PHYSICS

BOOKS - KCET PREVIOUS YEAR PAPERS

MODEL TEST PAPER 5

Physics

1. A moving body of mass m and velocity 3 km/hr collides with a rest body of mass 2m and sticks to it. Now the combined mass starts

to move. What will be the velocity of the combined mass ?

A. 3 km/hour

B. 1 km/hour

C. 2 km/hour

D. 4 km/hour

Answer: B

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2. The value of g on the earth's surface is $980 cm/\sec^2$. Its value at a height of 64 km from the earth's surface is

A. $960.40 cm/\sec^2$

B. $982.45 cm/\sec^2$

C. $984.90 cm/\sec^2$

D. $977.5 cm/\sec^2$

Answer: A

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3. A boy on a cycle pedals around a circle of 20 metres radius at a speed of $20\text{metres}/\sec$. The combined mass of the boy and the cycle is 90 kg . The angle that the cycle makes with the vertical so that it may not fall is $(g = 9.8m/\sec^2)$

A. 60.25°

B. 26.12°

C. 63.90°

D. 30.00°

Answer: D

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4. The translational kinetic energy of gas molecules for one mole of the gas is equal to

A. 3/2 RT

B. RT/2

C. 2/3 RT

D. 2/3 KT

Answer: A

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5. Hydra can be

A. Increase in the focal lengthh of eye lens

B. Shortening of eye ball

C. Small eye

D. Elongation of eye ball

Answer: D

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6. The acceleration due to gravity g and mean density of earth ρ are related by which of the following relations ?

(G = gravitational constant and R = radius of earth)

A. $\rho = \left\{\frac{g}{G}\right\} / \left\{\frac{4\pi}{3} R_e\right\}$

B. $\rho = \left\{\frac{g}{G}\right\} \frac{4\pi}{3} R_e^3$

C. $\rho = \left\{\frac{g}{G}\right\} / \left\{\frac{4\pi}{3} R_e^3\right\}$

D. $\rho = \left\{ \frac{g}{G} \right\} \frac{4\pi}{3} R_e^2$

Answer: A

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7. The angular speed of a fly wheel making 120 revolutions / minute is

A. $4\pi^2$ rad/s

B. 2π rad/s

C. 4π rad/s

D. π rad/s

Answer: C

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8. A block rests on a rough inclined plane making an angle of 30° with the horizontal . The coefficient of static friction between the block and the plane is 0.8 If the frictional force on the block is 10 N the mass of the block is

$$(g = 10ms^{-2})$$

A. 10 m

B. 4 m

C. 20/7 m

D. 5 m

Answer: A

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9. The mass of ship is 2×10^7 kg. On applying a force of 25×10^5 N, it is displaced to 25 metres, the speed of ship is

A. 2.5 m.s

B. 5.0 m/s

C. 2.7 m/s

D. 12.5 m/s

Answer: A

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10. A convex lens of focal length f is put in contact with a concave lens of the same focal

length. The equivalent focal length of the combination is :

A. 3/4 f

B. 4f

C. 3/2f

D. 2f

Answer: C

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11. Stationary waves are setup in an air column. Velocity of sound in air is $330ms^{-1}$ and frequency is $165Hz$. The distance between two successive nodes is

A. 2m

B. 0.5m

C. 1m

D. 4m

Answer: A

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12. Frequency of audible sound waves ranges between 20 Hz and 20 KHz. If the velocity of sound in air is 320 m/s, the range of the wavelengths of the sound in air is

A. 0 Hz - 30 KHz

B. 20 KHz-20000 KHz

C. 20 Hz - 20 KHz

D. 20 kHz--20 MHz

Answer: C

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13. What is responsible for the blue colour of the solution of alkali metali in liquid ammonia? Give chemical equation also.

A. Reflection

B. Scattering

C. Dispersion

D. Refraction

Answer: B

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14. A stationary point source of sound emits sound uniformly in all directions in a non absorbing medium. Two points P and Q are at a distance of 4 m and 9 m respectively from the source. The ratio of amplitudes of the waves at P and Q is

A. $1:2$

B. $1:4$

C. $4:1$

D. $2:1$

Answer: D

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15. A train blowing its whistle moves with a constant velocity v away from an observer on the ground. The ratio of the natural frequency of the whistle to that measured by the

observer is found to be 1.2. If the train is not rest and the observer moves away from it at the same velocity, this ratio would be given by

A. 0.51

B. 1.52

C. 1.25

D. 2.05

Answer: C

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16. A plane wave is described by the equation $y = 3\cos\left(\frac{x}{7} - 10t - \frac{\pi}{6}\right)$.

