



PHYSICS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 16

Paper 1 Physics Chemistry

1. Water rises upto height h in a capillary tube of certain diameter. This capillary tube is replaced by similar tube of twice the diameter. Now, the water will rise upto the height of

A. $4h$

B. $3h$

C. $2h$

D. $\frac{1}{2}h$

Answer: D



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2. Vectors which is perpendicular to $(a \cos \theta \hat{i} + b \sin \theta \hat{j})$

is

A. $b \sin \theta \hat{i} - a \cos \theta \hat{j}$

B. $\frac{1}{a} \sin \theta \hat{i} - \frac{1}{b} \cos \theta \hat{j}$

C. $5\hat{k}$

D. All of these

Answer: A

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3. Two trains are moving with equal speed in opposite directions along two parallel railway tracks. If the wind is blowing with speed u along the track so that the relative velocities of the trains with respect to the wind are in the ratio 1 : 2, then the speed of each train must be

A. $3u$

B. $2u$

C. 5 u

D. 4 u

Answer: A



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4. When a body is lifted from surface of earth height equal to radius of earth, then the change in its potential energy is

A. mgR

B. $\frac{3}{2}mgR$

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

D. $\frac{mgR}{4}$

Answer: C



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5. A piston of cross-section area A is fitted in a cylinder in which gas of volume V at pressure p is enclosed. If the gas obeys Boyle's law, then what is the angular frequency, if piston is displaced slightly ?

A. $\sqrt{\frac{Ag}{V}}$

B. $2\sqrt{\frac{Ag}{V}}$

C. $\sqrt{\frac{2Ag}{V}}$

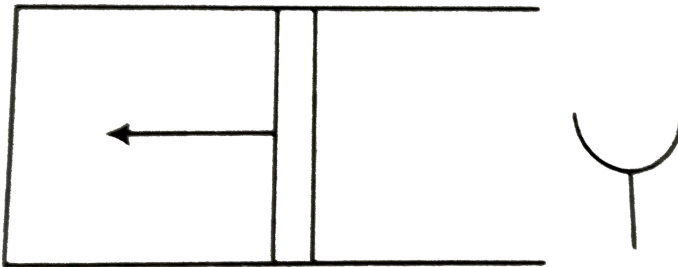
D. $\frac{3Ag}{V}$

Answer: A



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6. A piston fitted in cylindrical pipe, is pulled as shown in the figure. A tuning fork is sounded at open end and loudest sound is heard at open lengths 13 cm, 41 cm and 69 cm, the frequency of tuning fork if velocity of



A. 1250 Hz

B. 625 Hz

C. 417 Hz

D. 715 Hz

Answer: B



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7. Force of 4 N is applied on a body of mass 20 kg. The work done in 3rd second is

A. 2 J

B. 4 J

C. 16 J

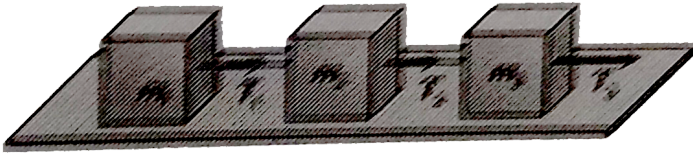
D. 1.2 J

Answer: A



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8. Three blocks of masses m_1 , m_2 and m_3 are connected by massless strings as shown on a frictionless table. They are pulled with a force $T_3 = 40N$. If $m_1 = 10kg$, $m_2 = 6kg$ and $m_3 = 4kg$ the tension T_2 will be



- A. 13 N
- B. 32 N
- C. 25 N
- D. 35 N

Answer: B

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9. A voltmeter has a range $0 - V$ with a series resistance R . With a series resistance $2R$, the range is $0 - V'$. The correct relation between V and V' is

A. $V' < 2V$

B. $V' > 2V$

C. $V' = 2V$

D. $V' = V$

Answer: A



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10. A weightless thread can bear tension upto 3.2 kg weight. A stone of mass 500 g is tied to it and removed in a circular path of radius 4 m in vertical plane. If $g = 10^2 \text{ m/s}^2$, the maximum angular velocity of the stone is

A. 2 rad/s

B. $\sqrt{21}$ rad/s

C. 16 rad/s

D. 4 rad/s

Answer: D



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11. If C be the capacitance and V be the electric potential, then the dimensional formula of CV^2 is

A. $[ML^{-3}TA]$

B. $[M^0LT^{-2}A^0]$

C. $[ML^{-1}T^{-2}A^{-1}]$

D. $[ML^2T^{-2}A^0]$

Answer: D



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12. Induced emf in the coil depends upon

A. conductivity of coil

- B. amount of flux
- C. rate of change of linked flux
- D. resistance of coil

Answer: C



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13. Within depletion region of p-n junction diode.

