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JEE MAIN NUCLEI — PYQS

Max. Marks: 84 **Questions:** 21

Section A (MCQ) — 19 questions

Q.1 Two radioactive substances A and B of mass numbers 200 and 212 respectively, shows spontaneous α-decay with same Q value of 1 MeV. The ratio of energies of α-rays produced by A and B is _____.

[JEE Main 2026 (Online) 8th April Evening Shift]

(1) $\frac{2548}{2650}$ (2) $\frac{2706}{2646}$ (3) $\frac{2597}{2600}$ (4) $\frac{2862}{2499}$

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Q.2 The energy released if hydrogen atoms are combined to form ${}_2^4He$ is _____ MeV.
(Take binding energies per nucleon of ${}_1^2H$ and ${}_2^4He$ as 1.1 MeV and 7.2 MeV, respectively)

[JEE Main 2026 (Online) 6th April Evening Shift]

(1) 6.1 (2) 24.4 (3) 26.6 (4) 5

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Q.3 Assuming the experimental mass of ${}_6^{12}C$ as 12 u, the mass defect of ${}_6^{12}C$ atom is _____ MeV/c^2.
(Mass of proton = 1.00727 u, mass of neutron = 1.00866 u, 1 u = 931.5 MeV/c^2 and c is the speed of the light in vacuum).

[JEE Main 2026 (Online) 5th April Evening Shift]

(1) 127.5 (2) 89.03 (3) 272.0 (4) 92.0

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Q.4 Two nuclei of mass number 3 combine with another nucleus of mass number 4 to yield a nucleus of mass number 10. If the binding energy per nucleon for the mass numbers 3, 4 and 10 are 5.6 MeV, 7.4 MeV and 6.1 MeV, respectively, then in the process, ΔMc^2 = _____ MeV.

[JEE Main 2026 (Online) 4th April Morning Shift]

(1) 6.9 (2) 7.9 (3) 2.2 (4) 4.3

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Q.5 The binding energy per nucleon of ${}^{209}_{83}Bi$ is _____ MeV.
[Take m(${}^{209}_{83}Bi$) = 208.980388 u, m_p = 1.007825 u, m_n = 1.008665 u, 1 u = 931 MeV/c^2]

[JEE Main 2026 (Online) 2nd April Evening Shift]

(1) 7.48 (2) 7.84 (3) 8.79 (4) 6.94

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Q.6 An atom ${}^8_3X$ is bombarded by shower of fundamental particles and in 10 s this atom absorbed 10 electrons, 10 protons and 9 neutrons. The percentage growth in the surface area of the nucleus is recorded by :

[JEE Main 2026 (Online) 28th January Morning Shift]

(1) 150% (2) 900% (3) 125% (4) 225%

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Q.7 A nucleus has mass number α and radius R_α. Another nucleus has mass number β and radius R_β. If β = 8α then R_α/R_β is :

[JEE Main 2026 (Online) 28th January Evening Shift]

(1) 1 (2) 2 (3) 8 (4) 0.5

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Q.8 Given below are two statements :
Statement-I: For all elements, greater the mass of the nucleus, greater is the binding energy per nucleon.
Statement-II: For all elements, nuclei with less binding energy per nucleon transform to nuclei with greater binding energy per nucleon.

In the light of the above statements, choose the correct answer from the options given below

[JEE Main 2026 (Online) 24th January Morning Shift]

(1) Statement-I is false but Statement-II is true
(2) Both Statement-I and Statement-II are true
(3) Both Statement-I and Statement-II are false
(4) Statement-I is true but Statement-II is false

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Q.9 The binding energies for the following nuclear reactions are expressed in MeV.
${}_2He^3 + {}_0n^1 \longrightarrow {}_2He^4 + 20$ MeV
${}_2He^4 + {}_0n^1 \longrightarrow {}_2He^5 - 0.9$ MeV
If X_3, X_4, X_5 denote the stability of ${}_2He^3$, ${}_2He^4$ and ${}_2He^5$, respectively, then the correct order is :

[JEE Main 2026 (Online) 24th January Evening Shift]

(1) $X_4 > X_5 > X_3$ (2) $X_4 < X_5 < X_3$
(3) $X_4 > X_5 < X_3$ (4) $X_4 = X_5 = X_3$

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Q.10 Which of the following pair of nuclei are isobars of the element?

[JEE Main 2026 (Online) 23rd January Evening Shift]

(1) ${}^{3}_{1}H$ and ${}^{3}_{2}He$ (2) ${}^{198}_{80}Hg$ and ${}^{197}_{79}Au$
(3) ${}^{2}_{1}H$ and ${}^{3}_{1}H$ (4) ${}^{236}_{92}U$ and ${}^{238}_{92}U$

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Q.11 The minimum frequency of photon required to break a particle of mass 15.348 amu into 4α particles is _____ kHz.
[mass of He nucleus = 4.002 amu, 1 amu = 1.66×10^{-27} kg, h = 6.6×10^{-34} J s and c = 3×10^{8} m/s]

[JEE Main 2026 (Online) 22nd January Morning Shift]

(1) 14.94×10^{20} (2) 9×10^{19}
(3) 9×10^{20} (4) 14.94×10^{19}

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Q.12 For a nucleus of mass number A and radius R, the mass density of nucleus can be represented as

[JEE Main 2025 (Online) 8th April Evening Shift]

(1) $A^{\frac{2}{3}}$ (2) Independent of A
(3) A^{3} (4) $A^{\frac{1}{3}}$

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Q.13 Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A): The density of the copper $\left({}^{64}_{29}Cu\right)$ nucleus is greater than that of the carbon $\left({}^{12}_{6}C\right)$ nucleus.

Reason (R): The nucleus of mass number A has a radius proportional to $A^{1/3}$.

