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[Total No. of Pages : 2

**SVS-N-313 B-18**  
**B.Sc. Vth Semester Degree Examination**  
**PHYSICS**

**(Quantum Mechanics Statistical Mechanics and Material Physics)**

**Paper - 5.2**  
**(New)**

**Time : 3 Hours**

**Maximum Marks : 80**

**Instructions to Candidates:**

- 1) Answer ALL Questions from section A, Any Five from Section B and Four from Section C.

**SECTION-A**

I. Answer ALL the following questions.

**(15×1=15)**

1. When a charged particle is accelerated through potential difference V volts what happens to its K.E?
2. Write any one property of wave function.
3. What are matter waves?
4. Define Eigen value.
5. What are canonically conjugate variables?
6. What is Ensemble?
7. What are fermions?
8. What is statistical equilibrium?
9. What are paramagnetic materials?
10. Define critical current.
11. What is the location of fermi level in case of super conductors?
12. What is magnetic Levitation?
13. What is the surface area to Volume ratio in nano materials?
14. What is the size of human hair?
15. What is nano technology?

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## SECTION-B

II. Answer any Five of the following:

(5×5=25)

16. Describe GP Thomson experiment.
17. State Heisenberg uncertainty principle. Illustrate with diffraction at a single slit.
18. Write note on Boltzmann equipartition theorem.
19. Write note on classification of Ferrites.
20. Write note on Meissner effect.
21. Explain sol Gel method for preparation of Nano materials.
22. Write note on quantum size effect.

## SECTION-C

III. Answer any four of the following:

(4×10=40)

23. a. Derive Schrodinger Time independent wave equation.
- b. Derive expression for probability current density. (5+5)
24. a. Derive expression for energy level of Linear Harmonic oscillator.
- b. Write note on physical significance of Wave function. (7+3)
25. a. Derive expression for Fermi Dirac distribution function.
- b. Distinguish between micro canonical and canonical ensembles. (6+4)
26. a. What is Hysteresis? Explain BH curve.
- b. Write note on Application of nano materials. (5+5)
27. a. What is critical Magnetic field?
- b. Explain Langevins theory of diamagnetism. (2+8)
28. a. Describe chemical vapour deposition method for preparation of nano materials.
- b. Write note on reduction of dimension. (6+4)

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**SVS-N-312 B-18**  
**B.Sc. Vth Semester Degree Examination**  
**PHYSICS**  
**(Atomic and Molecular Physics)**  
**Paper -5.1**  
**(New)**

**Time : 3 Hours**

**Maximum Marks : 80**

***Instruction to Candidates:***

- i) Answer *ALL* Questions from section-A
- ii) Answer any *FIVE* in section- B
- iii) Answer any *FOUR* from section- C

**SECTION -A**

**I. Answer ALL the following questions. (15×1=15)**

1. Mention two properties of cathode rays.
2. What is the mass of the electron?
3. Define critical Potentials.
4. What is Alkali Spectra?
5. What is meant by coupling?
6. What is Bohr Magneton?
7. What is the draw back of Fran-Hertz Experiment?
8. What are stokes and Anti-stokes lines.
9. State Larmor's theorem.
10. Write the expression for hande of factor.



13. What is band head?
14. What is Rayleigh's scattering?
15. Mention two application of Raman effect.

### SECTION - B

II. Answer any FIVE of the following.

16. Explain the construction and working of Dunnington's method to determine  $e/m$  of the electron.
17. Describe Frank-Hertz Experiment to determine critical Potentials.
18. Write a note on vector atom model.
19. Write a note on critical Potentials.
20. What is zeeman effect? Describe Experimental arrangement to study ~~zeeman effect~~.
21. Write a note on vibrational Spectrum.
22. Write a note on Laser Raman Spectrometer.

