KURDISTAN REGION GOVERNMENT -IRAQ   IN THE NAME OF ALLAH   Subject: Physics
MINISTRY OF EDUCATION   Time:3.30 hours
HIGH COMMITTEE OF THE GENERAL EXAMINATION
General Examinations for Preparatory Stage
Study year (2023-2024)   (Grade twelve scientific)   2nd Attempt

Fingerprint

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

1. Shazad rides on a carousel that is rotating clockwise. He travels through an arc length of 11.5 m. If his angular displacement is 135°, what is the radius of the carousel?
A) 0.396 m   **B)** 3.99 m   **C)** 39.6 m   **D)** 4.88 m

2. How long does it take the second hand of a clock to move through π rad?
A) 75 s   **B)** 7.5 s   **C)** 30 s   **D)** 0.075 s

3. An airplane is flying in a horizontal circle at a speed of 105 m/s. the pilot does not want the centripetal acceleration to exceed 7 times free-fall acceleration. Find the minimum radius of the plane's path?
A) 16.5 m   **B)** 160.6 m   **C)** 549 m   **D)** 102 m

4. The time rate of change of angular speed:
A) Angular displacement   **B)** Angular acceleration   **C)** Centripetal acceleration   **D)** Angular speed

5. Identify the force that maintains the circular motion for (A bobsled turning a corner on its track):
A) gravity.   **B)** Friction between bobsled and the road.
C) The normal force from the curved side of the track.   **D)** None of them.

6. The figures below show a stretched string vibrating in several of its modes. If the length of the string is 2 m, which of the waves has a wavelength of 4 m?
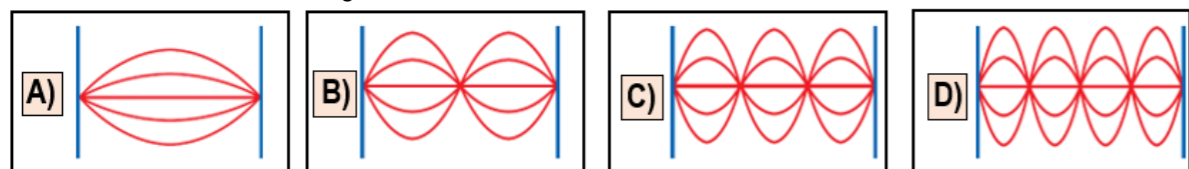

7. How would the force needed to open a door change if you put the handle in the middle of the door?
A) Doubled   **B)** Becomes three times   **C)** Becomes four times   **D)** Do not change.

8. A man stands on a light board of length 3 m that is fixed on two supports at its extremities. If the distance between the point where the man stands and the first support is 0.5 m, what is the force exerted by the second support on the board, if you know that the force exerted by the first support on the board is 540 N.?
A) 108 N   **B)** 648 N   **C)** 180 N   **D)** 720 N

9. Find the direction of the magnetic force on a proton moving through magnetic field as shown in the figure:
A) to the right of the page   **B)** into the page
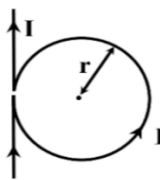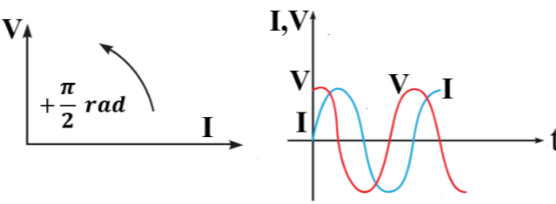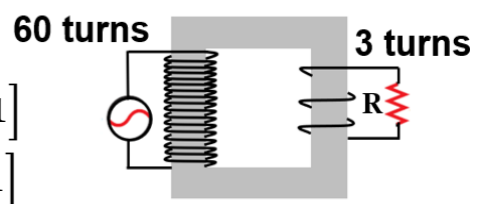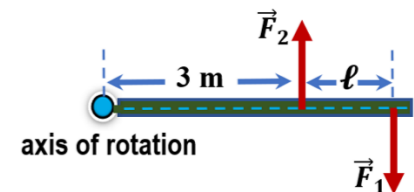**C)** down the page   **D)** up the page
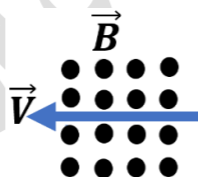
10. A cable passes over a pulley that rotates about a fixed axis. Because of friction, the force in the cable is not the same on opposite sides of the pulley. The force on one side is 100 N, and the force on the other side is 80 N. Assuming that the pulley is a uniform disk with a mass of 2 Kg and radius of 0.8 m determine the angular acceleration of the pulley?   **A)** 0.86 rad/s^2 **B)** 25 rad/s^2 **C)** 1.9 rad/s^2 **D)** 23.5 rad/s^2

