Physicsaholics

DPP – 2

Video Solution on Website:- https://physicsaholics.com/home/courseDetails/46

Video Solution on YouTube:- https://youtu.be/OwQSGnhMQUI

Written Solution on Website:- https://physicsaholics.com/note/notesDetalis/19

Q 1. If two nuclei of mass number A_1 and A_2 fuse together to form a nucleus of mass number A, then –
(a) A = $A_1 + A_2$ (b) A > $A_1 + A_2$
(c) A < $A_1 + A_2$ (c) A £ $A_1 + A_2$

Q 2. Thermal neutron means:
(a) neutron being heated
(b) the energy of these neutrons is equal to the energy of neutrons in a heated atom.
(c) these neutrons have energy of neutron in a neutron gas at normal temperature
(d) such neutrons gather energy released in the fission process

Q 3. 10^{14} fissions per second are taking place in a nuclear reactor having efficiency 40%. The energy released per fission is 250 MeV. The power output of the reactor is –
(a) 2000 W (b) 4000 W
(c) 1600 W (d) 3200 W

Q 4. Which of the following is a fusion reaction ?
(a) ${}_1^2H + {}_1^2H \rightarrow {}_2^4He$
(b) ${}_0^1n + {}_7^{14}N \rightarrow {}_6^{14}C + {}_1^1H$
(c) ${}_0^1n + {}_{92}^{238}U \rightarrow {}_{93}^{239}Np + \beta^- + \gamma$
(d) ${}_1^3H \rightarrow {}_2^3He + \beta^- + \gamma$

Q 5. For a chain nuclear fission of U235 the moderation of neutron is a must because very high energy neutron –
(a) will collide inelastically with the nucleus and so there is no fission
(b) will collide elastically with the nucleus and so there is no fission
(c) will be trapped in the nucleus and hence no fission
(d) repelled by nucleus

Q.6 200 MeV energy is released due to fission of U^{235} by slow neutrons. If the output power from a atomic reactor is 1.6 MW, then rate of fission will be -
(a) $5 \times 10^{16}\ S^{-1}$ (b) $10 \times 10^{16}\ S^{-1}$
(c) $15 \times 10^{16}\ S^{-1}$ (d) $20 \times 10^{16}\ S^{-1}$

Q 7. The amount of U^{235} in kg which is to be used per hour in a nuclear reactor of capacity 100 kW (E = 200 MeV/fission) -
(a) 0.45×10^{-5} (b) 4.5×10^{-5}
(c) 4.5×10^{5} (d) 45×10^{5}

Q 8. A fusion reaction takes place at very high temperature because -
(a) atoms get ionized at high temperature
(b) molecules get decomposed at high temperature
(c) nuclei get decomposed at high temperature
(d) due to their high energy nuclei overcome their mutual repulsion and combines.

Q 9. Two deuterons are moving towards each other with equal speeds. What should be their initial kinetic energies so that the distance of closest approach between them is 2 fm?
(a) 0.36 MeV (b) 0.51 MeV
(c) 1.02 MeV (d) 7.8 MeV