The maximum velocity of the particles of the medium due to this wave is

A. 30

B. $3/4$

C. $3\pi/2$

D. 40

Answer: A

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17. A source of sound S is moving with a velocity 50 m/s towards a stationary observer. The observer measures the frequency of the source as 1000 Hz. What will be the apparent frequency of the source when it is moving away from the observer after crossing him : the velocity of soudn in the medium is 350 m/s

.

A. 750 Hz

B. 1143 Hz

C. 857 Hz

D. 1333 Hz

Answer: A

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18. If velocity of sound waves of 300 Hz frequency is v m/sec, then the velocity of sound wave of 150 hertz frequency is

A. v/2m/sec

B. v/4m/sec

C. v m/sec

D. 2v m/sec

Answer: B

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19. Find the number of beats produced per sec by the vibrations $x_1 = A\sin(320\pi t)$ and $x_2 = A\sin(326\pi t)$.

A. 6

B. 12

C. 3

D. 4

Answer: C

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20. What are photodiodes used for ?

A. Cut off glare

B. Absorb more light than coloured glasses

C. Are light weight

D. Remove the polarization of direct sunlight

Answer: C

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21. To observe diffraction, the size of the obstacle

A. Should be of the same order as wavelength

B. Have no relation to wavelength

C. Should be much larger than the wavelength

D. Should be exactly $\pi / 2$

Answer: C

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22. If two light waves having same frequency have intensity ratio $4:1$ and they interfere, the ratio of maximum to minimum intensity in the pattern will be

A. $9:1$

B. $25:9$

C. $3:1$

D. $16:25$

Answer: A

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23. In Young's double slit experiement when wavelength used is 6000Å and the screen is $40cm$ from the slits, the fringes are $0.012cm$ wide. What is the distance between the slits?

A. 0.024 cm

B. 0.24 cm

C. 2.4 cm

D. 0.2 cm

Answer: D

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24. Dispersive power of prism material is

A. Refractive index

B. Frequency of light

C. Material of prism

D. All of these

Answer: C

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25. The reaction $5^{B^8} \rightarrow 4^{Be^8}$ takes place due to

A. Phase difference

B. Velocity change

C. Amplitude change

D. Intensity

Answer: A

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26. Match the following Column - A and Column - B

A	B
1) Inland fisheries	a) Sahiwal
2) Marine fisheries	b) Aseel
3) Exotic breeds	c) catlas
4) Local breeds	d) Bhetki
5) cross- breeding	e) Brown Swiss

A. $\frac{\varepsilon_0 A}{d} \cdot \frac{K_1 + K_2}{2}$

B. $\frac{2\varepsilon_0 A}{d} \cdot \frac{K_1 + K_2}{K_1 K_2}$

C. $\frac{2\varepsilon_0 A}{d} \cdot \frac{K_1 K_2}{K_1 + K_2}$

D. $\frac{2\varepsilon_0 A}{d} \cdot \frac{1}{K_1 K_2}$

Answer: C

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27. The unit of absolute permittivity is

A. F

B. Fm^{-1}

C. Fm

D. Am^{-2}

Answer: B

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28. The electric intensity at a point distant 1 m from the centre of a sphere of radius 25 cm in air is $10^4 N/C$. The surface density of the charge on the surface of sphere is

A. $1.414 \times 10^{-5} cm^2$

B. $0.1414 \times 10^{-6} cm^2$

C. $14.14 cm^2$

D. $0.1414 \times 10^{-5} cm^2$

Answer: D

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29. A positive charge Q is placed at the centre O of a thin metalic spherical shell. Select the correct statements from the following:

(i) The electric field at any point outside the shell is zero

(ii) The electrostatic potential at any point outside the shell is $\frac{Q}{4\pi\varepsilon_0 r}$, where r is the distance of the point from O

(iii) The outer surface of the spherical shell is an equipotential surface

(iv) The electric field at any point inside the shell , other than O , is zero

A. The electric field at any point outside the shell is zero.

B. The outer surface of the spherical shell is an equi- potential surface

C. The electric potential at any point outside the shell is $Q/(4\pi\varepsilon_0 r)$, where r is the distance of the point from O.