### SECTION - C

III. Answer any FOUR of the following.

23. a) Explain Thomson method to determine  $e/m$  of an electron. (4×1=4)  
 b) Calculate the wavelength separation between two component lines which are observed in the normal zeeman effect the magnetic field used is  $0.4 \text{ wb/m}^2$  (7+3)  
 $e/m = 1.76 \times 10^{11} \text{ c/kg}$  and  $\lambda = 6000 \text{ \AA}$ .
24. a) Explain quantum number associated with the vector atom model. (7+3)  
 b) A beam of silver atom in Stern-Gerlach Experiment traverse a distance of  $0.2 \text{ m}$  in a non-homogenous magnetic field of field gradient  $50 \text{ T/m}$  if the velocity of the silver atoms is  $400 \text{ m/s}$ . calculate the separation between the two trace on the collector plate  $0.5 \text{ m}$  from the pole-piece, mass of the silver atom is  $1.79 \times 10^{-25} \text{ kg}$ ,  $\mu_s = 9.2 \times 10^{-24} \text{ J/T}$ .



25. a) Give the principle and theory of Stern- Gerlach Experiment. (6+4)  
b) Write a note on spin-orbit Interaction.
26. a) Give the theory of anomalous zeeman effect.  
b) Explain energy level diagram for sodium D-line in weak magnetic field. (10)
27. a) Explain Elementary theory of vibrational rotational spectra of diatomic molecule.  
b) Derive expression for energy of rotational starts of rigid rotator. (5+5)
28. a) Describe experimental study of Raman effect.  
b) Explain Raman effect on the basis of quantum theory. (5+5)
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SVS-N-312 B-19  
B.Sc. V Semester Degree Examination

PHYSICS

Atomic and Molecular Physics

Paper - 5.1

(New)

Maximum Marks : 80

Time : 3 Hours

Instructions to Candidates:

- 1) Answer all the questions from Section - A, Any five
- 2) questions from section - B and any four from section - C.

SECTION - A

(15×1=15)

Answer All the questions.

1. What are electrons?
2. What is the value of Redberg constant?
3. Define sommerfeld relativistic atom model.
4. What is principle quantum number?
5. Write the expression for spin magnetic moment of the electron.
6. Define ionisation potential.
7. Write the electronic configuration of Neon.
8. What is alkali spectra?
9. Write the expression for Lande's 'g' factor.
10. State Franck - Condon principle.
11. What is coherent scattering?
12. What is Raman effect?
13. State Rayleigh's fourth power law.
14. Due to the scattering of radiation by the vibrating molecules which spectrum appears?
15. Who proposed the hypothesis of electron spin?



### SECTION - B

(5×5=25)

Answer any **Five** of the following.

16. Give the properties of Cathod rays.
17. Explain concept of vector atom model.
18. Write a note on spectra of Alkali elements.
19. State and explain Larmor's theorem.
20. Explain Franck and Hertz experiment.
21. State and explain Rayleigh law of scattering of light.
22. With ray diagram explain Laser Raman spectrometer.

### SECTION - C

(4×10=40)

Answer any **Four** of the following.

23. a) Describe construction and theory of specific charge ( $e/m$ ) of an electron by J.J.Thomson method. (8)
- b) An electron starts from rest and moves freely in an electric field of intensity  $1200 \text{ V/m}$ . Find the force on electron ( $e = 1.6 \times 10^{-19} \text{ C}$ ;  $m = 9.12 \times 10^{-31} \text{ Kg}$ ). (2)
24. a) Give the principle & theory of stern - Gerlach experiment. (7)
- b) State and explain Pauli's Exclusion principle. (3)
25. What is anomalous Zeeman effect? Derive expression for Lande of factor. (10)
26. a) Explain Debye's theory for normal Zeeman effect. (8)
- b) What is the magnetic flux required to observe the normal Zeeman effect if a spectrometer can resolve spectral lines separated by  $0.05 \times 10^{-9} \text{ m}$  at  $500 \times 10^{-9} \text{ m}$ ? (2)
27. Derive the expression of energy of a diatomic molecule for rigid rotator. (10)
28. a) Describe Quantum theory of Raman effect. (5)
- b) Mention the applications of Raman spectroscopy in organic molecules. (5)



SVS-N-313 B-19  
B.Sc. -V Semester Degree Examination  
PHYSICS

Quantum Mechanics, Statistical Mechanics and Material Physics

Paper - 5.2

(New)

Time : 3 Hours

Maximum Marks : 80

*Instructions to Candidates:*

Answer **all** the questions from Section - A, Any **Five** questions from Section - B and any **Four** from Section- C.

