PHYSICS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 09

Paper 1 Physics Chemistry

1. A ball is moving in a circular path of radius 5m. If tangential acceleration at any instant is

10 m/s^2 and the net acceleration makes an angle 30° with the centripetal acceleration, then the instantaneous speed is

A. $50\sqrt{3}m/s$

B. $9.3m/s$

C. $6.6m/s$

D. $5.4m/s$

Answer: B

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2. A wire under certain tension is in unison with a tuning fork when tension in the wire is increased by 2%, 3 beats/second are produced. Find the frequency of tuning fork.

A. 250 Hz

B. 300 Hz

C. 400 Hz

D. 350 Hz

Answer: B

3. The unit of magnetic moment is

A. T/J

B. JT^{-1}

C. A/m^2

D. A/m

Answer: B

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4. In a rectangle $ABCD(BC = 2AB)$. The moment of inertia is minimum along axis through

A. BC

B. BD

C. HF

D. EG

Answer: D

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5. If $n_1, n_2 \text{and} n_3$ are the fundamental frequencies of three segments into which a string is divided, then the original fundamental frequency n of the string is given by

A. $\frac{1}{n} = \frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3}$

B. $\frac{1}{\sqrt{n}} = \frac{1}{\sqrt{n_1} + \frac{1}{\sqrt{n_2} + \frac{1}{\sqrt{n_3}}}}$

C. $\sqrt{n} = \sqrt{n_1} + \sqrt{n_2} + \sqrt{n_3}$

D. $n = n_1 + n_2 + n_3$

Answer: A

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6. If at the same temperature and pressure, the densities of two diatomic gases are d_1 and d_2 respectively. The ratio of mean kinetic energy permolecule of gasses will be

A. $1:1$

B. $d_1:d_2$

C. $\sqrt{d_1}:\sqrt{d_2}$

D. $\sqrt{d_2} : \sqrt{d_1}$

Answer: A

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7. Two coherent sources with intensity ratio α interfere. Then, the ratio $\frac{l_{\max} - l_{\min}}{l_{\max} + l_{\min}}$ is

A. 2α

B. $\frac{2\sqrt{\alpha}}{1+\alpha}$

C. $\frac{2}{1-\alpha}$

D. $\frac{4\sqrt{\alpha}}{1+\alpha}$

Answer: B

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8. Two polaroids are crossed. If one of them is rotated through 30° and unpolarised light of intensity l_0 is incident on the first polaroid, then the intensity of transmitted light will be

A. $\frac{l_0}{4}$

B. $\frac{3l_0}{4}$

C. $\frac{3l_0}{8}$

D. $\frac{l_0}{8}$

Answer: D

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9. An unchanged capacitor with a solid dielectric is connected to a similar air capacitor charged to a potential of V_0. . If the common potential after sharing of charges

becomes V, then the dielectric constant of the dielectric must be

A. V_0 / V

B. V / V_0

C. $(V_0 - V) / V$

D. $(V_0 - V) / V_0$

Answer: C

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10. The inductance of a coil in which a current of 0.2 A is increasing at the rate of 0.5 A/s represents a power flow of 0.5 W is

A. 2 H

B. 5 H

C. 10 H

D. 20 H

Answer: B

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11. The values of two resistors are $R_1 = (6 \pm 0.3)k\Omega$ and $R_2 = (10 \pm 0.2)k\Omega$. The percentage error in the equivalent resistance when they are connected in parallel is

A. 0.05125

B. 0.02

C. 0.03125

D. 0.10125

Answer: D

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12. What is cyclotron frequency of an electron with an energy of 100 eV in the earth's magnetic field of $1 \times 10^{-4} Wb/m^2$ if its velocity is perpedicular to magnetic field.

