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## PHYSICS

## RESONANCE ENGLISH

## NUCLEAR PHYSICS

Exercise

1. As the mass number $A$ increases, which of
the following quantities related to a nucleous
do not change
A. mass
B. volume
C. density
D. binding energy

## Answer: C

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2. Fusion reaction takes place at high tamperature 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 energy nuclei overcome
their mutual repulsion and combines

## Answer: D

3. Two protons are kept at a separation of 10 nm . Let $F_{n}$ and $F_{e}$ be the nuclear force and the electromagnetic force between them.

$$
\begin{aligned}
& \text { A. } F_{n} \gg F_{e} \\
& \text { B. } F_{n}=F_{e} \\
& \text { C. } F_{n} \ll F_{e} \\
& \text { D. } F_{n} \approx F_{e}
\end{aligned}
$$

## Answer: C

4. In a fast breeder atomic reactor
A. fast neutrons converts natural uranium into fissionable fuel and released energy
B. thermal neutrons cause fission of
enriched uranium and released energy
C. Fast neutrons cause fission of enriched
uranium and release more energy
D. thermal neutrons cause fission of
natural uranium and produce energy

## Answer: C

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5. If $m, m_{n}$ and $m_{p}$ are masses of ${ }_{Z} X^{A}$ nucleus, neutron and proton respectively.
A. $M=(A-Z) m_{n}+Z m_{p}$
B. $M=Z m_{n}+(A-Z) m_{p}$
C. $M<(A-Z) m_{n}+Z m_{p}$
D. $M>(A-Z)+Z m_{p}$

Answer: A

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6. A positron of 1 MeV collides with an electron
of 1 MeV and gets annihilated and the reaction
produces two $\gamma-$ ray photons. If the effective mass of each photons is 0.0016 amu , then the energy of each $\gamma$ - ray photon is about-
A. 1.5 MeV
B. 3 MeV

## C. 6 MeV

D. 2 MeV

## Answer: B

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7. If mass of the fissionable material is less
than the critical mass, then
A. fission and chain reaction both are
B. fission is possible but chain reaction is impossible
C. fission is impossible but chain reaction is
possible
D. fission and chain reaction both are possible.

Answer: A

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8. If the total binding energies of
${ }_{\cdot 1} H^{2}, \cdot{ }_{2} H e^{4}, \cdot{ }_{26} F e^{56}$ and ${ }_{92} U^{235}$ nuclei are
$2.22,28.3,492$ and 1786 MeV respectively, identify the most stable nucleus out of the following
A. ${ }_{26} F e^{58}$
B. ${ }_{1} H^{2}$
C. ${ }_{92} U^{235}$
D..$_{2} H e^{4}$

Answer: D
9. The binding energies per nucleon for a deuteron and an $\alpha$-particle are $x_{1}$ and $x_{2}$ respectively. The energy $Q$ released in the reaction ${ }^{2} H_{1}+{ }^{2} H_{1} \rightarrow{ }^{4} H e_{2}+Q$ is
A. $\left(x_{1}+x_{2}\right)$
B. $\left(x_{2}-x_{1}\right)$
C. $4\left(x_{1}-x_{2}\right)$
D. $4\left(x_{2}-x_{1}\right)$

## Answer: D

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10. If the mass of proton= 1.008 a.m.u. and mass of neutron=1.009a.m.u. then binding energy per nucleon for ${ }_{4} B e^{9}$ (mass=9.012 amu) would be-
A. 0.065 MeV
B. 60.44 MeV
C. 0.7 MeV

## D. 6.72 MeV

## Answer: C

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11. The binding energies of two nuclei $P^{n}$ and
$Q^{2 n}$ and x and y joules. If $2 x>y$ then the energy released in the reaction
$P^{n}+P^{n} \rightarrow Q^{2 n}$, will be
A. $2 x+y$
B. $2 x-y$
C. $-(2 x-y)$
D. $x+y$

Answer: B

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12. One requires energy $E_{n}$ to remove a nucleon from a nucleus and an energy $E_{e}$ to remove an electron from the orbit of an atom.
A. $E_{n}<E_{e}$
B. $E_{e}<E_{n}$
C. $E_{e}=E_{n}$
D. nothing can be stated

## Answer: C

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13. Slow neutron are sometimes refer to as
thermal neutrons because
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 neutrons
in a neutron has at normal temperature
D. such neutrons gather energy released in
the fission process

## Answer: C

14. Which of the following is correct about nuclear forces?
A. these are the strongest among forces
B. these are short range force
C. these are charge independent forces
D. all of the above

Answer: D

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15. The graph between the binding energy per nucleon ( $E$ ) and atomic mass number ( $A$ ) is as-
(1)

(2)

C.

