

**Rayat Shikshan Sanstha's**  
**Yashavantrao Chavan Institute of Science, Satara**  
**Department of Nanoscience and Technology**  
**Question Bank – BNTT 601-Solid state physics and Nuclear physics**

- 1) Define concept of current density
- 2) Write a short note on Semiconductors.
- 3) Define Conductivity.
- 4) What is classical free electron theory?
- 5) Obtain expression for root mean square velocity using classical theory
- 6) Give classification of metals semiconductors and insulators.
- 7) Explain merits and demerits of quantum theory of free electron
- 8) Explain concept of resistivity and resistance.
- 9) Obtain expression for current density
- 10) Explain Pauli's Exclusion principle.
- 11) Give the necessity of quantum theory of free electron .
- 12) Explain Rutherford's Atomic model.
- 13) Explain Bohr's Atomic model
- 14) Explain Sommerfeld's Atomic model
- 15) Explain Vector atom model
- 16) What are quantum numbers? Explain In detail principal quantum number.
- 17) Write a note on azimuthal quantum number
- 18) Explain Spin quantization and spin quantum number.
- 19) Explain Hydrogen spectrum using Bohr's atomic model.
- 20) Explain classical theory for electrical conduction
- 21) Obtain expression for heat capacity of the electron gas.
- 22) Write note on types of defects.
- 23) Write a short note Advantages of classical theory
- 24) Write a short note disadvantages of classical theory
- 25) Obtain expression for vacancies in crystal.
- 26) What are subatomic particles.

- 27) Write a note on Fermi energy and fermi level
- 28) Explain various atomic models
- 29) Explain Density of states.
- 30) Explain types of subatomic particles.
- 31) Write a note on Neutrons.
- 32) What are the postulates of Bohr atomic model.
- 33) Explain twin Boundaries.
- 34) Explain Burger vector.
- 35) Explain Volume defects
- 36) What are Frankel defect and Schottky defect.
- 37) What is band gap? Differentiate metal semiconductor and insulator on the basis of band gap
- 38) Show that the number of Frankel defects in equilibrium at a given temperature is proportional to  $(N/N_i)^{1/2}$  where N be number of atom and  $N_i$  be the interstitial atoms.
- 39) Write a short note physical significance of wave function in quantum theory of conduction.
- 40) What is Zeeman effect?
- 41) Explain normal and anomalous Zeeman effect.
- 42) Explain difference between edge and screw dislocation.
- 43) Write a short note on hydrons.
- 44) Write a short note on Lepton.
- 45) Write a short note on Baryons.
- 46) What are color centers.
- 47) Explain temperature dependence on creation of vacancies in crystal.
- 48) Explain extrinsic and intrinsic semiconductor.
- 49) How vacancies are created in crystal.
- 50) How p-type and n -type semiconductors are made?

**Rayat Shikshan Sanstha's**  
**Yashavantrao Chavan Institute of Science, Satara (Autonomous)**  
**Department of Nanoscience and Technology**  
**Class: B.Sc.-III Sem VI**  
**Subject: Physical & Organic chemistry (BNTT-602)**  
**Subject Code: 50052**

- 01) Explain SN1 reaction with respects to mechanism.
- 02) Explain orientation of E1CB reaction
- 03) Explain in detail Laws of photochemistry
- 04) Explain E1 reaction with respects to mechanism
- 05) Explain in brief Hoffman rule
- 06) Write a short note on Structure & stability of Nitrenes
- 07) Explain in brief stereochemistry of E1 reaction
- 08) Explain in brief stereochemistry of E2 reaction
- 09) Write short note on Aromatic compound
- 10) Write short note on Lambert law
- 11) Write a note on Stability of carbocation.
- 12) Write a Huckel's rule for non -aromatic compound
- 13) Write short note on Hyperconjugation effect
- 14) Explain SN1 reaction with respects to mechanism and stereochemistry
- 15) Explain E2 reaction with respects to mechanism and stereochemistry
- 16) Describe in brief the parallel reaction
- 17) Write short note on opposing reaction
- 18) Write short note on Factors affecting Quantum yield
- 19) Explain in brief Hyperconjugation effect
- 20) Write short note on Carbene
- 21) Explain E1CB reaction mechanism.
- 22) Write short note on Nucleophilic substitutions at an allylic
- 23) Write short note on Benzenoid compound
- 24) Write short note on Rate of reaction
- 25) State a Stark-Einstein law
- 26) Write short note on Anti-aromatic compound

