



24518

V Semester B.Sc. Degree Examination, September/October 2020

PHYSICS

Paper VI (5.2) – Statistical Mechanics, Quantum Mechanics
and Electronics – I

(New)

Time : 3 Hours

Max. Marks : 80

- Instructions :** 1) Answer **all** the questions from Section A in the first two pages only.
2) Answer **any five** questions from Section B and **any four** from Section C.

SECTION – A

- I. Answer **all** of the following : (15 × 1 = 15)
1. What is Fermion?
 2. What is ensemble?
 3. Is Compton scattering incoherent scattering?
 4. What are matter waves?
 5. State Heisenberg Uncertainty principle.
 6. What is wave function?
 7. Write the concept of zero point energy of harmonic oscillator.
 8. What is intrinsic semiconductor?
 9. Define Hall effect.
 10. What is filter?
 11. Define Zener diode.
 12. What is photo diode?

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13. Name a material using in manufacture of LED.
14. What is biasing of a transistor?
15. Write the expansion of MOSFET.

SECTION – B

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

16. Write a note on Gibb's paradox.
17. Describe Davisson and Germer experiment.
18. Derive time-independent Schrodinger wave equation.
19. Explain the concept of valance band, conduction band and energy gap in semiconductor.
20. Explain bridge rectifier.
21. Explain working principle of solar cell.
22. Describe AC load line of a transistor.

SECTION – C

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

23. (a) Distinguish between Fermi-Dirac and Bose-Einstein statistics.
(b) Explain the characteristics of a transistor in CE mode. (5 + 5)
24. (a) Derive an expression for de-Broglie's wavelength.
(b) Illustrate the Heisenberg's Uncertainty Principle by Gamma ray microscope. (5 + 5)
25. (a) Explain the physical significance of wave function.
(b) Obtain an expression for energy of a particle in a one dimensional box. (5 + 5)



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26. (a) Write a note on extrinsic semiconductor.
(b) Explain the importance of Hall effect. (5 + 5)
27. (a) Write the applications of LED.
(b) Compare LED and LCD. (5 + 5)
28. (a) Explain Biasing of a transistor.
(b) Explain the characteristics of field effect transistor. (5 + 5)
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V Semester B.Sc. Degree Examination, September/October 2020

PHYSICS

**Paper 5.2 – Statistical Mechanics, Quantum Mechanics and
Electronics – I**

(CBCS)

Time : 3 Hours

Max. Marks : 70

Instructions : Answer **all** questions from Section A in first two pages only.

SECTION – A

Answer the following :

(15 × 1 = 15)

1. Define ensemble.
2. Define phase space.
3. What is most probable distribution?
4. State Heisenberg's uncertainty principle.
5. Write the expression for de-Broglie wavelength of matter.
6. Give an example of inelastic scattering.
7. What is an Eigen value?
8. What is a linear Harmonic oscillator?
9. Write the physical significance of wave function.
10. How do you obtain n-type semi conductor?
11. What is L-section filter?
12. What do you mean by biasing of a transistor?
13. Which material emits blue colour in LED?
14. What is meant by dark current of photo diode?
15. What is a photo diode?

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SECTION - B

Answer **any five** of the following :

(5 × 5 = 25)

16. Illustrate the Heisenberg uncertainty principle by Gamma ray microscope.
17. Explain the working of Zener diode as voltage regulator.
18. Discuss the concept of zero point energy.
19. Write a note on P-type semiconductor.
20. Based on band theory distinguish between conductor, insulator and semi conductor.
21. Explain the construction and working of a solar cell.
22. State and prove Boltzman equi partition theorem.

