Unit I

1) In the following decay scheme, the blanks should contain .

$$^{A}_{Z}P \rightarrow {^{A}_{Z-1}}D + \underline{\quad\quad} + \underline{\quad\quad}$$

a) β+ and n
b) β– and ν
c) β– and p
d) β+ and ν
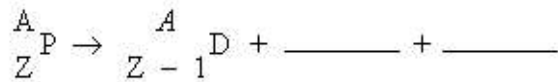
2) If during the Beta decay process, if , **M(A,Z)>M(A,Z+1),** then ---------------- (where symbols have their usual meaning)
a) the emission of electron takes place.
b) the emission of positron takes place.
c) the emission of electron & positron takes place.
d) the electron capture process takes place.

3) The 'neutrino hypothesis' was postulated to solve the problem about ---------- .
a) conservation of linear momentum
b) conservation of charge
c) conservation of energy & conservation of angular momentum
d) conservation of mass

4) Straggling of range of alpha particles with same initial energy is _____
a) due to statistical fluctuation about a mean value in the energy loss per collision
b) due to fluctuation in the energy loss
c) independent of number of collisions
d) due to ionization potential of the gas

5) Geiger Nuttal law is given by the equation:
   a) $\log_{10} R_\alpha = A + B \log_{10} \lambda$
   b) $\log_{10}\lambda = A + B \log_{10} R_\alpha$

c) $\log_{10} \frac{1}{R_\alpha} = A + B \log_{10} \lambda$

d) $\log_{10} R_\alpha = A + B \log_{10} \lambda^{-1}$

Unit II

1) In internal conversion process, the surplus energy of nucleus is directly transferred to _____

a) nucleus
b) Proton
c) Neutron
d) Orbital electron

2) If the mean life for gamma decay is _____ , then such excited states are called metastable state .
a) From 10^{-10} sec to many years
b) From 10^{-10} sec to 1 sec
c) From 10^{-15} sec to few months
d) From 10^{-15} sec to few months

3) Nuclei with odd numbers of protons and odd number of neutrons are_____.
a) Least stable
b) Most stable
c) unstable
d) different

4) In mass-parabolas, the mass of the most stable odd A isobar is_____.
a) $M(Z_0,A)=\alpha A - \gamma Z_0$
b) $M(Z_0,A)=\alpha A - \gamma Z_0^2$
c) $M(Z_0,A)=\beta A - \gamma Z_0$
d) $M(Z_0,A)=\alpha A - \beta Z_0$

5) Effect of coulomb energy on the binding energy is given by $B_c =$ _____

a) $\frac{a_c Z}{A^{1/3}}$

b) $\frac{-a_c Z^2}{A^{2/3}}$

c) $\frac{-a_c Z^2}{A^{1/3}}$

d) $\dfrac{a_c Z^2}{A^{1/3}}$

Unit III

1) Name the moderator used in the nuclear reactor?
a) Plutonium
b) Thorium
c) Graphite
d) Beryllium

2) Which type of reaction takes place in sun?
a) Nuclear Fusion
b) Nuclear Fission
c) Spontaneous Fission
d) Double Beta Decay

3) A uniform magnetic field of $2Wb/m^2$ is used in a cyclotron to accelerate protons. The radius of the cyclotron is 0.32m. The electric field between the Dee s should be reversed after every_____
   Given: mass of the proton = 1.67×10^{-27}kg and charge of the proton = 1.67×10^{-19} C

a) 1.64 sec

b) 1.64×10^{-8}sec

c) 3.28×10^{-8}sec

d) 1.64×10^{-46}sec

4) In betatron, if the electrons have to be kept on constant radius r_0, then the following condition has to be satisfied
a) $\Delta\varphi = 2\pi r_0^2 \Delta B_0$
b) $\Delta\varphi = \pi r_0^2 \Delta B_0$
c) $\Delta\varphi = 2\pi r_0 \Delta B_0$
d) $\Delta\varphi = 2\pi r_0^2 B_0$

5) The number of neutrons that will be therein the hundredth generation if the fission process starts from 1000 neutrons and k= 1.05 is _____

a) 1.25×10^2

b) 1.25

c) 1.25×10^5

d) 12.5×10^5

Unit IV

1) The magnetic moment of proton is

a) 2.7973 nuclear magneton
b) 2.9773 nuclear magneton
c) 2.7793 nuclear magneton
d) 2.3779 nuclear magneton

2) Which of the following statement is incorrect about the photon?

a) Photon is quantum of electromagnetic field
b) Photon has no electrical charge
c) Photon has no mass
d) Photon is spin half particle

3) How many quarks make up a proton?

a) 0
b) 1
c) 2
d) 3

4) The rest mass of the meson is given by

a) $\hbar/2R\ c$
b) $h/R\ c$
c) $\hbar/2\ c$
d) $h/2R\ c$

5) Which of the following about the nuclear force is true?

a) It is an attractive force between electrons and protons in an atom
b) It is an attractive force between electrons and neutrons in an atom.
c) It is much weaker than the gravitational force.
d) It is a strong, short-range, attractive force between the nucleons.