A. 0.7 MHz

B. 2.1 MHz

C. 1.4 MHz

D. 2.8 MHz

Answer: D

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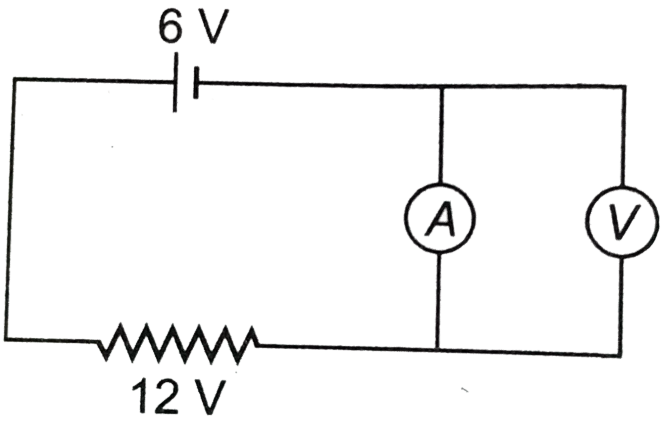
13. In the circuit given below, the ameter and voltmeter are ideal measuring devices. What is the reading of the voltmeter?



A. 6 V

B. 3 V

C. 1.5 V

D. Zero

Answer: D

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14. When the road is dry and the coefficient of friction is μ, the maximum speed of a car in a circular path is 10 m/s. if the road becomes

wet and $\mu' = \frac{\mu}{2}$, what is the maximum speed permitted?

A. 5m/s

B. 10 m/s

C. $10\sqrt{2}m/s$

D. $5\sqrt{2}m/s$

Answer: D

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15. What should be the rate of variation of current in self inductance 1H to generate induced emf equal to 1V?

A. Less than 1 A/s

B. 1 A/s

C. 2 A/s

D. More than 2 A/s

Answer: B

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16. The potential of a large liquid drop when eight liquid drops are combined is 20 V. Then, the potential of each single drop was

A. 10 V

B. 7.5 V

C. 5 V

D. 2.5 V

Answer: C

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17. If the wavelength of incident light changes from 400 nm to 300 nm, the stopping potential for photoelectrons emitted from a surface becomes approximately

A. 1.0 V greater

B. 1.0 V smaller

C. 0.5 V greater

D. 0.5 V smaller

Answer: A

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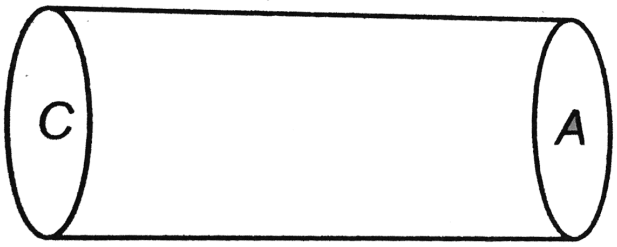
18. A hollow cylinder has a charge qC within it. If ϕ is the electric flux in unit of voltmeter associated with the curved surface B the flux linked with the plance surface A in unit of voltmeter will be



A. $\frac{1}{2}\left(\frac{q}{\varepsilon_0}-\phi\right)$

B. $\frac{q}{2\varepsilon_0}$

C. $\frac{\phi}{3}$

D. $\frac{q}{\varepsilon_0} - \phi$

Answer: A

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19. A point is situated at 6.5 cm and 6.65 cm from two coherent sources. Find the nature of illumination at the point if wavelength of light is 5000 Å.

A. Bright

B. Dark

C. Low bright

D. Low dark

Answer: A

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20. The binding energy of deuteron is 2.2 MeV and that of $._2^4He$ is 28 MeV. If two deuterons

are fused to form one $._{2}^{4}He$, th n the energy released is

A. 25.8 MeV

B. 23.6 MeV

C. 19.2 MeV

D. 30.2 MeV

Answer: B

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21. In an n-p-n transistor, the collector current is 10 mA. If 90% of the electrons emitted reach the collector, then the emitter current will be

A. $l_e = 1mA, l_b = 11mA$

B. $l_e = 11mA, l_b = 1mA$

C. $l_e = -1mA, l_{b0=9mA}$

D. $l_e = 9mA, l_b = 1mA$

Answer: B

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22. Two equal vector have a resultant equal to either of them, then the angle between them will be:

