PHYSICS

BOOKS - BITSAT GUIDE

QUESTION-PAPERS-2012

Physics

1. A straight wire of mass 200 g and length 1.5 m carries a current of 2A. It is suspended in mid-air by a uniform horizontal magnetic field

B. The magnitude of B (in tesla) is (assume $g = 9.8ms^{-2}$)

A. 2

B. 1.5

C. 0.55

D. 0.65

Answer: D

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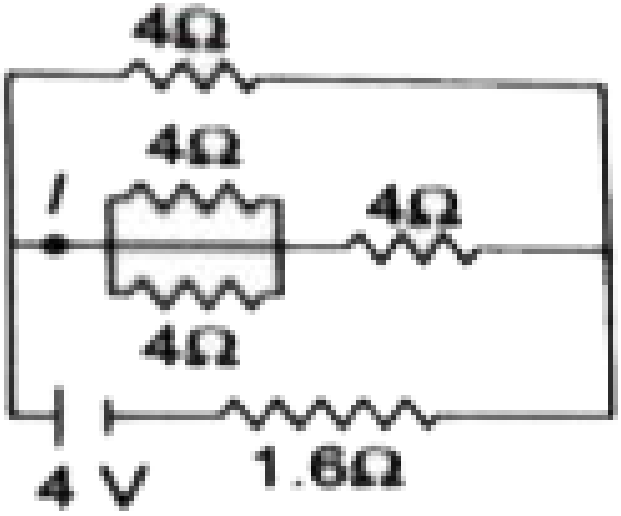
2. In the circuit shown the value of I in ampere is



A. 1

B. 0.60

C. 0.4

D. 1.5

Answer: C

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3. When light of wavelength 300 nm falls on a photoelectric emitter, photoelectrons are liberated. For another emitter, light of wavelength 600 nm is sufficient for liberating photoelectrons. The ratio of the work function of the two emitters is

A. $1:2$

B. $2:1$

C. $4:1$

D. $1:4$

Answer: B

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4. A monatomic gas is suddenly compressed to $\left(\frac{1}{8}\right)$th of its initial volume adiabatically. The ratio of its final pressure to the initial pressure

is (Given, the ratio of the specific heats of the given gas to be 5/3)

A. 32

B. $40/3$

C. $24/5$

D. 8

Answer: A

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5. the intensity of the magnetic induction field at the centre of a single turn circular coil of radius 5 cm carrying current of 0.9 A is

A. $36\pi \times 10^{-7}T$

B. $9\pi \times 10^{-7}T$

C. $36\pi \times 10^{-6}T$

D. $9\pi \times 10^{-6}T$

Answer: A

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6. A capacitor of capacity $0.1\mu F$ connected in series to a resistor of $10M\Omega$ is charged to a certain potential and then made to discharge through resistor. The time in which the potential will take to fall to half its original value is (Given, $\log_{10} 2 = 0.3010$)

A. $2s$

B. $0.693s$

C. $0.5s$

D. $1.0s$

Answer: B

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7. If the force is given by $F = at + bt^2$ with t is time. The dimensions of a and b are

A. $[MLT^{-4}], [MLT^{-2}]$

B. $[MLT^{-3}], [MLT^{-4}]$

C. $[ML^2T^{-3}], [ML^2T^{-2}]$

D. $[ML^2T^{-3}], [ML^3T^{-4}]$

Answer: B

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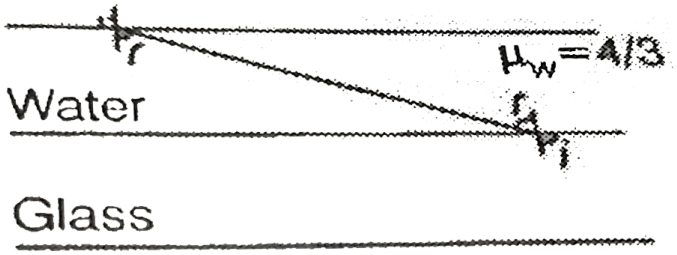
8. A ray of light is incident on the interface between water and glass at an angle i and refracted parallel to the water surface, then value of μ_g will be



A. $(4/3)\sin i$

B. $\frac{1}{\sin i}$

C. $\frac{4}{3}$

D. 1

Answer: B

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9. A body is moved in straight line by constant power of machine. What will be the relation between the travelling distance and time?

