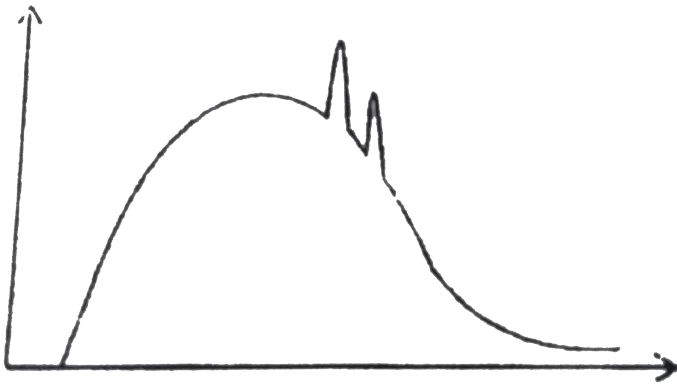# PHYSICS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 86

Physics

1.

A beam of electrons striking a cooper target produces X-rays. Its spectrum is as shown. Keeping the voltage same if the copper target is replaced with a different metal, the cut-off wavelength and characteristic lines of the new spectrum will change in comparison with old as:

A. Cut - off wavelength will remain unchanged while characteristic lines will be different

B. Both cut - off wavelength and characteristic lines will remain unchanged

C. Both cut - off wavelength and characteristic lines will be different

D. Cut - off wavelength will be different while characteristic lines will remain

unchanged

Answer: A

2. A ball falls freely from a height of 45m. When the ball is at a height of 25m, it explodes into two equal piece. One of them moves horizontally with a speed of $10ms^{-1}$. The distance between the two pieces on the ground is

A. 10 m

B. 20 m

C. 15 m

D. 30 m

Answer: B

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3. A particle of mass m moves along the internal smooth surface of a vertical cylinder of the radius R. Find the force with which the

particle acts on the cylinder wall if at the initial moment of time its velocity equals v_0.

And forms an angle α with the horizontal.

A. $\dfrac{mV_0^2}{R}\sin^2\alpha$

B. $\dfrac{mV_0^2}{2R}\cos^2\alpha$

C. $\dfrac{2mV_0^2}{R}\cos^2\alpha$

D. $\dfrac{mV_0^2}{R}\cos^2\alpha$

Answer: D

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4. Two identical metal plates are given poistive charges Q_1 and Q_2 ($< Q_1$) respectively. If they are now brought close together to form a parallel plate capacitor with capacitance C, the potencial difference between them is

A. $\dfrac{Q_1 + Q_2}{2C}$
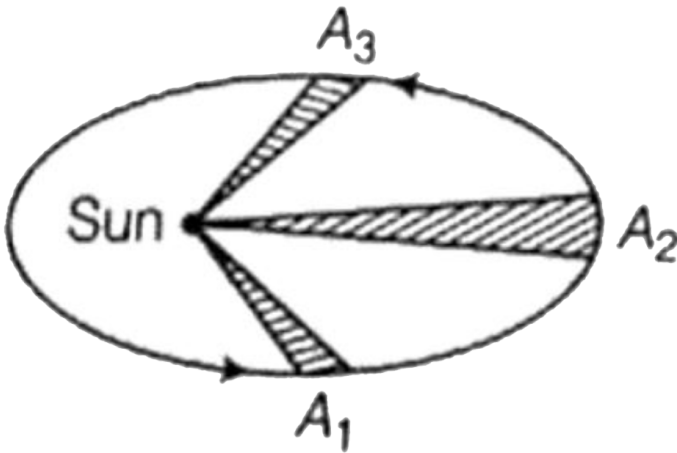
B. $\dfrac{Q_1 + Q_2}{C}$

C. $\dfrac{Q_1 - Q_2}{C}$

D. $\dfrac{Q_1 - Q_2}{2C}$

Answer: D

5. A planet moving around the sun sweeps area A_1 in 2 days, A_2 in 4 days and A_3 in 9 days. Then, relation between them

A. $A_1 = A_2 = A_3$

B. $9A_1 = 3A_2 = 2A_3$
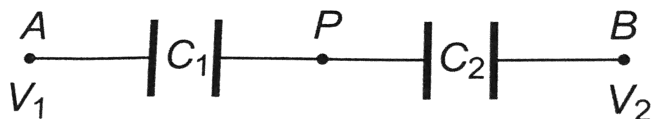
C. $18A_1 = 9A_2 = 4A_3$

D. $3A_1 = 4A_2 = 6A_3$

Answer: C

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6. Two capacitors C_1 and C_2 in a circuit are joined as shown. If $V_A = V_1, V_B = V_2,$ the

potential of point P is

A. $\dfrac{V_1 + V_2}{2}$

B. $\dfrac{C_2 V_1 + C_2 V_2}{C_1 + C_2}$

C. $\dfrac{C_1 V_1 + C_2 V_2}{C_1 + C_2}$

D. $\dfrac{C_2 V_1 + C_1 V_2}{C_1 + C_2}$

Answer: C

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7. A long wire carries a steady curent . It is bent into a circle of one turn and the magnetic field at the centre of the coil is B. It is then bent into a circular loop of n turns. The magnetic field at the centre of the coil will be

A. nB

B. $n^2 B$

C. $3nB$

D. $n^3 B$

Answer: B

8. Two seconds after projection, a projectile is travelling in a direction inclined at $30°$ to the horizontal. After one more second, it is travelling horizontally. Find the magnitude and direction of its velocity.