A. 120°

B. 110°

C. 60°

D. 150°

Answer: A

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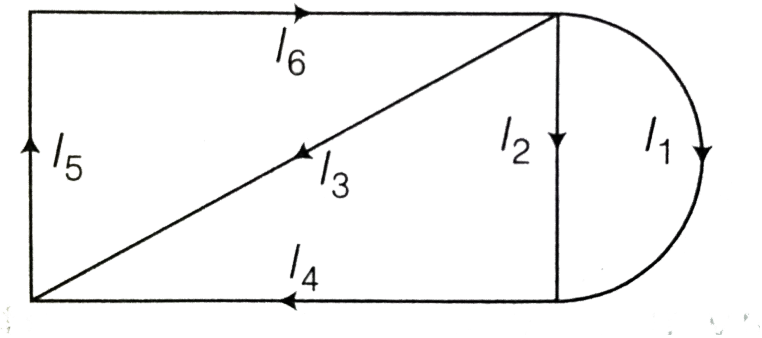
23. In the following network of 5 branches, the respective current are l_1, l_2, l_3 etc. given that $l_1 = -0.5A, l_4 = 1A$ and $l_5 = 0.5A$, the remaining currents are



A. $l_2 = -1.5A, l_3 = 0.5A, l_6 = 0.5A$

B. $l_2 = 1.5A, l_3 = -0.5A, l_6 = 0.5A$

C. $l_2 = 1.5A, l_3 = 0.5A, l_6 = -0.5A$

D. $l_2 = 1.5A, l_3 = 0.5A, l_6 = 0.5A$

Answer: B

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24. Balmer gave an equation for wavelength of visible radiation of H-spectrum as $\lambda = \frac{kn^2}{n^2 - 4}$. The value of k in terms of Rydberg's constant R is m / R, where m is :

A. R

B. 4R

C. R/4

D. 4/R

Answer: D

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25. A radioactive substance has an average life of 5 hours. In a time of 5 hours

A. all active nuclei will decay

B. less than 50% of the active nuclei will decay

C. less than 60% of the active nuclei will decay

D. more than 70% of the active nuclei will decay

Answer: D

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26. A solid sphere of radius R has moment of inertia I about its diameter. What will be moment of inertia of a shell of same mass and same radius about its diameter?

A. $\frac{3}{5}l$

B. $\frac{5}{3}l$

C. $\frac{2}{3}l$

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

Answer: B

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27. If the angle between the vectors A and B is θ, the value of the product (BxA). A is equal to

A. $BA^2 \cos\theta$

B. $BA^2 \sin\theta$

C. $BA^2 \sin\theta \cos\theta$

D. zero

Answer: D

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28. By sucking a straw a student can reduce the pressure in his lungs to $750mm$ of $Hg(\text{density} = 13.6kg/cm^3)$ Using the straw, he can drink water from a glass up to a maximum depth of :

A. 10 cm

B. 75 cm

C. 13.6 cm

D. 1.36 cm

Answer: C

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29. A stretched sonometer wire is in unison with a tuning fork. When length of wire is increase by 1%, the number of beats heard per second is 5. then, the frequency of the fork is

A. 500 Hz

B. 505 Hz

C. 255 Hz

D. 250 Hz

Answer: B

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30. The displacement y in cm is given in terms of time t sec by the equation

$y = 3\sin 314t + 4\cos 314t$

The amplitude of SHM is

A. 7 cm

B. 3 cm

C. 4 cm

D. 5 cm

Answer: D

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31. Two wires of same material of length l and 2l vibrate with frequencies 100 Hz and 150 Hz respectively. The ratio of their tensions is

