DPP
DAILY PRACTICE PROBLEMS

Class : XIIth **Subject : PHYSICS**
Date : **DPP No. : 6**

Topic :-Nuclei

1. Highly energetic electrons are bombarded on a target of an element containing 30 neutrons. The ratio of radii of nucleus to that of Helium nucleus is $14^{1/3}$. The atomic number of nucleus will be
   a) 25 b) 26 c) 56 d) 30
2. Fusion reaction take place at high temperature because
   a) Atoms are ionised at high temperature
   b) Molecules break up at high temperature
   c) Nuclei break up at high temperature
   d) Kinetic energy is high enough to overcome repulsion between nuclei
3. In a sample of hydrogen like atoms all of which are in ground state, a photon beam containing photons of various energies is passed. In absorption spectrum, five dark lines, are observed. The number of bright lines in the emission spectrum will be (assume that all transitions takes place)
   a) 5 b) 10 c) 15 d) None of these
4. The radioactive nucleus of mass number A, initially at rest, emits an $\alpha -$ particle with a speed$v$. The recoil speed of the daughter nucleus will be
   a) $\frac{2v}{A-4}$ b) $\frac{2v}{A+4}$ c) $\frac{4v}{A-4}$ d) $\frac{4v}{A+4}$
5. A radioactive element ${}_{90}X^{238}$ decays into ${}_{83}Y^{222}$. The number of $\beta -$ particles emitted are
   a) 4 b) 6 c) 2 d) 1
6. A radioactive nucleus ${}_{92}X^{235}$ decays to ${}_{91}Y^{231}$. Which of the following particles are emitted
   a) One alpha and one electron b) Two deuterons and one positron
   c) One alpha and one proton d) One proton and four neutrons
7. In a mean life of a radioactive sample
   a) About 1/3 of substance disintegrates b) About 2/3 of the substance disintegrates
   c) About 90% of the substance disintegrates d) Almost all the substance disintegrates
8. The half life of a radioactive isotope X is 50 years. It decays to another element Y which is stable. The two elements X and Y were found to be in the ratio of 1:16 in a sample of a given rock. The age of the rock was estimated to be

   a) 100 years b) 150 years c) 200 years d) 250 years

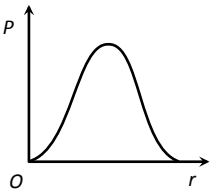
9. A hypothetical radioactive nucleus decays according to the following series

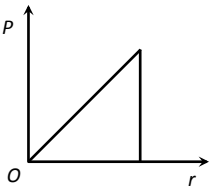
$$_{72}A^{180} \xrightarrow{\alpha} A_1 \xrightarrow{\beta^-} A_2 \xrightarrow{\alpha} A_3 \xrightarrow{\gamma} A_4$$

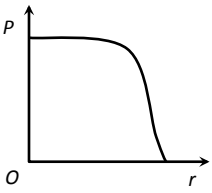
If the mass number and atomic number of A are respectively 180 and72. Then to atomic number and mass number of A will respectively be

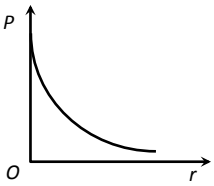
a) 69,171 b) 70,172 c) 68,172 d) 69,172

10. The change density in a nucleus varies with distance from the centre of the nucleus according to the curve in Fig.

a) 

b) 

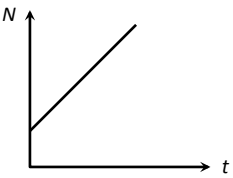
c) 

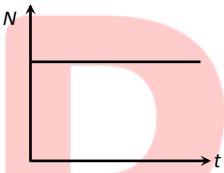
d) 

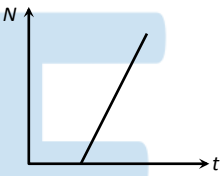
11. If the mass number of an atom is $A = 0$ and its electron configuration is $1s^2,2s^2,2p^6,3s^2,3p^6$, the number of neutrons and protons in its nucleus will be

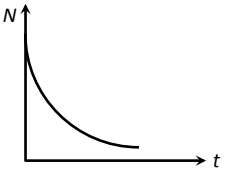
a) 22, 18 b) 18, 22 c) 20, 20 d) 18, 18

12. The graph between the instantaneous concentration (N) of a radioactive element and time (t) is

a) 

b) 

c) 

d) 

13. For a nuclear to be in critical condition, the value of neutron multiplication factor (k) must be

a) $k > 1$ b) $k < 1$ c) $k = 1$ d) $k = 0$

14. Which state of triply ionized Beryllium (Be^{+++}) has the same orbital radius as that of the ground state of hydrogen

a) $n = 4$ b) $n = 3$ c) $n = 2$ d) $n = 1$

15. The nuclear reactor at Kaiga is a

a) Research reactor b) Fusion reactor c) Breeder reactor d) Power reactor

16. If in nature there may not be an element for which the principle quantum number $n > 4$, then the total possible number of elements will be

a) 60 b) 32 c) 4 d) 64

17. If $_{92}U^{238}$ emits 8 α − particles and 6 β − particles, then the resulting nucleus is

a) $_{82}U^{206}$ b) $_{82}Pb^{206}$ c) $_{82}U^{210}$ d) $_{82}U^{214}$

18. The mass of a neutron is the same as that of

a) A proton b) A meson c) An epsilon d) An electron

19. Radon (Rn) decays into Polonium (Po) by emitting an α − particle with half-life of 4 days. A sample contains 6.4×10^{10} atoms of Rn. After 12 days, the number of atoms of Rn left in the sample will be

a) 3.2×10^{10} b) 0.53×10^{10} c) 2.1×10^{10} d) 0.8×10^{10}

20. Consider two nuclei of the same radioactive nuclide. One of the nuclei was created in a supernova explosion 5 billion years ago. The probability of decay during the next time is
    a) Different for each nuclei
    b) Nuclei created in explosion decays first
    c) Nuclei created in the reactor decays first
    d) Independent of the time of creation