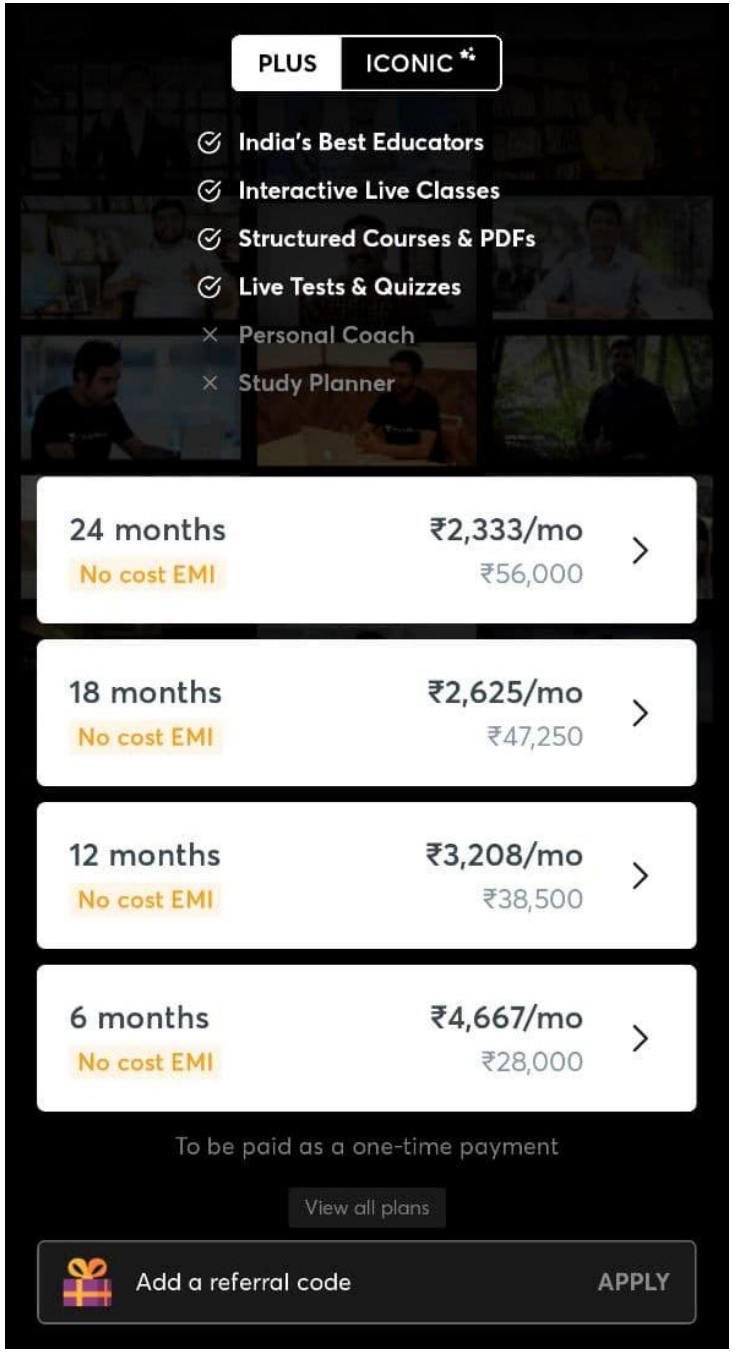
Q 10. A stationary 238U nucleus decays by a emission generating total kinetic energy T
$^{238}_{92}U \rightarrow ^{234}_{90}Th + ^{4}_{2}\alpha$
What is the kinetic energy of the α particle ?
(a) slightly less than T/2
(b) T/2
(c) slightly less than T
(d) slightly greater than T

Q 11. In the nuclear process, $^{11}_{6}C$ ¾® $^{11}_{5}B$ + b^{+} + X, X stands for –
(a) neutrino (b) g-particle
(c) a-particle (d) Neutron

Q 12. A nucleus disintegrates into two nuclear parts which have their velocities in the ratio of 2 : 1. The ratio of their nuclear radii will be –
(a) $3^{1/2}$: 1 (b) 1 : $2^{1/3}$
(c) $2^{1/3}$: 1 (d) 1 : $3^{1/2}$