A. $2:3$

B. $3:2$

C. $1:9$

D. $1:3$

Answer: C

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32. Two solid pieces, one of steel and the other of aluminium when immersed completely in

water have equal weights. When the solid pieces are weighed in air

A. the weight of aluminium is half the weight of steel

B. steel piece will weigh more

C. they have the same weight

D. aluminium piece will weigh more

Answer: A

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33. A galvanometer has a coil of resistance 100Ω and gives a full scale deflection for 30 volt range, the resistance required to be added will be

A. 900Ω

B. 1800Ω

C. 500Ω

D. 1000Ω

Answer: A

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34. If the radius of a potentiometer wire is increased four times, keeping its length constant, then the value of its potential gradient will become

A. half

B. two times

C. four times

D. constant

Answer: D

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35. A very long magneti is placed vertically with one pole on the table. A neutral point was found at 20 cm from the pole. What is the pole strength if the vertical component of earth's field is $0.4 \times 10^{-4} Wb/m^2$?

A. 16 A-m

B. 8 A-m

C. 4 A-m

D. none of the

Answer: A

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36. A single slit of width a is illuminated by violet light of wavelength $400nm$ and the width of the diffraction pattern is measured as y. When half of the slit width is covered and illuminated by yellow light of wavelength $600nm$, the width of the diffraction pattern is

A. the patternn vanishes and the width is zero

B. $\frac{y}{3}$

C. $3y$

D. None of the above

Answer: C

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37. A body of mass m is travelling with a velocity vu. When a constant retarding force F is applied, it comes to rest after travelling a distance s_1. If the initial velocity is 2u with the same force F, the distance travelled before it comes to rest is s_2. then,

A. $s_2 = 4s_1$

B. $2s_2 = 2s_1$

C. $s_2 = \frac{s_1}{2}$

D. $s_2 = s_1$

Answer: A

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38. For a carrier frequency of 100 kHz and a modulating frequency of 5kHz what is the width of AM transmission-

A. 105 kHz

B. 95 kHz

C. 2.5 kHz

D. 10 kHz

Answer: D

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39. A rocket with a lift-off mass $3.5 \times 10^4 kg$ is blasted upwards with an initial acceleration of $10 m / s^2$. Then the initial thrust of the blast is

A. $3.5 \times 10^5 N$

B. $7.0 \times 10^5 N$

C. $14.0 \times 10^5 N$

D. $1.75 \times 10^5 N$

Answer: A

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40. A particle of mass M is situated at the centre of a spherical shell of same mass and radius 'a'. The gravitational potential at a point situated at $\frac{a}{2}$ distance from the centre, will be

A. $-\frac{3GM}{a}$

B. $-\frac{2GM}{a}$

C. $-\frac{GM}{a}$

D. $-\frac{4GM}{a}$

Answer: A

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41. The maimum velocity of a particle, executing SHM with an amplitude 7 mm is 4.4 m/s. the period of oscillation is

A. 0.01s

B. 10s

C. 0.1s

D. 100s

Answer: A

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42. A large glass slabe $(\mu = 5/3)$ of thickness 8cm is placed over a point source of light on a plane surface. It is seen that light emerges out of th etop surface fo the slab from a circular area of radius R cm. What is the value of R?

A. 6 cm

B. 7 cm

C. 8 cm

D. 9 cm

Answer: A

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43. If the work done in stretching a wire by 1 mm is 2J, then work necessary for stretching another wire of same material but with double

radius of corss-section and half the length by 1 mm is

A. 16

B. 8

C. 4

D. $\frac{1}{4}$

Answer: B

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44. A fixed volume of iron is drawn into a wire of length l. The extension produced in this wire by a constant force F is proportional to

A. $\frac{1}{L}$

B. L^2

C. L

D. $\frac{1}{L^2}$

Answer: B

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45. A capillary tube when immersed vertically in a liquid records a rise of 3cm.if the tube is immersed in the liquid at an angle of 60° with the vertical, then find the length of the liqiud column along the tube.

