PHYSICS

BOOKS - NTA MOCK TESTS

NTA NEET SET 44

Physics

1. The magnetic needle of a vibration magnetometer makes 12 oscillations per minute in the horizontal component of earth's

magnetic field. When an external short bar magnet is placed at some distance along the axis of the needle in the same line it makes 15 oscillations per minute. If the poles of the bar magnet are inter changed, the number of oscillations it takes per minute is

A. $\sqrt{61}$

B. $\sqrt{63}$

C. $\sqrt{65}$

D. $\sqrt{67}$

Answer: B

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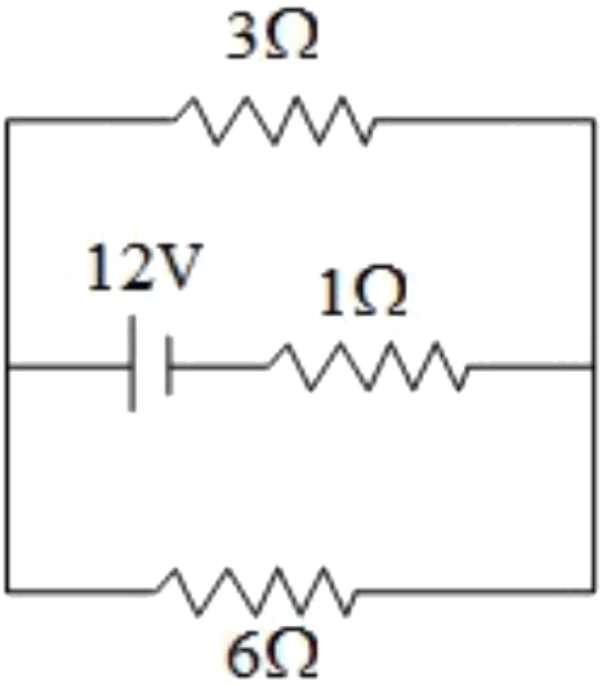
2. The current flowing in 3Ω Resistance will be



A. $\frac{8}{3}$ A

B. $\frac{3}{8}$ A

C. $\frac{1}{8}$ A

D. $\frac{5}{8}$ A

Answer: A

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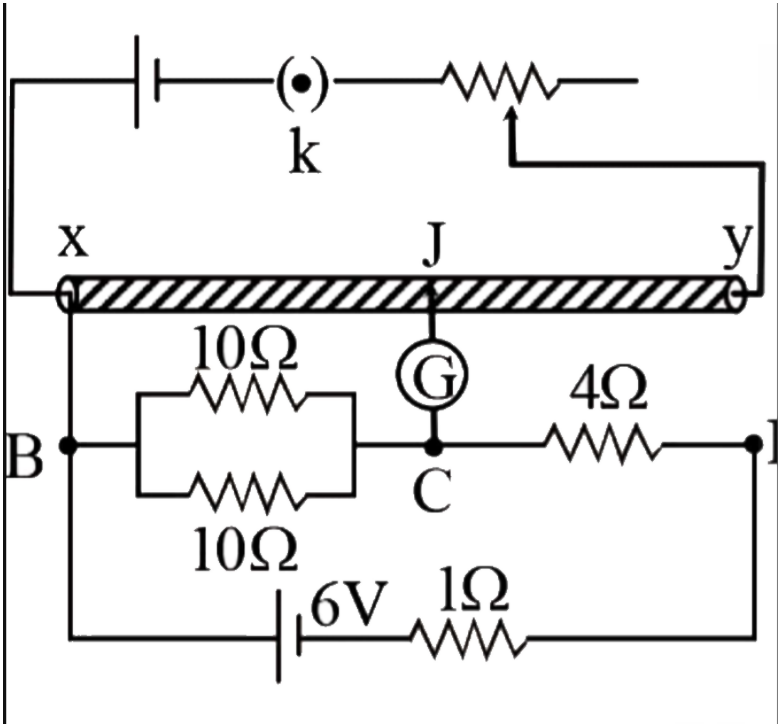
3. If the balance length corresponding to points B and C is 40 cm on the potentiometer wire, the balance length corresponding to