D.
(4)

16. The probability of a radioactive atoms to
survive 5 times longer than its half-value period is-
A. $\frac{2}{5}$
B. $2 \times 5$
C. $2^{-5}$
D. $2^{5}$

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17. After emission of an $\alpha$-particle by a radiative element . $84 X^{212}$, the resulting element would be-

$$
\begin{aligned}
& \text { A. } .84 Y^{210} \\
& \text { B. } .82 Y^{208} \\
& \text { C. } .84 Y^{208} \\
& \text { D. } .86 Y^{210}
\end{aligned}
$$

18. The SI unit of activity is-
A. Curie
B. rutherford
C. becquerel
D. sievert

Answer: C
19. The specific activity of radius is nearly-
A. 1 Bq
B. 1 Ci
C. $3.7 \times 10^{10} \mathrm{Ci}$
D. 1 mCi

Answer: B
20. After a time equal to four half lives, the amount of radioactive material remaining undecayed is-
A. $6.25 \%$
B. $12.5 \%$
C. $25 \%$
D. $50 \%$

Answer: A

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21. The mean of life of a radioactive sample is

100 years. Then after 100 years, about-
A. $0 \%$ of the sample remains active
B. $37 \%$ of the simple remains active
C. $63 \%$ of the sample remain active
D. $50 \%$ of the sample remains active

Answer: B
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22. The count rate of $10 g$ of radioactive material was measured at different times and times has been shown in the figure. The half-
life of material and the total counts
(approximately) in the first half life period, respectively are.

A. $4 \mathrm{~h}, 9000$
B. $3 \mathrm{~h}, 14000$
C. $3 \mathrm{~h}, 235$
D. $3 \mathrm{~h}, 50$

Answer: B

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23. How many atoms decay in one mean life
time of a radioactive sample-
A. $37 \%$
B. $63 \%$
C. $50 \%$
D. $100 \%$

Answer: B

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24. The half life of radioactive substance is $T$.

Then the fraction of the substance that has decayed in time $t$ is-
A. $(t / T)$
B. $2^{t / T}$
C. $(1 / 2)^{t / T}$
D. $1-(1 / 2)^{t / T}$

## Answer: D

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25. The half-life of a radioactive substance is

3 h and its activity is $1 \mu \mathrm{Ci}$. Then the activity after 9 h will be (in $\mu C i$ )-
A. $\frac{1}{9}$
B. $\frac{1}{27}$
C. $\frac{1}{3}$
D. $\frac{1}{8}$

## Answer: D

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26. The half -life of cobalt- 60 is 5.25 years. How
long after a new sample is delivered, will the
activity have decreased to about one third $(1 / 3)$ of its original value-
A. 5.25 years
B. 8.3 years
C. 10.50 years
D. 15.75 years

Answer: B

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27. A radioactive element $T h A\left(\cdot{ }_{84} P o^{216}\right)$ can undergo $\alpha$ and $\beta$ are type of disintegrations with half-lives, $T_{1}$ and $T_{2}$ respectively. Then the half-life of ThA is
A. $T_{1}+T_{2}$
B. $T_{1} T_{2}$
C. $T_{1}-T_{2}$
D. $\frac{T_{1} T_{2}}{T_{1}+T_{2}}$

## Answer: D

28. A radioactive nucleus undergoes a series of decay according to the scheme
$A \xrightarrow{\alpha} A_{1} \xrightarrow{\beta} A_{2} \xrightarrow{\alpha} A_{3} \xrightarrow{\gamma} A_{4}$
if the mass number and atomic number of $A$
are 180 and 72 respectively, then what are
these number for $A_{3}$
A. 171 and 69
B. 174 and 70
C. 176 and 69

## D. 176 and 70

## Answer: A

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29. Compare the ionising power of $\alpha, \beta$ and $\gamma$ radiations.
A. $\alpha>\gamma>\beta$
B. $\alpha>\beta>\gamma$
C. $\alpha<\beta<\gamma$

$$
\text { D. } \alpha>\beta<\gamma
$$

## Answer: B

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30. In nuclear power station energy of uranium is used for producing-
A. Electric energy
B. Mechanical energy
C. Heat energy

## D. magnetic energy

## Answer: A

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31. The order of magnitude of the density of nuclear matter is=
A. $10^{4} \mathrm{~kg} / \mathrm{m}^{3}$
B. $10^{17} \mathrm{~kg} / \mathrm{m}^{3}$
C. $10^{27} \mathrm{~kg} / \mathrm{m}^{3}$

$$
\text { D. } 10^{34} \mathrm{~kg} / \mathrm{m}^{3}
$$

## Answer: B

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32. The Process by which a heavy nucleus splits
into light nuclei is known as-
A. fission
B. $\alpha$-decay
C. Fussion
D. chain reaction

## Answer: A

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## 33.

In
equation
${ }_{.92} U^{235}+{ }_{.0} n^{1} \rightarrow{ }_{.56} B a^{144}+{ }_{.36} K r^{89}+X$
: X is-
A. . ${ }_{0} n^{1}$
B. 3 H
C. $3 \cdot{ }_{0} n^{1}$
D. none of these

## Answer: C

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34. Boron rods are used in nuclear reactor as
A. moderator
B. control rods
C. coolant

## D. protective shield

## Answer: B

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35. Staements I:.$_{z} X^{4}$ undergoes $2 \alpha$-decays,
$2 \beta$-decays (negative $\beta$ ) and $2 \gamma$-decays. As a result, the daughter product is $\cdot z \cdot{ }_{-2} X^{A-B}$.

Staements II: In $\alpha$-decay, the mass number decreases by 4 unit and atomic number decreases by 2 unit. In $\beta$-decay (negative $\beta$ ),
the mass number remains unchanged and atomic number increases by 1 unit. In $\gamma$-decay, mass number and atomic number remain unchanged.
A. Statement- 1 is true, Statement-2: is true,

Statement-2 is a correct explanation for

Statement-1.
B. Statement-1 is true, Statement-2: is true,

Statement-2 is NOT a correct explanation
for Statement-1.
C. Statement-1 is true but statement-2 is
false
D. Statement-1 is false, Statement- 2 is true

Answer: A

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