Physics

1. If the vector product of two vectors $\vec{P}$ and $\vec{Q}$ is given by $\vec{R} = PQ\hat{n}$, then what is the angle between the two vectors?

A) $\theta = 90°$
B) $\theta = 0°$
C) $\theta = 180°$
D) $\theta = 45°$

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2. A ball is released from the top of a building of height 'H' m. It takes 'T' seconds to reach ground. What is the position of the ball at T/4 seconds?

A) $\frac{H}{9} m$ from ground

B) $\frac{H}{16} m$ from ground

C) $\frac{8H}{9} m$ from ground

D) $\frac{4H}{3} m$ from ground

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3. A balloon is rising up with a velocity of 30m/s. A stone is dropped from it and it reaches the ground in 15 sec. What is the height of the balloon when the stone was dropped from it?

A) 640m
B) 645m
C) 652.5m
D) 650m

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4. A body of mass 10 kg is moving with a uniform velocity of 100ms^{-1}. What is the force required to stop the body in 10 seconds?

A) -100N
B) +95N
C) +100N
D) -105N

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5. When a body moves in a circular path, no work is done by the force. Why?

A) Force is always acting away from the centre of the body.
B) There is no displacement for the body
C) There is no net force on the body
D) Force and displacement are perpendicular to each other.

6. A bullet of mass 20g is fired with a velocity of $1200ms^{-1}$. After passing through a mud wall of 2m thick, its velocity decreases to $200ms^{-1}$. What is the average resistance offered by the mud wall?

A) 7000N
B) -7100N
C) -7000N
D) 7100N

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7. What is the value of escape velocity on a planet having radius 3 times that of earth and on which acceleration due to gravity is three times that on earth?

A) 11.2 kms^{-1}
B) 22.4 kms^{-1}
C) 33.6 kms^{-1}
D) 5.6 kms^{-1}

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8. A Carnot's engine absorbs 2000J of heat energy from the source at 500K and rejects 1500J of heat to the sink during each cycle. What will be the efficiency of the engine?

A) 44.44%
B) 33.33%
C) 30%
D) 35%

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9. A hot body and a cold body are kept in vacuum separated from each other. What is the reason for the decrease in temperature of the hot body?

A) Radiation
B) Convection
C) Conduction
D) The temperature of both the bodies remains unchanged.

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10. Two stars radiate maximum energy at wavelength $4.8 \times 10^{-7}m$ and 7.2×10^{-7} m respectively. What is the ratio of their temperatures?

A) $\dfrac{3}{2}$

B) $\dfrac{1}{2}$

C) $\dfrac{4}{3}$

D) $\dfrac{3}{2}$

11. When will the K.E of a particle executing S.H.M be maximum?

A) When its displacement is equal to Zero
B) When its displacement is equal to Amplitude/4
C) When its displacement is equal to Amplitude/2
D) When its displacement is equal to Amplitude

12. Two point charges +4μC and -4μC are located at points R and S, 20 cm apart in air. What will be the magnitude and direction of the electric field at the midpoint P of the line joining the two charges?

A) 7.2×10^6 NC^{-1} along PS
B) 7.2×10^6 NC^{-1} along PR
C) 14.4×10^6 NC^{-1} along PS
D) 14.4×10^6 NC^{-1} along PR

13. The effective capacity of two capacitors C1 and C2 when in series is $\frac{20}{9}\mu F$ and when in parallel 9μF.What is the value of individual capacitors?

A) $C_1 = 4\mu F, C_2 = 5\mu F$

B) $C_1 = 3\mu F, C_2 = 5\mu F$

C) $C_1 = 20\mu F, C_2 = 9\mu F$

D) $C_1 = 4\mu F, C_2 = 3\mu F$

14. If 2 resistors 4Ω and 8Ω are connected first in series and then in parallel. What is the ratio of their effective resistances?

A) 9:8
B) 3:2
C) 5:3
D) 9:2

15. Consider a charged particle q moving in a magnetic field B with velocity v. When will the force experienced by the charged particle be maximum?