- A. p-side is positive and n-side is negative
- B. p-side is negative and n-side is positive
- C. Both sides are positive or both negative
- D. Both sides are neutral

Answer: B



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14. 27 small drops each having charge q and radius r coalesce to form big drop. How many times charge and capacitance respectively will become?

- A. 3 and 27
- B. 27 and 3
- C. 27 and 27
- D. 3 and 3

Answer: B



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15. Light of frequency ν falls on material of threshold frequency ν_0 . Maximum kinetic energy of emitted electron is proportional to

A. $\nu - \nu_0$

B. ν

C. $\sqrt{\nu - \nu_0}$

D. ν_0

Answer: A



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16. A wave equation is given by

$$y = 4 \sin \left[\pi \left(\frac{t}{5} - \frac{x}{9} + \frac{1}{6} \right) \right]$$
 where x is in cm and t is in

second. Which of the following is true ?

A. $\lambda = 18\text{cm}$

B. $v = 4 \text{ m/s}$

C. $a = 0.4 \text{ m}$

D. $f = 50 \text{ Hz}$

Answer: A



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17. A metallic rod of length l and cross-sectional area A is made of a material of Young's modulus Y . If the rod is elongated by an amount y , then the work done is proportional to

A. y

B. $1/y$

C. y^2

D. $1/y^2$

Answer: C



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18. A particle executing SHM with time period T and amplitude A . The mean velocity of the particle averaged over quarter oscillation, is

A. $\frac{A}{4T}$

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

C. $\frac{3A}{T}$

D. $\frac{4A}{T}$

Answer: D



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19. Two closed organ pipe A and B have the same length. A is wider than B. They resonate in the fundamental mode at frequencies V_A and V_B respectively , then

A. $V_A = V_B$

B. $V_A > V_B$

C. $V_A < V_B$

D. Either (b) or (c) depending on the ratio of their diameters

Answer: C



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20. A tuning fork of frequency 340Hz is sounded above an organ pipe of length 120cm . Water is now slowly poured in it. The minimum height of water column required for resonance is (speed of sound in air = 340m/s)

A. 45 cm

B. 30 cm

C. 35 cm

D. 25 cm

Answer: A



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21. If two particles performing SHM, are given by,

$$x_1 = 10 \sin[3\pi t + (\pi/4)] \text{ and}$$

$$x_2 = 5[\sin 3\pi t + \sqrt{3} \cos 3\pi t]$$

then the ratio of their amplitudes is

A. 2:1

B. 1:1

C. 1:2

D. $1:\sqrt{2}$

Answer: B



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22. The moment of inertia of a rod about an axis through its centre and perpendicular to it, is $\frac{1}{12}ML^2$ (where, M is the mass and L is length of the rod). The rod is bent in the middle, so that two halves make an angle of 60° . The moment of inertia of the bent rod about the same axis would be

A. $\frac{1}{48}ML^2$

B. $\frac{1}{12}ML^2$

C. $\frac{1}{24}ML^2$

D. $\frac{ML^2}{8\sqrt{3}}$

Answer: B



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23. A boat at anchor is rocked by waves whose crests are 100m apart and whose speed is $25\text{m} / \text{s}$. These waves reach the boat once every :

A. 2500 s

B. 75 s

C. 4 s

D. 0.25 s

Answer: C



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24. In the spectrum of light of a luminous heavenly body the wavelength of a spectral line is measured to be 4747\AA while actual wavelength of the line is 4700\AA . The relative velocity of the heavenly body with respect to earth will be (velocity of light is $3 \times 10^8 m/s$)

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

B. $3 \times 10^5 m/s$

C. $3 \times 10^6 m/s$

D. $2.5 \times 10^6 m/s$

Answer: C



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25. Two parallel large thin metal sheets have equal surface charge densities ($\sigma = 26.4 \times 10^{-12} \text{C}/\text{m}^2$) of opposite signs. The electric field between these sheets is

A. $1.5 \text{N}/\text{C}$

B. $1.5 \times 10^{-10} \text{N}/\text{C}$

C. $3 \text{N}/\text{C}$

D. $3 \times 10^{-10} \text{N}/\text{C}$

Answer: C



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26. The Young's double slit experiment is carried out with light of wavelength 5000\AA . The distance between the slits

is 0.2mm and the screen is at 200cm from the slits. The central maximum is at $y = 0$. The third maximum will be at y equal to