A. $2\sqrt{2}ms^{-1}$, $60°$

B. $20\sqrt{3}ms^{-1}$, $60°$

C. $6\sqrt{40}ms^{-1}$, $30°$

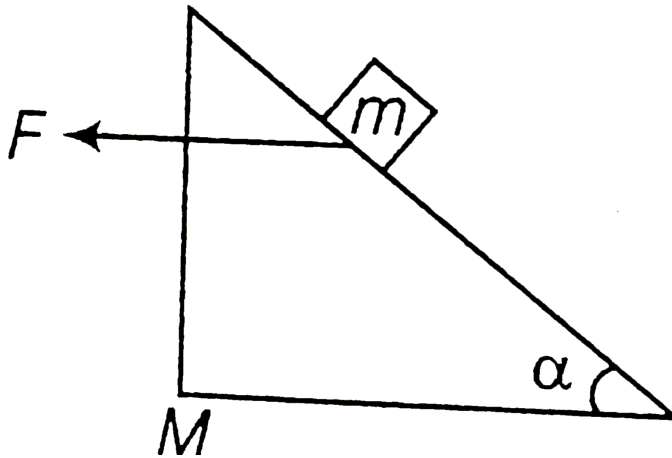D. $40\sqrt{6}ms^{-1}, 30°$

Answer: B

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9. A wooden wedge of mass M and inclination anlgle(α) rest on a smooth floor. A block of mass m is kept on wedge.A force F is applied on the wedge as shown in the figure such that block remains stationary with respect to

wedge So, magnitude of froce F is

A. $(M + m)g\tan\alpha$

B. $g\tan\alpha$

C. $mg\cos\alpha$

D. $(M + m)g\mathrm{cosec}\ \alpha$

Answer: A

10. If a proton and anti-proton come close to each other and annihilate, how much energy will be released ?

A. $3.0 \times 10^{-10} J$

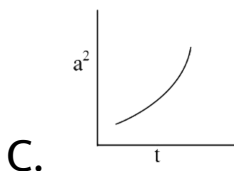B. $28.8 \times 10^{-10} J$
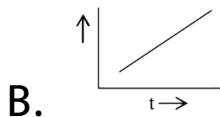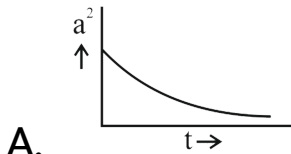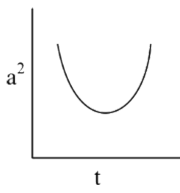
C. $6 \times 10^{-10} J$

D. $9 \times 10^{-10} J$

Answer: A

11. In an experiment , to find the loss of energy with respect to time in case of swinging simple pendulum , the graph between $(amplitude)^2$ and time is

A.

B.

C.

D.

Answer: A

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12. In an experiment on photoelectric emission from a metallic surface ,wavelength of incident light 2×10^{-7} m and stopping potential is 2.5V .The threshold frequency of the metal (in Hz) approximately

(Charge of electrons $e = 1.6 \times 10^{-19}$C,

Planck's constant $h = 6.6 \times 10^{-34} J - s$)

A. 12×10^{15}

B. 9×10^{15}

C. 9×10^{14}

D. 12×10^{13}

Answer: C

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13. The lower end of a glass capillary tube is dipped in water. Water rises to a height of 9 cm. The tube is then broken at a height of 5 cm. the height of the water column and angle of contact will be

A. $5cm$, $\cos^{-1}\left(\dfrac{5}{9}\right)$

B. $4cm$, $\cos^{-1}\left(\dfrac{5}{4}\right)$

C. $5cm$, $\cos^{-1}\left(\dfrac{9}{5}\right)$

D. $5cm$, $\cos^{-1}\left(\dfrac{6}{7}\right)$

Answer: A

14. A small solid sphere of radius r rolls down an incline without slipping which ends into a vertical loop of radius R. Find the height above the base so that it just loops the loop

A. 2.1 R

B. 2.3 R

C. 2.7 R

D. 2.5 R

Answer: C

15. For CE transistor amplifier, the audio signal voltage across the collector resistance of $2k\Omega$ is 4V. If the current amplification factor of the transistor is 100 and the base resistance is $1k\Omega$, then the input signal voltage is

A. 10 mV

B. 20 mV

C. 30 mV

D. 15 mV

Answer: B

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16. A body takes 10 minutes to cool from $60°C$ to $50°C$. The temperature of surroundings is constant at $25°$C. Then, the temperature of the body after next 10 minutes will be approximately

A. $48^\circ C$

B. $46^\circ C$

C. $49^\circ C$

D. $42.85^\circ C$

Answer: D

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17. The potential energy of a particle varies with distance x from a fixed origin as

$$U = \frac{A\sqrt{x}}{x^2 + B},$$ where A and B are dimensional constants , then find the dimensional formula for AB.