point C and D is



A. 25 cm

B. 32 cm

C. 40 cm

D. 64 cm

Answer: B

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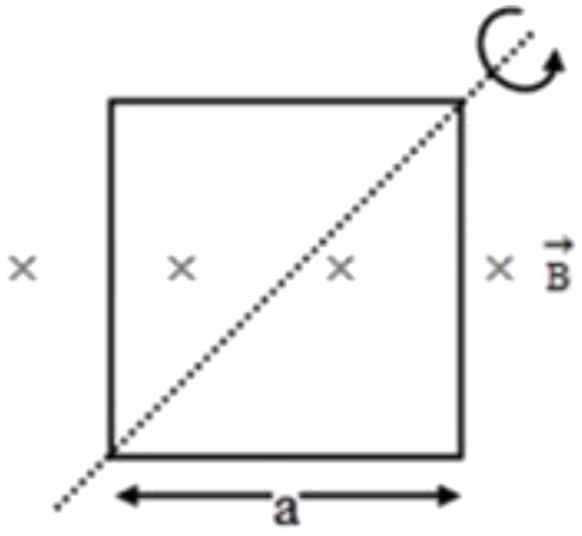
4. A square loop of side a is rotating about its diagonal with angular velocity ω in a perpendicular magnetic field $\overrightarrow{B}$ It has 10

turns. The emf induced is



A. $Ba^2 \sin \omega t$

B. $Ba^2 \cos \omega t$

C. $5\sqrt{2}Ba^2$

D. $10Ba^2\omega \sin \omega t$

Answer: D

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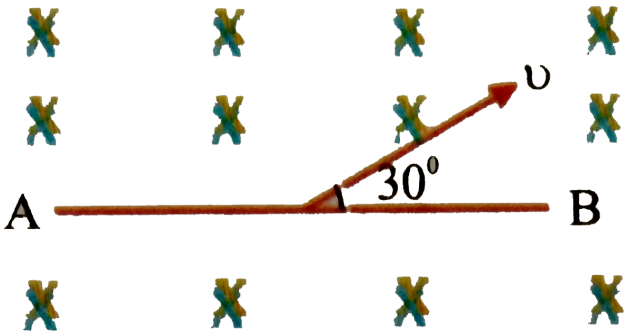
5. A conducitng rod AB of length $l = 1m$ moving at a velcity $v = 4m/s$ making an angle 30° with its length. A uniform magnetic field $B = 2T$ exists in a direction

perpendicular to the plane of motion. Then :



A. $V_A - V_B = 8V$

B. $V_A - V_B = 4V$

C. $V_B - V_B = 8V$

D. $V_B - V_A = 4V$

Answer: B

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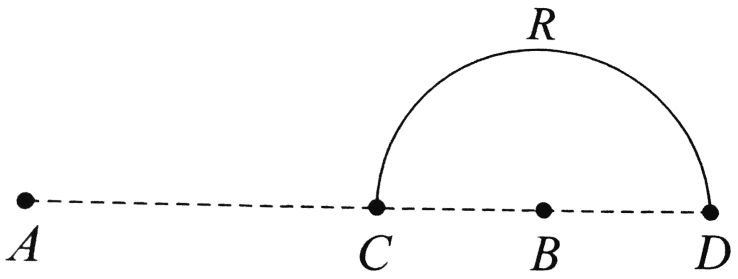
6. Charges $+q$ and $-q$ are placed at points A and B respectively which are a distance $2L$ apart, C is the midpoint between A and B. The work done in moving a charge $+Q$ along the semicircle CRD is



A. $\dfrac{qQ}{2\pi\varepsilon_0 L}$ and infinity

B. $\dfrac{qQ}{6\pi\varepsilon_0 L}$ and zero

C. zero , zero

D. $\frac{-qQ}{6\pi\varepsilon_0 L}$ and zero

Answer: D

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7. The insulated spheres of radii R_1 and R_2 having charges Q_1 and Q_2 respectively are connected to each other. There is

A. no change in the energy of the system

B. an increase in the energy of the system

C. always a decrease in the energy of the system

D. a decrease in energy of the system unless $q_1 R_2 = q_2 R_1$

Answer: D

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8. Four very long straight wires carry equal electric currents in the $+z$ direction. They intersect the xy plane at $(x, y) = (-a, 0), (0, a), (a, 0),$ and $(0, -a)$. The magnetic force exerted on the wire at position $(-a, 0)$ is along

A. $+y - \text{axis}$

B. $-y - \text{axis}$

C. $+x - \text{axis}$

D. $-x - \text{axis}$

Answer: C

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9. A proton, a deuteron and an α-particle with the same KE enter a region of uniform magnetic field, moving at right angles to B. What is the ratio of the radii of their circular paths ?

