Kurdistan Region -Iraq
Ministry of Education-High Committee of General Examination
General Examinations for Preparatory (Scientific)

In the name of God

Subject: Physics Time: 3:30 hour
Model answers
(2024-2025) first round

Fingerprint

A

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

1. Calculate the unknown quantity in the corresponding table:

$\Delta\theta$	Δs	r
$-180°$	$-1.2\,m$	$?\,m$

A) 0.38 m B) 0.6 m
C) 0.83 m D) 0.93 m

2. A car moves along a circular track with average angular speed of 0.628 rad/s, what is the angular displacement of car in 10 s? A) 0.5 rev B) 1 rev C) 2 rev D) 2.5 rev

3. Which of the following is the unit of constant of universal gravitation [G] ?
A) $\frac{N\ .\ m}{kg^2}$ B) $\frac{kg^2}{N\ .\ m^2}$ C) $\frac{N\ .\ m^2}{Kg}$ D) $\frac{N\ .\ m^2}{kg^2}$

4. Which of the following changes the velocity of car?
A) gas pedal B) brakes C) steering wheel D) All answers are correct

5. A car traveling at 15 m/s on a flat surface turn in a circle with a radius of 25 m. What is the most direct cause of the car's centripetal acceleration?
A) the rectilinear motion of the car. B) the force of friction between the tires and the road.
C) the motion of the car with a constant velocity. D) The normal force between the tires and the road.

6. All points on a disk rotating around a fixed axis, have the same:
A) tangential speed B) angular speed C) tangential acceleration D) both (A) and (C) are correct

7. If the torque required to loosen a nut on the wheel of a car has a magnitude of 50 N.m what minimum force must be exerted by a mechanic at the end of a 25 cm wrench to loosen the nut?
A) 20 N B) 200 N C) 150 N D) 133.3 N

8. The object is completely in equilibrium, if:
A) $[\sum\tau > 0]$ B) $[\sum\vec{F} > 0 \text{ and } \sum\tau = 0]$ C) $[\sum\vec{F} > 0]$ D) $[\sum\vec{F} = 0 \text{ and } \sum\tau = 0]$

9. A meterstick is supported at its 50 cm mark by a string attached to the ceiling. A 1.2 kg mass hangs vertically from the 70 cm mark. and a 0.6 kg mass of is attached from the 30 cm mark on the meterstick. Find the location of point that the 0.4 kg mass should be attaches to the stick to keep in a state of rotational and translational equilibrium
A) at mark 30 cm B) at mark 20 cm C) at mark 40 cm D) at mark 80 cm

10. The combination of an applied force and a frictional force produces a constant torque of 34 N.m on a wheel rotating about a fixed axis. The applied force acts for 5 s, during this time the angular speed of the wheel increases from 0 rad/s to 10 rad/s. The applied Force is then removed, and the wheel comes to rest in 50 s. What is the torque of applied force?
A) 37.4 N.m B) 30.6 N.m C) - 3.4 N.m D) 17 N.m

11. The product of a rotating object's moment of inertia and angular speed about the same axis
A) Torque B) Rotational kinetic energy C) Angular momentum D) Angular acceleration

12. A solid sphere rolls along a horizontal surface at a constant linear speed without slipping. What is the ratio of the rotational kinetic energy about the center of the sphere to its total kinetic energy ($I = \frac{2}{5}MR^2$)
A) $\frac{7}{2}$ B) $\frac{7}{5}$ C) $\frac{5}{7}$ D) $\frac{2}{7}$

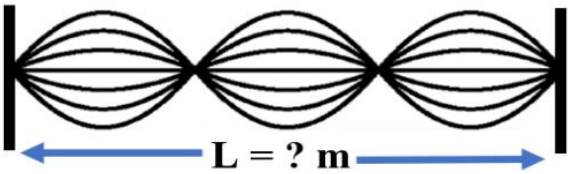
13. What is the restoring force of the (mass-spring) system?
A) Elastic force of spring B) weight C) frictional force D) both (B and C) are correct

14. Which of the following does not affect the period of (mass-spring system?
A) mass B) spring constant C) mass and spring constant D) amplitude of vibration

