

SSR DEGREE COLLEGE (AUTONOMOUS) NIZAMABAD

M.SC. PHYSICS

INTERNAL – II SEM – II

Subject statistical mechanics

QUESTION BANK

I. Multiple Choice

1. Bose–Einstein statistics applies to:

- A) Fermions
- B) Bosons
- C) Electrons only
- D) Protons only

Answer: B) Bosons

2. Which particle obeys Bose–Einstein statistics?

- A) Electron
- B) Proton
- C) Photon
- D) Neutron

Answer: C) Photon

3. Bose–Einstein condensation occurs at:

- A) High temperature
- B) Low temperature
- C) Room temperature
- D) Infinite temperature

Answer: B) Low temperature

4. Bosons can occupy:

- A) Same quantum state
- B) Different quantum states only
- C) Same orbit only
- D) No quantum state

Answer: A) Same quantum state

Two Fluid Model (Superfluid Helium)

5. The two-fluid model explains the behavior of:

- A) Water
- B) Mercury
- C) Liquid helium
- D) Steam

Answer: C) Liquid helium

6. In the two-fluid model, helium-II consists of:

- A) Solid and liquid
- B) Normal fluid and superfluid
- C) Gas and liquid
- D) Plasma and liquid

Answer: B) Normal fluid and superfluid

7. Superfluid helium has:

- A) High viscosity

- B) Infinite resistance
- C) Zero viscosity
- D) Constant pressure

Answer: C) Zero viscosity

White Dwarfs

8. White dwarfs are supported against gravitational collapse by:

- A) Thermal pressure
- B) Radiation pressure
- C) Electron degeneracy pressure
- D) Nuclear force

Answer: C) Electron degeneracy pressure

9. White dwarfs mainly obey:

- A) Bose–Einstein statistics
- B) Fermi–Dirac statistics
- C) Maxwell statistics
- D) Classical mechanics

Answer: B) Fermi–Dirac statistics

10. The maximum mass of a white dwarf is called:

- A) Einstein limit
- B) Bohr limit
- C) Chandrasekhar limit
- D) Newton limit

Answer: C) Chandrasekhar limit

Fermi–Dirac Gas

11. Fermi gas consists of:

- A) Bosons
- B) Fermions
- C) Molecules only
- D) Photons

Answer: B) Fermions

12. Electrons in a metal behave as:

- A) Ideal gas
- B) Bose gas
- C) Fermi gas
- D) Perfect liquid

Answer: C) Fermi gas

13. The highest occupied energy level at 0 K is called:

- A) Excited level
- B) Fermi level
- C) Ground state
- D) Bohr level

Answer: B) Fermi level

14. Fermi–Dirac statistics follows:

- A) Pauli exclusion principle
- B) Newton's law
- C) Boyle's law
- D) Hooke's law

Answer: A) Pauli exclusion principle

Bragg–Williams Approximation

15. Bragg–Williams approximation is related to:

- A) Atomic ordering
- B) Gravitation
- C) Optics
- D) Electricity

Answer: A) Atomic ordering

16. Bragg–Williams approximation assumes:

- A) Short-range order only
- B) Long-range order
- C) No interaction
- D) Random motion only

Answer: B) Long-range order

17. Bragg–Williams theory is mainly used for:

- A) Magnetic systems and alloys
- B) Fluid flow
- C) Heat engines
- D) Radiation

Answer: A) Magnetic systems and alloys

Order–Disorder Transition

18. Order–disorder transition occurs in:

- A) Alloys
- B) Pure gases
- C) Vacuum
- D) Water only

Answer: A) Alloys

19. At high temperature, an ordered alloy becomes:

- A) Crystalline
- B) Superfluid
- C) Disordered
- D) Solid only

Answer: C) Disordered

20. Order–disorder transition is mainly affected by:

- A) Pressure only
- B) Temperature
- C) Density only
- D) Volume only

Answer: B) Temperature

II. Fill in the Blanks

1. Bose–Einstein statistics applies to particles called ____.

Answer: bosons

2. Photons obey ____ statistics.

Answer: Bose–Einstein

3. Bose–Einstein condensation occurs at very ____ temperatures.

Answer: low

4. The two-fluid model explains the behavior of liquid ____.
Answer: helium
5. In the two-fluid model, helium-II consists of normal fluid and ____ fluid.
Answer: super
6. Superfluid helium has ____ viscosity.
Answer: zero
7. White dwarfs are supported by ____ degeneracy pressure.
Answer: electron
8. White dwarfs mainly obey ____ statistics.
Answer: Fermi–Dirac
9. The maximum mass of a white dwarf is called ____ limit.
Answer: Chandrasekhar
10. White dwarfs are formed after the death of ____ stars.
Answer: small
11. Fermi gas consists of particles called ____.
Answer: fermions
12. Electrons in metals behave like a ____ gas.
Answer: Fermi
13. No two fermions can occupy the same ____ state.
Answer: quantum
14. The highest occupied energy level at absolute zero is called ____ energy level.
Answer: Fermi
15. Bragg–Williams approximation is used to explain ____ in alloys.
Answer: ordering
16. It assumes ____ range order among atoms.
Answer: long
17. Bragg–Williams approximation is mainly applied to ____ systems.
Answer: alloy
18. Order–disorder transition mainly occurs in ____.
Answer: alloys
19. Increasing ____ may convert an ordered alloy into a disordered state.
Answer: temperature
20. In disordered state, atoms are arranged ____.
Answer: randomly

III. Descriptive Questions

1. Explain Bose Einstein gas equation
2. Explain white dwarfs in detail
3. Explain fermi dirac gas equation
4. Explain the method bragg Williams approximation
5. Explain order disorder transformation