A. $S^2 \propto t^3$

B. $S^2 \propto t$

C. $S^3 \propto t^2$

D. $S \propto t^3$

Answer: A

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10. Magnetic moment of bar magnet is M. The work done to turn the magnet by 90° of magnet in direction of magnetic field B will be

A. Zero

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

C. 2 MB

D. MB

Answer: D

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11. Voltage V and current I in AC circuit are given by V =50sin(50 t)volt,I = 50 sin $(50t + \frac{\pi}{3}$

)mA

The power dissipated in the ciruit is

A. 5.0 W

B. 2.5 W

C. 1.25 W

D. zero

Answer: C

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12. A simple wave motion represented by $y = 5\left(\sin 4\pi t + \sqrt{3}\cos 4\pi t\right)$. Its amplitude is

A. 5

B. $5\sqrt{3}$

C. $10\sqrt{3}$

D. 10

Answer: D

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13. A large open tank has two holes in the wall. One is a square hole of side L at a depth y from the top and the other is a circular hole of radius R at a depth 4y from the top. When the tank is completely filled with water, the quantities of water flowing out per second from both holes are the same. Then, R is equal to

A. $\frac{L}{\sqrt{2\pi}}$

B. $2\pi L$

C. $L\sqrt{\frac{2}{\pi}}$

D. $\frac{L}{2\pi}$

Answer: A

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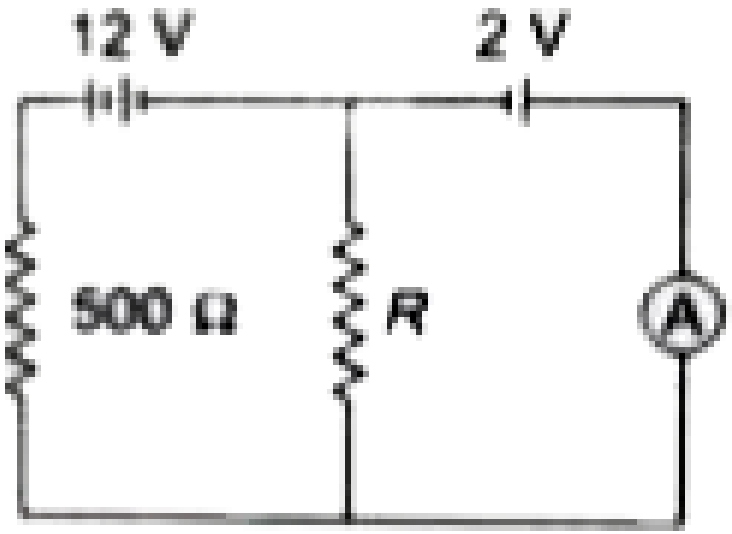
14. In the circuit shown below, the ammeter reading is zero. Then, the value of the

resistance R is



A. 50Ω

B. 100Ω

C. 200Ω

D. 400Ω

Answer: B

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15. The dimensional formula for inductance is

A. $\left[ML^2T^{-2}A^{-2}\right]$

B. $\left[ML^2TA^{-2}\right]$

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

D. $\left[ML^2T^{-2}A^{-2}\right]$

Answer: A

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16. The maximum current that can be measured by a galvanometer of resistance 40Ω is 10 mA . It is converted into a voltmeter that can read upto 50 V . The resistance to be connected in series with the galvanometer is ... (in ohm)

A. 2010

B. 4050

C. 5040

D. 4960

Answer: D

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17. For a given velocity, a projectile has the same range R for two angles of rpojection if t_1 and t_2 are the times of flight in the two cases then

