PHYSICS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

MHTCET 2019 PAPER 2

Physics

1. A metal surface is illuminated by a light of given intensity and frequency to cause

photoemission. If the intensity of illumination is reduced to one-fourth of its original value, then the maximum KE of emitted photoelectrons will become.

A. twice the original value

B. four times the original value

C. one fourth of the original value

D. unchanged

Answer: D

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2. A rectangular loop carrying a current i is placed in a uniform magnetic field B. The area enclosed by the loop is A. If there are n turns in the loop, the torque acting on the loop is given by

A. $ni\left(\widehat{A}.\,\widehat{B}\right)$

B. $\frac{nBA}{i}$

C. $ni(A \times B)$

D. $\frac{iBA}{n}$

Answer: C

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3. A force $(F) = -5\hat{i} - 7\hat{j} + 3\hat{k}$ acting on a particles causesa displacement $(s) = 3\hat{i} - 2\hat{j} + a\hat{k}$n its own direction. If the work done is 14 J, then the vaule of 'a' is

A. 0

B. 5

C. 15

D. 1

Answer: B

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4. when an electron jumps from the fourth orbit to the second orbit, one gets the

A. second line of Balmer series

B. first line of Balmer series

C. first line of P fund series

D. second line of Paschen series

Answer: A

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5. Light of wavelength λ is incident on a single sht of width. 'a' and the distance between slit and screen is 'D. In diffraction pattern, if slit width is equal to the width of the central maximum then 'O is equal to

A. $\frac{a}{2\lambda}$

B. $\frac{a^2}{2\lambda}$

C. $\frac{a}{\lambda}$

D. $\frac{a^2}{\lambda}$

Answer: B

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6. In U.C.M., when time interval $\delta t \to 0$, the angle between change in velocity (δv) and linear velocity (v) will be

A. 0°

B. 90°

C. 180°

D. 45°

Answer: B

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7. A stretched string fixed at both end has n nods, then the lengths of the string is

A. $(m-1)\frac{\lambda}{2}$

B. $\frac{(m+1)\lambda}{2}$

C. $\frac{m\lambda}{2}$

D. $(m-2)\frac{\lambda}{2}$

Answer: A

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8. A particle is performing a linear simpfe harmonic motion of amplitude 'A'. When it is midway between its mean and extreme

position, the magnitudes of its velcoity and acceleration are equal. What is the periodic time of the motion ?

A. $\frac{2\pi}{\sqrt{3}}s$

B. $\frac{\sqrt{3}}{2\pi}s$

C. $2\pi\sqrt{3}s$

D. $\frac{1}{2\pi\sqrt{3}}$s

Answer: A

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9. Three identical thin rods each of length l and mass M are joined together to from a letter H. What is the moment of inertia of the system about one of the sides of H ?

A. $\frac{2ML^2}{3}$

B. $\frac{ML^2}{2}$

C. $\frac{ML^2}{6}$

D. $\frac{4ML^2}{3}$

Answer: D

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10. The luminous border that surrounds the profile of a mountain just before sun rises behind it, is an example of

A. dispersion

B. total internal reflection

C. interference

D. diffraction

Answer: D

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11. A block of mass 'm' moving on a frictionless surface at speed 'v' collides elastically with a block of same mass, initially at rest. Now the first block moves at an angle θ with its initial direction and has speed v_1 . The speed of the second block after collision is

A. $\sqrt{v_1^2 - v^2}$

B. $\sqrt{v^2 - v_1^2}$

C. $\sqrt{v^2 + v_1^2}$

D. $\sqrt{v - v_1}$

Answer: B

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12. Three point masses are at the corners of an equilateral traingle of side r. Their separations do not change when the system rotates about the centre of the triangle. For this, the time period of rotation must be proportional to

A. $\sqrt{L}$

B. $L^{3/2}$

C. L

D. L^{-2}

Answer: B

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13. Two apdulums begin to swing simultaneosuly. The first pendulum makes 9 full oscillations when the other makes 7. Find the ratio of length of the two pendulums

A. $\frac{49}{81}$

B. $\frac{64}{81}$

C. $\frac{8}{9}$

D. $\frac{7}{9}$

Answer: A

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14. When light enters glass from vacuum, then the wavelength of light

A. decreases

B. becomes zero

C. remains same

D. Increases

Answer: A

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15. Which one of the following statement is correct?

