KHAIRA COLLEGE, KHAIRA, BALASORE

DEPARTMENT OF PHYSICS

QUESTION BANK

UG 4th Sem - CC – IX

Answer all questions

1- Answer the following : **[1mark]**

a) Photoelectric effect illustrates _____ nature of light .

b) Bohr's atom model could not explain about of Hydrogen spectral line.

c) _____ waves are not electro - magnetic in nature.

d) Davison-Garmer experiment confirms _____ nature of particles.

e) Write uncertainty principle in terms of time and energy.

f) Which nucleus is highly stable ?

g) The unit of Radioactivity is _____ .

h) A positron has same mass as that of _____ .

i) A hot body emits _____ radiation.

j) Bohr atom model does not explain _____ of spectral lines under the effect of magnetic field.

k) Rest mass of photon is _____ .

l) If the momentum of particle is increased to 3 times, the de-Broglie Wavelength will become _____ .

m) The equation of motion of matter wave was derived by _____ .

n) _____ can travel faster than speed of light.

o) The mass of electron is _____ to mass of proton.

p) _____ is the minimum value of energy of the incident photon for the process of pair production to take place.

2- Answer the following (Very short type) :-   **[1.5 marks]**

   a) Define work function.

   b) Calculate the energy associated with a photon of wave length 6000 Å . h = 6.62×10^{-34} JS .

   c) Write Bohr's postulate explaining frequency condition.

   d) Calculate the De Broglie wavelength of electron moving with a speed of 10^5 m/s, mass of electron = 9.1×10^{-31} kg.

   e) Calculate the wavelength of photon whose energy is 6×10^{-18} J.

   f) Write the failures of shell model.

   g) Explain packing factor of nucleus.

   h) Write down uses of Nuclear Reaction.

   i) Define Nuclear fission.

   j) Find the radius of $_8O^{16}$ nucleus.

   k) A photon has 10^9 ev. Calculate momentum of photon.

   l) State Wiens displacement law.

   m) What is Compton wavelength? Find it's value.

   n) Explain in brief the significance of Frank Hertz experiment.

   o) State the conclusion of De-Broglie hypothesis matter wave.

   p) Find the Wavelength for a beam of neutrons whose kinetic energy is 50ev. Given $m_2 = 1.67 \times 10^{-27}$ kg and h = 6.62×10^{-34} JS.

   q) Explain how the wave nature of particle gives rise to uncertainty principle.

   r) Find approximately the ratio of the nuclear radii of the gold isotope Au^{197} and silver isotope Au^{197}_{79}.

   s) Find rest mass energy of electron in Mev.

   t) Why a hydrogen bomb more dangerous than an atom bomb.

3- Answer the following (Sort type) :-   **[2 marks]**

   a) What is Compton shift? Write it's expression.

   b) Derive Einstein's photo electron equation.

c) Explain wave particle duality.

d) State Heisenberg's uncertainty principle.

e) Write down the limitations of Bohr's atom model.

f) Write down the properties of Nuclear force.

g) Find the wavelength of second line of Balmer series of Hydrogen atom if wavelength of 1st line is 6683Å.

h) Find the energy equivalent of mass of 1 amu.

i) Derive a relation between decay constant and half life period.

j) Show that density of nucleus is independence of mass number.

k) What is meant by critical potential of an atom?

l) State the factors on which Compton shift depends.

m) Find shortest Wavelength of Balmer series.

n) Write the limitation of liquid drop model.

o) Explain stability of nuclei with the help of N-Z graph.

p) Calculate the Wavelength associated with photon carrying energy 13.24 ev and h=6.62×10^{-34} J.S.

q) Write down the properties of black body radiation.

r) Write down the difference between excitation energy and ionization energy.

s) Calculate energy equivalent to 1 amu in Mev.

t) Write about dual nature of light.

4- Answer the followings (Long type) :-   [6marks]

a) Explain the Compton effect. How this effect is different from photoelectric effect.

b) Describe Frank – Hertz experiment.

c) Explain Davison German experiment.

d) Discuss the validity of Huygen's berg uncertainty principle with the help gamma ray microscope and estimate the ground state energy of H-atom.

e) Write down few experimental facts in support of magic numbers. Draw shell model for $^{208}pb_{82}$.

f) Explain the terms of semi-empirical mass formula those are Quantum origin.

g) State and explain laws of Radioactivity decay. Define decay constant.

h) Describe the construction and working of a Nuclear reactor.

i) Derive Rutherford's formula of α-particle.

j) Explain Bohr's correspondence principle.

k) Explain de-Broglie's hypothesis for matter wave.

l) Use uncertainty principle to explain.

m) What are Nuclear forces? Explain their properties.

n) Explain how shell model explain magic numbers successfully.

o) Write short notes of Nuclear Fission.

p) Discuss the law of successive disintegration in radioactivity.

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