15. If the frequency of an object is 5 Hz calculate its period: A) 0.5 s B) 0.2 s C) 10 s D) 20 s

16. A tuning fork produces a sound with a frequency of 460 Hz and a wavelength in air of 0.75 m. What value does this give for the speed of sound in air?
A) 340 m/s B) 345 m/s C) 350 m/s D) 355 m/s

17. The figure shows a standing wave on a vibrating string if the wavelength (λ = 1.5 m) what is the length of string (L)?
A) 1.5 m B) 2.25 m
C) 3 m D) 4.5 m



18. Which equation correctly describes the condition for observing the first dark fringe in an interference pattern?
A) $d \sin\theta = \frac{1}{2}\lambda$ B) $d \sin\theta = \frac{3}{2}\lambda$ C) $d \sin\theta = \frac{5}{2}\lambda$ D) $d \sin\theta = \lambda$

19. The distance between adjacent wave fronts of sound is equal to: A) λ B) $\frac{1}{4}\lambda$ C) 2 λ D) $\frac{1}{2}\lambda$

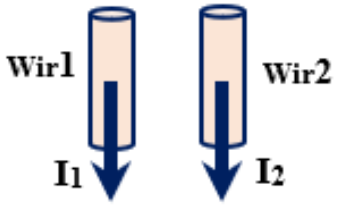
20. A police car emits a sound of frequency 1113 Hz, what is the speed of the car can have in order for a person standing on the sidewalk to hear it at a frequency of 1200 Hz? (Speed of sound in air is 345 m/s)?
A) 15 m/s B) 25 m/s C) 30 m/s D) 35 m/s

21. The decibel level of the sound waves produced by a trumpet is 80 dB at a distance of 5 m what is the decibel level of these sound waves at distance of 50 m?
A) 50 dB B) 60 dB C) 70 dB D) 80 dB

22. The frequency difference between adjacent harmonics in a pipe - closed at one end is equal to:
A) fundamental frequency B) half of fundamental frequency
C) twice of fundamental frequency D) quarter of fundamental frequency

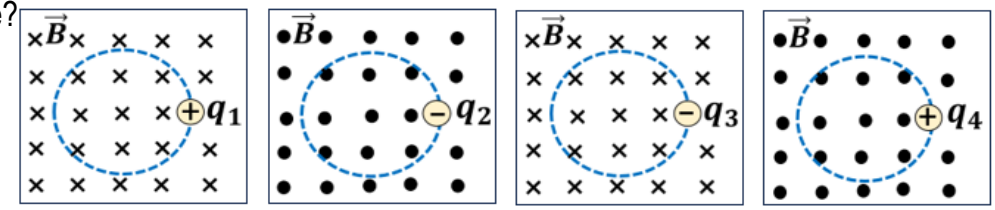
23. What fundamental frequency in a 2.45 m long pipe that is open at both ends (Speed of sound in air is 345 m/s)
A) 70.4 Hz B) 35.2 Hz C) 105.6Hz D) 211.2Hz

24. In the figure Wire 1 carries current I_1 and creates magnetic field B_1, Wire 2 carries current I_2 and creates magnetic field B_2. What is the magnitude of the magnetic force acting on wire 2 ?
A) $B_1 I_2\, l_2$ B) $B_2 I_1\, l_1$
C) $B_1 I_1\, l_2$ D) $B_2 I_2\, l_2$



25. Calculate the magnitude of the magnetic field at a point in air at a distance 0.1 m from a straight conducting wire carrying a current of 15 A? knowing that [$\mu_o = 4\pi \times 10^{-7}$ T.m/A]
A) 2×10^{-7} T B) 1×10^{-6} T C) 3×10^{-5} T D) 2×10^{-5} T

26. Four charges, each charge moving on a circular path in a magnetic field as in the figures shown, which of the charges move clockwise?
A) q_1 and q_4
B) q_3 and q_4
C) q_1 and q_3
D) q_2 and q_3



27. A wire carries a current from east to west. the direction of Earth's magnetic field at the wire's location is directed from south to north. What is the direction of the magnetic force on the wire?
A) toward the north B) toward the south C) upward (toward the sky) D) downward (toward the Earth)

28. An alpha particle ($q = 3.2 \times 10^{-19}c$) moves at speed of 2.5×10^{6} m/s perpendicular to a magnetic field of strength 2×10^{-4} T. what is the magnitude of the magnetic force on the particle?

