No. of Printed Pages : **2**

36529

Sl. No. 100132

B.Sc. V Semester Degree Examination, September/October - 2023

PHYSICS - V

5.1 : Atomic and Molecular Physics

(CBCS)

Time : 3 Hours | Maximum Marks : 70

Note : *Write answers to Section - A questions in first two pages only.*

SECTION-A

Answer the following : **15x1=15**

1. Define atomic mass unit.
2. What is the specific charge of an electron ?
3. Who discovered nucieus of an atom ?
4. What will be the energy of emitted photon when an electron jumps from third orbit to the ground state ?
5. Mention any one failure of Rutherford's model of an atom.
6. State Pauli's exclusion principle.
7. What is Stark effect ?
8. Name the molecular spectra observed in IR region.
9. What is fluorescence ?
10. State Franck-Condon principle.
11. What are Eigen values ?
12. Mention any one application of Raman effect.
13. What is Raleigh's scattering of light ?
14. What is the composition of Ruby Rod ?
15. What is optical pumping ?

P.T.O.

SECTION-B

Answer any **five** of the following : **5x5=25**

16. Describe the construction and working of Dempster's mass spectrograph.

17. Write a note on Sommerfeld's model of an atom.

18. Describe Stern-Gerlach experiment.

19. Discuss J-J coupling scheme.

20. Explain Fluorescence. Mention its applications.

21. Describe the experimental study of Raman effect.

22. Explain, in brief spontaneous and stimulated emission with Einstein co-efficient equation.

SECTION-C

Answer any **three** of the following : **3x10=30**

23. (a) Explain J.J. Thomson's method of determining the specific charge of an electron. **7+3**

(b) A drop of oil of radius 10^{-6}m carries a charge equal to that of an electron. If the density of the oil is 2×10^3 kg m^{-3}, find the electric field required to keep it stationary.

24. (a) State the postulates of Bohr's theory of hydrogen atom. **5+5**

(b) Describe Frank-Hertz experiment.

25. (a) Derive an expression for pure rotational spectral energy of a diatomic molecule as rigid rotator. **5+5**

(b) Explain the experimental study of normal Zeeman effect.

26. (a) Discuss quantum theory of Raman effect. **5+5**

(b) Discuss LS-coupling scheme.

27. (a) Explain the construction and working of Ruby Laser. **5+5**

(b) Write a note on holography.

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No. of Printed Pages : **2**

36530

Sl. No. 100113

B.Sc. V Semester Degree Examination, September/October - 2023

PHYSICS - VI

5.2 : Statistical Physics, Quantum Mechanics and Electronics

(CBCS)

Time : 3 Hours | Maximum Marks : 70

Note : *Write answer to Section - **A** Questions in the first two pages only.*

SECTION-A

I. Answer all the following questions. **15x1=15**

1. What is an ensemble ?
2. What is Stirling's approximation ?
3. Can matter wave travel faster than light ?
4. State Heisenberg uncertainty principle.
5. What is a wave function ?
6. What is zero point energy ?
7. Define conduction band.
8. What are dopants ?
9. Name the factor on which electrical conductivity of a conductor depend.
10. What are rectifiers ?
11. Define ripple factor.
12. Give the relation between α and β.
13. What is photo diode ?
14. Expand LED.
15. Give any one application of liquid crystals.

P.T.O.

SECTION - B

II. Answer **any five** of the following. **5x5=25**

16. Derive an expression for Boltzmann equipartion theorem.

17. Illustrate Heisenberg's uncertainty principle by gamma-ray microscope.

18. Explain the physical significance of wave function.

19. Derive Eigen values for linear Harmonic oscillator.

20. Distinguish between Intrinsic and Extrinsic Semiconductors.

21. Explain the transistor as an amplifier in CE mode with a neat circuit diagram.

22. Explain the working principle of solar cell.

SECTION - C

III. Answer **any three** of the following. **3x10=30**

23. (a) Explain Maxwell-Boltzmann distribution function and Fermi-Dirac distribution function. **6+4**

(b) Write a note on Gibb's paradox.