**SECTION - A**

Answer **all** the following questions:

(15×1=15)

- 1) What is Compton effect?
- 2) State Heisenberg's uncertainty principle.
- 3) What is matter wave?
- 4) What are ferrits?
- 5) What is permutation?
- 6) What are nano materials?
- 7) State Curie's Law.
- 8) What is hysteresis curve?
- 9) What is transition temperature?
- 10) What are fermions?
- 11) Write the Schrodinger time independent wave equation.
- 12) What is quantum dot?
- 13) What is superconductivity?
- 14) Name the two particles involved in Compton scattering.
- 15) What is resistivity?



**SECTION - B**

(5×5=)

Answer any **FIVE** of the following:

- 16) Derive an expression for de -Broglie wave length.
- 17) Write a note on Maxwell - Boltzmann statistics.
- 18) Write a note on PVD.
- 19) Write the properties of dia-magnetic materials.
- 20) Give the theory of Davisson Germer's experiment.
- 21) Write a note on BCS theory.
- 22) Mention the applications of nano materials.

**SECTION - C**

(4×10=40)

Answer any **FOUR** of the following:

- 23) Derive the expression for time- dependent Schrodinger's equation. (10)
- 24) a. Describe experiment to show wave like nature of electrons by G.P. Thomson. (5)  
b. Mention the properties of matter waves. (5)
- 25) a. State and explain Bose - Einstein distribution Law. (7)  
b. Find the numbers of waves in which three bosons may distributed in four cells. (3)
- 26) Describe Langevin's Theory for Diamagnetism. (10)
- 27) a. Give the properties of superconductors. (5)  
b. What is Meissner effect? Explain. (5)
- 28) a. Write a note on quantum nanostructures. (5)  
b. Write a note on CVD. (5)

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SVS-N-483 A-22  
B.Sc. V Semester Degree Examination  
PHYSICS  
Physics Workshop Skills  
Paper : PHY 501 T (SEC - I)  
(New)

Time : 2 Hours

Maximum Marks : 40

*Instructions to Candidates:*

1. Answer all sections.
2. Draw diagram wherever necessary

I. Answer any five of the following.

(5×2=10)

1. What are derived units? Give an example. (2)
2. Write any two types of drilling machine. (2)
3. What is function generator? (2)
4. Define mechanism. (2)
5. What is screw gauge? Give its uses. (2)
6. Mention types of braking system. (2)

II. Answer any two of the following.

(2×5=10)

7. Write a note on Travelling Micro scope. (5)
8. Explain the types of welding defects. (5)
9. What is lever mechanism? Explain working mechanism. (5)



**III. Answer any two of the following.**

**(2×10=20)**

10. a) Explain characteristics of standard unit. (5)
- b) Explain fundamentals of milling process. (5)
11. a) Describe construction and working of function generator. (8)
- b) Give two uses of Multimeter. (2)
12. a) Write a note on power generation. (5)
- b) What is file? Mention the uses. (5)
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**SVS-N-482-A-22**  
**B.Sc. V Semester (CBCS) Degree Examination**  
**PHYSICS**  
**Solid State Physics**  
**Paper : PHY 503 T2**  
**(New)**

**Time : 3 Hours**

**Maximum Marks : 80**

**Instructions to Candidates:**

- 1) Answer any ten from Section - A.
- 2) Answer any four from Section- B.
- 3) Answer any four from Section - C

**SECTION - A**

**Answer any ten questions**

**(10×2=20)**

1. What are Miller Indices?
2. What is lattice plane?
3. What are monoatomic and diatomic molecules?
4. What is specific heat capacity of solids?
5. What is susceptibility?
6. What is Bhor magneton?
7. Define depolarization field.
8. What are dielectric materials?
9. What is conduction band and valance band?
10. Define drift velocity.
11. What is superconductivity?
12. Define transition temperature.



## SECTION - B

Answer any four questions.

(4×5=20)

13. What is Bragg's spectrometer.
14. Describe inelastic scattering of neutrons by phonons.
15. What are soft and hard magnetic materials?
16. What is plasma frequency? Explain.
17. What is Hall effect? Derive an expression for hall co-efficient.
18. Write a note on BCS theory.