A. $1:\sqrt{2}:1$

B. $1:\sqrt{2}:\sqrt{2}$

C. $\sqrt{2}:1:1$

D. $\sqrt{2}:\sqrt{2}:1$

Answer: A

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10. The radiation emitted by a star A is 10,000 times that of the sun. If the surface temperatures of the sun and the star A are 6000 K and 2000 K respectively, the ratio of the radii of the star A and the sun is

A. $300:1$

B. $600:1$

C. $900:1$

D. $1200:1$

Answer: C

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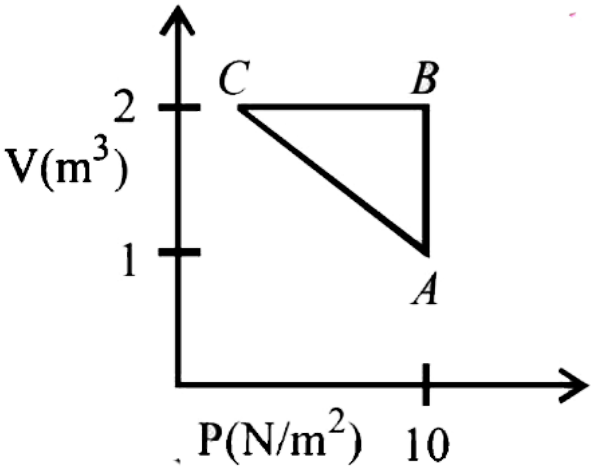
11. An ideal gas is taken through the cycle $A \to B \to C \to A$, as shown in the figure, If the net heat supplied to the gas in the cycle is

5J, the work done by the gas in the process CtoA is



A. $-5J$

B. $-10J$

C. $-15J$

D. $-20J$

Answer: A

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12. A gas mixture consists of 2 moles of oxygen and 4 moles of argon at temperature T. Neglecting all vibrational modes, the total internal energy of the system is

A. 4RT

B. 15RT

C. 9RT

D. 11RT

Answer: D

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13. A gas expands adiabatically at constant pressure such that its temperature $T \propto \frac{1}{\sqrt{V}}$, the value of C_P / C_V of gas is

A. 1.30

B. 1.50

C. 1.67

D. 2.00

Answer: B

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14. If two rods of length L and 2L having coefficients of linear expansion α and 2α respectively are connected so that total length becomes 3L, the average coefficient of linear expansion of the composite rod equals

A. $\frac{3}{2}\alpha$

B. $\frac{5}{2}\alpha$

C. $\frac{5}{3}\alpha$

D. $\frac{5}{3}\alpha$

Answer: C

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15. The steam point and the ice point of a mercury thermometer are marked as 80° and 10°. At what temperature on

centigrade scale the reading of this thermometer will be 59° ?

A. $70^\circ C$

B. $60^\circ C$

C. $80^\circ C$

D. none of these

Answer: A

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16. A wire is 4 m long and has a mass 0.2 kg. The wire is kept horizontally. A transverse pulse is generated by plucking one end of the taut (tight) wire. The pulse makes four trips back and forth along the cord in 0.8 sec. The tension is the cord will be -

A. 80 N

B. 160 N

C. 240 N

D. 320 N

Answer: A

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17. A bus is moving with a velocity $10ms^{-1}$ on a straight road. A scooterist wishes to overtake the bus in $100s$. If the bus is at a distance of $1km$ from the scooterist, with what velocity should the scooterist chase the bus ?

A. $50ms^{-1}$

B. $40ms^{-1}$

C. $30ms^{-1}$

D. $20ms^{-1}$

Answer: D

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18. When a man moves down the inclined plane with a constant speed $5ms^{-1}$ which makes an angle of 37° with the horizontal, he finds that the rain is falling vertically

downward. When he moves up the same inclined plane with the same speed, he finds that the rain makes an angle $\theta = \tan^{-1}\left(\frac{7}{8}\right)$ with the horizontal. The speed of the rain is