D. Both (b) and (c) are correct.

Answer: D

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30. An e.m.f. of 15 volt is applied in a circuit containing 5 henry inductance and 10 ohm resistance. The ratio of the current at time $t = \infty$ and at $t = 1$ second is

A. $\frac{e^{1/2}}{e^{1/2} - 1}$

B. $1 - e^{-1}$

C. $\frac{e^2}{e^2 - 1}$

D. e^{-1}

Answer: C

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31. Equal charges Q are placed at the four corners A, B, C, D of a square of length a. The magnitude of the force on the charge at B will be

A. $\frac{3q^2}{4\pi\varepsilon_0 a^2}$

B. $\left(\frac{1+2\sqrt{2}}{2}\right)\frac{q^2}{4\pi\varepsilon_0 a^2}$

C. $\frac{4q^2}{4\pi\varepsilon_0 a^2}$

D. $\left(2+\frac{1}{\sqrt{2}}\right)\frac{q^2}{4\pi\varepsilon_0 a^2}$

Answer: B

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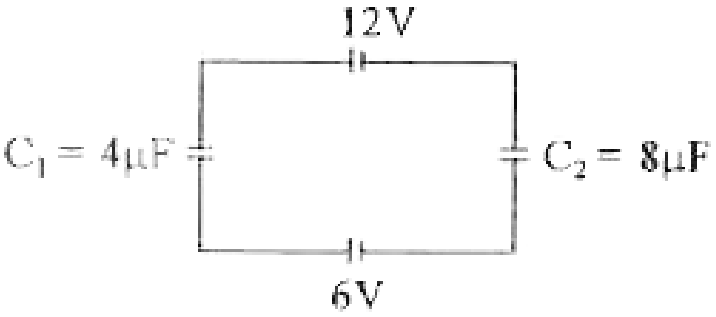
32. In the circuit shown



A. $-2V$

B. 5V

C. 2v

D. $\frac{20}{11}V$

Answer: B

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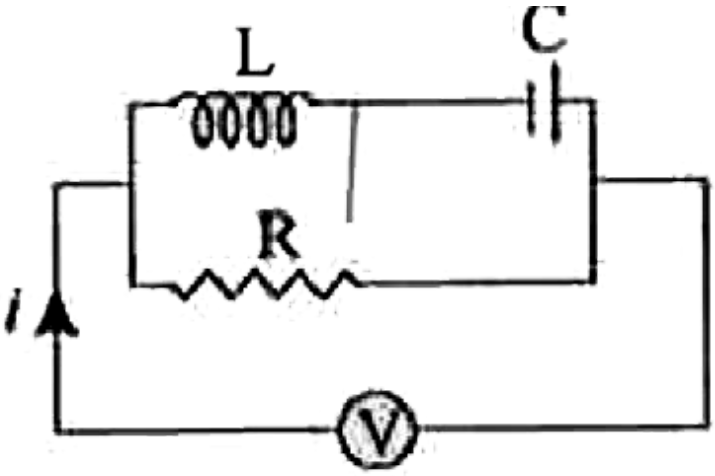
33. In the following circuit in state of resonance, which statement is correct?



A. Power factor is ϕ

B. Maximum current flows in the circuit

C. Minimum current flows in the circuit

D. Value of i depends on the value of L, C, and R.

Answer: C

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34. A bar of diamagnetic substance is placed in a magnetic field with its length making angle 30° with the direction of the magnetic field, the bar behaviour is given by the statement ?

A. Bv/R in anti-clockwise direction

B. 2Bv/R in clockwise direction

C. 2Bv/R in anti-clockwise direction

D. None of these

Answer: A

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35. An electron of mass m and charge e is accelerated from rest through a potential