A. Surface energy is potential energy per unit length

B. Surface tension is work done per unit area

C. Surface tension is wmk done per unit length

D. Surface energy is work done per unit force

Answer: B

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16. What is the minimum energy required to launch a satellite of mass m from the surface of a planet of mass M and radius R in a circular orbit at an altitude of 2R?

A. $\frac{GMm}{2R}$

B. $\frac{2GMm}{2}$

C. $\frac{GMm}{3R}$

D. $\frac{5GMm}{2}$

Answer: B

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17. A wire of length L and cross-sectional area A is made of material of Young's modulus Y. The work done in stretching the wire by an amount x is

A. $\frac{Yx^2A}{2L}$

B. $\frac{2Yx^2A}{L}$

C. $\frac{YxA}{2L}$

D. $\frac{Yx^2A}{2}$

Answer: A

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18. In a parallel plate air capacitor the distance between plates is reduced to one fourth and the space between them is filled with a dielectric medium of constant 2. If the initial capacity of the capacitor is $4\mu F$. then its new capacity is .

A. $32\mu F$

B. $18\mu F$

C. $8\mu F$

D. $44\mu F$

Answer: A

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19. An aircraft is moving with uniform velocity 150 mis in the space. If all the forces acting on it are balanced, then it will

A. keep moving with same velocity

B. remain floating at its place

C. escape in space

D. fall down on earth

Answer: A

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20. In a $P-N$ junction diode is P region is heavily doped than n region then the depletion layer is

A. decreased with heavy doping

B. increased by reverse biasing

C. decreased with light doping

D. increased by forward biasing

Answer: B

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21. In the study of transistor as an amplifier, the ratio of collector current to emitter

current is 0.98 then the ratio of collector current to base current will be

A. 99

B. 49

C. 50

D. 98

Answer: B

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22. A stretched wire of length 260 cm is set into vibrations. It is divided into three segments whose frequencies are in the ratio 2 : 3 : 4. Their lengths must be

A. 80 cm, 60 cm, 120 cm

B. 120 cm, 80 cm, 60 cm

C. 60 cm, 80 cm, 120 cm

D. 120 cm, 60 cm, 80 cm

Answer: B

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23. Force F and density D are related as $F = \frac{\alpha}{\beta + \sqrt{d}}$, Then find the dimensions of α and β

A. $\left[L^{\frac{1}{2}} M^{\frac{3}{2}} T^{-2}\right]$

B. $\left[L^{-1} M^{\frac{1}{2}} T^{-2}\right]$

C. $\left[L^{-1} M^{\frac{3}{2}} T^{-2}\right]$

D. $\left[L^{-\frac{1}{2}} M^{\frac{1}{2}} T^{-2}\right]$

Answer: A

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24. A bar magnet has length 3 cm, cross-sectional area $2cm^3$ and magnetic moment $3Am^2$. The intensity of magnetisation of bar magnet is

A. $3 \times 10^5 A/m$

B. $4 \times 10^5 A/m$

C. $2 \times 10^5 A/m$

D. $1 \times 10^5 A/m$

Answer: D

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25. What are the dimensions of mutual inductance ?

A. $\left[L^{-2}M^{1}T^{-2}L^{-2}\right]$

B. $\left[L^{2}M^{2}T^{-2}I^{-2}\right]$

C. $\left[L^{2}M^{1}T^{-2}I^{-2}\right]$

D. $\left[L^{2}M^{2}T^{-2}I^{-2}\right]$

Answer: C

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26. Which of the following molecules is a polar molecule?

