Faculty of Science

B.Sc (Physics) III-Year, CBCS –V Semester

Backlog Examinations -June/July, 2022

PAPER: Modern Physics

Time: 3 Hours   Max Marks: 80

Section-A

I. Answer any *eight* of the following questions   (8x4=32 Marks)

1. Explain L-S and J-J coupling schemes.

2. Write the limitations of Bohr's theory.

3. A sample was excited by 4358A° line .A Raman line was observed at 4447A° . Calculate the Raman shift. At what wavelength anti stokes line appears?.

4. Discuss the inadequacy of classical physics.

5. Obtain an expression for the group velocity in a dispersive medium.

6. Deduce Schrödinger time dependent wave equation.

7. A nucleus of mass number 125 has radius 6fermi. Find the radius of a nucleus having mass number 64.

8. What is neutrino hypothesis in the β-decay?

9. What is binding energy and explain.

10. What are the miller indices? Write rules for finding miller indices.

11. What is Madelung constant? Write its importance.

12. Calculate the potential energy of NaCl crystal when the ions are at a distance of 2.5A°.

Section-B

II. Answer the following questions   (4x12=48 Marks)

13. (a) What is Zeeman effect? Describe the experimental arrangement to study the normal Zeeman effect.

(OR)

(b) What is FIR spectroscopy? Derive an expression for Rotational energy levels of Diatomic molecules.

14. (a) State Photo electric effect. Describe the experimental setup and derive Einstein's photo electric equation.

(OR)

(b) State and explain Heisenberg's uncertainty principle for

i) Position-Momentum   ii) Energy –Time.

(c) Obtain Heisenberg's uncertainty principle using Gamma ray microscope.

15. (a) Discuss the Liquid drop model of the nucleus. Obtain semiemphirical mass formula.

(OR)

(b) Describe the construction and working of G.M Counter. Write advantages and disadvantages.

16. (a) Enumerate the seven crystal systems and point out their features.

(OR)

(b) Derive Bragg's law for diffraction of X-rays by a crystal. Explain crystal structure determined by Laue method.

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Faculty of Science

B.Sc (Physics) III-Year, CBCS –V Semester Regular Examinations –Jan, 2023

PAPER: Modern Physics

Time: 3 Hours   Max Marks: 80

Section-A

I.   Answer any *eight* of the following questions   (8x4=32 Marks)

1. Explain L-S and J-J coupling schemes.
2. What is Raman Effect? Give its applications.
3. Wavelength of H_α line is 6560Å. Calculate Rydberg constant.
4. Write Einstein's photo electric equation. Explain the terms in the equation.
5. State and explain complimentary principle of Bohr.
6. If an electron is accelerated with a voltage of 1000V in an electron microscope, find de-Broglie wavelength. (Planck's constant=6.67×10^{-34}, mass of electron= 9.1×10^{-31} kg, charge of electron=1.6×10^{-19} coulomb.)
7. Define Binding energy. Calculate the binding energy of Deuteron.
8. Write a short note on α-decay.
9. The radius of Ho^{165} is 7.731 fermi. Find the radius of He^4
10. Describe the crystal structure of CsCl.
11. Derive Bragg's law of X-Ray diffraction.
12. In a simple cubic lattice find the ratio of intercepts on the three axes by $(1,\bar{3},2)$ plane.

Section-B

II. Answer the following questions   (4x12=48 Marks)

13. (a) Explain the features of Vector atom model and how they are experimentally verified by the Stern-Gerlach experiment.

(OR)

   (b) Discuss about vibrational energies and spectrum of diatomic molecules. Mention transition rules for pure vibration.

14. (a) What are matter waves? Describe Davisson-Germer experiment to demonstrate wave nature electrons.

(OR)

   (b) Derive Schrodinger's time independent wave equation.

15. (a) Explain Gamow's theory of α-decay. Obtain Geiger-Nuttal law from it.

(OR)

   (b) Explain the construction and working of the GM Counter. State its merits and demerits.

16. (a) Describe lattice energy of an ionic crystal. Obtain the expression for lattice energy of ionic molecule.

(OR)

   (b) Describe the Powder method for the analysis of crystal structure.

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Faculty of Science

B.Sc (Physics) III-Year, CBCS –V Semester Backlog Examinations –June, 2023

PAPER: Modern Physics

Time: 3 Hours

Max Marks: 80

Section-A

I. Answer any *eight* of the following questions (8x4=32 Marks)

1. Explain L-S and J-J coupling schemes.
2. Explain different types of emission spectra.
3. Wavelength of H_α line is 6560Å. Calculate Rydberg constant.
4. State the properties of matter waves.
5. State and explain complimentary principle of Bohr.
6. What is the de-broglie wavelength of proton moving with 1/30 of the velocity of light?
7. Define Binding energy. Calculate the binding energy of Deuteron.
8. Write a short note on β-decay.
9. The radius of Ho^{165} is 7.731 fermi. Find the radius of He^4
10. Describe the crystal structure of NaCl.
11. Derive Bragg's law of X-Ray diffraction.
12. In a simple cubic lattice find the ratio of intercepts on the three axes by $(1,\bar{3},2)$ plane.

Section-B

II. Answer the following questions (4x12=48 Marks)

13. (a) Explain the features of Vector atom model and how they are experimentally verified by the Stern-Gerlach experiment.

(OR)

(b) What is Raman Effect? How is it experimentally studied.

14. (a) What is Compton Effect? Derive expression for Compton shift.

(OR)

(b) Derive Schrodinger's time independent wave equation.

15. (a) Explain how the shell model accounts for the existence of magic numbers.

(OR)

(b) Explain Gamow's theory of α-decay. Obtain Geiger-Nuttal law from it.

16. (a) Describe lattice energy of an ionic crystal. Obtain the expression for lattice energy of ionic molecule.

(OR)

(b) Describe the Powder method for the analysis of crystal structure.

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