PHYSICS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 04

Paper 1 Physics Chemistry

1. A 4 kg mass moves on a circular track radius 2 m with 120 rev/min its KE will be

A. 2 J

B. 32 J

C. 80 J

D. 1262 J

Answer: D

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2. Which one of the following is not a unit of young's modulus

A. Nm^{-1}

B. Nm^{-2}

C. Dyne cm^{-2}

D. MPa

Answer: A

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3. A stone is thrown with a velocity less than the escape velocity. The sum of its' KE and PE is

A. positive

B. negative

C. zero

D. may be positive or negative

Answer: B

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4. The dimensions of plank's constant is same as that of

A. angular momentum

B. linear momentum

C. work

D. coefficient of viscosity

Answer: A

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5. Moment of inertia of a body does not depend on

A. mass of the body

B. angular velcoity of the body

C. axis of rotation of the body

D. distribution of the mass of the body

Answer: B

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6. The radius of gyration of a disc of mass 100 g and radius 5 cm about an axis pasing

through centre of gravity and perpendicular to the plane is

A. 3.54 cm

B. 1.54 cm

C. 4.54 cm

D. 2.5 cm

Answer: A

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7. Magnitude of vector which comes on addition of two vectors, $6\hat{i} + 7\hat{j}$ and $3\hat{i} + 4\hat{j}$ is

A. $\sqrt{132}$

B. $\sqrt{136}$

C. $\sqrt{160}$

D. $\sqrt{202}$

Answer: D

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8. The velocity of particle undergoing SHM is v at the mean position. If only amplitude is doubled, the velocity at mean position

A. 2 v

B. 3 v

C. $2\sqrt{2}v$

D. 4 v

Answer: A

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9. Refractive index of glyceric w.r.t. air is 1.4 in glycerin the speed of light will be $\left(c = 3 \times 10^8 m/s\right)$

A. $1.25 \times 10^8 m/s$

B. $2.14 \times 10^8 m/s$

C. $2.5 \times 10^8 m/s$

D. $1.8 \times 10^8 m/s$

Answer: B

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10. Matter shows property of elasticity which has all the three types of elasticity?

A. Gas

B. Liquid

C. Solid

D. All of these

Answer: C

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11. Searle's method is used to determine

A. bulk modulus

B. compressibility

C. density of material

D. young's modulus

Answer: D

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12. A force $\overrightarrow{F} = \left(5\hat{i} + 3\hat{j}\right)N$ is applied over a particle which displaces it from its original position to the point $\overrightarrow{s} = S\left(2\hat{i} - 1\hat{j}\right)m$. The work done on the particle is

A. -7

B. $+7$

C. $+10$

D. $+13$

Answer: B

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13. Water raises to a height of $10cm$ in a capillary tube and mercury falls to a depth of 3.5 cm in the same capillary tube. If the density of mercury is $13.6\frac{gm}{c.c}$ and its angle of contact is 135° and density of water is $1\frac{gm}{c.c}$ and its angle of contact is $0^{\circ C}$ then the ratio of surface tensions of two liquids is $(\cos 135^\circ = 0.7)$

A. $1:14$

B. $5:34$

C. $1:5$

D. $5:25$

Answer: B

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14. A body of mass 10 kg is acted upon by two forces each of magnitude 10 N making an angle of 60° with each other. Find the net acceleration of the body

A. $2\sqrt{3}ms^{-2}$

B. $\sqrt{3}ms^{-2}$

C. $3\sqrt{3}ms^{-2}$

D. $4\sqrt{3}ms^{-2}$

Answer: B

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15. A tuning fork produces 5 beats/sec with a senometer wire of length 78 cm. if the length of the wire is increased by 2 cm, then there is a

resonance between the tuning form and the wire. The frequency of the fork is

A. 195 Hz

B. 190 Hz

C. 200 Hz

D. 180 Hz

Answer: A

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16. A 5000 kg rocket is set of vertical firing. The exhaust speed is $800 \quad ms^{-1}$. To give an initial upward acceleration of $20ms^{-2}$, the amount of gas ejected per second to supply the needed thrust will be (take, $g = 10ms^{-2}$)

A. 127.5 kg s^{-1}

B. 187.5 kg s^{-1}

C. 185.5 kg s^{-1}

D. 137.5 kg s^{-1}

Answer: B

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17. A closed organ pipe emits harmonics in the ratio of