In the light of the above statements, choose the **most appropriate answer** from the options given below :

[JEE Main 2025 (Online) 7th April Evening Shift]

(1) (A) is correct but (R) is not correct
(2) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(3) (A) is not correct but (R) is correct
(4) Both (A) and (R) are correct and (R) is the correct explanation of (A)

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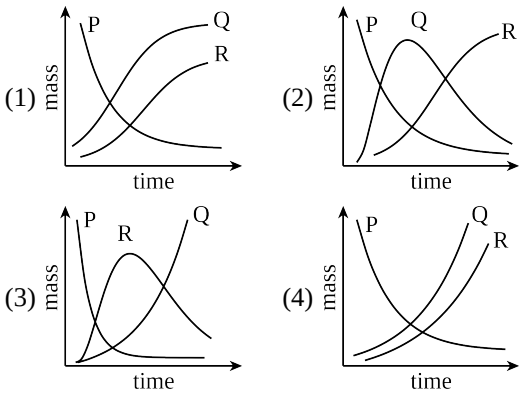
Q.14 A radioactive material P first decays into Q and then Q decays to non-radioactive material R. Which of the following figure represents time dependent mass of P, Q and R ?

[JEE Main 2025 (Online) 4th April Evening Shift]



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Q.15 Match the **LIST-I** with **LIST-II**

	List - I		List - II
A.	${}^{1}_{0}n + {}^{235}_{92}U \longrightarrow {}^{140}_{54}Xe + {}^{94}_{38}Sr + 2{}^{1}_{0}n$	I.	Chemical reaction
B.	$2H_2 + O_2 \longrightarrow 2H_2O$	II.	Fusion with +ve Q value
C.	${}^{2}_{1}H + {}^{2}_{1}H \longrightarrow {}^{3}_{2}He + {}^{1}_{0}n$	III.	Fission
D.	${}^{1}_{1}H + {}^{3}_{1}H \longrightarrow {}^{2}_{1}H + {}^{2}_{1}H$	IV.	Fusion with -ve Q value

Choose the correct answer from the options given below: [JEE Main 2025 (Online) 3rd April Morning Shift]

(1) A-II, B-I, C-III, D-IV
(2) A-III, B-I, C-II, D-IV
(3) A-III, B-I, C-IV, D-II
(4) A-II, B-I, C-IV, D-III

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Q.16 Energy released when two deuterons $({}_{1}H^{2})$ fuse to form a helium nucleus $({}_{2}He^{4})$ is : (Given : Binding energy per nucleon of ${}_{1}H^{2}$ = 1.1 MeV and binding energy per nucleon of ${}_{2}He^{4}$ = 7.0 MeV)

[JEE Main 2025 (Online) 2nd April Evening Shift]

(1) 26.8 MeV (2) 8.1 MeV
(3) 23.6 MeV (4) 5.9 MeV

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Q.17 Choose the correct nuclear process from the below options [p : proton, n : neutron, e^{-} : electron, e^{+} : positron, ν : neutrino, $\bar{\nu}$: antineutrino]

[JEE Main 2025 (Online) 28th January Morning Shift]

(1) $n \longrightarrow p + e^{+} + \nu$ (2) $n \longrightarrow p + e^{-} + \bar{\nu}$

(3) $n \longrightarrow p + e^{+} + \bar{\nu}$ (4) $n \longrightarrow p + e^{-} + \nu$

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Q.18 A radioactive nucleus n_2 has 3 times the decay constant as compared to the decay constant of another radioactive nucleus n_1. If initial number of both nuclei are the same, what is the ratio of number of nuclei of n_2 to the number of nuclei of n_1, after one half-life of n_1 ?

[JEE Main 2025 (Online) 23rd January Morning Shift]

(1) 1/4 (2) 1/8 (3) 4 (4) 8

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Q.19 Given below are two statements. One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A): The binding energy per nucleon is found to be practically independent of the atomic number A, for nuclei with mass numbers between 30 and 170.

Reason (R): Nuclear force is long range.

In the light of the above statements, choose the correct answer from the options given below :

[JEE Main 2025 (Online) 23rd January Evening Shift]

(1) (A) is true but (R) is false

(2) Both (A) and (R) are true and (R) is the correct explanation of (A)

(3) (A) is false but (R) is true

(4) Both (A) and (R) are true but (R) is NOT the correct explanation of (A)

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Section B (Numerical) — 2 questions

Q.20 The energy released when $\frac{7}{17.13}$ kg of ${}_3^7Li$ is converted into ${}_2^4He$ by proton bombardment is $\alpha \times 10^{32}$ eV. The value of α is _____. (Nearest integer)

(Mass of ${}_3^7Li$ = 7.0183 u, mass of ${}_2^4He$ = 4.004 u, mass of proton = 1.008 u and 1 u = 931 MeV/c^2 and Avogadro number = 6.0×10^{23})

[JEE Main 2026 (Online) 6th April Morning Shift]

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Q.21 The average energy released per fission for the nucleus of ${}^{235}_{92}U$ is 190 MeV. When all the atoms of 47 g pure ${}^{235}_{92}U$ undergo fission process, the energy released is $\alpha \times 10^{23}$ MeV. The value of α is _____. (Avogadro Number = 6×10^{23} per mole)

[JEE Main 2026 (Online) 23rd January Evening Shift]

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ANSWER KEY

Section A (MCQ) — 19 questions

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	**3**	**2**	**2**	**3**	**2**	**3**	**4**	**1**	**1**	**1**	**4**
Ques.	12	13	14	15	16	17	18	19			
Ans.	**2**	**3**	**2**	**2**	**3**	**2**	**1**	**1**			

Section B (Numerical) — 2 questions

Ques.	20	21					
Ans.	**6**	**228**					