24. (a) Derive an expression for de-Broglie's wavelength. **5+5**

(b) Explain Davisson and Germer experiment.

25. (a) Describe time-independent Schrodinger wave equation. **6+4**

(b) What is the lowest energy in Mev that a neutron can have if it is confined to move along the edge of an impermeable box of length 10^{-14}m. Mass of neutron $= 1.67 \times 10^{-27}$kg.

26. (a) Derive an expression for electrical conductivity of a semiconductor. **5+5**

(b) Obtain an expression for Hall co-efficient.

27. (a) Explain construction and working of a Bridge rectifier with neat circuit diagram. **6+4**

(b) Write the applications of LED.

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36523

V Semester B.Sc. Degree Examination, September/October - 2023

CHEMISTRY - V

5.1

100225

(CBCS-NEW)

Time : 3 Hours | Maximum Marks : 70

Note : *(i)* ***Section - A*** *contains questions from Inorganic, Organic and Physical Chemistry.*

(ii) ***Section - B*** *contains questions from Inorganic Chemistry.*

Section - C *contains questions from Organic Chemistry.*

Section - D *contains questions from Physical Chemistry.*

(iii) *Answer* ***all*** *the four sections* ***A, B, C*** *and* ***D.***

SECTION - A

Answer **any ten** of the following questions. **10x1=10**

1. Define magnetic susceptibility.

2. What is meant by Spectrochemical Series ?

3. What is Spectroscopic ground state term for d configuration ?

4. Write the structure of S_4N_4.

5. What is down field shift ?

6. What are the non-equivalent protons ?

7. Write the reaction product when diethyl sulphide is undergoes oxidation with conc.HNO_3.

8. Give any two examples for aromatic acids.

9. State Einstein's law of photochemical equivalence.

10. State Grothus - Draper's law.

11. Define quantum yield.

12. What is Photo Sensitization ?

P.T.O.

SECTION - B

Answer **any two** of the following questions. **2x10=20**

13. (a) Explain with neat diagram, how the magnetic susceptibility and moment are measured by Guoy's method. **6**

(b) Explain the type of Electronic Transitions. **4**

14. (a) Give a brief account on Diamagnetism, Ferromagnetism and antiferromagnetism. **6**

(b) Explain the spectra of an octahedral complex of d configuration with an example. **4**

15. (a) Give the preparation and properties of $(NPCl_2)_3$. **6**

(b) How the Magnetic Susceptibility varies with temperature ? Explain. **4**

SECTION - C

Answer **any two** of the following questions. **2x10=20**

16. (a) Describe the methods of synthesis of α - amino acids from strecker and Gabriel's Phthalimide methods. **6**

(b) Write a note on acid-base behaviour of amino acids. **4**

17. (a) Give any two methods of preparation and chemical reactions of ethyl mercaptan. **6**

(b) Write a note on basic components of spectrophotometer. **4**

18. (a) Explain the salient features and applications of Infra-red Spectroscopy. **6**

(b) Explain the following terms in brief : **4**

(i) (n + 1) rule.

(ii) Chemical shift

SECTION - D

Answer **any two** of the following questions. **2x10=20**

19. (a) Give the clausius - Mesoti equation. Explain the terms and discuss its Importance. **6**

(b) Discuss the applications of dipole moment on elucidating the structure of BF_3 and CO_2. **4**

20. (a) State and derive Lamberts - Beers law for light adsorptions by solutions. **6**

(b) Calculate the Einstein's energy for the radiation of wavelength 4000°C. **4**

21. (a) Discuss the mechanism of photochemical decomposition of hydrogen iodide. **6**

(b) Write a note on photo inhibition. **4**

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B.Sc. V Semester Degree Examination, September/October - 2023

CHEMISTRY - VI

5.2

(CBCS - New)

100182

Time : 3 Hours

Maximum Marks : 70

Note : *(i)* ***Section - A*** *contains questions from Inorganic, Organic and Physical Chemistry.*