- 27) Describe in brief Inductive effects
- 28) Explain E1 reaction with respects to mechanism and stereochemistry
- 29) Describe in brief the opposing reaction.
- 30) Explain SN2 reaction with respects to mechanism and stereochemistry
- 31) Write short note on SN1 reaction mechanism
- 32) Explain Resonance effects
- 33) Write short note on Explain the Characteristics of first order reaction
- 34) Explain Huckel's rule of aromaticity
- 35) Write short note on Quantum yield
- 36) Write short note on Neighbouring Group Participation
- 37) Describe in brief Non-benzenoid compound
- 38) Write a note on Stability of carbene
- 39) write a note on Resonance effects
- 40) Explain the Anti-aromatic compound
- 41) State a Lambert – Beer's law
- 42) Explain SN2 reaction with respects to mechanism and stereochemistry
- 43) Explain E1 reaction with respects to mechanism and stereochemistry
- 44) Explain the Structure & stability of carbocation and carbenes reactive intermediates
- 45) Explain Nucleophilic substitution reaction at Benzylic position
- 46) Difference between SN1 reaction and SN2 reaction
- 47) Write short note on Hoffman and Saytzeff elimination rule
- 48) Explain a Jablonski diagram
- 49) Write short note on Consecutive reactions
- 50) Write short note on Hyperconjugation effect

**Rayat Shikshan Sansthas**

**Yashavantrao Chavan Institute of Science, Satara**

**B. Sc III Professional Science Semester VI Examination, April 2022**

**Molecular biology and genetic engineering (BNTT-603)**

**Subject code: 50053**

**Question bank**

1. Name of Nucleotides and their types
2. Define a Base stacking
3. Short note on Transcription
4. Types of DNA
5. Define Cloning Vectors
6. Define polymerase chain Reaction and explain steps involved in PCR with draw neat labelled diagram
7. Explain process of Prokaryotic Replication and introduce enzyme involved in replication
8. Explain C-DNA library and Different blotting techniques
9. Short note on Cloning vector and properties of good vector
10. Explain methods of nanoparticles used in DNA delivery
11. Short note on Ti plasmid
12. Short note on application of Recombinant DNA technology
13. Define plasmid and their types
14. Explain blotting techniques with suitable diagram
15. Explain a term Genetic code
16. Define a term Base pairing
17. Short note on mechanism of Translations
18. Types of RNA
19. Short note on Transformation
20. Explain Blotting techniques and Their types with suitable diagram
21. Define polymerase chain Reaction and explain steps involved in PCR with draw neat labelled diagram
22. Explain process of Prokaryotic Replication and introduce enzyme involved in replication
23. Short note on Cloning vector and properties of good vector
24. Explain methods of nanoparticles used in DNA delivery
25. Short note on Ti plasmid
26. Short note on application of Recombinant DNA technology
27. Define plasmid and their types
28. Explain role Ri or Recombinant plasmid
29. Central Dogma of Molecular Biology
30. Types of DNA

31. Explain a term Replication
32. Explain in brief Base stacking
33. Role and function of DNA polymerase
34. Explain process of Prokaryotic Replication and introduce enzyme involved in replication
35. Define polymerase chain Reaction and explain steps involved in PCR with draw neat labelled diagram
36. Explain C-DNA library and Different blotting techniques
37. Explain methods of nanoparticles used in DNA delivery
38. Short note on Cloning vector and properties of good vector
39. Short note on application of Recombinant DNA technology
40. Short note on Ti plasmid
41. Define plasmid and their types
42. Explain blotting techniques with suitable diagram
43. Explain types of Ti and Ri plasmid
44. Explain function of GMP crops
45. Short note on concept of BT cotton
46. Explain term central dogma of molecular biology
47. Short note on DNA Library
48. Define term cosmid and their types
49. Short note on Artificial chromosome and their types
50. Explain a term Yeast Artificial Chromosome

**Rayat Shikshan Sanstha's**

**Yashvantrao Chavan Institute of Science, Satara**

**B.Sc.-III, Nanoscience & Technology, Semester VI Examination,  
Science at nanoscale: Properties of Nanomaterials (BNTT 604)**

**Subject Code: 50054**

1. Explain in brief reasoning tunnelling diode?
2. Explain magnetism in nanomaterials?
3. What is Nanoindentation?
4. Write note on tunnel diode?
5. Explain electron transport in 1D,2D,3D materials?
6. Write note on hardness of nanomaterials?
7. Write note on mechanical characterization of nanomaterials?
8. Explain density of states?
9. Write note on reasoning tunnelling diode?
10. Write short note on oscillatory exchange coupling?
11. Explain briefly magnetic tunnel junction (MTJ)?
12. Classify dia, para and ferro-magnetic materials in brief?
13. Explain exchange coupling in magnetic multilayers?
14. Difference between surface plasmon resonance and localized surface plasmon resonance?
15. Write note on Giant Magnetoresistance|?
16. Explain the concept of the Paramagnetism in brief?
17. What are the optical properties of QD nanomaterials?
18. Write short note on CNT based transistor?
19. Explain Drude conduction of metals?
20. Write in short direct and indirect band gap transitions?
21. Write note on Drude conduction of metals?
22. Write note on Micro Electrochemical systems (MEMS) & Nano Electrochemical Systems (NEMS)?
23. Explain electrical conductivity of nanocomposites?