difference V in vacuum. The final speed of the electron will be

A. $eV/2m$

B. $\sqrt{\left(\frac{2eV}{m}\right)}$

C. eV/m

D. $\sqrt{\left(\frac{eV}{m}\right)}$

Answer: B

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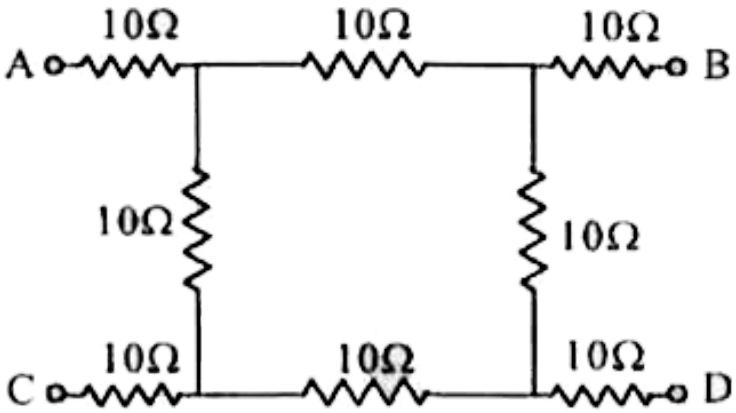
36. What will be the equivalent resistance between the two points A and D?



A. 10Ω

B. 30Ω

C. 20Ω

D. 40Ω

Answer: B

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37. Two very thin metallic wires placed along X and Y axes carry equal currents as shown AB and CD are lines at 45° with the axes having origin at O the magnetic field will be zero on the line

A. AB

B. Segment OB only of line AB

C. CD

D. Segment OC only of line CD

Answer: A

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38. The electrochemical equivalent of magnesium is $0.126mg/C$. A current of 5 A is passed in a suitable solution for 1 hour . The mass of magnesium deposited will be

A. 0.0378 g

B. 0.378 gm

C. 0.277 gm

D. 2.27 gm

Answer: D

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39. Acrolein test is positive for

A. Paramagnetic substances

B. Non-magnetic substances

C. Ferro-magnetic substances

D. None of these

Answer: C

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40. A particle A has chrage $+q$ and a particle B has charge $+4q$ with each of them having the same mass m. When allowed to fall from rest through the same electric potential

difference, the ratio of their speed $\frac{v_A}{v_B}$ will become

A. $2:1$

B. $1:4$

C. $1:2$

D. $4:1$

Answer: C

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41. A solenoid is at potential difference 60 V and current flows through it is 15 ampere , then the resistance of coil will be

A. 4Ω

B. 0.25Ω

C. 8Ω

D. 2Ω

Answer: A

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42. An electron emits energy

A. Because it is in orbit

B. When it escapes from the atom

C. When it falls into the nucleus

D. When it jumps from one energy level to another

Answer: D

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43. Two particles X and Y having equal charges, after being acceleration through the same potential difference, enter a region of uniform magnetic field and describe circular paths of radii R_1 and R_2, respectively. The ratio of the mass of X to that of Y is

A. R_2 / R_1

B. R_1 / R_2

C. $(R_1 / R_2)^2$

D. $(R_1 / R_2)^{1/2}$

Answer: C

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44. In an AC circuit, the current is given by $i = 5\sin\left(100t - \frac{\pi}{2}\right)$ and the AC potential is $V = 200\sin(100t)$volt. Then the power consumption is

A. 1000 watt

B. 2 watt

C. 0 watt

D. 40 watt

Answer: C

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45. Three bulbs of 40 W, 60 W and 100 W are arranged in series with 220 V. The maximum light is obtained from which bulb?

A. 40 W

B. 100 W

C. 60 W

D. equal in all bulbs

Answer: A

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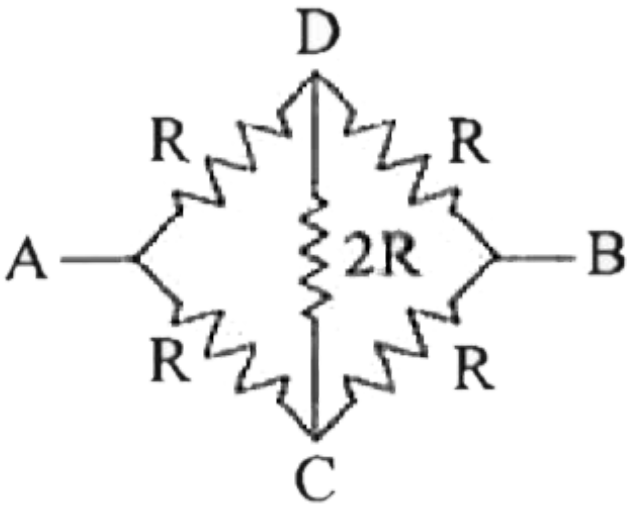
46. Equivalent resistance between A and B in the given circuit will be



