DPP
DAILY PRACTICE PROBLEMS
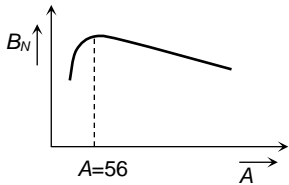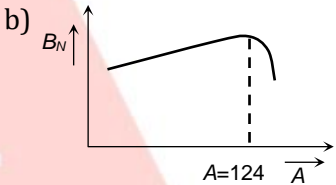
Class : XIIth   Subject : PHYSICS
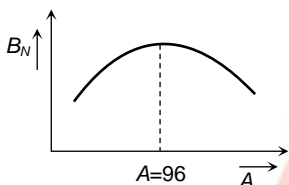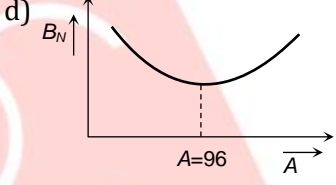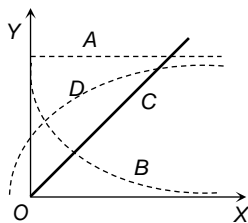Date :   DPP No. : 3

Topic :-Nuclei

1. Consider α − Particles, β − Particles and γ − rays, each having an energy of 0.5 MeV. In increasing order of penetrating powers, the radiations are
   a) α, β, γ b) α, γ, β c) β, γ, α d) γ, β, α

2. The dependence of binding energy per nucleon, B_N on the mass number, A, is represented by
   a)
   b)
   c)
   d)

3. A radioactive isotope has a half-life of T years. How long will it take the activity to reduce to 1% of its original value
   a) $3.2T$ year   b) $4.6\ T$ year   c) $6.6\ T$ year   d) $9.2\ T$ year

4. An artificial radioactive decay series begins with unstable $^{241}_{94}Pu$. The stable nuclide obtained after eight α −decays and five β −decays is
   a) $^{209}_{83}Bi$ b) $^{209}_{82}Pb$ c) $^{205}_{82}Ti$ d) $^{201}_{82}Hg$

5. A radioactive sample S_1 having an activity of 5μCi has twice the number of nuclei as another sample S_2 which has an activity of $10\ \mu$Ci. The half lives of S_1 and S_2 can be
   a) 20 yr and 5 yr ,respectively   b) 20 yr and 10 yr ,respectively
   c) 10 yr each   d) 5 yr each

6. The rest mass of an electron as well as that of positron is $0.51\ MeV$. When an electron and positron are annihilate, they produce gamma-rays of wavelength(s)

   a) 0.012 Å   b) 0.024 Å   c) 0.012 Å to ∞   d) 0.024 Å to ∞

7. In Fig. X represents time and Y represents activity of a radioactive sample. Then the activity of sample, varies with time according to the curve

a) A b) B c) C d) D

8. In the Bohr model of the hydrogen atom, let R, v and E represent the radius of the orbit, the speed of electron and the total energy of the electron respectively. Which of the following quantity is proportional to the quantum number n

a) R/E b) E/v c) RE d) uR

9. In Bohr's model of hydrogen atom, which of the following pairs of quantities are quantized
a) Energy and linear momentum   b) Linear and angular momentum
c) Energy and angular momentum   d) None of the above

10. Two nucleons are at a separation of one fermi. Protons have a charge of $+ 1.6 \times 10^{-19}$ C. The net nuclear force between them is F_1, if both are neutrons ,F_2 if both are protons and F_3 if one is proton and the other is neutron. Then

a) $F_1 = F_2 > F_3$ b) $F_1 = F_2 = F_3$ c) $F_1 < F_2 < F_3$ d) $F_1 > F_2 > F_3$

11. If r_1 and r_2 are the radii of the atomic nuclei of mass numbers 64 and 125 respectively, then the ratio (r_1/r_2) is

a) $\dfrac{64}{125}$ b) $\sqrt{\dfrac{64}{125}}$ c) $\dfrac{5}{4}$ d) $\dfrac{4}{5}$

12. In a material medium, when a positron meets an electron both the particles annihilate leading to the emission of two gamma ray photons. This process forms the basis of an important diagnostic procedure called

a) MRI   b) PET   c) CAT   d) SPECT

13. If $\lambda_{\max}$ is 6563 Å, then wavelength of second line for Balmer series will be

a) $\lambda = \dfrac{16}{3R}$ b) $\lambda = \dfrac{36}{5R}$ c) $\lambda = \dfrac{4}{3R}$ d) None of the above

14. Rest mass energy of an electron is $0.54\ MeV$. If velocity of the electron is $0.8c$, then $K.E.$ of the electron is

a) $0.36\ MeV$ b) $0.41\ MeV$ c) $0.48\ MeV$ d) $1.32\ MeV$

15. If the binding energies of a deuteron and an alpha particle are 1.125MeV and 7.2MeV, respectively , then the more stable of the two is
a) deuteron
b) Alpha-particle
c) Both (a) and (b)
d) Sometimes deuteron and Sometimes Alpha-particle

16. Consider the following two statements
A. Energy spectrum of α-particles emitted in radioactive decay is discrete
B. Energy spectrum of β-particles emitted in radioactive decay is continuous
a) Only A is correct   b) Only B is correct
c) A is correct but B is wrong   d) Both A and B are correct

17. Two radioactive materials X_1 and X_2 have decay constants 10λ and λ repectively. If initially, they have the same number of nuclei, then the ratio of the number of nuclei of X_1 to that of X_2 will be $1/e$ after a time

a) $\dfrac{1}{10\lambda}$ b) $\dfrac{1}{11\lambda}$ c) $\dfrac{11}{10\lambda}$ d) $\dfrac{1}{9\lambda}$

18. If half life of radium is 77 days. Its decay constant in day will be

a) 3×10^{-13}/day   b) 9×10^{-3}/day   c) 1×10^{-3}/day   d) 6×10^{-3}/day

19. Which of the following atoms has the lowest ionization potential

a) $^{16}_{8}O$ b) $^{14}_{7}N$ c) $^{133}_{55}Cs$ d) $^{40}_{18}Ar$

20. Isobars are formed by

a) α −decay   b) β −decay   c) γ −deacy   d) h −decay