(ii) ***Section - B*** *contains questions from Inorganic Chemistry,* ***Section - C*** *contains questions from Organic Chemistry,* ***Section - D*** *contains questions from Physical Chemistry.*

(iii) Answer ***all*** *the* ***four*** *sections A, B, C & D.*

SECTION - A

Answer **any ten** of the following questions. **10x1=10**

1. Define Absolute error.

2. Salt solutions conduct electricity better in liquid NH_3 than in their aqueous solutions. Give reason.

3. Define nuclear fission.

4. What is mass defect ?

5. Define epimerisation.

6. Write the composition of oil.

7. Write one use of Nylon.

8. What is Malachite green ?

9. Define Specific Conductance.

10. What is ionic conductance ?

11. Define transport number.

12. Define degree of Polymerization.

P.T.O.

SECTION - B

Answer **any two** of the following questions. **2x10=20**

13. (a) Discuss briefly Sampling of solids, liquids and gases. **6**

(b) Differentiate between accuracy and precision. **4**

14. (a) Discuss the Solubility of alkali and alkaline earth metals in liquid ammonia. **6**

(b) Give any two Chemical reactions of liquid SO_2. **4**

15. (a) Discuss the shell model of nucleus. **6**

(b) Explain nuclear fusion with two examples. **4**

SECTION - C

Answer **any two** of the following questions. **2x10=20**

16. (a) Explain Keto-enol tautomerism in ethylacetoacetate. **6**

(b) Write a note on chain shortening in aldoses. **4**

17. (a) How do you determine iodine number of oils and fats ? **6**

(b) Give two uses of teflon and terylene. **4**

18. (a) Explain the elucidation of open-chain structure of D-glucose. **6**

(b) Write the Synthesis of methyl orange. **4**

SECTION - D

Answer **any two** of the following questions. **2x10=20**

19. (a) Describe the methods of determination of solubility, solubility product of sparingly soluble salts by conductance method. **6**

(b) Define equivalent conductance. Explain the variation of equivalent conductance of strong electrolytes with dilution. **4**

20. (a) Explain the method of determination of molecular weight of polymers by viscosity method. **6**

(b) Write a note on advantages of conductance titrations. **4**

21. (a) Describe the experimental method of determination of transport number by Hittorf's method for non-attackable electrodes. **6**

(b) The resistance of a decinormal solution of a salt when measured by a cell is 40 ohm. The cell constant was found to be 0.52 cm^{-1}. Calculate specific and equivalent conductance of the solution. **4**

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B.Sc. V Semester Degree Examination, September/October - 2023

MATHEMATICS

IX : Integral Transforms

(CBCS)

100182

Time : 3 Hours | Maximum Marks : 70

Note : *Answer* ***all*** *the Sections.*

SECTION - A

Answer **any five** of the following. **5x2=10**

1. Find $L[(1+t)^3]$.

2. Find $L[e^{6t} \cdot 8^t]$.

3. Find $L[\cos^2 6t]$.

4. Using convolution theorem find $L^{-1}\left[\frac{1}{(S+1)}\frac{1}{(S+2)}\right]$.

5. If $f(x)=x^2$ in $(-\pi, \pi)$, then find Fourier coefficient of a_n.

6. If $f(S)$ is the Fourier transform of $F(x)$, then prove that $\frac{1}{a} f\left(\frac{S}{a}\right)$ is Fourier transform of $F(ax)$.

7. Find z-transform of e^{-an}.

SECTION - B

Answer **any five** of the following. **5x6=30**

8. Evaluate $L[4 \cdot \sin^2 t \cos 2t]$.

9. Verify Convolution theorem for $f(t)=e^t$ and $g(t)=\cos t$.

10. Find inverse Laplace of $\frac{1}{S(S+1)(S+2)}$.

P.T.O.