## SECTION - C

Answer any four questions

(4×10=40)

19. a) Describe simple cubic, FCC and BCC in Crystal structure. (6)  
b) Explain NaO crystal structure. (4)
  20. Derive an expression for vibrations of monoatomic linear lattice. (6)
  21. a) What are dia, para and ferromagnetic materials. Explain. (6)  
b) What is B-H curve. (4)
  22. Derive an expression for classical tangevin-Debye theory. (4)
  23. a) What is Meissner effect? Explain. (6)  
b) Derive an expression for London's equation. (6)
  24. a) Classify the materials in conductors, insulators and semi-conductors. (6)  
b) What are n-type and p-type semi conductors. (4)
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**SVS-N-484-A-22**  
**B.Sc. V Semester Degree Examination**  
**PHYSICS**  
**(Basic Instrumentation Skill)**  
**Paper - SEC-2, PHY 502T**  
**(New)**

Time : 2 Hours

Maximum Marks : 40

*Instructions to Candidates:*

- 1) Answer all sections.
- 2) Draw Diagram wherever necessary.

- I. Answer any Five of the following. (5×2=10)**
1. What is sensitivity? Explain. (2)
  2. Give the advantages of digital voltmeter. (2)
  3. What is digital multimeter? (2)
  4. Mention two applications of CRO. (2)
  5. What is rectifier? Explain. (2)
  6. Mention types of Ammeter. (2)
- II. Answer any Two of the following. (2×5=10)**
7. Write a note on Active high pass filter. (5)
  8. With block diagram explain working of digital voltmeter. (5)
  9. Mention the disadvantages of CRT. (5)
- III. Answer any Two of the following. (2×10=20)**
10. a. With neat diagram Explain working of peak detector. (5)
  - b. Write a note on function generator. (5)



11. a. Give classification of AC voltmeter. (5)
- b. What is LCR meter? Mention the uses. (5)
12. Derive the expression for magnetic deflection Sensitivity of CRO. (10)
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S5S-653-A-23

B.Sc. V Semester (CBCS) Degree Examination

PHYSICS

Physics Workshop Skills

Paper : SEC - 1, PHY501T

Maximum Marks : 40

Time : 2 Hours

Instructions to Candidates:

- 1) Answer All sections.
- 2) Draw diagram whenever necessary.

SECTION - A

I. Answer any FIVE of the following in two or three sentences.

(5×2=10)

1. What are fundamental units? Give example.
2. Mention the types of welding defects.
3. What is leg vice? Mention its use.
4. What is relay? Mention its use.
5. What is spherical mechanism?
6. What is the need of gears?

SECTION - B

II. Answer any TWO of the following.

(2×5=10)

7. Describe construction and Working of Screw-gauge.
8. Write a note on Lubricant oil.
9. What is braking? Explain its types.

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SECTION - C

III. Answer any TWO of the following.

(2×10=20)

10. a) Explain the characteristics of a standard unit.

(5+5)

b) Write a note on travelling microscope.

11. a) Explain lifting of heavy objects using lever.

(5+5)

b) Write a note on pulley.

12. a) Explain construction and working of drilling machine.

(7+3)

b) Write a note on grinding machine.

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**S5S-651-A-23**  
**B.Sc. V Semester (CBCS) Degree Examination**  
**PHYSICS**  
**Solid State Physics**  
**Paper - PHY - 503T2 DSC - 1**

Maximum Marks : 80

Time : 3 Hours

**Instructions to Candidate:**

- 1) Answer any Ten from Section - A.
- 2) Answer any Four Section - B.
- 2) Answer any Four Section - C.

**SECTION - A**

**I.** Answer any **TEN** of the following.

(10×2=20)

1. Define unit cell.
2. When a solid is said to be crystalline?
3. What is reciprocal lattice?
4. What is phonon?
5. What is lattice vibrations?
6. Define permeability.
7. State curie law.
8. Define intensity of magnetisation.
9. What are polar and nonpolar molecules.
10. What is polarization of dielectric materials?
11. What is fermi level?
12. What is critical magnetic field?