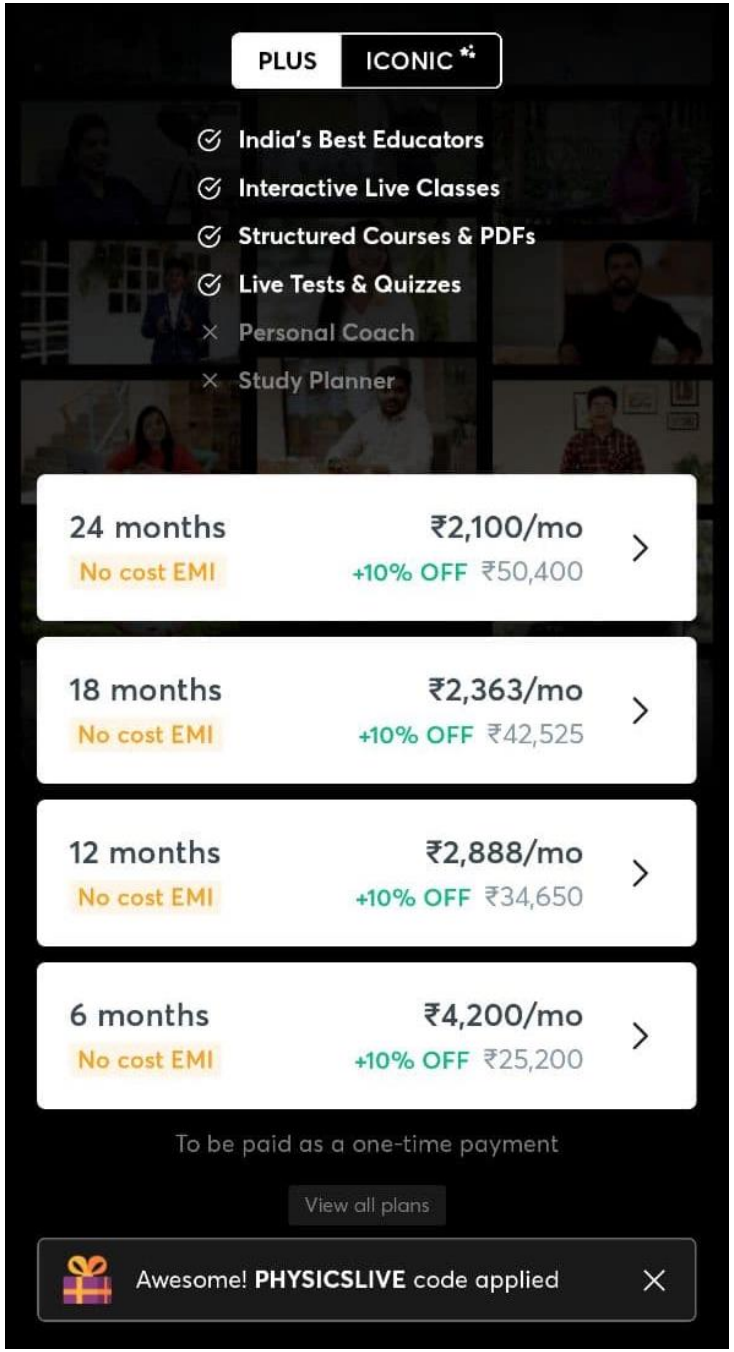
Answer Key

Q.1 a	**Q.2 c**	**Q.3 c**	**Q.4 a**	**Q.5 b**
Q.6 a	**Q.7 a**	**Q.8 d**	**Q.9 a**	**Q.10 c**
Q.11 a	**Q.12 b**			



PHYSICSLIVE

Use code PHYSICSLIVE to get 10% OFF on Unacademy PLUS.



Written Solution

DPP –2 Nuclear Physics: Radioactive Decay , Nuclear Fission , Nuclear Fusion

By Physicsaholics Team

Q1) If two nuclei of mass number A_1 and A_2 fuse together to form a nucleus of mass number A, then -

(a) $A = A_1 + A_2$

(b) $A > A_1 + A_2$

(c) $A < A_1 + A_2$

(c) $A \leq A_1 + A_2$

Q2) Thermal neutron means :

(a) neutron being heated

(b) the energy of these neutrons is equal to the energy of neutrons in a heated atom.

(c) these neutrons have energy of neutron in a neutron gas at normal temperature

(d) such neutrons gather energy released in the fission process

Q3) 10^{14} fissions per second are taking place in a nuclear reactor having efficiency 40%. The energy released per fission is 250 MeV. The power output of the reactor is -

Power output $= 10^{14} \times 250 \times 10^{6} \times 1.6 \times 10^{-19} \times \frac{40}{100}$

$= 1.6 \times 10^{3}$

$= 1600\,W$

(a) 2000 W
(b) 4000 W
(c) 1600 W
(d) 3200 W

Q4) Which of the following is a fusion reaction ?