A. 9 cm

B. 6 cm

C. 3 cm

D. 2 cm

Answer: B

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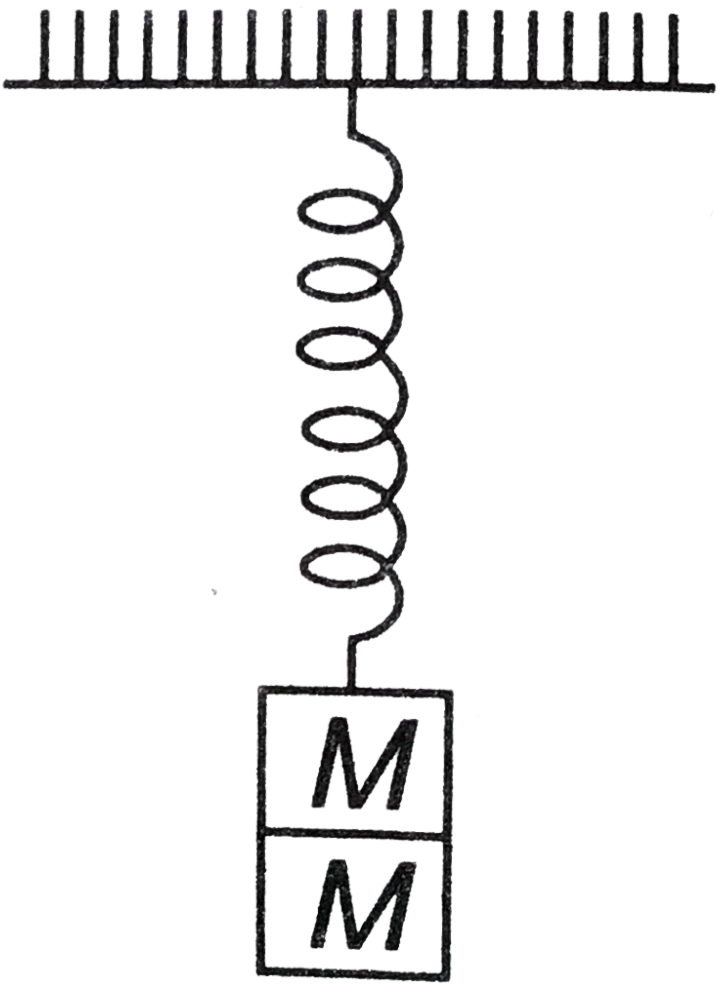

46.

The period of oscillation of a mass M

suspended from a spring of spring constant K is T. the time period of oscillation of combined blocks is

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

B. $\sqrt{2}T$

C. $2T$

D. T/2

Answer: B

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47. Starting from rest , a body slides down at 45° inclined plane in twice the time it takes to slide down the same distance in the absence of friction. The coefficient of friction between the body and the inclined plane is

A. 0.33

B. 0.25

C. 0.75

D. 0.8

Answer: C

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48. The radiation energy density per unit wavelength at a temperature T has a maximum at a wavelength λ_0. At temperature 2T, it will have a maximum wavelength

A. $4\lambda_0$

B. $2\lambda_0$

C. $\frac{\lambda_0}{2}$

D. $\frac{\lambda_0}{4}$

Answer: C

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49. A cup of tea cools from $80^\circ C$ to $60^\circ C$ in one minute. The ambient temperature is $30^\circ C$. In cooling from $60^\circ C$ to $50^\circ C$ it will take

A. 50 s

B. 90 s

C. 60 s

D. 20 s

Answer: A

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50. A condenser of capacity C is charged to a potential difference of V_1. The plates of the condenser are then connected to an ideal inductor of inductance L. The current through the inductor wehnn the potential difference across the condenser reduces to V_2 is

A. $\left(\frac{C(V_1 - V_2)^2}{L}\right)^{\frac{1}{2}}$

B. $\frac{C\left(V_1^2 - V_2^2\right)}{L}$

C. $\frac{C\left(V_1^2 + V_2^2\right)}{L}$

D. $\left(\frac{C\left(V_1^2 - V_2^2\right)}{L}\right)^{\frac{1}{2}}$

Answer: D

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