A. $1:5:9$

B. $1:2:3$

C. $1:3:5$

D. None of these

Answer: C

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18. The ratio of the molar specific heats of a gas is 1.41, if the molar specific heat of the gas at constant volume is 4.846 kcal/kmol-K universal gas constant has the value

A. 2.0 kcal/kmol-K

B. 1.98 kcal/kmol-K

C. 8.31 kcal/kmol-K

D. Can't be found

Answer: B

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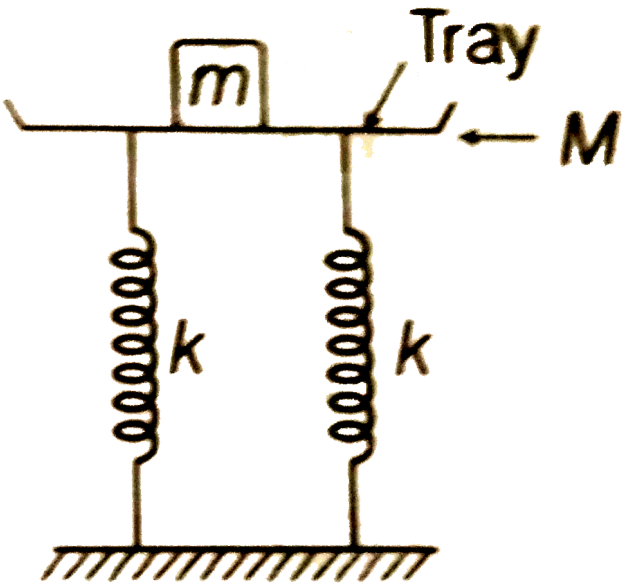

19.

A tray of mass M=10kg is supported on two identical springs, each of spring constant k, as

shown in figure, when the tray is depressed a little and released, it executes simple harmonic motion of period 1.5 s. when a blockof mass m is placed on the tray, the speed of oscillation becomes 3 s. the value of m is

A. 10 kg

B. 20 kg

C. 30 kg

D. 40 kg

Answer: C

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20. A motorcycle is going on an overbridge of radius R. The driver maintains a constant speed. As the motorcycle is ascending on the overbridge, the normal force on it

A. increases

B. decreases

C. remains the same

D. fluctuates

Answer: A

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21. In Melde's experiment the srting vibrates in 4 loops when a 50 g weight is placed on the pan of weight 15 g.How much weight must be added or removed to make the string vibrate in 6 loops ?

A. 28 g

B. 35 g

C. 40 g

D. 42 g

Answer: B

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22. Emissive powerr of a surfac eis maximum when surface is

A. perfectly black

B. smooth

C. shining

D. white

Answer: A

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23. The force of repulsion between two electrons kept at a distance of 1 m is F. if m is the mass of the electron, h is the planck's constant and c is the velocity of light, then the Rydberg's constant of

A. $\frac{F^2 2\pi^2 m}{h^3 c}$

B. $\frac{F 2\pi^2 m}{h^3 c}$

C. $\frac{h^3 c}{F^3 2\pi^2 m}$

D. $\frac{F 2\pi^2 m}{h^2 c}$

Answer: A

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24. A horizontal pipeline carries water in a streamline flow. At a point along the pipe, where the cross- sectional area is $10 cm^2$, the

water velocity is $1ms^{-1}$ and the pressure is 2000 Pa. The pressure of water at another point where the cross-sectional area is $5cm^2$, is.....Pa. (Density of water $= 10^3 kg.\, m^{-3}$)

A. 200 Pa

B. 400 Pa

C. 500 Pa

D. 800 Pa

Answer: C

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25. In the propagation of electromagnetic waves the angle between the direction of propagation and plane of polarisation is

A. 0°

B. 45°

C. 90°

D. 180°

Answer: A

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26. A spring executes SHM with mass off 10 kg attached to it. The force constant of spring is $10N/m$. If at any instant its velocity is 40cm/s , the displacement will be (where amplitude is 0.5m)

A. 0.09 m

B. 0.3 m

C. 0.03 m

D. 0.9 m

Answer: B

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27. For constructive interference to take place between two monochromatic light waves of wavelength λ , the path difference should be

A. $(2n-1)\frac{\lambda}{4}$

B. $(2n-1)\frac{\lambda}{2}$

C. $n\lambda$

D. $(2n+1)\lambda/2$

Answer: C

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28. Interference is possible in

A. all waves

B. transverse waves only

C. logitudinal waves only

D. progressive waves only

Answer: A

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29. The headlights of a truck are 1.22 m apart and light of wavelength 5000 Å is used for the headlights. The pupil of the eye of the obeserver has a diameter of 1 mm. what should be the maximum distance of the truck from observer, so that the headlights are just separated for him?