A. R

B. R/2

C. 2R

D. 4R

Answer: A

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47. Nuclear forces are

A. Short range and charge dependent

B. Long range and charge dependent

C. Short range and charge independent

D. Long range and charge independent

Answer: C

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48. The first line in the Lyman series has wavelength λ. The wavelegnth of the first line in Balmer series is

A. $27/5\lambda$

B. $9/2\lambda$

C. $5/27\lambda$

D. $2/9\lambda$

Answer: A

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49. $1g$ of hydrogen is converted into $0.993g$ of helium in a thermonuclear reaction. The energy released is.

A. $63 \times 10^7 J$

B. $63 \times 10^{14} J$

C. 63×10^{10} J

D. $63 \times 10^{20} J$

Answer: C

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50. If the kinetic energy of a moving particle is E , then the de-Broglie wavelength is

A. $\lambda = hv(2mE)$

B. $\lambda + \frac{h}{\sqrt{2mE}}$

C. $\lambda = \frac{v2mE}{h}$

D. $\lambda = \frac{hE}{\sqrt{2mE}}$

Answer: B

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51. The mass number of He is 4 and that for suphur is 32. The radius of sulphur nuclei is larger than that of helium by

A. $\sqrt{8}$

B. 2

C. 4

D. 8

Answer: A

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52. If the binding energy per nucleon in Li^7 and He^4 nuclei are respectively $5.60MeV$ and $7.06MeV$. Then energy of reaction $Li^7 + p \rightarrow 2_2He^4$ is.

A. 19.6 MeV

B. 8.4 MeV

C. 2.4 MeV

D. 17.3 MeV

Answer: B

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53. What is the threshold wavelength of a metal if the photoelectric work function of the metal is 5 eV?

A. $249.0 \times 10^{-8} m$

B. 830 Angstrom unit

C. 249 Angstrom unit

D. 2490 Angstrom unit

Answer: D

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54. The same radioactive nucleus may emit

A. All the three α, β and γ radiations simultaneously

B. Only α, β simultaneously

C. Only one α, β or γ at a time

D. All the three α, β and γ one after another

Answer: A

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55. On increases the reverse biase to a large value of in a PN- junction diode, current.

A. Increases slowly

B. Suddenly increases

C. Remains fixed

D. Decreases slowly

Answer: B

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56. In Millikan oil drop experiment, a charged drop of mass $1.8 \times 10^{-14} kg$ is stationary between its plates. The distance between its plates is $0.90 cm$ and potential difference is 2.0 kilo volts. The number of electrons on the drop is

A. 500

B. 5

C. 50

D. 0

Answer: C

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57. Emission of electrons from a metal surface due to incident radiation is called

A. Photo-electric effect

B. Photo-conductivity

C. Thermo-electric effect

D. Doppler's effect

Answer: A

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58. A potential of 1 million volts is applied to an Xray tube. The wavelength of the X-rays produced is

A. 2 Å

B. 0.012 Å

C. 3 Å

D. 0.5 Å

Answer: B

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59. An α-particle having energy = 10 meV collides with a nucleus of atomic number 50. The distance of the closest approach is

A. $1.5 \times 10^{-16} m$

B. 1.5×10^{-19}

C. $1.5 \times 10^{-7} m$

D. 1.5×10^{-12} m

Answer: C

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60. Consider the D–T reaction (deuterium–tritium fusion)

$$_1^2H + _1^3H \rightarrow _2^4He + n$$

(a) Calculate the energy released in MeV in

this reaction from the data:

$m\left({}_{1}^{2}H\right) = 2.014102u$

$m\left({}_{1}^{3}H\right) = 3.016049u$

(b) Consider the radius of both deuterium and tritium to be pproximately 2.0 fm. What is the kinetic energy needed to overcome the coulomb repulsion between the two nuclei? To what temperature must the gas be heated to initiate the reaction? (Hint: Kinetic energy required for one fusion event =average thermal kinetic energy available with the interacting particles = 2(3kT/2), k = Boltzman's constant, T = absolute temperature.)

A. 200 MeV

B. 125 MeV

C. 80 MeV

D. 15 MeV

Answer: C

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