/s²

31. The second harmonics of a guitar string has a frequency of 165 Hz. If the speed of waves on the strings is 120 m/s. What is the string's length? A) 0.36 m B) 0.73 m C) 1.1 m D) 1.4 m

32. A car tire rotates with an average angular speed of 14π rad/s. in what time interval will the tire rotate 3.5 times?
A) 0.5 s B) 0.76 s C) 2 s D) 4.9 s

33. Which of the following relationship is correct between tangential acceleration (a_t) and angular acceleration (α) ?
A) $a_t = r\,\alpha$ B) $\alpha = \frac{r}{a_t}$ C) $r = \frac{\alpha}{a_t}$ D) $a_t = r^2\,\alpha$

34. If the intensity of lawn mower is $1 \times 10^{-3}\ \mathrm{W/m^2}$. What is relative intensity of the sound in decibel (dB)?
A) 0 dB B) 90 dB C) 120 dB D) 130 dB

35. Which of the following is directly proportional with frequency in AC circuits?
A) X_L B) X_C C) I_C D) Both (A and C) are correct

36. A pendulum bob hangs from a string and moves with simple harmonic motion. What is the restoring force in the pendulum?
A) the total weight of the bob.
B) the component of the bob's weight tangent to the motion of the bob.
C) the component of the bob's weight perpendicular to the motion of the bob.
D) the elastic force of the stretched string.

37. In which of the following of standing waves are produced when the number of nodes is equal to number of antinodes?
A) string B) pipe opened at both ends C) pipe closed at one end D) Both (A and B) are correct

38. Two long parallel wires (a and b), each of them is 2 m long, are separated by a distance of 0.5 m between their centers. The wires carry currents $(I_a = 10\ \mathrm{A})$ and $(I_b = 15\ \mathrm{A})$, in opposite directions. What is the magnitude of magnetic force acting on wire (b) as a result of magnetic field of wire (a)? $[\mu_o = 4\pi \times 10^{-7}\ \mathrm{T.m/A}]$
A) 1.2×10^{-4} N B) 12×10^{-4} N C) 0.6×10^{-4} N D) 2.4×10^{-4} N

39. Volt (V) is equal to: A) $\frac{T}{m^2 . S}$ B) $\frac{T . m}{S}$ C) $\frac{T . m^2}{S}$ D) $T . m^2$

40. An interference pattern is formed by using green light, If the two slits are moved farther apart, what happens to the distance between the bright fringes?
A) increase B) decrease C) remain unchanged D) doubled

41. The distance between node and next antinode in a standing wave on string equal:
A) $\frac{1}{4}\lambda$ B) $\frac{1}{2}\lambda$ C) λ D) 2λ

42. An object rolls along a horizontal surface at a constant linear speed without slipping. If the translational kinetic energy of the object is 37.5 J and its total kinetic energy is 52.5 J what is the shape of object?
A) ring B) disk C) hollow sphere D) solid sphere

43. When a part of a sound wave travels from air into water, the wavelength of the sound increases. What happens to the frequency and the speed of the sound wave?
A) speed remains constant, and the frequency increases. B) frequency remains constant, and the speed decreases.
C) speed increases, and the frequency remain constant. D) speed increases, and the frequency decreases.

44. A step-up transformer: A) $V_2 > V_1$ B) $N_2 > N_1$ C) $\frac{N_2}{N_1} > 1$ D) All the answers are correct

45. How can you increase the strength of a magnetic field inside a solenoid?
A) Increase the number of coils per unit length. B) Increase the current.
C) Place an iron rod inside the solenoid. D) All answers are correct.

