

Important Q- s for B. Sc. III<sup>rd</sup> year (Physics 1<sup>st</sup> paper)

Unit-1:

Q-1: Explain photoelectric effect in brief.

Q-2: What is meant by black body radiation, why its spectrum could not be explained by classical theory?

Q-3: What is Compton Effect how could it be explained by the Quantum theory?

Q-4: Explain the wave particle duality of matter and obtain an expression for the de-Broglie wavelength.

Q-5: What is wave packet explain its physical meaning and state how wave packet is formed.

Q-6: Explain Heisenberg uncertainty principle and derive it.

Q-7: Establish the time independent Schrödinger wave equation.

Q-8: Establish the time dependent Schrödinger wave equation.

Q-9: Write short notes on-

- |                                |                                   |
|--------------------------------|-----------------------------------|
| 1- Properties of wave function | 2- Normalization of wave function |
| 3- Wave velocity               | 4- Group velocity                 |

Unit-2:

Q-1: Write Schrödinger wave equation for a particle in a potential well of width  $a$  and infinite depth and obtain the Eigen function and Eigen energy of the particle in it.

Q-2: Give a solution of Schrodinger equation for a particle enclosed in one dimensional box.

Q-3: Write down the equation for a particle incident on a rectangular potential barrier if  $E < V_0$ . Derive the expression for the transmission coefficient.

Q-4: What is tunneling effect explain Alpha decay with the help of it.

Q-5: Write down the equation for simple harmonic oscillator and solve it.

Q-6: Write short notes on-

- |                  |                 |               |                  |
|------------------|-----------------|---------------|------------------|
| 1- Free particle | 2- Point energy | 3- Fixed Axis | 4- Rigid rotator |
|------------------|-----------------|---------------|------------------|

### Unit-3:

Q-1: What is Bohr's atomic model? Give its success and drawbacks.

Q-2: What is meant by spin motion of electron. Describe Stern-gerlach's experiment for its verification.

Q-3: Explain spatial quantization and spin quantization.

Q-4: Discuss different series obtained in the spectrum of hydrogen atom on the basis of Bohr's model. What are the facts which could not be explained by this model?

Q-5: What is atomic shell model? Explain the distribution of electrons in different sub shell with the help of quantum numbers.

Q-6: Explain Pauli's exclusion principle.

Q-7: Explain-

- 1- total orbital angular momentum L
- 2- total spin angular momentum S
- 3- total angular momentum I

In reference to the many electron systems of atom.

Q-8: What is Zeeman Effect? Obtain an expression for Zeeman shift.

Q-9 state Duane and Haunt's law and explain it

Q-10 write short notes on-

- 1- Characteristics of X-Ray
- 2- Mosley's law
- 3- L-S coupling
- 4- J-J coupling
- 5- Continuous x-ray spectrum

### Unit-4:

Q-1: What do you mean by molecular spectra? What are its kinds and in what electromagnetic regions are they obtained explain.

Q-2: Discuss pure rotational spectra in diatomic molecules.

Q-3: Discuss vibrational spectra in detail.

Q-4: What is Raman Effect? Describe experimental arrangement for its study

Q-5: Write short notes on-

- 1- Zero point energy
- 2- Morse potential and Inharmonicity
- 4- Born-Oppenheimer

Unit-5:

Q-1: Discuss size and shape of nucleus.

Q-2: Explain the terms mass defect packing fraction and binding energy.

Q-3: How is the energy of alpha particle measured explain why alpha particles are not monoenergetic.

Q-4: State Geiger- Nuttall law and explain it.

Q-5: What is beta decay explain.

Q-6: What is meant by nuclear reaction?

Q-7: Write short notes on-

1- Nuclear cross section 2- liquid drop model

3- Shell model magic numbers 4- Q value of nuclear reaction

Q-8: Compare Nuclear fission and nuclear fusion in detail.