PHYSICS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 22

Physics Chemistry

1. The wavelength of light coming from a distant galaxy is found to be 0.5% more than

that coming from a source on earth. Calculate the velocity of galaxy.

A. stationary with respect to the earth

B. approaching the earth with velocity of light

C. receding from the earth with velocity of light

D. receding from the earth with a velocty equal to 1.5×10^6 m/s

Answer: D

2. A ball is moving in a circular path of radius 5 m. If tangential acceleration at any instent is m/s^2 and the net acceleration makes an angle $30°$ with the centripetal accelaration, then the instantaneous speed is

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

B. $9.3m/s$

C. $6.6m/s$

D. $5.4 m/s$

Answer: B

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3. The radius of curvature of concave mirror is 24 cm and the image is magnified by 1.5 times. The object distance is

A. 20 cm

B. 8 cm

C. 16 cm

D. 24 cm

Answer: A

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4. The moment of inertia of thin spherical shell of mass M and radius R about a diameter is $\dfrac{2}{3}$ MR. Its radius of gyration K about a tangent will be

A. $\sqrt{\dfrac{2}{3}}R$

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

C. $\dfrac{5}{3}R$

D. $\sqrt{\dfrac{5}{3}}R$

Answer: D

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5. The outer sphere of a spherical air capacitor

is earthed.For increasing its capacitance

A. vacuum is created between two spheres

B. dielectric material is filled between two spheres

C. the space between two spheres is increased

D. the earthing of the outer sphere is removed

Answer: B

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6. A body weighs 200 N at the surface of earth. If it be placed in an artificial satellite revoling at height where jaccelaration due to gravity is half of that at earth's surface. It will weigh

A. 100 N

B. 200 N

C. 400 N

D. zero

Answer: D

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7. The bulk modulus of water is $2.0 \times 10^9 N/m^2$. The pressure required to increase the density of water by 0.1% is

    A. $2 \times 10^9 N/m^2$

    B. $2 \times 10^8 N/m^2$

    C. $2 \times 10^6 N/m^2$

    D. $2 \times 10^4 N/m^2$

Answer: C

8. A simple pendulum is made by attaching a 1 kg bob to a 5 m long copper wire. Its period is T. Now, if 1 kg bob is replaced by 1o kg bob,the period of oscillations

    A. remains T

    B. becomes greater than T

    C. becomes less than T

    D. any of above depends on locality

Answer: B

9. A wire suspended vertically from one of itsends is strached by attached a weight of $200N$ to the lower end . The weight streches the wire by $1mm$. Then the elastic energy stored in the wire is

A. 20 J

B. 0.1 J

C. 0.2J

D. 10 J

Answer: B

10. The focal length of a thin biconex lens is 20 cm. When an object is moved from a distance of 25 cm in front energy stored in the wire is

A. 6

B. 7

C. 8

D. 9

Answer: A

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11. Dimensions of ohm are same as that of

(where h is Planck's constant and e is charge)

A. $\dfrac{h^2}{e^2}$

B. $\dfrac{h^2}{e}$

C. $\dfrac{h}{e^2}$

D. $\dfrac{h}{e}$

Answer: C

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12. Certain neutron stars are believed to be rotating at about $1 rev/\sec$. If such a star has a radius of 20 km , the acceleration of an object on the equator of the star will be

A. $20 \times 10^8 m/s^2$

B. $8 \times 10^5 m/s^2$

C. $120 \times 10^5 m/s^2$

D. $4 \times 10^8 m/s^2$

Answer: B

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13. The length of needle floating on water is

2.5 cm. Calculate the added force required to

pull the needle out of water

$$(T = 7.2 \times 10^{-2} N/m)$$

A. $3.6 \times 10^{-3} \text{N}$

B. $3.4 \times 10^{-10} \text{N}$

C. $3.0 \times 10^{-5} \text{N}$

D. $3.8 \times 10^{-11} \text{N}$

Answer: A

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14. A capillary tube of radius R is immersed in water and water rises in it to a height H . Mass of water in the capillary tube is . M If the radius of the tube is doubled, mass of water that will rise in the capillary tube will now be