46. In the adjacent figure, an AC Generator is shown.an AC Generator can be converted to a DC Motor by:
A) Replacing the lamp with a galvanometer.
B) Replacing the two slip rings with a commutator and replacing the lamp with a battery.
C) Replacing the lamp with a battery.
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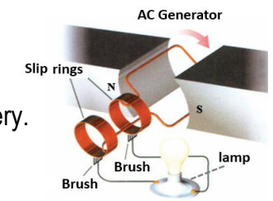

47. Which of the following is correct for the two points (a and b) for a merry- go-round rotating about a fixed axis as in the figure?
A) $(v_t)_b < (v_t)_a$ B) $\omega_a > \omega_b$
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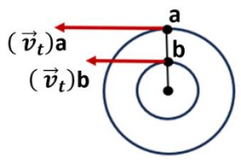

48. Which of the following factors changes when a sound gets louder for a certain source?
A) Intensity B) Relative intensity of the sound C) Amplitude D) All the answers are correct

49. Which of the following is <u>not correct</u> about the Laser? A) Laser light is coherent and monochromatic.
B) The process of stimulated emission violates the principle of energy conservation.
C) The active medium is an essential component of laser.
D) A laser source is a device converts electrical energy or chemical energy into coherent light.

50. Calculate the magnitude of the magnetic field at the center of a circular coil of 10 turns and radius 10 cm when a 20 A current passes through it $[\mu_o = 4\pi \times 10^{-7}\ \mathrm{T.m/A}]$?
A) 1.256×10^{-4} T B) 1.256×10^{-3} T C) 1.256×10^{-2} T D) 1.256×10^{-1} T

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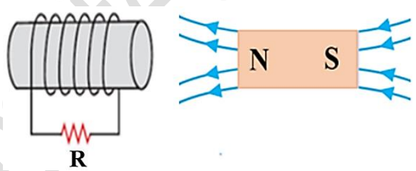

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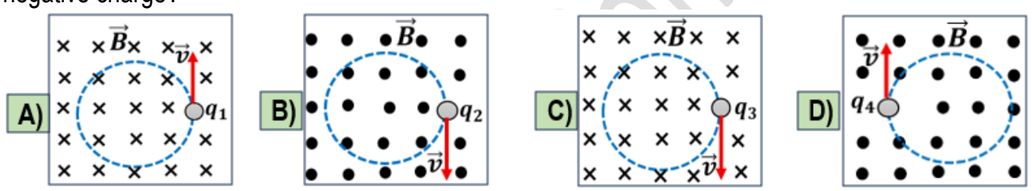

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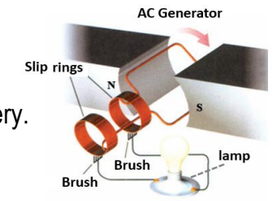

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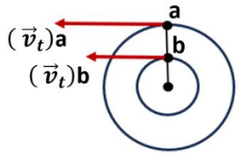

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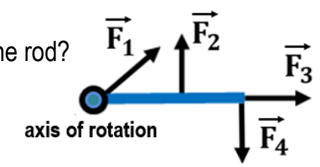

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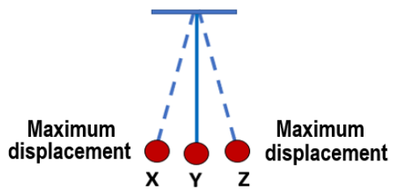


32. If a spinning amusement-park ride has an angular speed of 1.2 rad/s, what is the centripetal acceleration of a person standing 12 m from the center of the ride?
A) 17.28 m/s² B) 1.728 m/s² C) 172 m/s² D) 1282 m/s²

33. Find the magnitude of $(\Delta\theta)$ and (ω) in the adjacent table:
A) 2.5 rad, 15 rad/s B) 0.5 rad, 15 rad/s
C) 2.5 rad, 1.2 rad/s D) 15 rad, 2.5 rad/s

Δs	r	$\Delta\theta$	v_t	ω
0.25 m	0.1 m	?	1.5 m/s	?

34. Determine the change in gravitational force between two masses if the distance between their centers is doubled:
A) It becomes four times B) It becomes three times
C) It becomes quarter of the original value D) It becomes half of the original value

35. A loop with 40 turns and an area of 0.5 m² is rotating at 250 rad/s. The loop's axis of rotation is perpendicular to a uniform magnetic field with a strength of 0.04 T. what is the maximum emf induced?
A) 120 V B) 300 V C) 200 V D) 180 V

36. Breaking the sound barrier takes place when the speed of the plane.....: the speed of sound in air.
A) greater than B) equal to C) less than D) equal to half of

37. Identify which conditions of equilibrium hold for (a solid sphere rolling on incline)?
A) Translational equilibrium. B) Rotational equilibrium.
C) Translational and rotational equilibrium. D) None of the equilibrium conditions hold.