A. $t_1 t_2 \propto R$

B. $t_1 t_2 \propto R^2$

C. $t_2 t_2 \propto \frac{1}{R^2}$

D. $t_1 t_2 \propto \frac{1}{R}$

Answer: A

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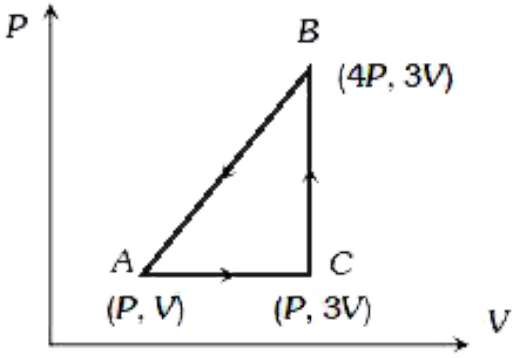
18. A sample of ideal monoatomic gas is taken round the cycle ABCA as shown in the figure.

The work done during the cycle is



A. 3 pV

B. zero

C. 9 pV

D. 6 pV

Answer: A

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19. A sound source is moving towards stationary listener with $\frac{1}{20}$ th of the speed of sound. The ratio of apparent to real frequency is

A. $\left(\frac{9}{10}\right)^2$

B. $\frac{20}{19}$

C. $\frac{11}{10}$

D. $\left(\frac{11}{10}\right)^2$

Answer: B

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20. A satellite is in a circular orbit round the earth at an altitude R above the earth's surface, where R is the radius of the earth. If g is the acceleration due to gravity on the surface of the earth, the speed of the satellite is

A. $\sqrt{2Rg}$

B. $\sqrt{Rg}$

C. $\sqrt{\frac{Rg}{2}}$

D. $\frac{\sqrt{Rg}}{4}$

Answer: C

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21. A 10 kg stone is suspended with a rope of breaking strength 30 kg-wt. The minimum time in which the stone can be raised through a

height 10 m starting from rest is (Take, $g = 10Nkg^{-1}$).

A. 0.5 s

B. 1.0 s

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

D. $2.0s$

Answer: B

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22. How much work must be done by a force on 50 kg body in order to accelerate it from rest to 20m/s in 10s?

A. $10^3 J$

B. $10^4 J$

C. $2 \times 10^3 J$

D. $5 \times 10^4 J$

Answer: B

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23. A and B are two metals with threshold frequencies $1.8 \times 10^{14} Hz$ and $2.2 \times 10^{14} Hz$. Two identical photons of energy 0.825 eV each are incident on them. Then, photoelectrons are emitted by (Taking, $h = 6.6 \times 10^{-34} J - s$)

A. B alone

B. A alone

C. Neither A nor B

D. Both A and B

Answer: B

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24. The square of resultant of two equal forces is three times their product. Angle between the force is

A. π

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

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

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

Answer: D

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25. An object placed on the ground in the stable equilibrium. If the object is given a light push, then initially the position of centre of gravity

A. moves nearer to ground

B. rises higher above the ground

C. Remains as such

D. May remain at same level

Answer: B

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26. The maximum height attained by a projectile when thrown at an angle θ with the horizontal is found to be half the horizontal range. Then θ is equal to

A. $\tan^{-1}(2)$

B. $\frac{\pi}{6}$

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

D. $\tan^{-1}\left(\frac{1}{2}\right)$

Answer: A

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27. A shell of mass $20kg$ at rest explodes into two fragments whose masses are in the ratio $2:3$. The smaller fragment moves with a

velocity of $6m/s$. The kinetic energy of the larger fragment is

A. 96 J

B. 216 J

C. 144 J

D. 360 J

Answer: A

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28. If the displacement of simple pendulum at any time is 0.02 m and acceleration is $2m/s^2$, then in this time angular velocity will be

A. 100 rad/s

B. 10 rad/s

C. 1 rad/s

D. 0.1 rad/s

Answer: B

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29. Which is constant, the earth revolving around the sun ?