A. 2 km

B. 1.5 km

C. 3 km

D. 3.5 km

Answer: A

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30. An iron sphere of mass 20×10^{-3} kg falls througha viscous liquid with terminal velcoity 0.5 ms^{-1}. The terminal velocity (in ms^{-1}) of another iron sphere of mass $54 \times 10^{-2} kg$ is

A. 4.5

B. 3.5

C. 2.5

D. 1.5

Answer: A

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31. A conducting sphere of radius 10 cm is given a charge of $+2 \times 10^{-8} C$. What will be its potential?

A. 0.03 kV

B. 0.8 kV

C. 1.8 kV

D. 3.6 kV

Answer: C

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32. Energy stored in two capactiros of capacitance joined in series $8\mu F$ joined in

series when connected with a buffer of emf 500 V is

A. 1 J

B. 0.5 J

C. 1.5 J

D. 2 J

Answer: B

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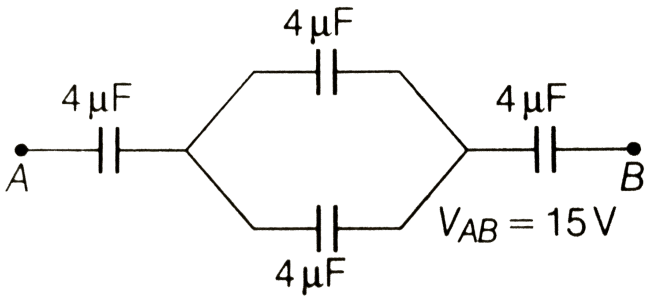
33. For a circuit arrangement shown in figure, energy stored will be



A. 0.54 J

B. 0.36 J

C. 0.24 J

D. 0.18 J

Answer: D

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34. An AC source is in series with R and L. if the respective potetntial drops are 200 V and 150 V, the applied voltage will be

A. 500 V

B. 25 V

C. 250 V

D. 350 V

Answer: C

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35. If in the experiment of Wheatstone's bridge, the positions of cells and galvanometer are interchanged, then balance point will

A. change

B. remain unchanged

C. depends upon internal resistance of cell

D. none of the above

Answer: B

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36. Find the incorrect from the following the equation of a stationary wave is given by $y = 6\cos\left(\frac{\pi x}{5}\right)\sin(4\pi t)$, where y and x are in cm and t is in second. Then, for the stationary wave

A. amplitude=3cm

B. wavelength=5cm

C. frequency=20Hz

D. velocity=2m/s

Answer: B

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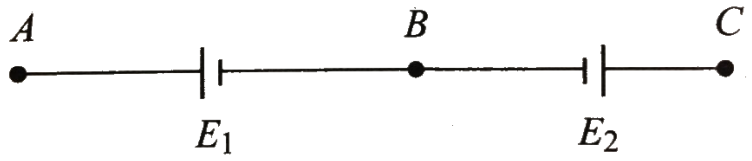
37. Two cells of emfs E_1 and $(E_2(E_1 > E_2)$ are connected as shows in Fig. 6.45.



When a potentiometer is connected between

A and B, the balancing length of the potentiometer wire is $300cm$. On connecting the same potentiometer between A and C, the balancing length is $100cm$. The ratio E_1 / E_2 is

A. $3:1$

B. $1:3$

C. $2:3$

D. $3:2$

Answer: D

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38. An ammeter is always connected is series in a circuit because.....

A. parallel

B. series

C. high voltage line

D. anywhere

Answer: B

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39. What is meant by cyclotron frequency?