11. Solve $\frac{dx}{dt} = x - 2y$ and $\frac{dy}{dt} = -2x + y$ given that $x(0)=1$, $y(0)=2$.

12. Find the Fourier series of function $f(x)=|x|$ in $-\pi<x<\pi$ and hence deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots\ldots = \frac{\pi^2}{8}$.

13. Find the Fourier expansion for the function $f(x) = \begin{cases} -1 & ; \ -3<x<0 \\ 0 & ; \ x=0 \\ 1 & ; \ 0<x<3 \end{cases}$

14. Find the complex form of Fourier series for the function $f(x) = \begin{cases} -k & ; \ -\pi<x<0 \\ k & ; \ 0<x<\pi \end{cases}$

SECTION - C

Answer **any five** of the following. **5x6=30**

15. Find the Fourier transform of $f(x) = \begin{cases} 1 & ; \ |x|\le 1 \\ 0 & ; \ |x|>1 \end{cases}$ and hence evaluate $\int_0^\infty \frac{\sin x}{x} dx$.

16. Find Fourier sine and cosine transform of $7e^{-6x} + 8e^{-9x}$.

17. Using Parseval's Identity for Fourier cosine transform show that $\int_0^\infty \frac{\sin ax}{x(a^2+x^2)} dx = \frac{\pi(1-e^{-a^2})}{2a^2}$ where a>0.

18. If $Z_T(Un) = \bar{U}(z)$ then prove that $Z_T(Un-k) = Z^{-k}\bar{U}(z)$ when k>0.

19. Find Inverse z-transform of $\frac{3z^2}{(5z-1)} + \frac{2z}{(5z+2)}$.

20. Find the z-transform of cosnθ and sinnθ.

21. Solve $y_{n+1} + \frac{1}{4}y_n = \left(\frac{1}{4}\right)^n$ where $y_0 = 0$ by using z-transform.

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Sl. No. 100114

B.Sc. V Semester Degree Examination, September/October - 2023

MATHEMATICS - X

5.2 : Applied Mathematics

(CBCS)

Time : 3 Hours | Maximum Marks : 70

Note : *Answer* ***all*** *the sections.*

SECTION - A

Answer **any five** of the following questions. **5x2=10**

1. If $\phi(x, y, z) = 3x^2 - 2y - 3z$ find $|\nabla\phi|$ at $(2, 1, -3)$.

2. Find the maximal directional derivatives of $x^2y + yz^2 - xz^3$ at $(-1, 2, 1)$.

3. If $\vec{F} = x^2yi + y^2zj + z^2xk$ find curl (curl $\vec{F}$) at (1, 1, 1).

4. State stoke's theorem.

5. Write one-dimensional heat equation and write its appropriate solution.

6. Define Geodesics and Isoperimetric problems.

7. Find C.F of $(3D - 4D' - 2)z = 0$.

SECTION - B

Answer **any five** of the following questions. **5x6=30**

8. Prove that curl (curl $\vec{F}$) = grad (div $\vec{F}$) $- \nabla^2\vec{F}$.

9. If $\vec{r} = xi + yj + zk$, then show that $r^n.\vec{r}$ is an irrotational vector for any value of n. But is solenoidal only when $n = -3$.

P.T.O.

10. State and prove Green's Theorem in the plane.

11. Using Gauss divergence theorem, Evaluate.

$\iint_S \left[x^2 dydz + y^2 dzdx + 2z(xy-x-y)dxdy \right]$ where S is the surface of the cube $0 \le x \le 1, 0 \le y \le 1, 0 \le z \le 1$.

12. By stokes theorem prove that curl (grad ϕ) = 0.

13. Find the Extremal of the functions :

$I = \int_0^{\pi/2} \left[y^2 - (y')^2 - 2y \sin x \right] dx$ given boundary value conditions $y(0) = y\left(\frac{\pi}{2}\right) = 0$.