**SECTION - B**

**II.** Answer any **FOUR** questions.

(4×5=20)

13. Write a note on Miller indices.
14. State an explain Dulong and petit's law.
15. Write a note on Hysteresis curve.
16. Obtain an expression for clausius-Mosotti relation.
17. Distinguish between p-type and n-type semi conductors.
18. Write a note on Meissner effect



SECTION - C

III. Answer any **FOUR** questions.

(4×10=40)

19. a) Explain with figure 14-types of Bravais lattice. (7)  
b) State and explain Bragg's law. (3)
20. a) Explain Einstein's theory of specific heat capacity and derive an expression for it. (8)  
b) Discuss merits and demerits of Einstein's theory of specific heat capacity of solid. (2)
21. a) Explain Langevin's theory of diamagnetism. (8)  
b) The magnetic permeability of a substance is  $7.5 \times 10^{-3}$  Tm/A. Find the permeability and susceptibility of the substance. (2)
22. a) Derive an expression for plasma frequency.  $\omega_p = \sqrt{\frac{Nq^2}{m\epsilon_0}}$  (5)  
b) Write a note on depolarization. (5)
23. a) What is Hall effect? (2)  
b) Derive an expression for Hall voltage and Hall co-efficient. (8)
24. a) Derive London equation. in super conductors. (5)  
b) Mention the application of super conductors. (5)

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B.Sc. V Semester (CBCS) Degree Examination

PHYSICS

Solid State Physics

Paper - PHY - 503T2 DSC - 1

Time : 3 Hours

Maximum Marks : 80

**Instructions to Candidate:**

- 1) Answer any Ten from Section - A.
- 2) Answer any Four Section - B.
- 2) Answer any Four Section - C.

**SECTION - A**

**I. Answer any TEN of the following.**

**(10×2=20)**

1. Define unit cell.
2. When a solid is said to be crystalline?
3. What is reciprocal lattice?
4. What is phonon?
5. What is lattice vibrations?
6. Define permeability.
7. State curie law.
8. Define intensity of magnetisation.
9. What are polar and nonpolar molecules.
10. What is polarization of dielectric materials?
11. What is fermi level?
12. What is critical magnetic field?

**SECTION - B**

**II. Answer any FOUR questions.**

**(4×5=20)**

13. Write a note on Miller indices.
14. State and explain Dulong and petit's law.
15. Write a note on Hysteresis curve.
16. Obtain an expression for clausius-Mosotti relation.
17. Distinguish between p-type and n-type semi conductors.
18. Write a note on Meissner effect

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SECTION - C

III. Answer any FOUR questions.

(4×10=40)

19. a) Explain with figure 14-types of Bravais lattice. (7)  
b) State and explain Bragg's law. (3)
20. a) Explain Einstein's theory of specific heat capacity and derive an expression for it. (8)  
b) Discuss merits and demerits of Einstein's theory of specific heat capacity of solid. (2)
21. a) Explain Langevin's theory of diamagnetism. (8)  
b) The magnetic permeability of a substance is  $7.5 \times 10^{-3}$  Tm/A. Find the permeability and susceptibility of the substance. (2)
22. a) Derive an expression for plasma frequency. (5)  
b) Write a note on depolarization. (5)
23. a) What is Hall effect? (2)  
b) Derive an expression for Hall voltage and Hall co-efficient. (8)
24. a) Derive London equation. in super conductors. (5)  
b) Mention the application of super conductors. (5)

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S6S-688-B-23

B.Sc. VI Semester (CBCS) Degree Examination

PHYSICS

(Nuclear and Partical Physics)

Paper - DSE - 4 - PHY 603T1

Time : 3 Hours

Maximum Marks : 80

*Instructions to Candidates:*

1. Answer all the following questions.
2. Draw diagrams wherever necessary.

SECTION - A

I. Answer any **Ten** of the following in two or three sentences.

(10×2=20)

1. What is packing fraction and parity?
2. Who proposed proton - neutron hypothesis?
3. Write the semi emperical mass formula for binding energy.
4. Define atomic number and mass number.
5. Write any two units of radio activity.
6. Who discovered radio activity?
7. State the law of conservation of charge.
8. Define resonance reaction.
9. What is linear accelerator?
10. What is Betatron?
11. What are Barions?
12. What is CPT?