A. 

B. 

C. 

D. 

Answer: D

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27. Magnetic susceptibility of a paramagnetic substance is

A. large and positive

B. small and positive

C. small and negative

D. large and negative

Answer: B

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28. A circular coil of wire consisting of 100 turns each of radius 9 cm carries a current of 0.4 A. The magnitude of the magnetic field at the centre of coil is $[\mu_0 = 1256 \times 10^{-7}$ SI unit]

A. $2.4 \times 10^{-11} T$

B. $2.79 \times 10^{-5} T$

C. $2.97 \times 10^{-4} T$

D. $2.79 \times 10^{-3} T$

Answer: C

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29. A simple harmonic progressive wave is represented as $y = 0.03 \sin \pi(2t - 0.01x)$ m. At a given instant of time, the phase difference between two particles 25 m apart is

A. π rad

B. $\frac{\pi}{2} rad$

C. $\frac{\pi}{4}$ rad

D. $\frac{\pi}{8}$ rad

Answer: C

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30. The equation of state for 2g of oxygen at a pressure 'P' and temperature 'T , when occupying a volume. 'V will be

A. $pV = 16RT$

B. pV = RT

C. $pV = \frac{1}{16}RT$

D. pV = 2RT

Answer: C

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31. The magnetic dipole moment of a short magnetic dipole at a distant point along the equator of magnet has a magnitude of 'X' in SI

u'nits. If the distance between the point and the magnet is halved then the magnitude of dipole moment will be .

A. 2X

B. $\frac{1}{2}x$

C. X

D. $\frac{1}{8}X$

Answer: C

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32. The ratio of the dimensions of Planck's constant and that of moment of inertia has the dimensions of

A. angular momentum

B. velocity

C. frequency

D. time

Answer: C

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33. If x, v and a denote the displacement, the velocity and the acceleration of a particle executing simple harmonic motion of time period T, then, which of the following does not change with time?

A. $\frac{aT}{x}$

B. $at + 2\pi v$

C. $\frac{aT}{v}$

D. $aT + 4\pi^2 v^2$

Answer: C

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34. A particle is performing U.C.M. along the cirqumference of a circle of diameter 50 cm with frequency 2 Hz. The acceleration of the particle in m/s^2 is

A. $2\pi^2$

B. $8\pi^2$

C. π^2

D. $4\pi^2$

Answer: D

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35. Find the wrong statement from the following about the equation of stationary wave given by $Y = 0.04\cos(\pi x)\sin(50\pi t)$ m where tis in second. Then for the stationary wave.

A. Time period= 0.02 s

B. Wavelength= 2 m

C. Velocity = 50 m/s

D. Amplitude= 0.02 m

Answer: A

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36. A convex lens of focal length 'f' is placed in contact with a concave lens of the same focal length. The equivalent focal length of the combination is

A. f

B. infinity

C. $\frac{f}{2}$

D. zero

Answer: B

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37. Two light balls are suspended as shown in figure. When a stream of air passes through the space between them, the distance

between the balls will

A. remain same

B. increase

C. may increase or decrease, depending on speed of air

D. decrease

Answer: D

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38. An ammeter has resistance R_0 and range I what resistance should be connected in parallel with it to increase its range by nI ?

A. a series resistance of $\frac{G}{n+1}\Omega$

B. a shut of $\frac{G}{n+1}\Omega$

C. a shut of $\frac{G}{n+1}\Omega$

D. a series resistance of $\frac{G}{n-1}\Omega$

Answer: B

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39. The critical angle for light going from medium X into medium Y is θ . The speed of light in medium X is v. The speed of light in medium Y is

A. $\frac{V_x}{\tan\theta}$

B. $v_x \sin\theta$

C. $v_x \tan\theta$

D. $\frac{V_x}{\sin\theta}$

Answer: D

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40. When a 12000 joule of work is done on a flywheel, its frequency of rotation increases from 10 Hz to 20 Hz. The moment of inertia of flywheel about its axis of rotation is $(\pi^2 = 10)$