A. Angular momentum

B. Linear momentum

C. Rotational kinetic energy

D. Kinetic energy

Answer: A

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30. In non-elastic collision,

A. momentum is conserved

B. energy is conserved

C. momentum and energy are conserved

D. momentum and energy are non-conserved

Answer: D

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31. In the Young's double slit experiment , a mica slip of thickness t and refractive index μ is introduced in the ray from first source S_1 . By how much distance fringes pattern will be displaced ? (d = distance between the slits and D is the distance between slits and screen)

A. $\frac{d}{D}(\mu - 1)t$

B. $\frac{D}{d}(\mu - 1)t$

C. $\frac{d}{(\mu - 1)D}$

D. $\frac{D}{t}(\mu - 1)$

Answer: B

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32. The refractive index of water is 4 / 3 and that of glass is 5/3. What will be the critical angle for the ray of light entering water from the glass

A. $\sin^{-1}\left(\frac{4}{5}\right)$

B. $\sin^{-1}\left(\frac{5}{4}\right)$

C. $\sin^{-1}\left(\frac{1}{2}\right)$

D. $\sin^{-1}\left(\frac{2}{1}\right)$

Answer: A

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33. The produced rays in sonography are

A. microwaves

B. infrared wave

C. sound waves

D. ultra sound

Answer: D

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34. The ratio of secondary and primary turns of step-up transformer is 4 : 1.If a current of 4A is applied to the primary , the induced current in secondary will be

A. $8A$

B. $2A$

C. $1A$

D. $0.5A$

Answer: C

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35. The minimum force required to move a body up on an inclined plane is three times the minimum force required to prevent it from sliding down the plane.If the coefficient of friction between the body and the inclined

plane is $\frac{1}{2\sqrt{3}}$ the angle of the inclined plane is

A. 60°

B. 45°

C. 30°

D. 15°

Answer: C

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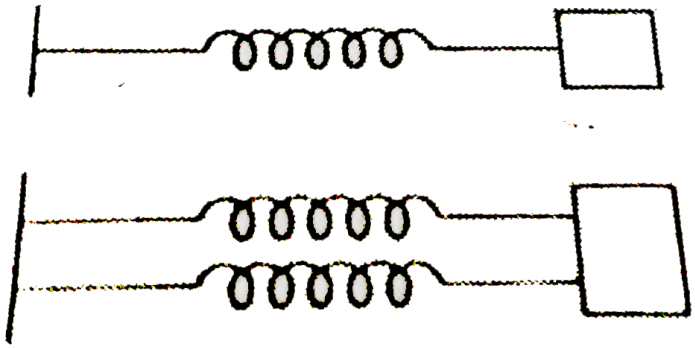
36. If k_s and k_p respectively are effective spring constant in series and parallel combination of springs as shown in figure, find $\frac{k_s}{k_p}$.



A. $\frac{9}{2}$

B. $\frac{3}{7}$

C. $\frac{2}{9}$

D. $\frac{7}{3}$

Answer: C

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37. The power dissipated across resistance R which is connected across a battery of potential V is P. If resistance is doubled, then the power becomes

A. $1/2$

B. 2

C. $1/4$

D. 1

Answer: A

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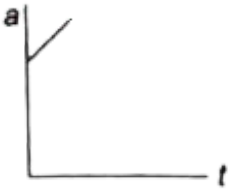
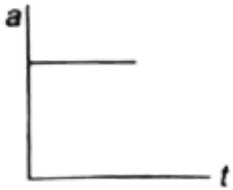
38. A body moves with uniform acceleration, which of the following graph is correct?

A.



B.

C.



D.

Answer: C

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39. The rate at which a black body emits radiation at a temperature T is proportional to

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

B. T

C. T^3

D. T^4

Answer: D

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40. Two equal charges q are kept fixed at $-a$ and $+a$ along the x-axis. A particle of mass m and charge $\frac{q}{2}$ is brought to the origin and given a small displacement along the x-axis, then

A. the particle executes oscillatory motion

B. the particle remains stationary

C. the particle executes SHM along x-axis

D. the particle executes SHM along y-axis

Answer: C

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