A. m

B. 2 m

C. $m/2$

D. 4 m

Answer: B

15. In planetary motion the areal velocity of possition vector of a planet depends of angular velocity (ω) and the distance of the planet from sun (r). If so the correct relation for areal velocity is

A. $\dfrac{dA}{dt} \propto \omega r$

B. $\dfrac{dA}{dt} \propto \omega^2 r$

C. $\dfrac{dA}{dt} \propto \omega r^2$

D. $\dfrac{dA}{dt} \propto wr^2$

Answer: C

16. When a galvanometer is shunted by resistance S, then its current capacity increases n times. If the same galvanometer is shunted by another resistance S', then its current capcity will increase by n' is given by

A. $\dfrac{(n+1)S}{S'}$

B. $\dfrac{S(n-1)+S'}{S'}$

C. $\dfrac{n+S}{S'}$

D. $\dfrac{S(n-1)-S'}{S'}$

Answer: B

17. A metallic solid sphere is rotating about its diameter as axes of rotation. If the temperature is increased by $200^\circ C$, the percentage increase in its moment of inertia is

(Coefficient of linear expansion of the metal

$= 10^{-5}/{}^\circ C$)

A. 0.1 %

B. 0.2 %

C. 0.3 %

D. 0.4 %

Answer: B

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18. In a simple pendulum experiment, the maximum percentage error in the measurement of length is 2% at that in the observation of the time period is 3% then, the maximum percentage error in determination of the acceleration due to gravity g is

A. 5%

B. 6%

C. 7%

D. 8 %

Answer: D

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19. Maximum energy is evolved during which of the following transitions ?

A. n=1 to n=2

B. n=2 to n=6

C. n=2 to n=1

D. n=6 to n=2

Answer: C

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20. The average velocity of the molecules in a gas in equilibrium is

A. proportional to $\sqrt{T}$

B. proportional to T

C. proportional to T^2

D. equal to zero

Answer: D

21. A vessel containing $0.1m^3$ of air at $76cm$ of Hg is connected to an evacuated vessel of capacity $0.09m^3$. The resultant air pressure is:

A. 20 cm of Hg

B. 30 cm of Hg

C. 40 cm of Hg

D. 60 cm of Hg

Answer: C

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22. Two springs of force constants $1000N/m$ and $2000N/m$ are stretched by same force. The ratio of their respective potential enegries is

A. $2:1$

B. $1:2$

C. $4:1$

D. $1:4$

Answer: A

23. 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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24. When LED is forward biased, then

A. electrons from the n-type material cross

   the p-n junction

B. electrons and holes neutralise each

   other

C. at junction electrons and holes remains

   at rest

D. None of the above

Answer: A

25. If there were no gravity, which of the following will not be there for a fluid ?

    A. viscosity

    B. surface tension

    C. Pressure

    D. Archimedes's upward thrust

Answer: D

26. Maximum velocity of photoelectron emitted is $4.8 ms^{-1}$. If e/m ratio of electron is $1.76 \times 10^{11} Ckg^{-1}$, then stopping potential is given by

A. 5×10^{-10} J/C

B. 3×10^{-7} J/C

C. 7×10^{-11} J/C

D. 2.5×10^{2} J/C

Answer: C

27. A copper rod is suspended in a non homogeneous magnetic field region. The rod when in equilibrium will align itself.

A. in the region where magnetic field is strongest

B. in the region where magnetic field is weakest and parallel to direction of

magnetic field there

C. in the direction in which it was originally

suspended

D. in the region where magnetic field is

weakest and perpendicular to be

direction of magnetic field there

Answer: D

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28. A black body of mass 34.38 g and surface area $19.2 cm^2$ is at an intial temperature of 400 K. It is allowed to cool inside an evacuated enclouse kept at constant temperature 300 K. The rate of cooling is $0.04°$ C/s. The specific heat of body is (Stefan's constant $\sigma = 5.73 \times 10^{-8} jm^{-2}K^{-4}$)