SECTION - C

Answer **any five** questions. **5x6=30**

14. Solve $(D^2 - 5DD' + 4D'^2)z = \sin(4x+y)$.

15. Solve $(D^2 - 2DD' + D'^2)z = 12xy$.

16. Solve $(2DD' + D'^2 - 3D')z = 5\cos(3x-2y)$.

17. Solve $(D - 3D' - 2)^2 z = 2e^{2x}.\tan(y+3x)$.

18. Reduce the equation $\frac{\partial^2 z}{\partial x^2} + x^2 \frac{\partial^2 z}{\partial y^2} = 0$ to a cannonical form.

19. Obtain the solution for one - dimensional wave equation $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$ by using the method of separation of variable.

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36521

Sl. No. 100077

B.Sc. V Semester Degree Examination, September/October - 2023

BOTANY - V

5.1 : Morphology, Taxonomy and Economic Botany

(CBCS)

Time : 3 Hours | Maximum Marks : 70

Note : *(i) Answer* ***all*** *the questions.*

(ii) Draw diagrams wherever necessary.

SECTION - A

I. Answer the following questions. **15x1=15**

1. What are Vitae ?
2. What is systematic Botany ?
3. Who proposed Binomial Nomenclature ?
4. What is Corollary Corona ?
5. What is phyllogenetic system of classification ?
6. What is offset ? Give an example.
7. What are tendrils ?
8. What is lomentum ?
9. What is Herbarium ?
10. What is Aestivation ?
11. Write the Botanical name of clove.
12. What is Spike ? Give an example.
13. Differentiate between cladode and phylloclade.
14. Define Androceium.
15. What is Napiform root ? Give an example.

P.T.O.

SECTION - B

II. Answer **any five** of the following. **5x5=25**

16. Explain epigynous and hypogynous flowers.

17. Describe the salient feature of family malvaceae.

18. What is fruit ? Explain different types of fleshy fruits.

19. What is Inflorescence ? Explain cyathium Inflorescence with diagram.

20. Mention any four fiber yielding plants and give their Botanical names.

21. Describe underground modification of root with example.

22. Distinguish between Apocyanaceae and Solanaceae.

SECTION - C

III. Answer **any three** of the following. **3x10=30**

23. Define a stem and explain different aerial stem modification.

24. Write the distinguishing character of family papilionaceae.

25. What is leaf ? Explain different types of compound leaves.

26. Assign the following plants to their respective families with their Botanical names :

(a) Mustard
(b) Cotton
(c) Sugarcane
(d) Wheat

27. What is Placentation ? Describe various forms of placentation with a neat labelled diagram.

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No. of Printed Pages : **2**

36522

Sl. No. 100064

B.Sc. V Semester Degree Examination, September/October - 2023

BOTANY - VI

5.2 : Cell Biology and Cytogenetics

(CBCS)

Time : 3 Hours | Maximum Marks : 70

Note : *(i) Answer* ***all*** *the questions.*

(ii) Draw the diagram wherever necessary.

SECTION - A

I. Answer all the following questions : **15x1=15**

1. Give difference between Prokaryotic and Eukaryotic cell.
2. What are peroxisomes ?
3. Write the functions of vessicles in plant cell.
4. Who proposed the fluid mosaic model ?
5. What is down syndrome ?
6. Give difference between DNA and RNA.
7. What is the concept of Erwin Chargaff ?
8. What are purines and pyramidines ?
9. What are allels ?
10. Define Linkage.
11. Who coined the term gene ?
12. Define heredity.

P.T.O.

13. Write any two beneficial effect of gene mutation.

14. Who re-discovered the inheritance ?

15. Define the gene epistasis.

SECTION - B

II. Answer **any five** of the following questions : **5x5=25**

16. Explain the DNA replication.

17. Write the properties of genetic code.

18. Write a note on Golgi apparatus with neat labelled diagram.

19. Give an account on supplementary factors with examples.

20. Explain Allopolyploidy with reference to the Brassica.

21. Describe the melandrium for sex determination.

22. Write a note on central dogma of molecular biology.

SECTION - C

III. Answer **any three** of the following questions : **3x10=30**

23. Explain the Law's of Mendel.

24. Enamurate the self sterility in Nicotiana.

25. Explain the mechanism involved in synthesis of protein.

26. What type of gametes will be produced by the pea plant in the following crosses ? And find out the phenotypic ratio of offsprings.
    (i) YyRr yyrr → YyRR × yyrr
    (ii) YyRr × YyRR → YyRr × Yyrr
    (iii) Yyrr × yyRR → YyRr × YyRr