(a) ${}_{1}^{2}H + {}_{1}^{2}H \rightarrow {}_{2}^{4}He$

(b) ${}_{0}^{1}n + {}_{7}^{14}N \rightarrow {}_{6}^{14}C + {}_{1}^{1}H$

(c) ${}_{0}^{1}n + {}_{92}^{238}U \rightarrow {}_{93}^{239}Np + \beta^{-} + \gamma$

(d) ${}_{1}^{3}H \rightarrow {}_{2}^{3}He + \beta^{-} + \gamma$

Q5) For a chain nuclear fission of U_{235} the moderation of neutron is a must because very high energy neutron -

(a) will collide inelastically with the nucleus and so there is no fission

(b) will collide elastically with the nucleus and so there is no fission

(c) will be trapped in the nucleus and hence no fission

(d) repelled by nucleus

Q6) 200 MeV energy is released due to fission of U^{235} by slow neutrons. If the output power from a atomic reactor is 1.6 MW, then rate of fission will be -

$N \times 200 \times 10^6 \times 1.6 \times 10^{-19} = 1.6 \times 10^6$

$N = \frac{10^{19}}{200} = \frac{1000 \times 10^{16}}{200}$

$= 5 \times 10^{16}$

(a) $5 \times 10^{16}\ S^{-1}$

(b) $10 \times 10^{16}\ S^{-1}$

(c) $15 \times 10^{16}\ S^{-1}$

(d) $20 \times 10^{16}\ S^{-1}$

Q7) The amount of U^{235} in kg which is to be used per hour in a nuclear reactor of capacity 100 kW (E = 200 MeV/fision) -

$$\frac{x \times 1000 \times 6 \times 10^{23}}{235} \times 200 \times 10^{6} \times 1.6 \times 10^{-19} = 10^{5} \times 3600$$

$$x = \frac{6 \times 235}{16 \times 200 \times 10 \times 10^{4}}$$

$$= \left(\frac{705}{16 \times 100}\right) \times 10^{-5}$$

$$= .44 \times 10^{-5}\ kg$$

(a) 0.45×10^{-5} (b) 4.5×10^{-5}

(c) 4.5×10^{5} (d) 45×10^{5}

Q8) A fusion reaction takes place at very high temperature because -

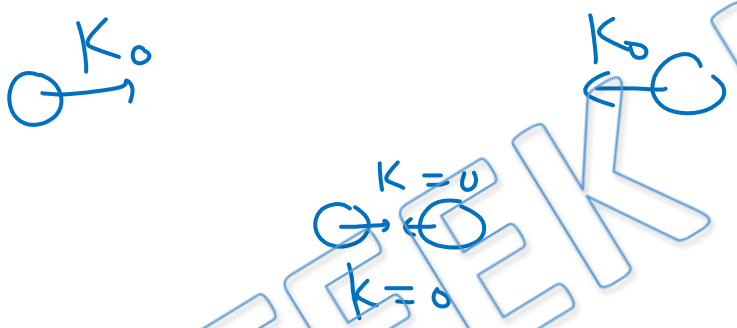
(a) atoms get ionized at high temperature

(b) molecules get decomposed at high temperature

(c) nuclei get decomposed at high temperature

(d) due to their high energy nuclei overcome their mutual repulsion and combines.