SECTION - B

II. Answer any **Four** of the following.

(4×5=20)

13. Write a note on Binding energy curve.
14. Mention the experimental evidence of shell model.
15. State and prove radio active decay law.



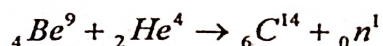
16. Discuss the various conservation law's in nuclear reaction.
17. Write the difference between linear accelerators and circular accelerators.
18. Describe construction and working of ionisation chamber.

### SECTION - C

III. Answer any Four of the following.

(4×10=40)

19. a. Write the properties of nuclear forces.  
b. What are the magic number? Give the evidence for magic number.
20. a. Explain the fermi theory of Beta - Decay.  
b. Explain the theory of successive disintegration.
21. a. What is Q-value of nuclear reaction? Obtain the expression for Q-value of a reaction and hence define exoergic and endoergic reaction.  
b. Calculate the Q-value of the reaction



mass of  $\text{Be}^9 = 9.01506$  amu

$\text{He}^4 = 4.008874$  amu

${}_0n^1 = 1.008986$  amu

$\text{C}^{12} = 12.003316$  amu

22. a. Explain the difference between proportional counter and QM - counter.  
b. Explain the construction and working of semiconductor detector.
23. a. Describe construction and working of cyclotron and what are its limitations.  
b. What is the energy to which protons can be accelerated in a cyclotron with a arc of diameter 2m and a magnetic field 0.7 T?  
 $e = 1.6 \times 10^{-19}\text{C}$ ,  $M_p = 1.673 \times 10^{-27}\text{kg}$ .
24. a. Write a note on
  - i. Hadrons.
  - ii. Leptons.
  - iii. Mass less Boson's.
- b. Explain quark model.

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**SVS-N-313 B-18**  
**B.Sc. Vth Semester Degree Examination**  
**PHYSICS**  
**(Quantum Mechanics Statistical Mechanics and Material Physics)**  
**Paper - 5.2**  
**(New)**

**Time : 3 Hours**

**Maximum Marks : 80**

***Instructions to Candidates:***

- 1) *Answer ALL Questions from section A, Any Five from Section B and Four from Section C.*

**SECTION-A**

- I. Answer ALL the following questions. (15×1=15)
1. When a charged particle is accelerated through potential difference  $V$  volts what happens to its K.E?
  2. Write any one property of wave function.
  3. What are matter waves?
  4. Define Eigen value.
  5. What are canonically conjugate variables?
  6. What is Ensemble?
  7. What are fermions?
  8. What is statistical equilibrium?
  9. What are paramagnetic materials?
  10. Define critical current.
  11. What is the location of fermi level in case of super conductors?
  12. What is magnetic Levitation?
  13. What is the surface area to Volume ratio in nano materials?
  14. What is the size of human hair?
  15. What is nano technology?

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**SECTION-B****II.** Answer any Five of the following:**(5×5=25)**

16. Describe G.P Thomson experiment.
17. State Heisenberg uncertainty principle. Illustrate with diffraction at a single slit.
18. Write note on Boltzmann equipartition theorem.
19. Write note on classification of Ferrites.
20. Write note on Meissner effect.
21. Explain sol Gel method for preparation of Nano materials.
22. Write note on quantum size effect.

**SECTION-C****III.** Answer any four of the following:**(4×10=40)**

23. a. Derive Schrodinger Time independent wave equation.
- b. Derive expression for probability current density. (5+5)
24. a. Derive expression for energy level of Linear Harmonic oscillator.
- b. Write note on physical significance of Wave function. (7+3)
25. a. Derive expression for Fermi Dirac distribution function.
- b. Distinguish between micro canonical and canonical ensembler. (6+4)
26. a. What is Hysteresis? Explain BH curve.
- b. Write note on Application of nano materials. (6+4)
27. a. What is critical Magnetic field?
- b. Explain Langevins theory of diamagnetism. (2+8)
28. a. Describe chemical vapour deposition method for preparation of nano materials.
- b. Write note on reduction of dimension. (6+4)





