PHYSICS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

MHTCET 2010

Physics

1. If KE of the particle of mass m performing UCM in a circle of radius r is E. Find the

acceleration of the particle

A. $\dfrac{2E}{mr}$

B. $\left(\dfrac{2E}{mr}\right)^2$

C. 2Emr

D. $\dfrac{4E}{mr}$

Answer: A

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2. If α is angular acceleration , ω is angular velocity and a is the centripetal acceleration then ,which of the following is true ?

A. $\alpha = \dfrac{\omega a}{v}$

B. $\alpha = \dfrac{v}{\omega a}$

C. $\alpha = \dfrac{av}{\omega}$

D. $\alpha = \dfrac{a}{\omega v}$

Answer: A

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3. When a disc is rotating with angular velocity

ω , a particle situated at a distance of 4 cm

just begins to slip . If the angular velocity is

doubled , at what distance will the particle

start to slip ?

   A. 1 cm

   B. 2 cm

   C. 3 cm

   D. 4 cm

Answer: A

4. A body is taken to a height of nR from the surface of the earth . The ratio of acceleration due to gravity on the surface to that at the altitude is

A. $(n + 1)^2$

B. $(n + 1)^{-2}$

C. $(n + 1)^{-1}$

D. $(n + 1)$

Answer: A

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5. If the density of the earth is doubled keeping its radius constant then acceleration due to gravity will be $(g = 9.8m/s^2)$

A. $9.8m/s^2$

B. $19.6m/s^2$

C. $4.9m/s^2$

D. $39.2m/s^2$

Answer: B

6. Which relation is not correct of the following ?

A. Torque = Moment of inertia $\times$ Angular acceleration

B. Torque = Dipole moment $\times$ Magnetic induction

C. Moment of inertia = Torque $\times$ Angular acceleration

D. Linear momentum = Moment of inertia $\times$ Angular velocity

Answer: C

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7. The moment of inertia of a uniform thin rod of length L and mass M about an axis passing

through a point at a distance of $L/3$ from one of its ends and perpendicular to the rod is

A. $\dfrac{ML^2}{12}$

B. $\dfrac{ML^2}{9}$

C. $\dfrac{7ML^2}{48}$

D. $\dfrac{ML^2}{48}$

Answer: B

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8. Moment of inertia of a uniform circular disc about a diameter is I. Its moment of inertia about an axis perpendicular to its plane and passing through a point on its rim will be.

A. $6I$

B. 4 I

C. 2 I

D. 8 I

Answer: A

9. For a particle in $S.H.M.$ if the amplitude of displacement is a and the amplitude of velocity is v the amplitude of acceleration is

 A. va

 B. $\dfrac{v^2}{a}$

 C. $\dfrac{v^2}{2a}$

 D. $\dfrac{v}{a}$

Answer: B

10. The increase in pressure required to decrease the 200 L volume of a liquid by 0.008 % in kPa is (Bulk modulus of the liquid = 2100 M Pa is)

A. 8.4

B. 84

C. 92.4

D. 168

Answer: B

11. Average velocity of a particle executing SHM in one complete vibration is :

A. $\dfrac{\omega^2 A}{2}$

B. $\dfrac{\omega^2 A}{\sqrt{2}}$

C. zero

D. $A\omega^2$

Answer: C

12. U is the PE of an oscillating particle and F is the force acting on it at a given instant . Which of the following is true ?

A. $\dfrac{U}{F} + x = 0$

B. $\dfrac{2U}{F} + x = 0$

C. $\dfrac{F}{U} + x = 0$

D. $\dfrac{F}{2U} + x = 0$

Answer: B

13. Which of the following relation is true ?

A. $Y = 2\eta(1 - \sigma)$

B. $Y = 2\eta(1 + 2\sigma)$

C. $Y = 2\eta(1 - \sigma)$

D. $(1 + \sigma)2\eta = Y$

Answer: D

14. Four wires of the same material are stretched by the same load. Which one of them will elongate most if their dimensions are as follows

    A. L = 100 cm , r = 1mm

    B. L = 200 cm , r = 3 mm

    C. L = 300 , r = 3 mm

    D. L = 400, r = 4mm

Answer: A

15. With an increase in temperature , surface tension of liquid (except molten copper and cadmium)

    A. increases

    B. remain same

    C. decreases

    D. first decreases then increases

Answer: C

16. On the surface of the liquid in equilibrium , molecules of the liquid possess

    A. maximum potential energy

    B. minimum potential energy

    C. maximum kinetic energy

    D. minimum kinetic energy

Answer: A

17. The equation of a simple harmonic progressive wave is given by y = A sin $(100\pi t - 3x)$. Find the distance between 2 particles having a phase difference of $\frac{\pi}{3}$.

