

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 ${}^{12}_6\text{C}$ as 12 u, the mass defect of ${}^{12}_6\text{C}$ 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, $\Delta mc^2 =$ _____ 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.3** The binding energy per nucleon of ${}^{209}_{83}\text{Bi}$ is _____ MeV.

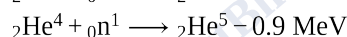
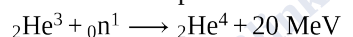
[Take $m({}^{209}_{83}\text{Bi}) = 208.980388$ u, $m_p = 1.007825$ u, $m_n = 1.008665$ u, 1 u = 931 MeV/c^2]

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



If X_3 , X_4 , X_5 denote the stability of ${}_2\text{He}^3$, ${}_2\text{He}^4$ and ${}_2\text{He}^5$, 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) $X_4 = X_5 = X_3$

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- 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, $h = 6.6 \times 10^{-34}$ J s and $c = 3 \times 10^8$ 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.6** Match the LIST-I with LIST-II

List - I		List - II	
A.	${}_0^1\text{n} + {}_{92}^{235}\text{U} \longrightarrow {}_{54}^{140}\text{Xe} + {}_{38}^{94}\text{Sr} + 2{}_0^1\text{n}$	I.	Chemical reaction
B.	$2\text{H}_2 + \text{O}_2 \longrightarrow 2\text{H}_2\text{O}$	II.	Fusion with +ve Q value
C.	${}_1^2\text{H} + {}_1^2\text{H} \longrightarrow {}_2^3\text{He} + {}_0^1\text{n}$	III.	Fission
D.	${}_1^1\text{H} + {}_1^3\text{H} \longrightarrow {}_2^4\text{He} + {}_0^1\text{n}$	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.7** Energy released when two deuterons (${}_1\text{H}^2$) fuse to form a helium nucleus (${}_2\text{He}^4$) is : (Given : Binding energy per nucleon of ${}_1\text{H}^2 = 1.1$ MeV and binding energy per nucleon of ${}_2\text{He}^4 = 7.0$ 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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Section B (Numerical) — 1 question

Q.8 The energy released when $\frac{7}{17.13}$ kg of ${}^7_3\text{Li}$ is converted into ${}^4_2\text{He}$ by proton bombardment is $\alpha \times 10^{32}$ eV. The value of α is _____. (Nearest integer)

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

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

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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										