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**SVS-N-313 B-18**  
**B.Sc. Vth Semester Degree Examination**  
**PHYSICS**  
**(Quantum Mechanics Statistical Mechanics and Material Physics)**  
**Paper - 5.2**  
**(New)**

**Time : 3 Hours**

**Maximum Marks : 80**

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**SECTION-A**

- I. Answer ALL the following questions. (15×1=15)
1. When a charged particle is accelerated through potential difference  $V$  volts what happens to its K.E?
  2. Write any one property of wave function.
  3. What are matter waves?
  4. Define Eigen value.
  5. What are canonically conjugate variables?
  6. What is Ensemble?
  7. What are fermions?
  8. What is statistical equilibrium?
  9. What are paramagnetic materials?
  10. Define critical current.
  11. What is the location of fermi level in case of super conductors?
  12. What is magnetic Levitation?
  13. What is the surface area to Volume ratio in nano materials?
  14. What is the size of human hair?
  15. What is nano technology?

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**(1)**

**[Contd....**



## SECTION-B

II. Answer any Five of the following:

(5×5=25)

16. Describe G.P Thomson experiment.
17. State Heisenberg uncertainty principle. Illustrate with diffraction at a single slit.
18. Write note on Boltzmann equipartition theorem.
19. Write note on classification of Ferrites.
20. Write note on Meissner effect.
21. Explain sol Gel method for preparation of Nano materials.
22. Write note on quantum size effect.

## SECTION-C

III. Answer any four of the following:

(4×10=40)

23. a. Derive Schrodinger Time independent wave equation.  
b. Derive expression for probability current density. (5+5)
24. a. Derive expression for energy level of Linear Harmonic oscillator.  
b. Write note on physical significance of Wave function. (7+3)
25. a. Derive expression for Fermi Dirac distribution function.  
b. Distinguish between micro canonical and canonical ensembler. (6+4)
26. a. What is Hysteresis? Explain BH curve.  
b. Write note on Application of nano materials. (6+4)
27. a. What is critical Magnetic field?  
b. Explain Langevins theory of diamagnetism. (2+8)
28. a. Describe chemical vapour deposition method for preparation of nano materials.  
b. Write note on reduction of dimension. (6+4)





**SVS-O 312 B-18**  
**B.Sc. Vth Semester Degree Examination**  
**PHYSICS**  
**(Atomic and Molecular Physics)**  
**Paper - 5.1(V)**  
**(Old)**

Time : 3 Hours

Maximum Marks : 80

**Instructions to Candidates:**

- 1) Answer **ALL** the questions from '**SECTION-A**'.
- 2) Answer any **FIVE** from '**SECTION-B**' and
- 3) Answer any **FOUR** from '**SECTION-C**'.

**SECTION-A****L** Answer the following questions in **ONE** or **TWO** sentences.**(15×1=15)**

1. Mention any two properties of cathode rays.
2. What is meant by specific charge of an electron?
3. What are the draw backs of Ruther Ford's atomic model?
4. What is impact parameter?
5. What is excitation potential?
6. State Pauli's exclusion principle.
7. What is Zeeman Effect?
8. State Larmor's theorem.
9. What is Stark effect?
10. What is the characteristic X-ray spectrum?
11. What is molecular Spectrum?
12. What is Phosphorescence?
13. What is Raman Shift?



14. What are Stokes and Anti-stokes lines in Raman effect?
15. What is meant by hologram?

### SECTION-B

II. Answer any FIVE.

(5×5=25)

16. With neat diagram, describe the working of Dempster's mass spectroscopy.
17. Write a note on Sommerfeld model of an atom.
18. Describe Stern-Gerlach experiment to the existence of Spin and Space quantisation.
19. Write a note on vector atom model.
20. Describe the theory of rotation spectra of diatomic molecule.
21. What is meant by Scattering of light? Explain briefly Tyndall's Scattering of light.
22. Describe the construction and working of He-Ne Laser.

