

# PYQSide

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

Max. Marks: 32

Questions: 8

### Section A (MCQ)

- 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

Scan or tap for the  
full solution



- 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/ $c^2$ ]

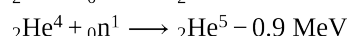
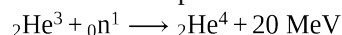
[JEE Main 2026 (Online) 2nd April Evening Shift]

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

Scan or tap for the  
full solution



- 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  ${}^2_2\text{He}^3$ ,  ${}^2_2\text{He}^4$  and  ${}^2_2\text{He}^5$ , 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)  $X_4 = X_5 = X_3$

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  $4\alpha$  particles is \_\_\_\_\_ kHz.

[mass of He nucleus = 4.002 amu, 1 amu =  $1.66 \times 10^{-27}$  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)  $14.94 \times 10^{20}$     (2)  $9 \times 10^{19}$   
(3)  $9 \times 10^{20}$     (4)  $14.94 \times 10^{19}$

Scan or tap for the  
full solution



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

| List - I |                                                                                                                           | List - II |                         |
|----------|---------------------------------------------------------------------------------------------------------------------------|-----------|-------------------------|
| A.       | ${}^1_0\text{n} + {}^{235}_{92}\text{U} \longrightarrow {}^{140}_{54}\text{Xe} + {}^{94}_{38}\text{Sr} + 2{}^1_0\text{n}$ | 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.       | ${}^2_1\text{H} + {}^2_1\text{H} \longrightarrow {}^3_2\text{He} + {}^1_0\text{n}$                                        | III.      | Fission                 |
| D.       | ${}^1_1\text{H} + {}^3_1\text{H} \longrightarrow {}^2_1\text{H} + {}^2_1\text{H}$                                         | 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 ( ${}^2_1\text{H}$ ) fuse to form a helium nucleus ( ${}^4_2\text{He}$ ) is : (Given : Binding energy per nucleon of  ${}^2_1\text{H} = 1.1$  MeV and binding energy per nucleon of  ${}^4_2\text{He} = 7.0$  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)

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

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

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

Scan or tap for the  
full solution



## ANSWER KEY

## Section A (MCQ)

|       |   |   |   |   |   |   |   |  |  |  |  |
|-------|---|---|---|---|---|---|---|--|--|--|--|
| Ques. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |  |  |  |  |
| Ans.  | 2 | 3 | 2 | 1 | 4 | 2 | 3 |  |  |  |  |

## Section B (Numerical)

|       |   |  |  |  |  |  |  |  |  |  |  |
|-------|---|--|--|--|--|--|--|--|--|--|--|
| Ques. | 8 |  |  |  |  |  |  |  |  |  |  |
| Ans.  | 6 |  |  |  |  |  |  |  |  |  |  |