A) 1.6×10^{-16} N B) -1.6×10^{-15} N C) 4×10^{-9} N D) zero

29. According to Lenz's law, if the applied magnetic field on circuit is changed, the induced field tends to make total field: A) constant B) increased C) decreased D) none of them

30. (Diffraction) is a property of which of the following waves?

A) Water waves B) Sound waves C) Light waves D) All answers are correct

31. A coil with 30 turns of wire is wrapped around a hollow tube with an area of 1.9 m^2. Each turn has the same area as the tube. A uniform magnetic field is applied at a right angle to the plane of the coil. If the field increases uniformly from 0T to 0.6T in 0.855 s, find the magnitude of the induced ε in the coil:

A) - 30 V B) - 31.4 V C) - 40 V D) - 25 V

32. In which of the following eddy currents are not used?

A) Furnaces B) Car brake system

C) measuring distances D) detecting metals in airports and under ground

33. Which of the following will increase the emf produced by a generator?

A) rotating the generator coil faster. B) Increasing the strength of the generator magnets.

C) increasing the number of turns of wire in the coil. D) All answers are correct.

34. In which of the following back emf (ε) is induced?

A) A.C generator B) D.C generator C) Motor D) both (A and B) are correct

35. A pair of adjacent coils has a mutual inductance of 1.05 H. Determine the average emf induced in the secondary circuit when the current in the primary circuit changes from 0 A to 10 A in a time interval of 0.05 s:

A) - 210 V B) 210 V C) - 215 V D) 215 V

36. A child on a merry-go-round undergoes a 1.5 m /s^2 tangential acceleration. If the merry-go-round's angular acceleration is 1 rad/s^2, how far is the child from the axis of rotation?

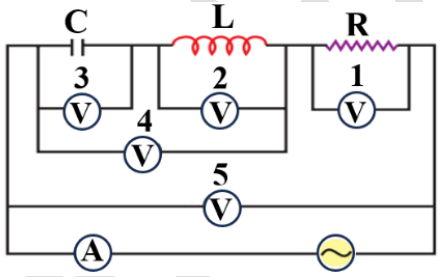
A) 1.5 m B) 0.364 m C) 1.33 m D) 31.63 m

37. An air solenoid of negligible resistance (pure self) its length l0 cm, cross sectional area 50 cm^2, and 700 turns, is connected across an A.C source of frequency 60 Hz an effective potential difference of 100 V, what is the intensity of maximum current thought the solenoid? [$\mu_o = 4\pi \times 10^{-7}$ T.m/A]

A) 12.18 A B) 8.6 A C) 0.12 A D) 8.6×10^{-3} A

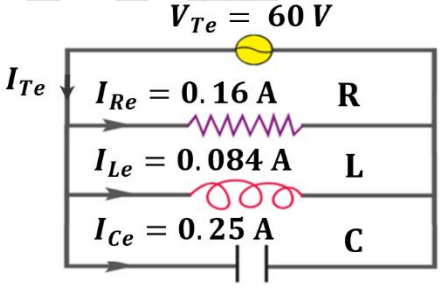
38. In the figure find the reading of voltmeter number (4) if: V_{Te} = 45 V , R = 12 Ω , XC = 5 Ω , X_L = 14 Ω

A) 15 V
B) 36 V
C) 27 V
D) 42 V



39. Calculate the impedance of the corresponding circuit?

A) 212 Ω
B) 300 Ω
C) 315 Ω
D) 260 Ω



40. Calculate the power lost as heat in a wire of resistance 160 Ω when traversed by a current of 50 A:

A) 140 kw B) 2700 kw C) 400 kw D) 1000 kw

41. Because of their great distance from us, stars are essentially point sources of light. If two stars were near each other in the sky, the light from them would not produce an interference pattern, because their lights are?