A. $1kgm^2$

B. $2kgm^2$

C. $1.688kgm^2$

D. $1.5kgm^2$

Answer: B

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41. A rigid body is rotating with angular velocity 'cd about an axis of rotation. Let 'v' be the linear velocity of particle which is at perpendicular distance 'r' from the axis of rotation. Then the relation $v = r\omega$ implies that

A. ω does not depend on r

B. $\omega \propto \frac{1}{2}$

C. $\omega \propto r$

D. $\omega = 0$

Answer: A

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42. In the given electrical circuit, which one of the following equations is a correct equation?

A. $E_2 - i_2r_2 - E_1 - i_1r_1 = 0$

B. $E_1 - (i_1 + i_2)R + i_1r_1 = 0$

C. $E_1 - (i_1 + i_2)R - i_1r_1 = 0$

D. $-E_2 - (i_1 + i_2)R + i_2r_2 = 0$

Answer: C

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43. The wavelength of maximum intensity of radiation emitted by a star is 289.8 nm . The radiation intensity for the star is : (Stefan's

constant $5.67 \times 10^{-8} Wm^{-2} K^{-4}$, constant $b = 2898 \mu mK$)-

A. $5.67 \times 10^{-12} WM^{-2}$

B. $10.67 \times 10^{14} Wm^{-2}$

C. $5.67 \times 10^{8} Wm^{-2}$

D. $10.67 \times 10^{7} Wm^{-2}$

Answer: C

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44. A lift of mass 'm' is connected to a rope which is moving upward with maximum acceleration 'a'. For maximum safe stress, the elastic limit of the rope is 'T'. The minimum diameter of the rope is

(g = gravitational acceleration)

A. $\left[\frac{6M(g+a)}{\pi S}\right]^{\frac{1}{2}}$

B. $\left[\frac{4m(g+a)}{\pi S}\right]^{\frac{1}{2}}$

C. $\left[\frac{M(g+a)}{\pi S}\right]^{\frac{1}{2}}$

D. $\left[\frac{M(g-a)}{\pi S}\right]^{\frac{1}{2}}$

Answer: C

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45. For balmer series wavelength of first line is λ_1 and for brackett series wavelength of first line is λ_2 then $\frac{\lambda_1}{\lambda_2}$ is

A. 0.162

B. 0.124

C. 0.138

D. 0.188

Answer: A

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46. An alternating voltage is given by $E = 100\sin\left(\omega + \frac{\pi}{6}\right)V$. The voltage will be maximum for the first time when is [T = periodic time)

A. $\frac{T}{12}$

B. $\frac{T}{2}$

C. $\frac{T}{6}$

D. $\frac{T}{3}$

Answer: C

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47. In frequency modulated wave

A. frequency varies with time

B. both frequency and amplitude vary with time

C. amplitude varies with time

D. both frequency and amplitude are constant

Answer: A

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48. In a meter bridge when the resistance in the left gap is 4Ω and an unknown resistance in the right gap the balance point is obtained at $40cm$ from the zero end. On shunting the

unknown resistance with 4Ω, find the shift of the balance point on the bridge wire

A. n series with 9 Ω

B. Parallel to X Ω

C. In series with X Ω

D. Parallel to 9 Ω

Answer: C

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49. The excess of pressure, due to surface tension, on a spherical liquid drop of radius 'R' is proportional to

A. R^{-1}

B. R

C. R^{-2}

D. R^2

Answer: A

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50. P and Q are two non-zero vectors inclined to each other at an angle 'fJ. 'p' and 'q' are unit vectors along P and Q respectively. The component of Q in the direction of Q will be

A. $P.q$

B. $\frac{P \times Q}{P}$

C. $\frac{P.Q}{Q}$

D. $p.q$

Answer: A

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