A. $\frac{\pi}{9}m$

B. $\frac{\pi}{18}m$

C. $\frac{\pi}{6}m$

D. $\dfrac{\pi}{3}m$

Answer: A

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18. In sine wave , minimum distance between 2 particles always having same speed is

A. $\dfrac{\lambda}{2}$

B. $\dfrac{\lambda}{4}$

C. $\dfrac{\lambda}{3}$

D. λ

Answer: A

19. Two Cu wires of radii R_1 and R_2 are such that $(R_1 > R_2)$. Then which of the following is true ?

A. Transverse wave travels faster in thicker wire

B. Transverse wave travels faster in thinner

wire

C. Travels with the same speed in both the

wires

D. Does not travel

Answer: B

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20. In the fundamental mode , time taken by the wave to reach the closed end of the air filled pipe is 0.01 s . The fundamental frequency is

A. 25

B. 12.5

C. 20

D. 15

Answer: A

21. n_1 is the frequency of the pipe closed at one and n_2 is the frequency of the pipe open at both ends. If both are joined end to end, find the fundamental frequency of closed pipe so formed

A. $\dfrac{n_1 n_2}{n_2 + 2n_1}$

B. $\dfrac{n_1 n_2}{2n_2 + n_1}$

C. $\dfrac{n_1 + 2n_2}{n_2 n_1}$

D. $\dfrac{2n_1 + n_2}{n_2 n_1}$

Answer: A

22. KE per unit volume is E. The pressure exerted by the gas is given by

A. $\dfrac{E}{3}$

B. $\dfrac{2E}{3}$

C. $\dfrac{3E}{2}$

D. $\dfrac{E}{2}$

Answer: B

23. The velocity of 4 gas molecules are given by 1km/s , 3km/s , 5 km/s and 7km/s . Calculate the difference between average and RMS velocity .

A. 0.338

B. 0.438

C. 0.583

D. 0.683

Answer: C

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24. The sphere of radii 8 cm and 2 cm are cooling. Their temperatures are $127°C$ and $527°C$ respectively . Find the ratio of energy radiated by them in the same time

A. 0.06

B. 0.5

C. 1

D. 2

Answer: C

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25. For an opaque body coefficient of transmission is

A. zero

B. 1

C. 0.5

D. ∞

Answer: A

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26. Light travels through a glass plate of thickness t and refractive index μ. If c is the speed of light in vacuum, the time taken by light to travel this thickness of glass is

A. $t\mu c$

B. $\dfrac{tc}{\mu}$

C. $\dfrac{t}{\mu c}$

D. $\dfrac{\mu t}{c}$

Answer: D

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27. Light is incident at an angle i on a glass slab. The reflected ray is completely polarished . The angle of refraction is

A. $90° - i$

B. $180° - i$

C. $90° + i$

D. i

Answer: A

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28. In Young's experiment , the fringe width of the fringes with light of wavelength 6000 Å is 2.0 mm . What will be the fringe width if the

entire apparatus is immersed in a liquid of refractive index 1.33 ?

A. 0.5 mm

B. 1 mm

C. 1.5 mm

D. 2 mm

Answer: C

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29. If the aperature of a telescope is decreased

resolving power will

A. increases

B. decreases

C. remain same

D. zero

Answer: B

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30. In Young's double slit experiment, a minimum is obtained when the phase difference of super imposing waves is

A. $n\pi$

B. $(n + 1)\pi$

C. $(2n - 1)\pi$

D. zero

Answer: C

31. The electric intensity of outside a charged sphere of radius R at a distance $r (r > R)$ is

A. $\dfrac{\sigma R^2}{\varepsilon_0 r^2}$

B. $\dfrac{\sigma r^2}{\varepsilon_0 R^2}$

C. $\dfrac{\sigma r}{\varepsilon_0 R}$

D. $\dfrac{\sigma R}{\varepsilon_0 r}$

Answer: A

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32. In a parallel plate capacitor , the capacity increases if

