PYQSide PYQSide.com — free PYQs with solutions Powered by PrepBlink

JEE MAIN NUCLEI — MASS–ENERGY EQUIVALENCE AND BINDING ENERGY — PYQS

Max. Marks: 32 **Questions:** 8

Section A (MCQ) — 7 questions

Q.1 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

Scan or tap for the full solution

Q.2 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

Scan or tap for the full solution

Q.3 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

Scan or tap for the full solution

Q.4 The binding energies for the following nuclear reactions are expressed in MeV.

$${}_{2}He^{3} + {}_{0}n^{1} \longrightarrow {}_{2}He^{4} + 20 \text{ MeV}$$

$${}_{2}He^{4} + {}_{0}n^{1} \longrightarrow {}_{2}He^{5} - 0.9 \text{ MeV}$$

If X_3, X_4, X_5 denote the stability of ${}_{2}He^{3}$, ${}_{2}He^{4}$ and ${}_{2}He^{5}$, 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) $X_4 = X_5 = X_3$

Scan or tap for the full solution

Q.5 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}

Scan or tap for the full solution

Q.6 Match the **LIST-I** with **LIST-II**

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

Scan or tap for the full solution

Q.7 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

Scan or tap for the full solution

Section B (Numerical) — 1 question

Q.8 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]

Scan or tap for the full solution

ANSWER KEY

Section A (MCQ) — 7 questions

Ques.	1	2	3	4	5	6	7				
Ans.	**2**	**3**	**2**	**1**	**4**	**2**	**3**				

Section B (Numerical) — 1 question

Ques.	8										
Ans.	**6**										