    A. $2800 J/kg - K$

    B. $2100 J/kg - K$

    C. $1400 J/kg - K$

D. $1200J/kg - K$

29. A rain drop of radius 0.3 mm falls through air with a terminal viscosity of $1ms^{-1}$. The viscosity of air is 18×10^{-5} poise. The viscous force on the rain drop is

A. 16.95×10^{-9}N

B. $1.695 \times 10^{-9} N$

C. $10.17 \times 10^{-9} N$

D. $101.73 \times 10^{-9} N$

Answer: D

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30. The motion of a particle executing S.H.M. is given by $x = 0.01 \sin 100\pi(t + .05)$, where x is in metres and time is in seconds. The time period is

A. 0.01

B. 0.02

C. 0.1

D. 0.2

Answer: B

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31. What is the area of the plates of a 3 F parallel plate capacitor, if the sepreration between the plates is 5 mm ?

A. $1.694 \times 10^9 m^2$

B. $4.529 \times 10^9 m^2$

C. $9.281 \times 10^9 m^2$

D. $12.981 \times 10^9 m^2$

Answer: A

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32. When a certain volume of water is subjected to 100 kPa pressure , the volume of

water decreases by 0.005 %. The speed of sound in water must be

A. 140 m/s

B. 300 m/s

C. 1400 m/s

D. 5000 m/s

Answer: C

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33. A man stands in a narrow, steep-sided valley. When he shouts he hears two eachoes, one after 1 s and other after 2 s. If the velocity of sound in air is 330 m/s, the width of the valley is

A. 300 m

B. 495 m

C. 600 m

D. 990 m

Answer: B

34. A cylinderical tube open at both ends, has a fundamental frequency f in air. The tube is dipped vertically in water so that half of it is in water. The fundamental frequency of air column is now

A. f/2

B. 3f/4

C. f

D. 2f

Answer: C

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35. The end correction of a resonance tube is

$1cm$. If shortest resonating length is $15cm$,

the next resonating length will be.

A. 31 cm

B. 45 cm

C. 46 cm

D. 47 cm

Answer: D

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36. A 1.5 kg ball drops vertically on a floor hitting with a speed of 25 ms^1. It rebounds with an initial speed of $15ms^{-1}$. If the ball was in contact for only 0.03, the force exerted on the floor by the ball is

A. 2000 N

B. 3000 N

C. 3500 N

D. 4000 N

Answer: A

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37. The de - Broglie wavelength of an electron

having $80ev$ of energy is nearly

$(1eV = 1.6 \times 10^{-19}J,$ Mass   of   electron

$= 9 \times 10^{-31} kg$ Plank's   constant

$= 6.6 \times 10^{-34} J - \sec)$

A. 140Å

B. 0.14Å

C. 14Å

D. 1.4Å

Answer: D

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38. The distance between two coherent sources is 1 mm. The screen is placed at a distance of 1 m from the sources. If the distance of the third bright fringe is 1.2 mm from the central fringe, the wavelength of light used is

A. 4000Å

B. 5000Å

C. 6000Å

D. 7200Å

Answer: A

39. Two polaroids are crossed. If now 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. $\dfrac{l_0}{4}$
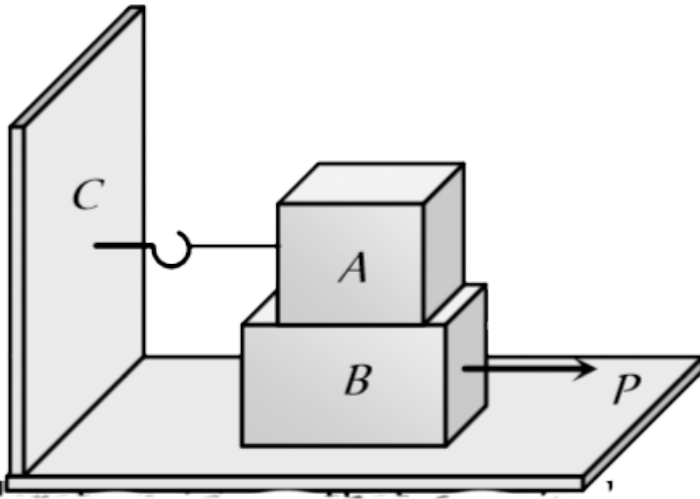
B. $\dfrac{3l_0}{4}$

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

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

Answer: D

40.