11. The angular momentum of a disk is (25 kg.m^2/s) and its moment of inertia is 5 kg.m^2 what is its rotational kinetic energy?   **A)** 62.5 J   **B)** 12 J   **C)** 31.75 J   **D)** 50 J

12. For which of the following objects during rolling, its translational kinetic energy is twice its rotational kinetic energy?
A) hollow sphere   **B)** solid sphere   **C)** solid cylinder   **D)** both (A) and (B) are correct

13. A mass of 0.75 kg attached to a vertical spring stretches the spring 3 cm from its original equilibrium position, what is the spring constant?   **A)** 269.8 N/m   **B)** 2666 N/m   **C)** 81 N/m   **D)** 245.25 N/m

14. Which of the following equations is correct to calculate the period of a simple pendulum?
A) $T = 2\pi\sqrt{\frac{L}{a_g}}$ **B)** $T = 2\pi\sqrt{\frac{a_g}{L}}$ **C)** $T = \frac{1}{2\pi}\sqrt{\frac{a_g}{L}}$ **D)** $T = \frac{1}{2\pi}\sqrt{\frac{L}{a_g}}$

15. Ranj sends a series of pulses of amplitude 24 cm down a string that is attached to a fixed boundary at one end. Assuming the pulses are reflected with no loss of amplitude, what is the amplitude at a point on the string where two pulses are crossing?   **A)** 0.0 m   **B)** 0.48 m   **C)** 0.33 m   **D)** 0.72 m

16. Transverse waves shown in the figure, which of the following is correct about [wavelength (λ) , amplitude (A)]?
A) [A = 1 m , λ = 2 m]   **B)** [A = 1 m , λ = 4 m]
C) [A = 2 m , λ = 2 m]   **D)** [A = 2 m , λ = 4 m]

17. When the amplitude of a mechanical wave is tripled, the energy the wave carries in a given time interval is increased by factor: **A)** 3   **B)** 6   **C)** 9   **D)** 18

18. A harmonic wave is traveling along a rope. The period of wave is 0.8 s. if the wave length of wave is 0.2 m what distance is travelled by a given crest of the wave along the rope in a time interval of 12 s?
A) 4 m   **B)** 0.319 m   **C)** 3 m   **D)** 1.92 m

19. Which of the figures indicates that the plane's speed greater than the speed of sound?
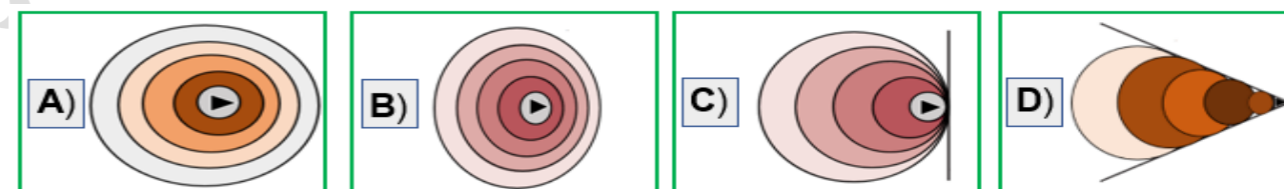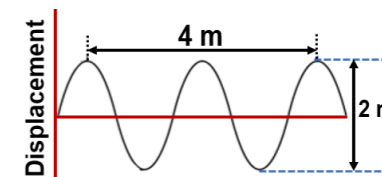
20. When the decibel level of traffic in the street goes from 30 dB to 60 dB, how much greater is the intensity of the noise?   **A)** 10^1 **B)** 10^2 **C)** 10^3 **D)** 10^4

21. Which of the following statements is correct?
A) Frequency determines pitch.   **B)** Pitch of a sound decreases as the frequency of sound increases.
C) Pitch is a measure of how high or low a sound is perceived.   **D)** (A and C) are correct.

