Practice Question Set For A-Level
Subject : Physics
Paper-1 Topic: Particle And Radiation

Merit Minds
www.merit-minds.com
Exam Preparation and Free Resources

Name of the Student:_____
Max. Marks : 18 Marks **Time : 18 Minutes**

Q1.

$^{x}_{81}Tl$ decays to $^{206}_{82}Pb$ by a series of four radioactive decays.

Each decay involves the emission of either a single α particle or a single β^- particle.

What is *x*?

A 207 ⬭
B 209 ⬭
C 210 ⬭
D 212 ⬭

(Total 1 mark)

Q2.

What is the number of up quarks and down quarks in a $^{9}_{4}Be$ nucleus?

	Number of up quarks	Number of down quarks	
A	11	16	⬭
B	13	14	⬭
C	14	13	⬭
D	16	11	⬭

(Total 1 mark)

Q3.

Which decay of a positive kaon (K^+) particle is possible?

A $K^+ \rightarrow \pi^0 + e^+ + \bar{\nu}_e$ ⬭
B $K^+ \rightarrow p + \nu_\mu$ ⬭

Downloaded from www.merit-minds.com

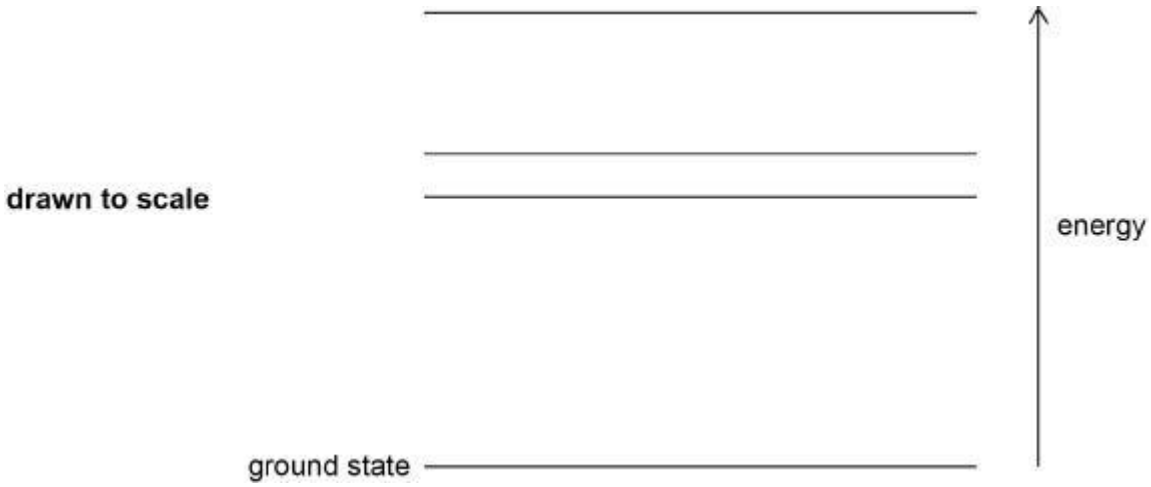
C $K^+ \rightarrow \pi^+ + \pi^+ + \pi^0$ ⬭

D $K^+ \rightarrow \mu^+ + \nu_\mu$ ⬭

(Total 1 mark)

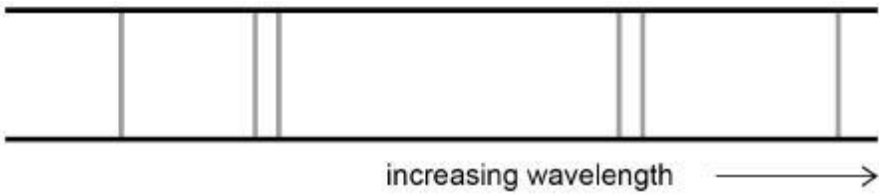
Q4.

The diagram shows four energy levels of an atom drawn to scale. These energy levels give rise to part of an emission spectrum.



Which pattern of lines will be observed from these energy levels?

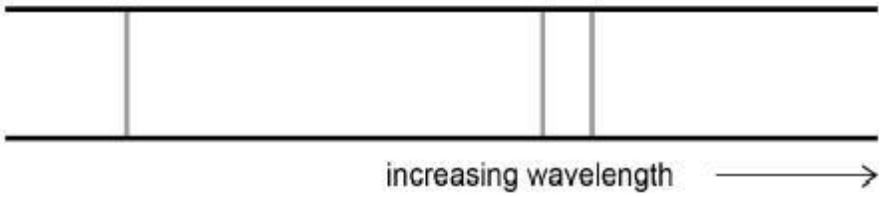
A ⬭



B ⬭



C ⬭



D ⬭



(Total 1 mark)

Q5.