- A. 5 cm
- B. 0.5 m
- C. 1.67 cm
- D. 1.5 cm

Answer: D

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27. The voltage of clouds is $4 \times 10^6\text{V}$ with respect to ground. In a lighting strike lasting 100ms , a charge of 4C

is delivered to the ground. The power of lightning strike is

A. 160 MW

B. 80 MW

C. 20 MW

D. 500 kW

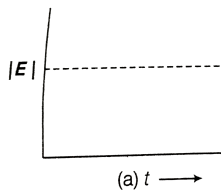
Answer: A



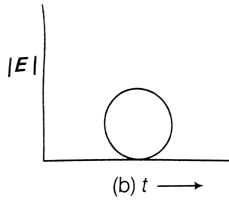
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28. Which of the following diagrams represent the variation of electric field vector with time for a circularly polarised light

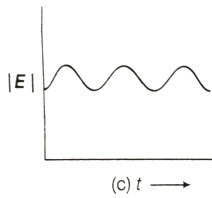
A.



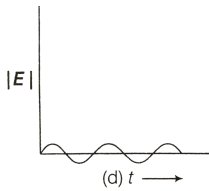
B.



C.



D.

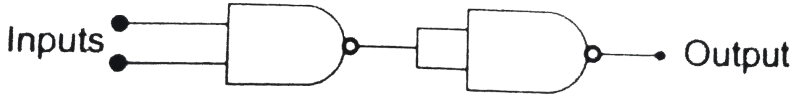


Answer: A



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29. The circuit given below represents which of the logic operations?



A. AND

B. NOT

C. OR

D. NOR

Answer: A



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30. Three objects coloured black, gray and white can withstand hostile conditions upto $2800^{\circ}C$. These objects are thrown into a furnace where each of them attains a temperature of $2000^{\circ}C$. Which object will glow brightest?

- A. The white object
- B. The black object
- C. All glow with equal brightness
- D. The gray object

Answer: B



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31. The measure of the diameter of a cylinder is (1.60 ± 0.01) cm and its length is (5.0 ± 0.1) cm . Calculate the percentage error in its volume .

A. 6 %

B. 3 %

C. 10 %

D. 5 %

Answer: A



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32. A screen is placed 50cm from a single slit, which is illuminated with 6000\AA light. If the distance between the first and third minima in the diffraction pattern is 3.00mm , what is the width of the slit ?

A. $1 \times 10^{-4}\text{m}$

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

C. $0.5 \times 10^{-4}\text{m}$

D. $4 \times 10^{-4}\text{m}$

Answer: B



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33. Two simple harmonic motions of angular frequency 100rads^{-1} and 1000rads^{-1} have the same displacement amplitude. The ratio of their maximum accelerations is

A. $1:10^3$

B. $1:10^4$

C. $1:10$

D. $1:10^2$

Answer: D



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34. A ball whose density is $0.4 \times 10^3 \text{ kg/m}^3$ falls into water from a height of 9 cm. To what depth does the ball sink ?

A. 9 cm

B. 6 cm

C. 4.5 cm

D. 2.25 cm

Answer: B



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35. The first line of the lyman series in a hydrogen spectrum has a wavelength of 1210 \AA . The corresponding

line of a hydrogen like atom of $Z = 11$ is equal to

A. 4000 \AA

B. 100 \AA

C. 40 \AA

D. 10 \AA

Answer: D



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36. The de-Broglie wavelength of an electron in 4th orbit is

(where, r =radius of 1st orbit)

A. $2\pi r$

B. $4\pi r$

C. $8\pi r$

D. $16\pi r$

Answer: C



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37. A wire 3 m is length and 1 mm is diameter at $30^{\circ}C$ is kept in a low temperature at $-170^{\circ}C$ and is stretched by hanging a weight of 10 kg at one end. The change in length of the wire is

[Take,

$$Y = 2 \times 10^{11} N/m^2, g = 10m/s^2 \text{ and } \alpha = 1.2 \times 10^{-5} / ^{\circ}C$$

]

A. 5.2 mm

B. 2.5 mm

C. 52 mm

D. 25 mm

Answer: A



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38. A soap bubble of radius r is blown up to form a bubble of radius $3r$ under isothermal conditions. What is the energy spent in doing so if the surface tension of soap solution is S .

