DPP
DAILY PRACTICE PROBLEMS

Class : XIIth **Subject : PHYSICS**
Date : **DPP No. : 1**

Topic :-Nuclei

1. A sample contains 16 g of a radioactive material, the half life of which is two days. After 32 days, the amount of radioactive material left in the sample is
   a) Less than 1 mg b) $\frac{1}{4}g$ c) $\frac{1}{2}g$ d) $1g$
2. Neutron is a particle, which is
   a) Charged and has spin b) Charged and has no spin
   c) Charge less and has spin d) Charge less and has no spin
3. The ratio of half-life times of two elements A and B is $\frac{T_A}{T_B}$. The ratio of respectively decay constants $\frac{\lambda_A}{\lambda_B}$ is
   a) $\frac{T_B}{T_A}$ b) $\frac{T_A}{T_B}$ c) $\frac{T_A+T_B}{T_A}$ d) $\frac{T_A-T_B}{T_A}$
4. In the following reaction the value of $'X'$ is
   ${}_7N^{14}+{}_2He^4 \rightarrow X + {}_1H^1$
   a) ${}_8N^{17}$ b) ${}_8O^{17}$ c) ${}_7O^{16}$ d) ${}_7N^{16}$
5. If $N_1 = N_0e^{-\lambda t_1}$, then the number of atoms decayed during time interval from t_1 and $t_2 (t_2 > t_1)$ will be
   a) $N_{t_1} = N_{t_2} = N_o[e^{-\lambda t_1} - e^{-\lambda r_2}]$ b) $N_{t_2} = N_{t_1} = N_o[e^{-\lambda t_2} - e^{-\lambda t_1}]$
   c) $N_{t_2} - N_{t_1} = N_o[e^{\lambda t}2 - e^{-\lambda t_1}]$ d) None of the above
6. The possible quantum numbers for $3d$ electrons are
   a) $n = 3, l = 1, m_l = +1, m_s = -\frac{1}{2}$ b) $n = 3, l = 2, m_l = +2, m_s = -\frac{1}{2}$
   c) $n = 3, l = 1, m_l = -1, m_s = +\frac{1}{2}$ d) $n = 3, l = 0, m_l = +1, m_s = -\frac{1}{2}$
7. Calculate the energy released when three $\alpha -$ particles combined to from a ${}^{12}C$ nucleus , the mass defect is
   (atomic mass of ${}_2He^4$ is 4.002603 u)
   a) 0.007809 u b) 0.002603 u c) 4.002603 u d) 0.5 u
8. In a hydrogen atom, which of the following electronic transitions would involve the maximum energy change
   a) From $n = 2$ to $n = 1$ b) From $n = 3$ to $n = 1$ c) From $n = 4$ to $n = 2$ d) From $n = 3$ to $n = 2$
9. The energy equivalent to 1 mg of matter in MeV is
   a) 56.25×10^{22} b) 56.25×10^{24} c) 56.25×10^{26} d) 56.25×10^{28}
10. The mass defect in particular nuclear reaction if 0.3 g. The amount of energy liberated in kilowatt hour is (Velocity of light= 3×10^8 ms^{-1})
    a) 1.5×10^6 b) 2.5×10^6 c) 3×10^6 d) 7.5×10^6
11. An electron jumps from the 4^{th} orbit to the 2^{nd} orbit of hydrogen atom. Given the Rydberg's constant $R = 10^5 cm^{-1}$. The frequency in Hz of the emitted radiation will be
    a) $\frac{3}{16} \times 10^5$ b) $\frac{3}{16} \times 10^{15}$ c) $\frac{9}{16} \times 10^{15}$ d) $\frac{3}{4} \times 10^{15}$
12. The electron in the hydrogen atom jumps from excited state $(n = 3)$ to its ground state $(n = 1)$ and the photons thus emitted irradiate a photosensitive material. If the work function of the material is

5.1 eV, the stopping potential is estimated to be (the energy of the electron in n^{th} state $E_n = -\frac{13.6}{n^2} eV$)

a) 5.1 V b) 12.1 V c) 17.2 V d) 7 V

13. The number of α-particles and $\beta -$ particles respectively emitted in the reaction ${}_{88}A^{196} \rightarrow {}_{78}B^{164}$ are

a) 8 and 8 b) 8 and 6 c) 6 and 8 d) 6 and 6

14. An electron passing through a potential difference of 4.9 V collides with a memory atom and transfers it to the first excited state. What is the wavelength of a photon corresponding to the transition of the mercury atom to its normal state

a) 2050 Å b) 2240 Å c) 2525 Å d) 2935 Å

15. The half -life period of a radioactive substance is 3 days. Three fourth of substance decays in

a) 3 days b) 6 days c) 9 days d) 12 days

16. What is the Q-value of the reaction

$P + {}^{7}\text{Li} \rightarrow {}^{4}\text{He} + {}^{4}\text{He}$

The atomic masses of ${}^{1}\text{H}$, ${}^{4}\text{He}$ *and* ${}^{7}\text{Li}$ are 1.007825 u, 4.002603 u and 7.016004 u respectively

a) 17.35 MeV b) 18.06 MeV c) 177.35 MeV d) 170.35 MeV

17. If one starts with one curie of radioactive substance ($T_{1/2} = 12hrs$) the activity left after a period of 1 week will be about

a) 1 curie b) 120 micro curie c) 60 micro curie d) 8 mili curie

18. If the half life of a radioactive sample is 10 *hours*, its mean life is

a) 14.4 *hours* b) 7.2 *hours* c) 20 *hours* d) 6.93 *hours*

19. The half-life of ${}^{215}\text{At}$ is 100 μs. The time taken for the radioactivity of a sample of ${}^{215}\text{At}$ to decay to $\frac{1}{16}$ th of its initial value is

a) 400 μs b) 6.3 μs c) 40 μs d) 300 μs

20. Half life of a radio-active substance is 20 *minutes*. The time between 20% and 80% decay will be

a) 20 *minutes* b) 40 *minutes* c) 30 *minutes* d) 25 *minutes*