Q9) Two deuterons are moving towards each other with equal speeds. What should be their initial kinetic energies so that the distance of closest approach between them is 2 fm?



$$2K_0 = \frac{9\times10^9 \times e \times 1.6\times10^{-19}}{(2\times10^{-15})}$$

$$= 3.6 \times 10^5 e$$

$$= 36 \text{ MeV}$$

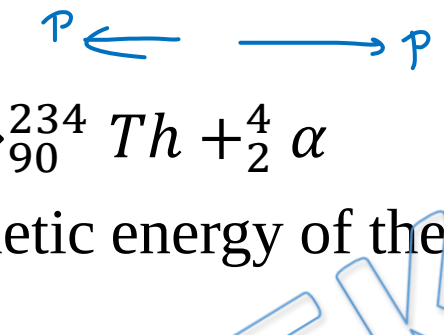
(a) 0.36 MeV

(b) 0.51 MeV

(c) 1.02 MeV

(d) 7.8 MeV

Q10) A stationary 238U nucleus decays by a emission generating total kinetic energy T



$$^{238}_{92}U \rightarrow ^{234}_{90}Th + ^{4}_{2}\alpha$$

What is the kinetic energy of the α particle ?

(a) slightly less than T/2

(b) T/2

(c) slightly less than T

(d) slightly greater than T

Q11) In the nuclear process, $^{11}_{6}C \longrightarrow {}^{11}_{5}B + \beta^{+} + X$, X stands for -

(a) neutrino
(b) γ-particle
(c) α-particle
(d) neutron

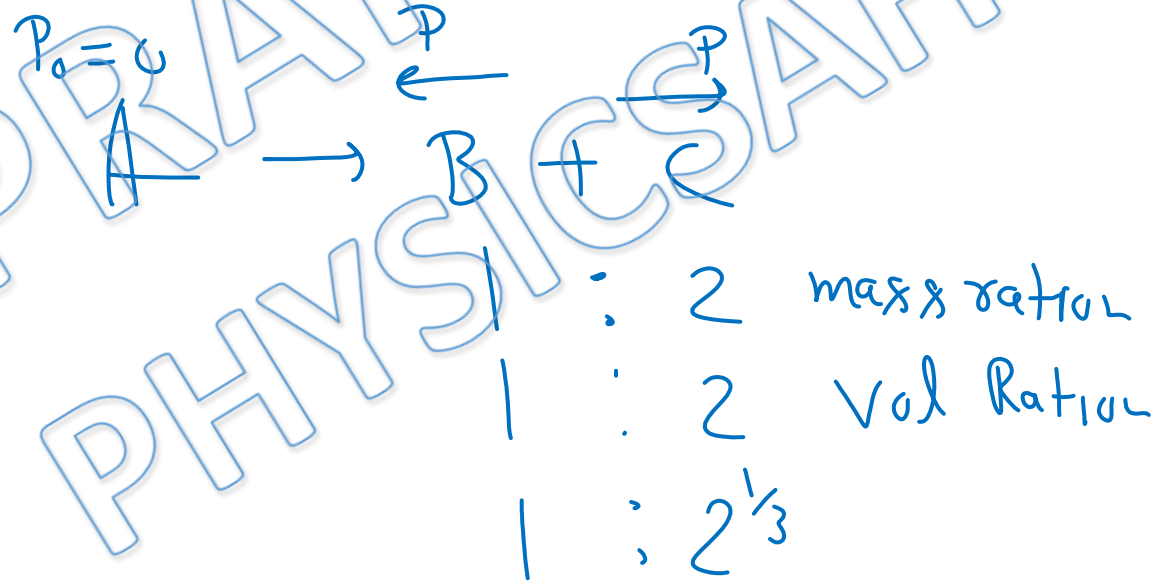
Q12) A nucleus disintegrates into two nuclear parts which have their velocities in the ratio of 2 : 1. The ratio of their nuclear radii will be –

(a) $3^{1/2} : 1$

(b) $1 : 2^{1/3}$

(c) $2^{1/3} : 1$

(d) $1 : 3^{1/2}$



For Video Solution of this DPP, Click on below link

Video Solution on Website:- https://physicsaholics.com/home/courseDetails/46

Video Solution on YouTube:- https://youtu.be/OwQSGnhMQUI

Written Solution on Website:- https://physicsaholics.com/note/notesDetalis/19

SUBSCRIBE

@Physicsaholics

@Physicsaholics_prateek

@NEET_Physics
@IITJEE_Physics

physicsaholics.com

Unacademy

CLICK

Chalo Niklo