22. The tub within a washer goes into its spin cycle, starting from rest after 6 s its angular speed becomes 15π rad∕s. How many revolutions does the tub complete in this time interval?
A) 22.5 rev   **B)** 32.5 rev   **C)** 42.5 rev   **D)** 52.5 rev

23. A bat flying with speed 25 m/s toward a fixed wall emits a chirp at 40 kHz what Is the frequency of the echo received by the bat? (Use speed of sound in air 345 m/s)
A) 42500 Hz   **B)** 45000 Hz   **C)** 46250 Hz   **D)** 45250 Hz

24. The unit for measuring the Magnetic flux(Φ): **A)** (wb)   **B)** (T.m^2)   **C)** (V.s)   **D)** All answers are correct

25. The galvanometer can be converted to an ammeter by connecting a resistor of............. to the galvanometer :
A) Very low resistance in parallel.   **B)** Very high resistance in parallel.
C) Very high resistance in series.   **D)** Very low resistance in series.

26. A long and straight wire carries a current of intensity 8 A, where a part of it is bent into a circular loop of one turn and radius 10 cm as shown in figure, Calculate the magnitude of the magnetic field at the center of the loop. (The plane of the loop and the wire coincides with the plane of the paper). [$\mu_o=4\pi \times10^{-7}$ T.m/A]
A) 3.43×10^{-5} T **B)** 6.12×10^{-6} T **C)** 6.4×10^{-5} T **D)** 2.62×10^{-4} T

27. A 2 kg bicycle tire of radius 0.33 m starts from rest and rolls down from the top of a hill that is 14.8 m hight. What is the translational speed of the tire when it reaches the bottom of the hill? (Assume that the tire is a hoop)
A) 6.727 m/s **B)** 4.245 m/s **C)** 5.29 m/s **D)** 12 m/s

28. 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.

29. A proton moving perpendicular to a magnetic field of strength 3.5 mT experiences a force due to the field of 4.5×10^{-21} N.find the kinetic energy of the proton.(Use m_{proton} = 1.67×10^{-27} kg, q_{proton} =1.6×10^{-19} C)
A) 4.5×10^{-26} J **B)** 5.4×10^{-26} J **C)** 5.4×10^{-27} J **D)** 5.4×10^{-25} J

30. A voltage source of instantaneous value $V = 20 \sin(100\pi\ t)$ is connected across a series combination of a pure resistor of resistance 100 Ω and a pure coil of self-inductance 0.2 H, Calculate the total impedance of the circuit?
A) 62.8 Ω **B)** 118 Ω **C)** 37 Ω **D)** 32.1 Ω

31. Which of the following quantities is not constant when alternating currents generating?
A) maximum value of current. **B)** frequency.
C) maximum value of potential difference. **D)** instantaneous value of current.

32. Which of the following is equal to Henry (H): **A)** $\left(\frac{V.\ s^2}{A}\right)$ **B)** $\left(\frac{V.\ s}{A^2}\right)$ **C)** $\left(\frac{V.\ s}{A}\right)$ **D)** $\left(\frac{V^2.\ s}{A}\right)$

33. The corresponding figure represents the angle of phase difference between the current intensity and alternating potential difference for which of the following?
A) Pure resistance circuit. **B)** A pure self-inductance circuit.
C) Capacitor circuit. **D)** The resonates circuit.

34. Which of the following is incorrect for a series circuit in resonance?
A) $Z = R$ **B)** $\omega = \frac{1}{\sqrt{LC}}$ **C)** $\omega C = \omega L$ **D)** $f = \frac{1}{2\pi\sqrt{LC}}$

35. A coil with 205 turns of wire, a total resistance of 23 Ω, and a cross-sectional area of 0.25 m² is positioned with its plane perpendicular to the field of a powerful electromagnet. What average current is induced in the coil during the 0.25 s that the magnetic field drops from l.6 T to 0 T?
A) 0.14 A **B)** 3.26 A **C)** 0.3 A **D)** 14.26 A

36. The maximum values for the current and potential difference in an AC circuit are 7.07 A and 141.4 V, respectively. How much power is dissipated in this circuit?
A) 300 W **B)** 500 W **C)** 600 W **D)** 1000 W

37. Rapidly inserting the north pole of a bar magnet into a coil of wire connected to a galvanometer causes the needle of the galvanometer to deflect to the right. What must be done to deflect the needle of the galvanometer to the left?**A)** pull the north pole of magnet out of the coil. **B)** let the magnet sit at rest in the coil.
C) thrust the south pole of the magnet into the coil. **D)** both (A) and (C) are correct.