A. $\left[ML^{\frac{5}{2}}T^{-2}\right]$

B. $\left[M^1L^2T^{-2}\right]$

C. $\left[M^{\frac{3}{2}}L^{\frac{5}{2}}T^{-2}\right]$

D. $\left[M^1L^{\frac{7}{2}}T^{-2}\right]$

Answer: D

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18. In a double slit experiment, the two slits are 1 mm apart and the screen is placed 1 m away. A monochromatic lightg of wavelength 500 nm is used, what will be the width of each slit for obtaining ten maxima of double slit within the central maxima of single slit pattern ?

    A. 0.2 mm

    B. 0.1 mm

    C. 0.5 mm

    D. 0.02 mm

Answer: A

19. A train moves towards a stationary observer with speed $34m/s$. The train sounds a whistle and its frequency registered by the observer is f_1. If the train's speed is reduced to $17m/s$, the frequency registered is f_2. If the speed of sound of $340m/s$, then the ratio f_1/f_2 is

A. $\dfrac{18}{19}$

B. $\dfrac{1}{2}$

C. 2

D. $\dfrac{19}{18}$

Answer: D

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20. The potential energy of a particle of mass 5 kg moving in the $x - y$ plane is given by $U = (-7x + 24y)J$, where x and y are given

in metre. If the particle starts from rest, from the origin, then the speed of the particle at $t = 2$s is

A. $5ms^{-1}$

B. $14ms^{-1}$

C. $17.5ms^{-1}$

D. $10ms^{-1}$

Answer: D

21. The emf of a cell is 6 V and internal resistance is $0.5k\Omega$. What will be the reading (in volt) of a voltmeter having an internal resistance of $2.5k\Omega$?

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22. Two coils are at fixed location: When coil 1 has no corrent and the current in coil 2 increase at the rate of $15.0As^{-1}$, the emf in coil 1 is $25mV$, when coil 2 has no current and
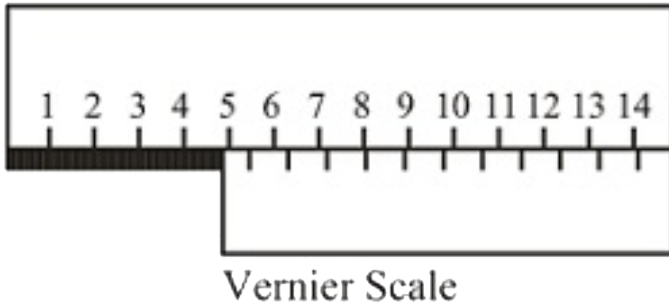
coil 1 has a current of $3.6A$, the flux linkange in coil 2 is

23. Consider the vernier calipers as shown, the instrument has no zero error. What is the length of the rod (in mm) shown, if

$1\,\text{msd} = 1\,\text{mm}$? Use

$7 \, \text{msd} = 8 \, \text{vsd}$.

Vernier Scale

24. Fig. shows a horzontal cylindrical container of length $30cm$, which is partitioned by a tight-fiting separator. The separator is diathermic but conductws heat very slowly. Initially the separator is the state shown in the

figure. The temperature of left part of cylinder is $100K$ and that on right part is $400K$. Initially the separator is in equilibrium. As heat is conducted from right to left part, of separator after a long when gases on the two displacement of separator after a long when gases on the two parts of cylinder are in thermal equilibrium.
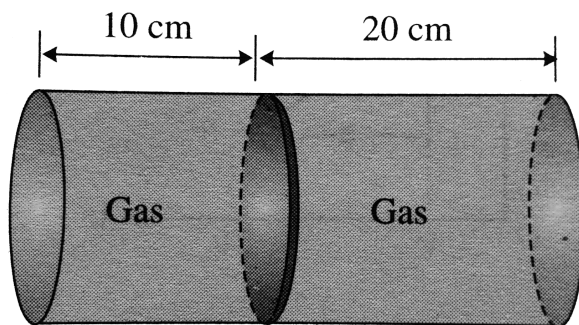
25. A double convex thin lens made of the refractive index 1.6 has radii of curvature 15 cm each. What is the focal length (in cm) of this les when immersed in a fluid of refractive index 1.63?