



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

1. A car traveling at 65 km/h on a flat surface turn in a circle with a radius 195 m, Find the minimum coefficient of static friction between the tires and the road that will allow the care to round the curve? ($a_g = 9.81 \text{ m/s}^2$)

- A) 0.17 B) 0.05 C) 0.3 D) 0.02

2. When you break a magnet in half, how many poles does each piece have?

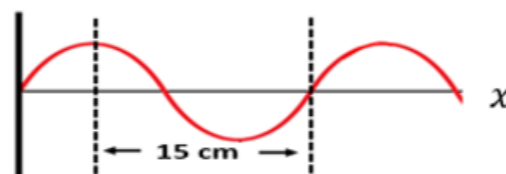
- A) 1 B) 2 C) 3 D) 4

3. Which of the following wavelengths will produce standing waves on a string that is 3 m long?

- A) 2 m B) 4 m C) 5 m D) 7 m

4. A wave traveling in the positive x direction with a frequency of 25 Hz as shown in the figure. Find the speed of this wave?

- A) 3.75 m/s B) 2.25 m/s
C) 0.5 m/s D) 5 m/s



5. Identify the source of force that maintains circular motion of (a bicycle moving around a flat circular track)?

- A) Normal force of track B) weight of bicycle
C) friction force between tires and the track D) the force of seat bicycle on the bicyclist

6. is the perpendicular distance from the axis of rotation to a line drawn along the direction of the force

- A) torque(τ) B) force(F) C) lever arm($d \sin \theta$) D) moment of inertia (I)

7. If the radius of car tire is 0.3 m rotates at an initial angular speed of 14 rad/s. The driver accelerates, and after 3.5 s the tire's angular speed is 28 rad/s. What is tangential acceleration of a point at the edge of tire?

- A) 1.9 m/s^2 B) 1.2 m/s^2 C) 4 m/s^2 D) 186 m/s^2

8. Earth of mass ($m=5.97 \times 10^{24} \text{ kg}$) orbits the sun with mass ($m=1.99 \times 10^{30} \text{ kg}$) at a mean distance of $1.5 \times 10^{11} \text{ m}$. what is the gravitational force of the sun on Earth? ($G=6.673 \times 10^{-11} \text{ N.m}^2/\text{kg}^2$)

- A) $5.29 \times 10^{32} \text{ N}$ B) $5.9 \times 10^{-2} \text{ N}$ C) $3.52 \times 10^{22} \text{ N}$ D) $1.77 \times 10^{-8} \text{ N}$

9. Find the tangential speed of a ball swung at a constant angular speed of 5 rad/s on a rope that is 0.5 m long

- A) 1 m/s B) 10 m/s C) 2.5 m/s D) 25 m/s

10. A uniform 40 N board supports two children, one weighing 510N and the other weighing 340 N. The support is under the center of mass of the board, and the 510 N children is 2 m from the center. Where should the second child sit to balance the system?

- A) 3 m from the center B) 2.2 m from the center C) 3.5 m from the center D) 2.5 m from the center

11. The symbol(μ) in this equation $B = \frac{\mu}{2\pi} \frac{I}{d}$ is called Coefficient of:

- A) self-induction B) Magnetic permeability of medium C) mutual induction D) friction

12. In which of the following should the object (s) be treated as an extended object?

- A) a ball from the roof of a house B) a wheel rotates.
C) a ball rolling toward the goal D) both B and C are correct

13. 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

14. The speed of all electromagnetic waves in empty space is $3 \times 10^8 \text{ m/s}$. Calculate the wavelength of radio waves at frequency 88 MHz?

- A) $5 \times 10^{-6} \text{ m}$ B) 3.41 m C) $5 \times 10^{-7} \text{ m}$ D) $1 \times 10^{-10} \text{ m}$

15. When a wheel is rotated through an angle of 35° , a point on the circumference travels through an arc length of 2.49 m, what is the angular displacement of the same point when travels through an arc length of 143 m?

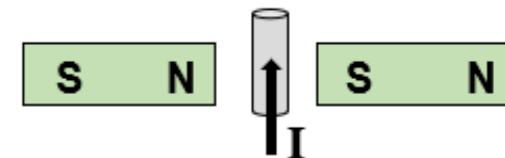
- A) 35 rad B) 4.1 rad C) 35 rev D) 90°

16. A bucket filled with water has a mass of 22.5 kg and is attached to a rope that is wound around a cylinder with a radius of 0.05 m at the top of a well. What torque does the bucket produce on the cylinder?