38. The transformer shown in the adjacent figure is constructed so that the coil on the left has 20 times as many turns of wire as the coil on the right does. if the input potential difference is across the coil on the left, what type of transformer is this? Why?
A) step up, because $\left[\frac{N_2}{N_1} > 1\right]$ **B)** step up, because $\left[\frac{N_2}{N_1} < 1\right]$
C) step down, because $\left[\frac{N_2}{N_1} < 1\right]$ **D)** step down, because $\left[\frac{N_2}{N_1} > 1\right]$

39. If the distance between two adjacent lines in diffraction grating is 2 μm Calculate the number of lines per centimetre on this diffraction grating. **A)** 5000 lines/cm **B)** 500 lines/cm **C)** 50000 lines/cm **D)** 500000 lines/cm

40. Which object would produce the most distinct diffraction pattern?
A) an apple. **B)** a human hair. **C)** a pencil lead. **D)** the diffractions in all them are same.

41. Light falls on a double slit with slit separation of 2.02×10^{-6} m, and the first bright fringe is seen at an angle of 16.5° relative to the central maximum. Find the wavelength of the light.
A) 7.5×10^{-7} m **B)** 3.52×10^{-7} m **C)** 6.3×10^{-8} m **D)** 5.73×10^{-7} m

42. A laser source is a device that convert..........into coherent light:
A) electrical energy. **B)** chemical energy. **C)** light energy. **D)** all answers are correct.

43. An object moves in a circle at a constant speed. Which of the following is true of the object?
A) The direction of its centripetal acceleration is perpendicular to the direction of centripetal force.
B) Its tangential acceleration is zero.
C) direction of its velocity is constant.
D) the angel between centripetal force and tangential speed is zero.

44. Two coherent light waves of the same amplitude they interfere, what is the amplitude of the resultant wave If the interference is constructive?
A) zero. **B)** is the same amplitude of either of two waves.
C) twice amplitude of either of these waves. **D)** less than the amplitude of either of these waves.

45. Identify which conditio of equilibrium hold for (A bicycle wheel rolling along a level highway at constant speed)?
A) translational **B)** rotational **C)** translational and rotational **D)** Neither rotational nor translational

46. Two forces equal in magnitude ($F_1 = F_2 = 20\ N$) acting on the bar as in adjacent figure, If the net torque acting on the bar is **(-12 N.m)** Find the distance (ℓ) between the two forces? (Disregard the weight of the bar)
A) 0.6 m **B)** 0.3 m **C)** 0.4 m **D)** 0.5 m

47. If a pendulum clock is running slow, what must be done to correct the time?
A) make the pendulum shorter. **B)** make the pendulum taller.
C) increasing the mass. **D)** increasing the amplitude.

48. Which of the following sound waves travel faster in the air?
A) audible waves. **B)** infrasonic waves.
C) ultrasonic waves. **D)** all of them travel at the same speed.

49. A proton moves in a uniform magnetic field on a circular path. Which of the following equations is correct to calculate the radius of its circular path?
A) $r = \frac{q\ B}{m\ v_t}$ **B)** $r = \frac{B}{m\ v_t}$ **C)** $r = \frac{m\ v_t}{q\ B}$ **D)** $r = \frac{v_t}{q\ B}$

50. If the intensity of the electric current in a coil change at a rate of $\left(\frac{\Delta I}{\Delta t}\right)$ the magnetic flux change at a rate of $\left(\frac{\Delta \Phi}{\Delta t}\right)$ this leads to creation of self emf, then the Coefficient of self-induction of the coil:
A) increases **B)** does not change **C)** becomes zero **D)** decreases