24. Difference between classical thermodynamics & Nano thermodynamics?
25. Derive the equation of Esaki tunnelling diode?
26. Explain fundamentals of electrical conductivity in carbon nanotubes?
27. Difference between direct and indirect band gap?
28. Explain hysteresis in ferromagnetic materials?
29. Give applications of Nano plasmonic?
30. Explain optoelectronics applications of nanomaterials?
31. Explain in brief photoluminescence?
32. What are the optical properties of core-shell nanomaterials?
33. Write short note on CNT based transistor?
34. What are the mechanical properties of CNT?
35. What do you understand by Hysteresis in ferromagnetic materials?
36. Explain CNT based transistor?
37. Write note on stress vs strain curve?
38. Give short note on optoelectronics applications of nanomaterials?
39. Explain density of states of 1D materials?
40. Explain in brief concept of direct band gap?
41. Write any four applications of Nano-plasmonic?
42. Write note on RKKY interaction?
43. Discuss nano-indentation?
44. Write note on electrical conductivity of nanomaterials?
45. Explain the concept of Ferro-Magnetism?
46. Write note on Nano thermodynamics?
47. Explain in brief Drude conduction model?
48. Explain in brief absorption and emission?
49. Write short note on hardness of nanomaterials
50. Explain the density of states of 2D nanomaterials?



**Rayat Shikshan Sanstha's**  
**Yashavantrao Chavan Institute of Science, Satara (Autonomous)**  
**Department of Nanoscience and Technology**  
**B.Sc.-III, Semester VI, Examination in June 2021-2022**  
**Paper Code: BNTT – 605**  
**Subject Code: 50056**  
**Question Bank**

Question:

- 1) What is the cause of disease?
- 2) What is the meaning of active drug?
- 3) What is incubation period?
- 4) What is the natural drug?
- 5) Write any two-suppository routes of dosage forms.
- 6) What are the Characterizations used for nanoparticle analysis.
- 7) Define disease concept & write the Phases in disease.
- 8) Write down the five different ways to supply nondrug to our body and explain them.
- 9) Write a note on tissue engineering.
- 10) What are the applications & challenges of Nano medicine?
- 11) Write a note on Nano robots & Nano machines.
- 12) How the Nondrug are made?
- 13) What is the use of biology in Nano medicine?
- 14) What is the approach to develop effective Nano medicine?
- 15) Write two examples of Nano robots.
- 16) Define Nano-medicine.
- 17) What is illness period?
- 18) What is biological drug?
- 19) Define Pharmaceuticals.
- 20) Write down the applications and challenges in making of Nano-medicine?
- 21) What is the concept of Disease? Write the progression in disease.
- 22) What are the Characterization techniques used for nanomaterials analysis?
- 23) Write a note on infections disease.

- 24) What are the different types of drug? Give example of each.
- 25) Write the applications behind the making of nondrug.
- 26) Write a note on Nano robots.
- 27) Write a note on Nano medicine for tissue engineering.
- 28) What are the applications of Nano in biology?
- 29) What is chemical drug?
- 30) What is decline period?
- 31) Define drug product in drug.
- 32) What is the Nanocrystal & cluster?
- 33) Infectious disease caused by?
- 34) Explain Routes of dosage form Administration of Nano medicine.
- 35) What are the different techniques used for nanomaterials.
- 36) Explain Nano-medicine. How it can help in tissue engineering?
- 37) Write the progression in disease.
- 38) How can be a nondrug is formed?
- 39) Why we develop Nano medicines instead of other commercial medicine?
- 40) Write a note on Nano-bio-machines.
- 41) What is the relation between Nano medicine and tissue engineering?
- 42) Write the challenges faced by making of Nano medicines.
- 43) What are the different nanobio assemblies?
- 44) What are the bioinspired nanomaterials?
- 45) What are the different types of inorganic materials used for synthesis.
- 46) What is the concept of drug?
- 47) Write a note on Formulation of nanocrystals.
- 48) Write a note on interaction between biomolecules and nanoparticle .
- 49) What are the various kind of nano-systems used for nanomedicine.
- 50) Write a note on nanotheranotics.