- A) 34 N.m B) 11 N.m C) 17 N.m D) 23 N.m

17. Find the direction of the magnetic force on the current -carrying wire as in Figure:

- A) out of the page B) into the page
C) down the page D) up the page



18. Which of the following equations is correct to calculate the angular momentum?

- A) $L = I\omega$ B) $L = I\omega^2$ C) $L = \frac{1}{2}I\omega$ D) $L = r\omega$.

19. Three identical vibrating simple pendulum of same length the first one on surface

of the Earth [$a_g = 9.81 \frac{\text{m}}{\text{s}^2}$], the second one on the surface of the moon [$a_g = 1.63 \frac{\text{m}}{\text{s}^2}$],

and the third one on the surface of the Mars [$a_g = 3.7 \frac{\text{m}}{\text{s}^2}$]. Which one of them has greater period?

- A) On Moon B) On Earth C) On Mars D) All have the same periods

20. 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 maximum displacement?

- A) elastic potential energy B) gravitational potential energy
C) kinetic energy D) kinetic energy and Elastic potential energy

21. A wave with an amplitude of 0.75 m has the same wave length as a second wave with an amplitude of 0.53 m the two waves interfere What is the amplitude of the resultant waves if the interference is constructive?

- A) 0.22 m B) 0.53 m C) 0.75 m D) 1.28 m

22. The sound waves with frequencies greater than 20 kHz, and cannot be heard by human ear are called,

- A) Infrasonic waves B) Ultrasonic waves C) Audible sound waves D) All of them are true

23. What are the first two harmonics in a 2.45 m long pipe that is closed at one end?

(The speed of sound in pipe is 345 m/s)

- A) [(35.2 Hz) (105.6 Hz)] B) [(106 Hz) (176 Hz)]
C) [(140.8 Hz) (70.4 Hz)] D) [(35.2 Hz) (70.4 Hz)]

24. A police car moves at a speed of 86.4 Km/h and emit a siren of frequency 1000 Hz. What is the frequency of the sound as detected by a standing observer as the police car moves away from him

(speed of sound in air is 340 m/s)?

- A) 1076 Hz B) 834 Hz C) 1234 Hz D) 934 Hz

25. Earth is rotate 360° every 24h what is the angular displacement of a person standing at the equator for 3 h?

- A) 0.26 rad B) 0.39 rad C) 0.52 rad D) 0.79 rad.

26. By what factor does the distance change from the sound source If the sound intensity becomes five times as the original intensity?

- A) $\frac{1}{5}$ B) $\frac{1}{\sqrt{5}}$ C) 5 D) $\frac{1}{25}$

27. A wire carrying a current is arranged so that electrons flow in one segment from west to east. If a compass is held over this segment of the wire, in what direction is the needle deflected?

- A) To the East B) To the North C) To the South D) To the Sky

28. Which of the following is a correct interpretation of the expression [The magnetic field due to a direct current in a solenoid]?

- A) The magnetic field inside a solenoid is weak and nonuniform
 B) The magnetic field outside solenoid is strong and uniform
 C) The intensity of the magnetic is inversely proportional with amount of current
 D) The magnetic field inside solenoid is strong and nearly uniform

29.law Used to determine the magnitude of induced electromotive force (emf):

- A) Oersted's B) Faraday's C) Ohm's D) Newton's

30. The mutual inductance between two coil depends on what?

- A) Only the geometrical properties of the coils B) Only the orientation of the coils to each other
 C) Both the geometrical properties of the coils and their orientation to each other D) none of them

31. A pendulum vibrates after uniform so that its frequency changes from 10 Hz to 30 Hz, in this case its period from (T) second will change to:

- A) $\frac{T}{6}$ s B) $\frac{T}{3}$ s C) 3 T s D) 6 T s

32. A wave that requires a medium through which to travel:

- A) mechanical wave B) infrared (IR) waves C) microwaves D) X rays

33. When a mechanical wave of amplitude is tripled, the energy the wave carries in a given time interval is increased by a factor of?

- A) 3 B) 6 C) 9 D) 18

34. If the coefficient of self-induction of the coil is 0.02 H, and If time rate of increase current is 100 A/s calculate the induced emf in the coil?