A particle has a kinetic energy of E_k and a de Broglie wavelength of λ.

Downloaded from www.merit-minds.com

What is the de Broglie wavelength when the particle has a kinetic energy of $4E_k$?

A $\frac{\lambda}{2}$ ○

B $\frac{\lambda}{\sqrt{2}}$ ○

C $\sqrt{2}\lambda$ ○

D 2λ ○

(Total 1 mark)

Q6.

A photon has energy of 1×10^{18} eV.
An object of mass 0.03 kg has kinetic energy equal to the energy of the photon.

What is the speed of the object?

A 1 m s^{-1} ○

B 3 m s^{-1} ○

C 10 m s^{-1} ○

D 30 m s^{-1} ○

(Total 1 mark)

Q7.

The radioactive nuclide $^{232}_{90}\text{Th}$ decays by one α emission followed by two β^- emissions.

Which nuclide is formed as a result of these decays?

A $^{238}_{92}\text{U}$ ○

B $^{230}_{90}\text{Th}$ ○

C $^{228}_{90}\text{Th}$ ○

D $^{228}_{88}\text{Rn}$ ○

(Total 1 mark)

Q8.

An electron collides with an isolated atom and raises an atomic electron to a higher energy level.

Which statement is correct?

A The colliding electron is captured by the nucleus of the atom. ○

Downloaded from www.merit-minds.com

B A photon is emitted when the electron rises to the higher energy level. ⬭

C An electron is emitted when the excited electron returns to the ground state. ⬭

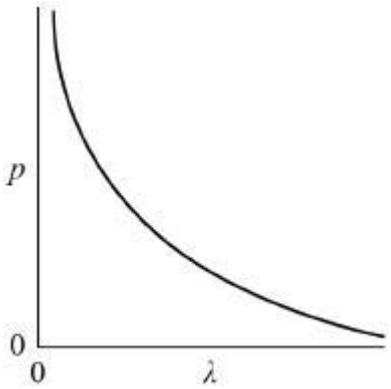
D The colliding electron transfers energy to the atomic electron. ⬭

(Total 1 mark)

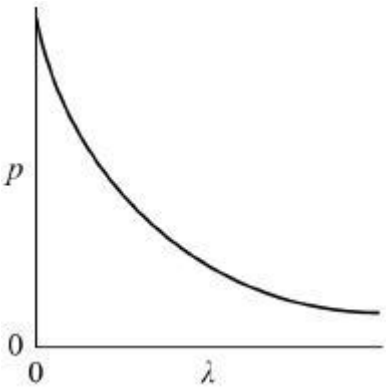
Q9.

Which graph shows the variation of momentum p with wavelength λ of a photon?