A. $\sqrt{116} ms^{-1}$

B. $\sqrt{32} ms^{-1}$

C. $5ms^{-1}$

D. $\sqrt{73} ms^{-1}$

Answer: B

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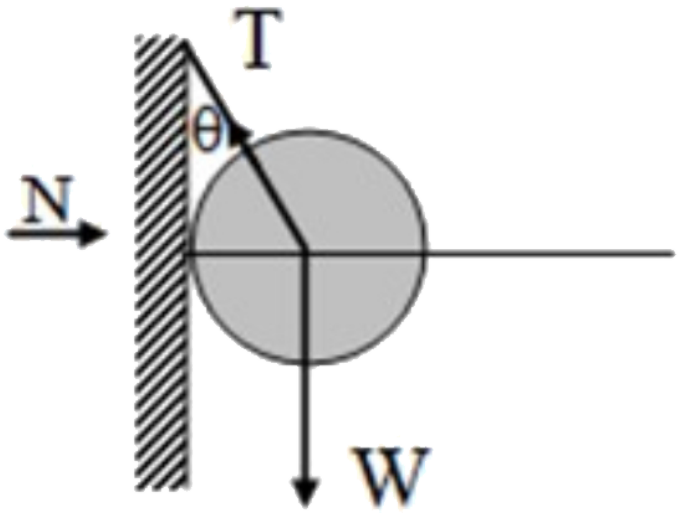
19. A metal sphere is hung by a string fixed to a wall. The forces acting on the sphere are shown in figure. Which of the following statements is/ are correct?



a. $\vec{N} + \vec{T} + \vec{W} = 0$

b. $T^2 = N^2 + W^2$

c. $T = N + W$

d. $N = W \tan \theta$

A. a,b,c

B. b,c,d

C. a,b,d

D. a,b,c,d

Answer: C

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20. A ball falls from a height of 5 m and strikes a lift which is moving in the upward direction with a velocity of $1ms^{-1}$, then the velocity with which the ball rebounds after collision will be

A. $11ms^{-1}$ downwards

B. $12ms^{-1}$ upwards

C. $13ms^{-1}$ upwards

D. $12ms^{-1}$ downwards

Answer: B

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21. A stone of mass 500g is dropped from the top of a tower of 100m height. Simultaneously another stone of mass 1 kg is thrown horizontally with a speed of $10ms^{-1}$ from same point. The height of the centre of mass of the above two stone system after 3 sec is $(g = 10ms^{-2})$

A. 45 m

B. 35 m

C. 55 m

D. none of these

Answer: C

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22. A uniform chain of length L and mass M is lying on a smooth table and one-third of its length is hanging vertically down over the edge of the table. If g is the acceleration due

to gravity, the work required to pull the hanging part on to the table is

A. MgL

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

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

D. $\frac{MgL}{18}$

Answer: D

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23. A body of mass m collides elastically with another body at rest and then continues to move in the original continues to move in the original direction with one half of its original speed. mass of the body is

A. m kg

B. $\frac{2}{3}$ m kg

C. $\frac{m}{3}$ kg

D. $\frac{m}{2}$ kg

Answer: C

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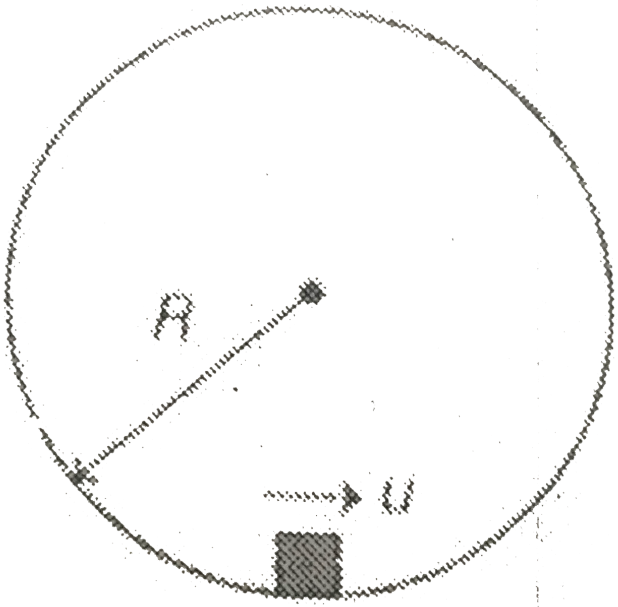
24. A particle is given an initial speed u inside a smooth spherical shell of radius $R = 1$ m such that it is just able to complete the circle. Acceleration of the particle when its velocity is

vertical is



A. $g\sqrt{10}$

B. g

C. $g\sqrt{2}$

D. 3g

Answer: A

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25. A body of mass m is taken from earth surface to the height h equal to radius of earth, the increase in potential energy will be

A. mgR

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

C. 2mgR

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

Answer: B

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26. A geostationary satellite is orbiting the earth at a height of 6R above the surface of the earth, where R is the radius of the earth. The time period of another satellite at a height of 2.5 R from the surface of the earth is ..... hours.