- A) 2×10^{-4} V B) -2 V C) 4 V D) -2×10^{-4} V

35. The unit for measuring Magnetic flux (Φ) is:

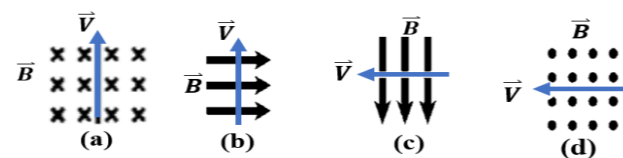
- A) weber (wb) B) Tesla (T) C) (T.m²) D) both A and C are true

36. A wire 36 m long carries a current of 22 A. If the magnetic force on the wire due to Earth's magnetic field has a magnitude of 4×10^{-2} N, find the magnitude of the magnetic field at this point?

- A) 5×10^{-5} T B) 3×10^{-3} T C) 3×10^{-5} T D) 5×10^{-2} T

37. In which situation, the direction of the magnetic force on a proton moves in a magnetic field is to left of the page:

- A) (d) B) (c)
 C) (b) D) (a)



38. At a maximum level of loudness, the power output of a 75-piece orchestra radiated as sound is 70 W. What is the intensity of these sound waves to a listener who is sitting 25 m from the orchestra?

- A) 9.81×10^{-3} w/m² B) 7.81×10^{-3} w/m² C) 8.91×10^{-3} w/m² D) 6.81×10^{-3} w/m²

39. The magnitude of the induced electromotive force (ϵ) in a straight conductor(wire) depends on which of the following:

- A) Length of the wire in the field B) Velocity with which the wire moving through the magnetic field
 C) Strength of the magnetic field D) all the answers are correct

40. The speed of sound depends on the temperature of the medium, this dependence is more noticeable in:

- A) Solid B) Liquid C) Gas D) All the answers are correct

41. A bicyclist exerts a constant force of 40 N on a pedal 0.15 m from the axis of rotation of a bicycle wheel with a radius of 50 cm. If his speed is 2.25 m/s after 3 s he starts from rest, what is the moment of inertia of the wheel? (Disregard friction and the moment of inertia of the other wheel.)

- A) 0.5 kg.m² B) 1 kg.m² C) 3 kg.m² D) 4 kg.m²

42. Which of the following ways can induce a current inside a closed circular loop?

- A) by moving the loop into or out of the magnetic field B) by rotating the loop inside the magnetic field
 C) by changing the strength of the magnetic field through the static loop D) All of them are correct

43. The tub within a washer rotate with angular speed of 11π rad/s then the tub slows to rest in 12 s, how many revolutions does the tub turn until the tub stops?

- A) 55 rev B) 66 rev C) 22 rev D) 33 rev

44. A fire engine is moving at 40 m/s and sounding its horn. Another car in front of the fire engine is moving at 30 m/s in the same direction and a van in front of the car is stationary who observer hears the fire engine's horn at a higher pitch?

- A) The driver of the car B) The driver of the van
 C) The driver of the fire engine D) All of them have same pitch heard

45. When a part of a sound wave travels from air into water, which property of the wave remains unchanged?

- A) speed B) frequency C) period D) both B and C are true

46. Eddy currents are used in:

- A) Furnaces B) Car brake systems
 C) Detecting metals in airports underground D) In all of them

47. A rectangular coil with area 0.0046 m² is positioned so that its cross-sectional area is perpendicular to the direction of a magnetic field, \vec{B} if the coil has 75 turns and a total resistance of 8.6 Ω and the field decreases at a rate of 3 T/s, what is the magnitude of the induced current in the coil?

- A) 1.05 A B) 8.27 A C) 0.12 A D) 0.26 A

48. Two spheres have the same mass One is hollow, and the other is solid. Which method would determine which is which:

- A) Drop them from the same height B) Roll them down an incline
 C) weigh them on a scale D) both (A and C) are true.

49. According to Lenz's law, if the applied magnetic field of circuit is changed, the induced field attempts to keep the total field is:

- A) keep constant B) increased
 C) decreased D) none of them

50. If the intensity of a sound is $1 \frac{W}{m^2}$ what is the relative intensity of this sound?

- A) 0 dB B) 60 dB C) 120 dB D) 40 dB