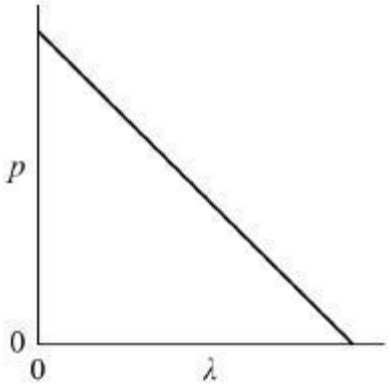
A



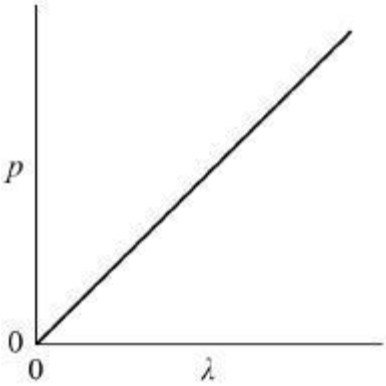
B



C



D



A ⬭

B ⬭

C ⬭

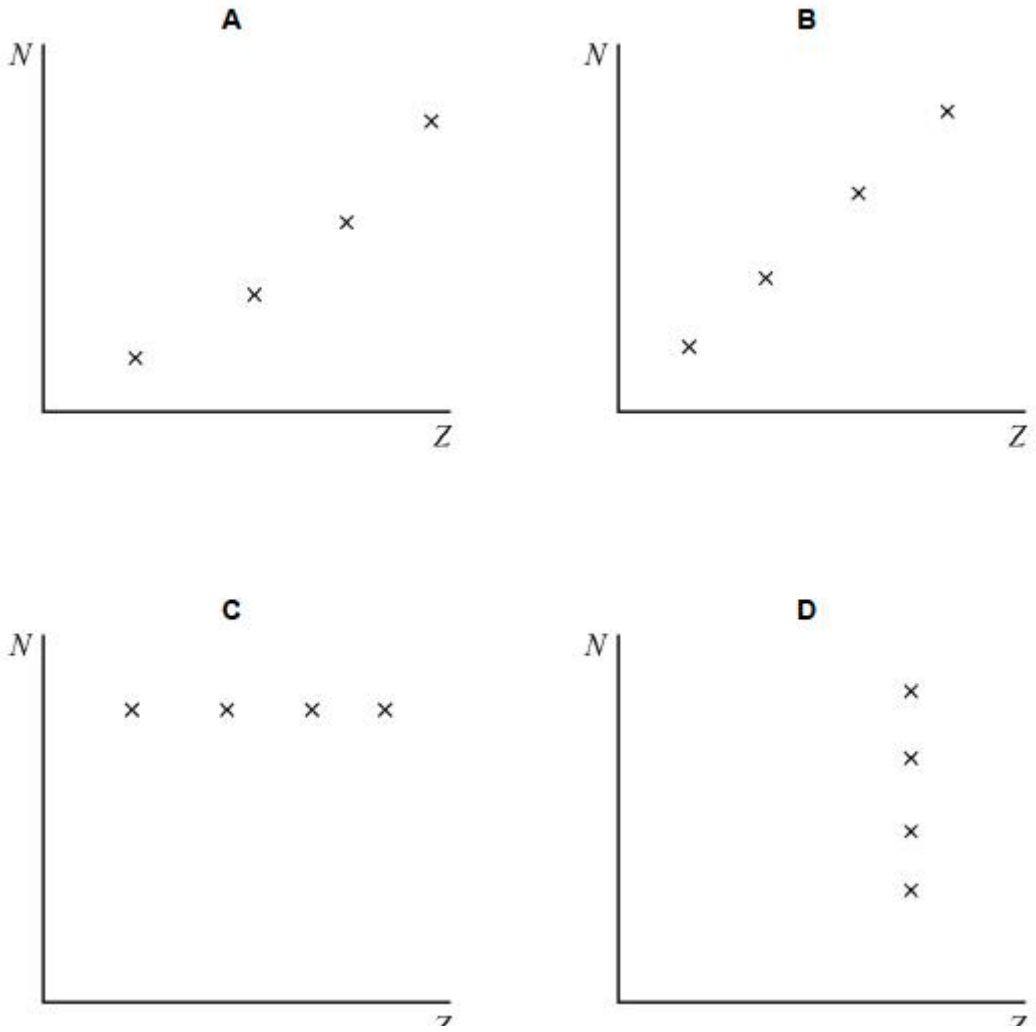
D ⬭

(Total 1 mark)

Q10.

Which is a graph of neutron number N plotted against proton number Z for the isotopes of a given element?

Downloaded from www.merit-minds.com



A ⬭

B ⬭

C ⬭

D ⬭

(Total 1 mark)

Q11.

Unstable nuclide **P** decays to nuclide **T** through a series of alpha (α) and beta-minus (β^-) decays.

$$\mathbf{P} \xrightarrow{\alpha} \mathbf{Q} \xrightarrow{\beta^-} \mathbf{R} \xrightarrow{\beta^-} \mathbf{S} \xrightarrow{\alpha} \mathbf{T}$$

Which statement is correct?

A **P** and **S** are isotopes. ⬭

B **Q** and **T** have different proton numbers. ⬭

Downloaded from www.merit-minds.com

C **Q** and **S** have different nucleon numbers. ⬭

D **R** has a greater proton number than **P**. ⬭

(Total 1 mark)

Q12.

Which row gives the numbers of baryons and leptons in an atom of $^{12}_{6}C$?

	Number of baryons	Number of leptons	
A	6	6	⬭
B	12	6	⬭
C	6	12	⬭
D	18	0	⬭

(Total 1 mark)

Q13.

Which row gives a particle with its quark combination and category?