A) not coherent B) coherent C) phase difference between them is constant D) both (B and C) are correct

42. A double - slit interference experiment is performed using blue light from a hydrogen discharge tube (λ=486 nm). The fifth - order bright fringe in the interference pattern is 0.578° from the central maximum. How far apart are the two slits separated?

A) 7.5×10^{-4} m B) 2.41×10^{-4} m C) 6.3×10^{-6} m D) 5.66×10^{-4} m

43. At a circus performance, a juggler is throwing two spinning clubs. One of the clubs is heavier than the other Which of the following statements is true? A) The smaller club is likely to have a larger moment of inertia.

B) The ends of each club will trace out parabolas as the club is thrown.

C) The centre of mass of each club will trace out a parabola as the club is thrown.

D) Both (A and B) are correct

44. A pendulum bob hangs from a string and moves with simple harmonic motion. If the pendulum's length is 1 m and $(a_g = 9.8\ m/s^2)$, how many complete oscillations does the pendulum make in 2 min?

A) 106 B) 60 C) 110 D) 90

45. A bat flying toward a fixed wall emits a sound. The reflected wave (echo) that received by the bat:

A) Its frequency is less than the frequency of original sound.

B) Its intensity is greater than intensity of original sound.

C) Its intensity is less than intensity of original sound.

D) Both (A and C) are correct

46. Which of the following equations used to calculate the magnitude of magnetic field at the center of circular coil ?

A) $\left[B = \frac{\mu N I}{2r}\right]$ B) $\left[B = \frac{\mu N I}{r}\right]$ C) $\left[B = \frac{\mu N}{2r}\right]$ D) $\left[B = \frac{\mu N I}{2}\right]$

47. Laser sources: A) convert light energy into coherent light B) convert electrical energy into coherent light

C) convert chemical energy into coherent light D) All answers are correct

48. Figure shows four waves.

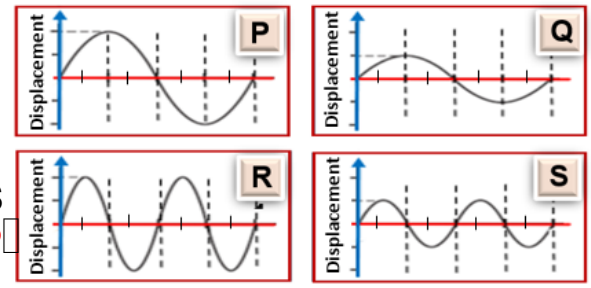
Which of the following is incorrect?

A) amplitude of wave P is equal to the amplitude of wave R

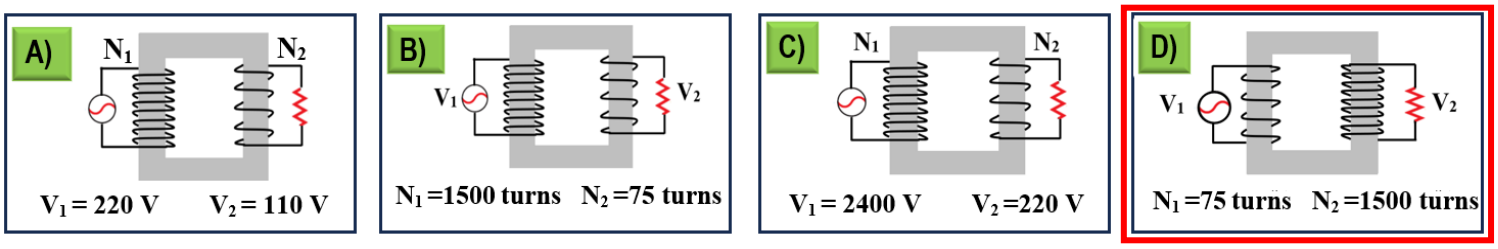
B) amplitude of wave S is equal to the amplitude of wave Q

C) wavelength of the wave R is equal to the wavelength of the wave S

D) wavelength of the wave S is equal to the wavelength of the wave P



49. Which of the following transformers represents a step-up transformer?



50. All of the following are characteristics of sound except:

A) Mechanical waves. B) Longitudinal waves.

C) Transverse waves. D) Travel through solids, liquids, and gases.