    A. area of the plate is decreased

    B. distance between the plate increases

    C. area of the plate is increased

    D. dielectric constant decrease

Answer: C

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33. Capacity of a capacitor is $48\mu F$. When it is charged from 0.1 C to 0.5 C , change in the energy stored is

A. 2500 J

B. $2.5 \times 10^{-3} J$

C. $2.5 \times 10^6 J$

D. $2.42 \times 10^{-2} J$

Answer: A

34. For measurement of potential difference, potentiometer is perferred in comparison to voltmeter because

A. potentiometer is more sensitive then voltmeter

B. the resistance of potentiometer is less than voltmeter

C. potentiometer is cheaper than voltmeter

D. potentiometer does not take current from the circuit

Answer: D

35. For a thermocouple , the inversion temperature is $600°C$ and the neutral temperature is $320°C$. Find the temperature of the cold junction ?

    A. $40°C$

    B. $20°C$

    C. $80°C$

D. $60°C$

Answer: A

36. A circular loop and a square loop are formed from the same wire and the same current is passed through them . Find the ratio of their dipole moments.

A. 4π

B. $\dfrac{4}{\pi}$

C. $\dfrac{2}{\pi}$

D. 2π

Answer: B

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37. Toroid is

A. ring shaped closed solenoid

B. rectangular shaped solenoid

C. ring shaped open solenoid

D. square shaped solenoid

Answer: A

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38. When a resistance of 100Ω is connected in series with a galvanometer of resistance R, then its range is V. To double its range, a resistance of 1000Ω is connected in series. Find the value of R.

A. 700Ω

B. 800Ω

C. 900Ω

D. 100Ω

Answer: C

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39. If the magnet is cut into four equal parts such that their lengths and breadths are equal . Pole strength of each part is

A. m

B. m/2

C. m/4

D. m/8

Answer: B

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40. Average power in the L-C-R circuit depends

upon

A. current

B. phase difference only

C. emf

D. current, emf and phase difference

Answer: D

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41. When a current of 2 A is passed through a coil of 100 turns , flux associated with it is

5×10^{-5}Wb. Find the self inductance of the coil.

A. $4 \times 10^{-3} H$

B. $4 \times 10^{-2} H$

C. $2.5 \times 10^{-3} H$

D. 10^{-3}H

Answer: C

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42. When a rod of length l is rotated with angular velocity of ω in a perpendicular field of induction B , about one end , the emf across its ends is

A. $Bl^2\omega$

B. $\dfrac{Bl^2\omega}{2}$

C. $Bl\omega$

D. $\dfrac{Bl\omega}{2}$

Answer: B

43. The dimensions of Planck's constant is the same as the product of

A. force and time

B. force, displacement and time

C. force and distance

D. time and displacement

Answer: B

44. Two particles of masses m_a and m_b and same charge are projected in a perpendicular magnetic field . They travel along circular paths of radius r_a and r_b such that $r_a > r_b$. Then which is true ?

A. $m_a v_a > m_b v_b$

B. $m_a > m_b$ and $v_a > v_b$

C. $m_a = m_b$ and $v_a > v_b$

D. $m_b v_b > m_a v_a$

Answer: A

45. The de-Broglie wavelength of an electron in the ground state of the hydrogen atom is

A. πr^2

B. $2\pi r$

C. πr

D. $\sqrt{2\pi r}$

Answer: B

46. In a hydrogen atom following the Bohr's postulates the product of linear momentum and angular momentum is proportional to n^x where 'n' is the orbit number. Then 'x' is:

A. 0

B. 1

C. -2

D. 2

Answer: A

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47. The orbital frequency of an electron in the

hydrogen atom is proportional to

A. n^3

B. n^{-3}

C. n^1

D. n^0

Answer: B

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48. How many $NAND$ gate are used to from AND gate?

A. 1

B. 2

C. 3

D. 4

Answer: B

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49. LED is a p-n junction diode which is

A. forward biased

B. either forward biased or reverse biased

C. reverse biased

D. neither forward biased nor reverse

biased

Answer: A

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50. Which of the following is absorbed by the

ozone layer ?

A. only gamma rays

B. visible light

C. radio waves

D. ultraviolet

Answer: D

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