27. Explain the double helix model of DNA with neat labelled diagram.

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No. of Printed Pages : **2**

Sl. No. 100052

B.Sc. V Semester Degree Examination, September/October - 2023

ZOOLOGY - V

Z-5.1 : Cell Biology and Developmental Biology

(CBCS)

Time : 3 Hours | Maximum Marks : 70

Note : *(i) Answer **all** questions.*

(ii) Draw diagrams wherever necessary.

SECTION - A

Answer **any five** of the following. **5x2=10**

1. Expand RER and SER.
2. Define Synapsis and Chiasmata.
3. What is Oncology ? Name any two chemical carcinogens.
4. Define Fertilizin and Antifertilizin.
5. What is Amphimixes ?
6. Mention the Hydrolytic enzyme found in Acrosome of Human Sperm and write its functions.

SECTION - B

A. Answer **any four** of the following. **4x5=20**

7. Write short notes on Germ Plasm Theory.
8. Sketch and label Hen's Egg.
9. Sketch and label 36 hrs (WM) chick embryo and add a brief note on it.
10. Describe V.S. of Blastula of Frog.
11. What is Organiser Phenomenon and write a short note on it ?
12. Enumerate the functions of placenta.

B. Answer **any two** of the following. **2x5=10**

13. Distinguish between Mitosis and Meiosis.
14. Explain the structure of Nucleus with a neat labelled diagram.
15. Sketch and label.
    (a) Fluid Mosaic Model of Plasma membrane.
    (b) Mitochondria.

P.T.O.

SECTION - C

A. Answer **any two** of the following. **2x10=20**

16. Explain 24 hrs (WM) chick embryo with labelled diagram.

17. What are Extraembryonic membranes ? Explain in detail about Extraembryonic membranes of chick.

18. (a) Define following terms :

(i) Spermiogenesis.

(ii) Selfing and Crossing.

(iii) Artificial Insemination and TTB.

(b) Mention the points of differences between Spermatogenesis and Oogenesis.

B. Answer **any one** of the following. **1x10=10**

19. Explain the different stages of Mitosis with neat labelled diagrams.

20. Explain Occurrence types, Structure and Functions of Endoplasmic Reticulum.

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Sl. No. 100065

B.Sc. V Semester Degree Examination, September/October - 2023

ZOOLOGY - VI

Z-5.2 : Environmental Biology and Wildlife Zoology

(CBCS)

Time : 3 Hours | Maximum Marks : 70

Note : *(i) Answer **all** the questions.*

(ii) Draw neat labelled diagrams wherever necessary.

SECTION - A

Answer **any five** of the following in a sentence or **two** each. **5x2=10**

1. Define Ecotype.
2. Expand IUCN and CITES.
3. What are Lithosphere and Hydrosphere ?
4. Mention any four abiotic factors.
5. Define Red data book and Green data book.
6. Define food web and food chain.

SECTION - B

Answer **any six** of the following in a paragraph each. **6x5=30**

7. Explain briefly about nitrogen cycle.
8. Write a short note on lentic habitat with examples.
9. Give an account on the zonation of sea.
10. Explain briefly on Artificial ecosystem.
11. Explain the role of NGO's in Environmental Monitoring.
12. Write a short note on thermal stratification.
13. Mention the ecological adaptations of Aerial animals.

P.T.O.

SECTION - C

Answer **any three** of the following in detail. **3x10=30**

14. Explain in detail about sound pollution.

15. Illustrate the flow of energy in ecosystem with the help of energy pyramid.

16. Describe the types of conservation of Wildlife.

17. Describe project tiger in detail.

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