A. $6\sqrt{2}$ hr

B. 6 hr

C. $5\sqrt{2}$ hr

D. 10 hr

Answer: A

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27. A mass M is suspended from a light spring. An additional mass m added to it displaces the spring further by distance x then its time period is

A. $T = 2\pi\sqrt{\frac{mg}{(M+m)X}}$

B. $T = 2\pi\frac{\sqrt{(M+m)X}}{mg}$

C. $T = \frac{\pi}{2}\sqrt{\frac{mg}{(M+m)X}}$

D. $T = 2\pi\sqrt{\frac{M+m}{mgX}}$

Answer: B

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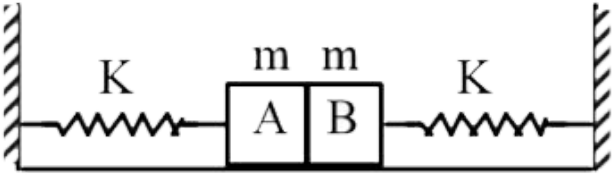
28. Two blocks each of mass m are connected with springs each of force constant K as

shown in fig. The mass A is displaced to the left & B to the right by the same amount and released then the time period of oscillation is -



A. $2\pi\sqrt{\frac{M}{K}}$

B. $2\pi\sqrt{\frac{m}{2K}}$

C. $\pi\sqrt{\frac{m}{K}}$

D. $\pi\sqrt{\frac{m}{2K}}$

Answer: C

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29. A liquid can easily change its shape but a solid can not because

A. the density of a liquid is smaller than that of a solid

B. the forces between the molecules is stronger in solid than in liquids

C. the atoms combine to form bigger molecules in a solid

D. the average separation between the molecules is larger in solids

Answer: B

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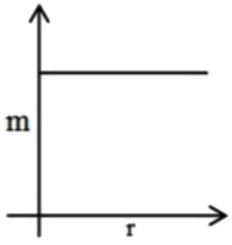
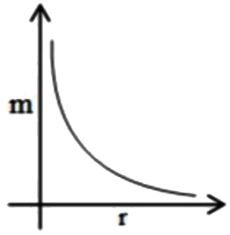
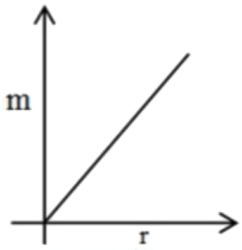
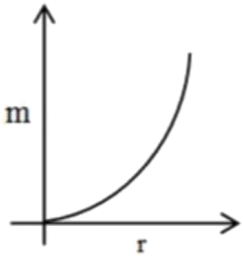
30. The graph between the mass of liquid inside the capillary and radius of capillary is

A. 

B. 

C. 

D. 

Answer: C

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31. For a sphere made out of a certain material, the moment of inertia of the sphere is proportional to [radius of the sphere = R]

A. R^2

B. R^3

C. R^4

D. R^5

Answer: A

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32. A projectile is fired with velocity v_0 at angle 60° with horizontal. At top of its trajectory it explodes into three fragments of equal masses. First fragment retraces the path, second moves vertically upwards with speed $\frac{3v_0}{2}$. Speed of the third fragment is

A. $\frac{3v_0}{2}$

B. $\frac{5v_0}{2}$

C. v_0

D. $2v_0$

Answer: B

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33. A particle moving with a velocity $\frac{1^{th}}{10}$ f that of light will cross a nucleus in about

A. $10^{47}s$

B. 10^{-22} s

C. 10^{-12} s

D. 10^{-8} s

Answer: B

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34. When a hydrogen atom emits a photon in going from n=5 to n=1, its recoil speed is almost

A. $10^{-4}ms^{-1}$

B. $2 \times 10^{-2}ms^{-1}$

C. $4ms^{-1}$

D. $8 \times 10^{2}ms^{-1}$

Answer: C

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35. Consider the nuclear reaction $X^{200} \rightarrow A^{110} + B^{80} + 10n^1$. If the binding energy per nucleon for X, A and B are 7.4 MeV, 8.2 MeV and 8.1 MeV respectively, then the energy released in the reaction:

A. 70 MeV

B. 200 MeV

C. 190 MeV

D. 10 MeV

Answer: A

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36. When photons of energy hv are incident on the surface of photosensitive material of work function hv_0, then