Block A weighing 100 kg rests on a block B and

is tied with a horizontal string to the wall at C.

Block B weighs 200 kg. The coefficient of

friction between A and B is 0.25 and between B

and the surface is 1/3. The horizontal force P

necessary to move the block B should be

$(g = 10m/s^2)$

A. 1150 N

B. 1250 N

C. 1300 N

D. 1420 N

Answer: B

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41. The intensity ratio of two coherent sources of light is p. They are interfering in some

region and produce interference patten. Then the fringe visibility is

A. $\dfrac{1 + P}{2\sqrt{P}}$

B. $\dfrac{2\sqrt{P}}{1 + P}$

C. $\dfrac{P}{1 + P}$

D. $\dfrac{2P}{1 + P}$

Answer: B

42. A condenser of capacitance $6\mu F$ was originally charged to 10 V. Now potential difference is made 20 V. The increase in potential energy is

    A. 3×10^{-4}J
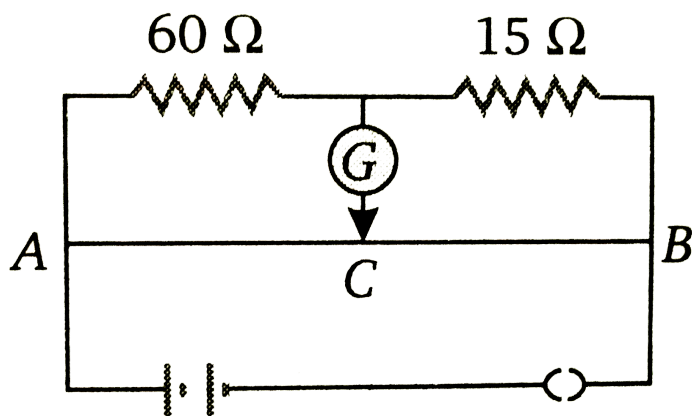
    B. 6×10^{-4}J

    C. 9×10^{-4}J

    D. 12×10^{-4}J

Answer: C

43. If there is no deflection in the galvanometer connected in a circuit shown in figure, then the ratio of lengths AC/CB is

A. $4:1$

B. $1:4$

C. 1 : 1

D. 2 : 1

Answer: A

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44. In moving coil galvanometer, the magnetic field used is

A. non-uniform

B. radial

C. uniform

D. None of these

Answer: B

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45. A particle has an initial velocity $3\hat{i} + 4\hat{j}$ and an accleration of $0.4\hat{i} + 0.3\hat{j}$. Its speed after 10s is

A. 10 unit

B. 7 units

C. $7\sqrt{2}$ units

D. 8.5 units

Answer: C

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46. Calculate the current which will produce a deflection of $30°$ in a tangent galvanometer, if its reduction factor is 3 A.

A. $1.732 A$

B. $0.732 A$

C. $3.732 A$

D. $2.732 A$

Answer: A

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47. Iron is ferromagnetic

A. at all temperatures

B. at NTP only

C. above $770°C$

D. below $770°C$

Answer: D

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48. If A=B+e and the values of A,B and C are 13,12 and 5 respectively, then the angle between A and C will be

A. $\cos^{-1}(5/13)$

B. $\cos^{-1}(13/12)$

C. $\pi/2$

D. $\sin^{-1}(5/12)$

Answer: A

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49. The mutual inductance of an induction coil is 5H . In the primary coil, the current reduces

from 5 A to zero in $10^{-3}s$. What is the induced emf in the secondary coil

A. 2500 V

B. 25000 V

C. 2510 V

D. Zero

Answer: B

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50. The electrical conductivity of a semiconductor increases when electromagnetic radiation of wavelength shorter than $2480nm$ is incident on it. The band gap in (eV) for the semiconductor is.

   A. $0.9eV$

   B. 0.7 eV

   C. 0.5 eV

   D. 1.1 eV

Answer: C

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