### SECTION - C

III. Answer any FOUR.

(4×10=40)

23. a) Describe Millikan's Oil drop method of determining the charge of an electron.  
b) A charged oil drop is suspended in uniform field of  $30.00 \text{ Vm}^{-1}$ , so that it neither falls nor rises. Find the charge on the drop, given its mass is  $9.75 \times 10^{-15} \text{ kg}$ .  
(7+3)
24. a) State Bohr's Postulates regarding hydrogen atom. (2+8)  
b) Obtain an expression of permitted radius and energy of the electron in its  $n^{\text{th}}$  orbit.
25. a) Write a note on Energy level diagram of atom. (5+5)  
b) What is continuous X-ray spectrum? Explain the origin of continuous X-ray spectrum.
26. a) What is Anomalous Zeeman Effect? (2+8)  
b) Give the theory of Anomalous Zeeman Effect.
27. a) Mention types of Molecular spectra and Explain them briefly. (6+4)  
b) What is Fluorescence? Explain.
28. a) Distinguish between Raman and Rayleigh Scattering of light. (4+6)  
b) Explain briefly stimulated emission of radiation.



Roll No. \_\_\_\_\_

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**SVS-N-312 B-18**  
**B.Sc. Vth Semester Degree Examination**  
**PHYSICS**  
**(Atomic and Molecular Physics)**  
**Paper -5.1**  
**(New)**

**Time : 3 Hours**

**Maximum Marks : 80**

***Instruction to Candidates:***

- i) Answer ALL Questions from section-A*
- ii) Answer any FIVE in section- B*
- iii) Answer any FOUR from section- C*

**SECTION -A**

**I. Answer ALL the following questions.**

**(15×1=15)**

1. Mention two properties of cathode rays.
2. What is the mass of the electron?
3. Define critical Potentials.
4. What is Alkali Spectra?
5. What is meant by coupling?
6. What is Bohr Magnetron?
7. What is the draw back of Fran-Hertz Experiment?
8. What are stokes and Anti-stokes lines.
9. State Larmor's theorem.
10. Write the expression for hande of factor.



11. Vibrational- Rotational spectrum falls in which region of electromagnetic radiation.
12. What is rigid rotator?
13. What is band head?
14. What is Rayleigh's scattering?
15. Mention two application of Ramen effect.

### SECTION - B

**II.** Answer any FIVE of the following. (5×5=25)

16. Explain the construction and working of Dunnington's method to determine e/m of the electron.
17. Describe Frank-Hertz Experiment to determine critical Potentials.
18. Write a note on vector atom model.
19. Write a note on critical Potentials.
20. What is zeeman effect? Describe Experimental arrangement to study zeeman effect.
21. Write a note on vibrational Spectrum.
22. Write a note on Laser Raman Spectrometer.

### SECTION - C

**III.** Answer any FOUR of the following. (4×10=40)

23. a) Explain Thomson method to determine e/m of an electron. (7+3)  
 b) Calculate the wavelength separation between two component lines which are observed in the normal zeeman effect the magnetic field used is 0.4 wb/m<sup>2</sup> sp.  
 charge= $1.76 \times 10^{-11}$  c/kg and  $\lambda = 6000 \text{ \AA}$ .
24. a) Explain quantum number associated with the vector atom model. (7+3)  
 b) A beam of silver atom in Stern-Gerlach Experiment traverse a distance of 0.2m in a non-homogenous magnetic field of field gradient 50T/m if the velocity of the silver atoms in 400 m/s. calculate the separation between the two trace on the collector plate 0.5m from the pole-piece, mass of the silver atom is  $1.79 \times 10^{-25}$  kg,  $\mu_s = 9.2 \times 10^{-24}$  J/T.

25. a) Give the principle and theory of Stern- Gerlach Experiment. (6+4)  
b) Write a note on spin-orbit Interaction.
26. a) Give the theory of anomalous zeeman effect.  
b) Explain energy level diagram for sodium D-line in weak magnetic field. (10)
27. a) Explain Elementary theory of vibrational rotational spectra of diatomic molecule.  
b) Derive expression for energy of rotational starts of rigid rotator. (5+5)
28. a) Describe experimental study of Raman effect.  
b) Explain Raman effect on the basis of quantum theory. (5+5)
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