A. the kinetic energy of all emitted electrons is hv_0

B. the kinetic energy of all emitted electrons is $h(v - v_0)$

C. the kinetic energy of all fastest emitted electrons is $h(v - v_0)$

D. the kinetic energy of all emitted electrons is hv

Answer: C

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37. We wish to observe an object which is 2.5Å in size. The minimum energy photon that can be used is

A. 5 keV

B. 8 keV

C. 10 keV

D. 12 keV

Answer: A

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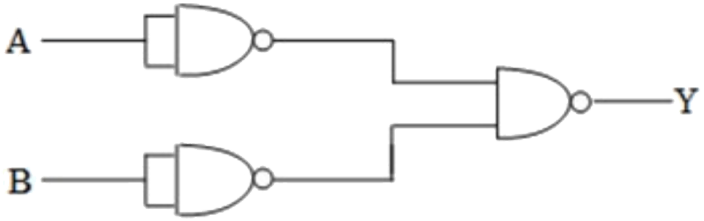
38. Following circuit is equivalent to



A. AND gate

B. OR gate

C. NOT gate

D. X - OR gate

Answer: B

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39. In a transistor

A. emitter is more highly doped than collector

B. collector is more highly doped than emitter

C. both emitter and collector are equally doped

D. none of these

Answer: A

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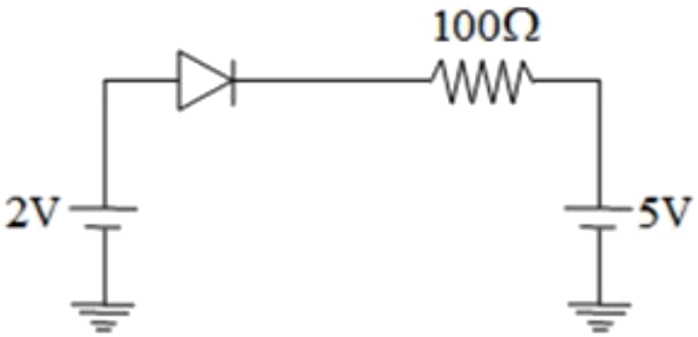
40. Current through the ideal diode is



A. zero

B. 20 A

C. $\frac{1}{20}A$

D. $\frac{1}{50}A$

Answer: A

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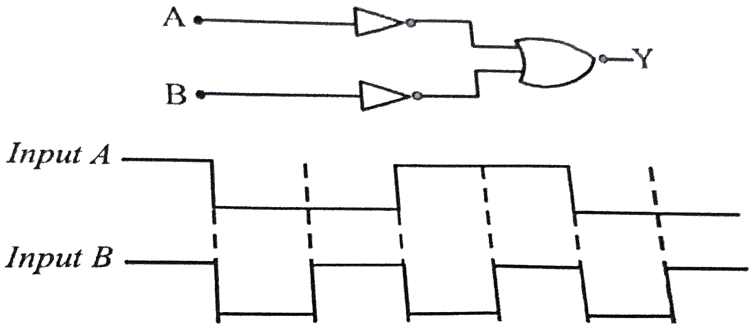
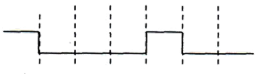
41. The logic circuit shown below has the input waveforms 'A' and 'B' as shown. Pick out the

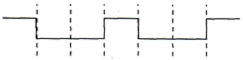
correct output waveform



A. 

B. 

C. 

D. 

Answer: A

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42. A piece of glass is placed on a paper having letters of different colours. The letters of which colour will be raised maximum is

A. red

B. green

C. yellow

D. violet

Answer: D

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43. If the refracting angle of a prism is 60° and the minimum deviation is 30°, then the angle of incidence is

A. 30°

B. 45°

C. 60°

D. 90°

Answer: B

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44. In Davisson-Germer experiment, the correct relation between angle of diffraction ϕ and glancing angle θ is-

A. $\theta = 90^\circ - \frac{\phi}{2}$

B. $\phi = \frac{\theta}{2} - 90^\circ$

C. $\theta = 90^\circ - \phi$

D. $\phi = 90^\circ - \theta$

Answer: A

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45. The maximum intensity in young's double-slit experiment is I_0. Distance between the slit is $d = 5\lambda$, where λ is the wavelength of monochromatic light used in the experiment. What will be the intensity of light in front of one of the slits on a screen at a distance $D = 10d$?

A. $\frac{I_0}{2}$

B. $\frac{3}{4}I_0$

C. I_0

D. $\frac{I_0}{4}$

Answer: A

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