A) When $\vec{v}$ and $\vec{B}$ are perpendicular to each other

B) When $\vec{v}$ particle $\vec{B}$ moves along field

C) When $\vec{v}$ and $\vec{B}$ are making an angle 60°

D) When $\vec{v}$ and $\vec{B}$ are making an angle 45°

16. A 200Ω resistor a 50µF capacitor and 240 mH inductor are connected in series with a 220 v -50Hz ac supply. What is the current in the circuit?

A) 1.5A
B) 0.98A
C) 1.06A
D) 1.2A

17. What is the velocity of the EM waves in a material medium of relative permeability μ_r and dielectric constant K?

A) $V = \dfrac{1}{\sqrt{\mu_r K}}$

B) $V = \sqrt[c]{\mu_r K}$

C) $V = \dfrac{C}{\sqrt{\mu_r K}}$

D) $V = \dfrac{K}{\sqrt{\mu_r C}}$

18. Two narrow slits are 0.16 mm apart when they are illuminated by a monochromatic light. Fringes of width 2.7 mm are obtained on the screen 0.6 m away. What is the wavelength of the light used?

A) 5400Å
B) 5395Å
C) 5405Å
D) 5450Å

19. If an electron has K.E. equal to 100ev .What will be the De-Broglie wavelength of the electron?

A) 1.2Å
B) 1.23Å
C) 1.29Å
D) 1.198Å

20. If the K.E. of an electron doubles, by how much factor its De-Broglie wavelength change?

A) $\sqrt{2}$

B) $\dfrac{1}{\sqrt{2}}$

C) 2

D) $\dfrac{1}{2}$

21. An electron transits from 4th to the 2nd orbit in hydrogen atom. What is the name of the region of the special line produced?

A) Far infrared region
B) Visible region
C) Infrared region
D) Ultraviolet region

22. What type of gate produce a false (0) output when both of its inputs are true (1)?

A) NOR
B) NAND
C) OR
D) XOR

23. With fall in temperature, what happens to the forbidden energy gap of a semiconductor?

A) Increases
B) Decreases
C) Remains unchanged
D) Sometimes increases and sometimes decreases

24. The bandwidth of a signal is 6 KHz and the highest frequency is 54 KHz. What is the lowest frequency?

A) 9 KHz
B) 60 KHz
C) 48 KHz
D) 324 Hz

25. Ohm's law is valid when the temperature of the conductor is:

A) Very low
B) Very high
C) Varying
D) Constant

26. The magnitude of the force (F) acting on a current (I) carrying conductor of length L, placed in magnetic field of strength B is given by

A) $F = BIL \cos \theta$
B) $F = BIL \sin \theta$
C) $F = B L \sin \theta$
D) $F = B L \cos \theta$

27. What is the torque required to hold a small circular coil of 10 turns, area 1 mm^2 and carrying a current of (31/53) in the middle of a long solenoid of 10^4 turns/meter carrying a current of 3.5 A, with its axis perpendicular to the axis of the solenoid ?

A) 2.57 x 10^{-7} Nm.
B) 3.57 x 10^{-7} Nm.
C) 2.57 x 10^{-5} Nm.
D) 3.57 x 10^{-5} Nm.

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28. A person using a 90 kg roller on a level surface exerts a force of 253 N at 49° to the ground. What will be the force exerted on the ground by the roller vertically?

A) 691 N
B) 890 N
C) 900 N
D) 592 N

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29. A glass capillary tube of inner diameter 0.4 mm is lowered into the water vertically. What will be the pressure to be applied on the water in the capillary tube so that water in the capillary tube is the same that in the vessel (Considering: Surface tension (S) =0.05 Nm^{-2}. Atmosphere pressure =10^5 Nm^{-2})

A) 120 x10^3 Nm^{-2}
B) 110.5 x10^3 Nm^{-2}
C) 105.5 x10^3 Nm^{-2}
D) 100.5 x10^3 Nm^{-2}

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30. The work function of a material is 3.31 x10^{-19} J. The Kinetic energy of photoelectrons emitted by incident radiations of wavelength 4500 A° is:

A) 1.093x10^{-19} J
B) 1.071x10^{-19} J
C) 1.107x10^{-19} J
D) 1.135x10^{-19} J