38. The second harmonics of a guitar string has a frequency of 165 Hz. If the speed of waves on the strings is 120 m/s. What is the string's length? A) 0.36 m B) 0.73 m C) 1.1 m D) 1.4 m

39. When a part of a sound wave travels from air into water, the wavelength of the sound increases. What happens to the frequency and the speed of the sound wave?
A) speed remains constant, and the frequency increases. B) frequency remains constant, and the speed decreases.
C) speed increases, and the frequency remain constant. D) speed increases, and the frequency decreases.

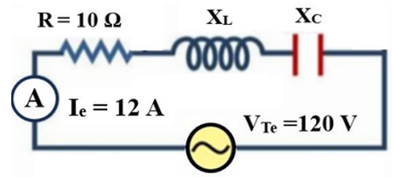
40. An inductive coil of resistance 20 Ω and self-inductance 0.4 H is connected in series with a capacitor of capacitance 200 μF and an AC source of effective voltage 200 V and frequency 60 Hz. Calculate the effective value of the alternating current. A) 10 A B) 6.4 A C) 1.44 A D) 8.62 A

41. Calculate the magnitude of the magnetic field at the center of a circular coil of 10 turns and radius 10 cm when a 20 A current passes through it $[\mu_o = 4\pi \times 10^{-7}\ \mathrm{T.m/A}]$?
A) 1.256×10^{-4} T B) 1.256×10^{-3} T C) 1.256×10^{-2} T D) 1.256×10^{-1} T

42. Which of the following is the unit of spring constant (K)? A) $\frac{N}{m^2}$ B) $\frac{m}{N}$ C) $\frac{N}{m}$ D) $\frac{m^2}{N}$

43. Which of the following factors changes when a sound gets louder for a certain source?
A) Intensity B) Relative intensity of the sound C) Amplitude D) All the answers are correct

44. In the electric circuit shown in the adjacent figure, Calculate the phase difference between the circuit current and the total potential difference:
A) 45° B) 53°
C) 180° D) 0°



45. If the intensity of lawn mower is $1 \times 10^{-3}\ \mathrm{W/m^2}$. What is relative intensity of the sound in decibel (dB)?
A) 0 dB B) 90 dB C) 120 dB D) 130 dB

46. An air solenoid of length 10 cm, cross sectional area 25 cm², and 400 turns Calculate the coefficient of self-induction of coil $[\mu_o = 4\pi \times 10^{-7}\ \mathrm{T.m/A}]$
A) 2 mH B) 5 mH C) 0.2 mH D) 0.5 mH

47. A wooden bucket filled with water is attached to a rope that is wound around a cylinder with a radius of 0.08 m. A crank with a turning radius of 0.3 m is attached to the end of the cylinder. If the minimum force that can be applied perpendicularly to the crank handle is 200 N to raise the bucket at constant speed find the force in the rope $(\vec{F}_T)$?
A) 75 N B) 35 N C) 750 N D) 350 N

48. A 90 kg person rides a spinning a measurement park ride that has an angular speed of 1.15 rad/s. If the distance of person is 11.5 m from the axis of rotation. What is the magnitude of the force that maintains the circular motion of the person? A) 1468.8 N B) 1268.8 N C)136.8 N D) 1368.8 N

49. Two uniformly solid cylinders of equal radii roll down an incline without slipping. The first cylinder has three times the mass of the second cylinder. The torque was exerted on the first cylinder is..... torque exerted on the second cylinder? A) twice B) three times C) four times D) five times

50. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. In what form is the energy in the system when the mass is at a point between maximum displacement and equilibrium position? A) elastic potential energy B) gravitational potential energy.
C) kinetic energy. D) kinetic energy and elastic potential energy