

## Nuclear Physics /3<sup>rd</sup> Communication /2<sup>nd</sup> course

Q1/Determine the atomic mass and the mass excess of ( $^{27}_{13}\text{Al}$ ).

Q2/Calculate the mass defect for  $^7_3\text{Li}$ . The mass of  $^7_3\text{Li}$  is 7.016003 amu.

Q3/ Determine the radii of a  $^{16}\text{O}$  and a  $^{208}\text{Pb}$  nucleus.

Q4/ If the radius of a nucleus is given by  $R=R_0 A^{1/3}$  with  $R_0 = 1.2\text{F}$ , what is the density of the nuclear matter (a) in  $\text{g/cm}^3$ , (b) in nucleons/ $\text{F}^3$ .

Q5/ Determine the approximate density of a nucleus, if the nucleus is treated as a uniform from sphere.

Q6/The actual atomic mass of  $^{40}_{20}\text{Ca}$  is 39.96259. find the binding energy of this nuclide, using 1.008665 amu for the mass of a neutron and 1.007825 amu for the mass of atomic hydrogen. also calculate the binding energy per nucleon.

Q7/Determine the total binding energy and the average binding energy of the element  $^7_3\text{Li}$ , if you know that each of quantities are in the amu, where  $M(^7_3\text{Li})=7.016004$  amu,  $M_n= 1.008665$  amu  $M_H=1.007825$ .

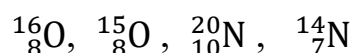
Q8/Two isotopes of oxygen  $^{16}_8\text{O}$  and  $^{18}_8\text{O}$  having the atomic masses (15.990523 u) and (17.994768 u) respectively. What do you expect the relative abundance of two isotopes.

Q9/ According to single particle model (shell model), what is the spin and parity of the ground state of  $^{39}_{19}\text{K}$  nucleus.

Q10/The atomic mass of Zinc isotope ( $^{64}_{30}\text{Zn}$ ) is (63.929 u). Compare binding energy between classical and liquid empirical mass formula.

( $m_p=1.007825\text{u}$ ,  $m_n=1.007825\text{u}$ ,  $a_v=14.1$ ,  $a_s=13$ ,  $a_c=0.595$ ,  $a_a=19$ ,  $a_p=33.5$ )

Q11/ Determine the ground state angular momentum of



Q12/ what will be the mass of a(10 curi) sample of (Co-60) given that its half life is (5.26 year).

Q13/ A certain radioactive substance has a decay constant ( $1.44 \times 10^{-3}\text{yr}$ ), in what time will (75%) of the initial number of atoms disintegration.

Q14/ What is activity of one gram (Ra-226) whose half live is 1622 year.

Q15/ What is the mass sample of C-14 ( $t_{1/2} = 5570\text{yr}$ ) that has on activity of 5 Ci?

Q16/ What is the activity of  $5 \times 10^{-7} \text{Kg}$  of (U-230) whose half life is  $(0.18 \times 10^4 \text{Sec})$ ?

Q17/ How much time required for amount of Sr-19 ( $t=28\text{yr}$ ) to be reduced by 75%?