A. $32\pi R^2 T$

B. $24\pi R^2T$

C. $8\pi R^2T$

D. $64\pi R^2T$

Answer: D



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39. A metal plate of area 10^3 cm^2 rests on a layer of oil 6 mm thick. A tangential force of 10^{-2} N is applied on it to move it with a constant velocity of 6 cm s^{-1} . The coefficient of viscosity of the liquid is :-

A. 0.01 poise

B. 0.5 poise

C. 0.7 poise

D. 0.9 poise

Answer: A

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40. Two strings A and B of lengths, $L_A = 80\text{cm}$ and $L_B = x\text{cm}$ respectively are used separately in a sonometer. The ratio of their densities (d_A/d_B) is 0.81. The diameter of B is one-half that of A. If the strings have the same tension and fundamental frequency the value of x is

A. 33

B. 102

C. 144

D. 130

Answer: C



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41. Two cells, having the same emf, are connected in series through an external resistance R . Cells have internal resistance r_1 and r_2 ($r_1 > r_2$) respectively. When the circuit is closed, the potential difference across the first cell is zero the value of R is

A. $r_1 - r_2$

B. $\frac{r_1 + r_2}{2}$

C. $\frac{r_1 - r_2}{2}$

D. $r_1 + r_2$

Answer: A



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42. A bucket full of hot water cools from $75^\circ C$ to $70^\circ C$ in time T_1 , from $70^\circ C$ to $65^\circ C$ in time T_2 and from $65^\circ C$ to $60^\circ C$ in time T_3 , then

A. $t_3 > t_2 > t_1$

B. $t_1 > t_2 = t_3$

C. $t_2 > t_1 = t_3$

D. $t_1 > t_2 > t_3$

Answer: A



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43. A long hollow copper tube carries a current I . Then, which of the following will be true ?

A. The magnetic field B will be zero at all points inside the tube

B. The magnetic field B will be zero only at points on the axis of the tube

C. The magnetic field B will be maximum at points on the axis of the tube

D. The magnetic field will be zero at any point outside the tube

Answer: a

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44. Find the magnetic potential at a point and distance of 1m from the centre of short magnetic dipole of moment $100Am^2$, if line joining point to the centre of dipole makes an angle 60° with the dipole moment vector.

A. $10 \times 10^{-6} J / Am$

B. $2.5 \times 10^{-6} J / Am$

C. $5 \times 10^{-6} J / Am$

D. $0.5 \times 10^{-6} J / Am$

Answer: C



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45. An inductance L and a resistance R are connected in series with a battery of emf ϵ . Find the maximum rate at which the energy is stored in the magnetic field.

A. $\frac{\epsilon^2}{4R}$

B. $\frac{\epsilon^2}{2R}$

C. $\frac{2R}{\epsilon}$

D. $\frac{4R}{\varepsilon}$

Answer: A



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46. Two plane mirrors are inclined to each other such that a ray of light incident on the first mirror and parallel to the second is reflected from the second mirror parallel to the first mirror. Determine the angle between the two mirrors:

A. 30°

B. 45°

C. 60°

D. 75°

Answer: C

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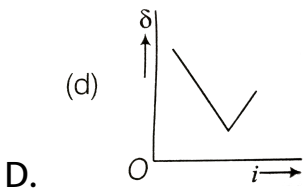
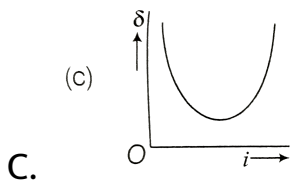
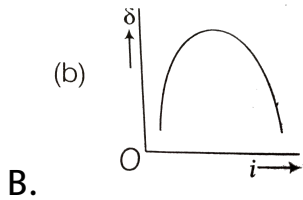
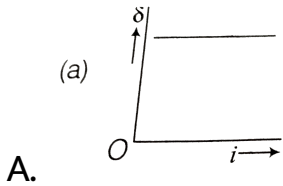
47. A galvanometer has a current sensitivity of 4 div/microampere. If the resistance of the galvanometer is 100Ω , its voltage sensitivity will be

- A. 2×10^3 div/volt
- B. 200 div/volt
- C. 2×10^4 div/volt
- D. 2×10^5 div/volt

Answer: C

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48. The graph between angle of deviation (δ) and angle of incidence (i) for a triangular prism is represented by



Answer: C



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49. The resolving power of a telescope whose lens has a diameter of 1.22 m for a wavelength of 5000\AA is

A. 2×10^5

B. 2×10^6

C. 2×10^2

D. 2×10^4

Answer: B



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50. The magnetic flux ϕ (in weber) in a closed circuit of resistance 10Ω varies with time t (in second) according to equation $\phi = 6t^2 - 5t + 1$. The magnitude of induced current at $t = 0.25$ s is

A. 0.2 A

B. 0.6 A

C. 1.2 A

D. 0.8 A

Answer: A



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