	Particle	Quark combination	Category	
A	Negative pion	dū	baryon	⬭
B	Positive pion	$u\bar{d}$	hadron	⬭
C	Negative pion	$u\bar{d}$	meson	⬭
D	Positive pion	dū	hadron	⬭

(Total 1 mark)

Q14.

A muon

A is subject to the strong interaction. ⬭

B can decay into an electron only. ⬭

C is a stable particle. ⬭

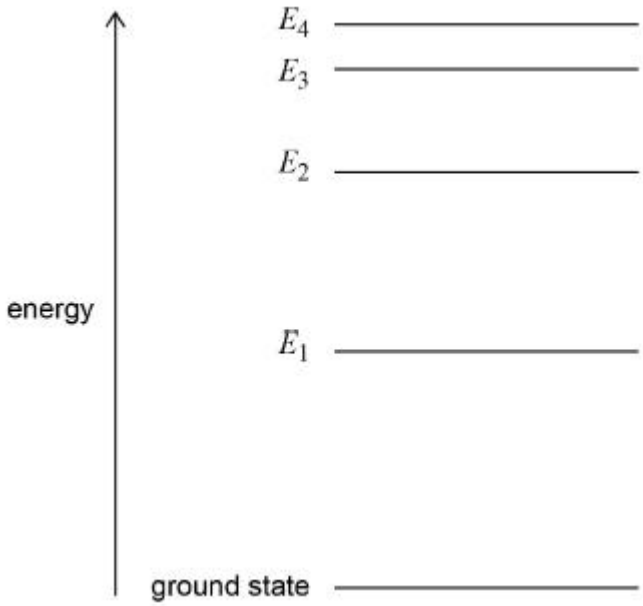
D is subject to the weak interaction. ⬭

(Total 1 mark)

Downloaded from www.merit-minds.com

Q15.

The diagram shows the energy levels in an atom drawn to scale. A transition from E_4 to E_2 causes the emission of a photon of green light.



Which transition could cause the emission of a photon of red light?

A E_2 to E_1 ⬭

B E_3 to E_1 ⬭

C E_3 to E_2 ⬭

D E_4 to E_1 ⬭

(Total 1 mark)

Q16.

Evidence of the wave-like properties of electrons is

A the emission of electrons when short-wavelength light falls on a metal surface. ⬭

B the movement of electrons in an electric current. ⬭

C the diffraction of electrons by a metal crystal. ⬭

D the annihilation of an electron with a positron. ⬭

(Total 1 mark)

Q17.

Photons of energy 1.0×10^{-18} J are incident on a metal surface and cause the emission of electrons from the metal surface.

Which statement about the emitted electrons is correct?

Downloaded from www.merit-minds.com

A They each have a kinetic energy of 1.0×10^{-18} J. ⬭

B They each have a kinetic energy that is a multiple of 1.0×10^{-18} J. ⬭

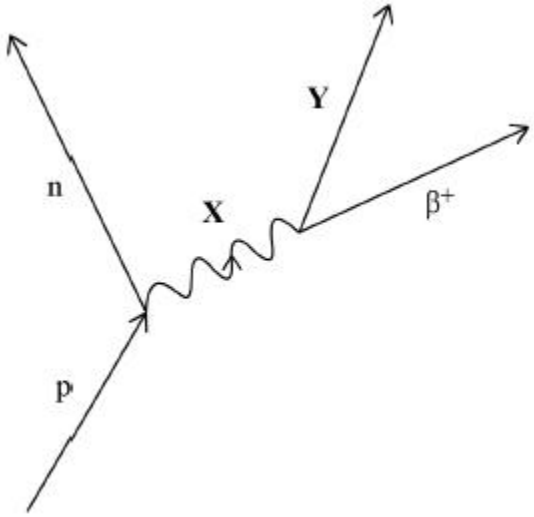
C Their mean kinetic energy is 1.0×10^{-18} J. ⬭

D The kinetic energy of each must be less than 1.0×10^{-18} J. ⬭

(Total 1 mark)

Q18.

The process of beta plus (β^+) decay can be represented by



Which row identifies particles **X** and **Y**?

	X	Y	
A	W^+	ν_e	⬭
B	W^+	$\overline{\nu_e}$	⬭
C	W^-	ν_e	⬭
D	W^-	$\overline{\nu_e}$	⬭

(Total 1 mark)

Downloaded from www.merit-minds.com