A. $v = \frac{\pi m}{qB}$

B. $v = \frac{qB}{2\pi m}$

C. $v = \frac{2\pi m}{qB}$

D. $v = \frac{2\pi m}{3qB}$

Answer: B

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40. For paramagnetic substances permeability is always

A. less than 1

B. equal to 1

C. greater than 1

D. none of these

Answer: C

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41. A concave lens of focal length 20 cm placed in contact with ah plane mirror acts as a convex mirror of focal length

A. 10 cm

B. 40 cm

C. 60 cm

D. 20 cm

Answer: A

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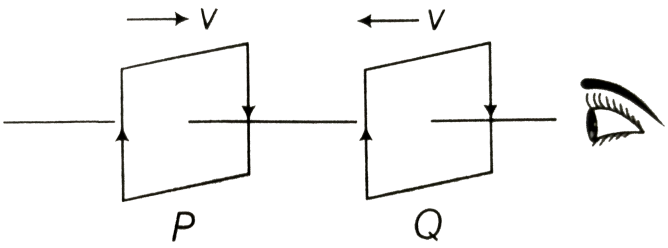
42. Two identical coils, each carrying the same current I in the clockwise direction as shown in fiigure, are moved towards e3ach other with the same speed, then, the current



A. will increase in each loop

B. will decrease in each loop

C. will remain same in each loop

D. will increase in coil A and decrease in the coil

Answer: B

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43. The AC's are given by $l_1 = l_0 \sin \omega t, l_2 = l_0 \cos(\omega t + \phi)$ the ratio of rms values is

A. $1:1$

B. $1:\phi$

C. $1:2$

D. $\phi:1$

Answer: A

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44. A uniform rope of length l lies on a table. If the coefficient of friction is μ, then the maximum length L of the part of this rope

which can overhang from the edge of the table without sliding down is

A. $\frac{l}{\mu}$

B. $\frac{l}{\mu+1}$

C. $\frac{\mu l}{1+\mu}$

D. $\frac{\mu l}{\mu-1}$

Answer: C

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45. 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 $._2^4He$, 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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46. A p-n jucntion when forward biased has a drop of 0.7 V which is assumed to be independent of current. The current in excess of 10 Ma through the diode produces a large joule heating effect which burns the diode. If we want to use 1.6 V battery to forward ibas the diode, the value of resistor used in series with the diode so that the maximum current does not exceed 6 mA should be

A. 50Ω

B. 200Ω

C. 150Ω

D. 250Ω

Answer: C

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47. When a certain metal surface is illuminated wth light of frequency v, the stopping potential for photoelectric current is V_0. When the same surface is illumiinated by light of

frequency $\frac{v}{2}$, the stopping potential is $\frac{V_0}{4}$. The threshold frequency ofr photoelectric emissiohn id

A. $\frac{v}{6}$

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

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

D. $\frac{4v}{3}$

Answer: B

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48. Semiconductor is damaged by the strong current due to

A. lack of free electrons

B. excess of electrons

C. decrease in electrons

D. None of these

Answer: B

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49. A forced oscillator is acted upon by a force, $F = F_0 \sin \omega t$. The amplitude of the oscillator is given by $A = \dfrac{55}{\sqrt{(2\omega^2 - 36\omega + 9)}}$ What is the resonance angular freuqnecy (in rad/s)?

A. 36

B. 18

C. 9

D. 2

Answer: C

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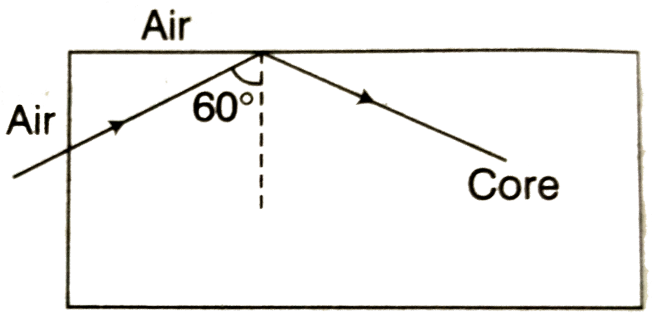
50. A light ray going from air is incident (as shown in figure) at one end of a optical fibre used for communication purpose (refractive index of core $\mu = 1.5$) making an incidence angle of 60° on the lateral surface.



so that it undergoes a total internal reflection.

how much time would it take to traverse the straight fibre of length 1 km?

A. $4.25 \times 10^{-5} s$

B. $3.85 \times 10^{-6} s$

C. $5.77 \times 10^{-6} s$

D. $4.85 \times 10^{-5} s$

Answer: C

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