SECTION - C

Answer **any three** of the following :

(3 × 10 = 30)

23. (a) Explain Davison and Germer's experiment for the study of diffraction of electron.
- (b) 10 kV electrons are passed through a thin film of a metal for which the atomic spacing is 5.5×10^{-11} m. What is the angle of deviation of the first order diffraction maximum? (7 + 3)
24. (a) Explain the construction and working of Full wave Rectifier with a neat circuit diagram and obtain the expression for efficiency of a Full wave rectifier.
- (b) Calculate the Base current for which $\beta = 100$ and emitter current is 2.020 m.A. (8 + 2)
25. (a) Derive an expression for energy of a particle in one dimensional box.
- (b) Derive Schrodinger time independent wave equation. (5 + 5)



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26. (a) What is Hall effect? Derive an expression for Hall coefficient.
(b) Obtain an expression for electrical conductivity of a semiconductor. (5 + 5)
27. (a) Write a note on seven segment display.
(b) Compare Maxwell Boltzman, Bose Einstein and Fermi Dirac distribution functions. (5 + 5)
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V Semester B.Sc. Degree Examination, September/October 2020

PHYSICS

Paper V (5.1) – Atomic and Molecular Physics

(CBCS)

Time : 3 Hours

Max. Marks : 70

Instructions : 1) Answer **all** questions from Section – A **and five** from Section – B and **any three** from Section – C.

2) Write answers to Section A questions in the first two pages only.

SECTION – A

Answer the following :

(15 × 1 = 15)

1. What is the specific charge of an electron?
2. Define impact parameter.
3. What is the nature of the path of a particle in the Thomson experiment?
4. What is the total energy of an electron for $n = \infty$?
5. Define ionization potential.
6. Who discovered the nucleus of the atom?
7. Who proposed the nuclear model for an atom?
8. What are stationary orbits?
9. State Pauli's exclusion principle.
10. Can principal quantum number is zero?
11. What is Stark effect?
12. What is Fluorescence?
13. Define normal Zeeman effect.
14. What is optical pumping?
15. What are Stokes lines?

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SECTION - B

Answer **any five** questions :

(5 × 5 = 25)

16. Discuss Thomson's and Rutherford's model of an atom.
17. Describe the Frank-Hertz experiment for the determination of critical potentials.
18. Write a note on space quantization.
19. Explain quantum theory of Raman effect.
20. Write any five applications of Laser.
21. Explain the principle, working of He-Ne Laser.
22. Explain the use of Raman effect in determining the molecular structure.

SECTION - C

Answer **any three** questions :

(3 × 10 = 30)

23. (a) Derive an expression for the radius of the electron orbit for hydrogen atom.
(b) Calculate the ionization potential for hydrogen atom. (6 + 4)
24. (a) With necessary theory explain J.J. Thomson's method to determine the specific charge of an electron.
(b) A water droplet of radius 10^{-6} m is charged with one electron. Calculate the electric field required to keep it stationary $\rho_w = 1000 \text{ kg m}^3$
 $e = 1.6 \times 10^{-19} \text{ C}$. (8 + 2)
25. (a) Explain the different quantum numbers associated with vector atom model.
(b) Write a note on Pauli's exclusion principle. (5 + 5)
26. (a) Describe Stern-Gerlach experiment.
(b) Explain quantum theory related to normal Zeeman effect. (5 + 5)
27. (a) Give the theory of pure rotational spectra.
(b) The $J = 0$ to $J = 1$ absorption line in the carbon monoxide occurs at a frequency 1.163×10^{11} Hz. Calculate the moment of inertia and bond length. (6 + 4)



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V Semester B.Sc. Degree Examination, September/October 2020

BOTANY

Paper 5.2 – Cell Biology and Cytogenetics

(CBCS – New)

Time : 3 Hours

Max. Marks : 70

Instructions :

- 1) *Answer all Sections.*
- 2) *Draw diagrams wherever necessary.*

SECTION – A

I. Answer **all** the questions :

(15 × 1 = 15)

1. Define the term gene.
2. What are multiple alleles?
3. What are centromeres?
4. What are autosomes and allosomes?
5. Define homozygote.
6. What is the function of ligase?
7. Name the triplet codon for the amino acid Methionine.
8. Define inversion.
9. What are dictiosomes?
10. Who proposed the term t-RNA?
11. Name any two cell wall substances.
12. Define synapsis.
13. Write the ratio of dihybride cross.
14. What is linkage?
15. What is translation?

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SECTION - B

- II. Answer **any five** of the following : (5 × 5 = 25)
16. Explain the Watson and Crick model of DNA with neat labelled diagram.
 17. What is genetic code? Explain its character.
 18. Explain the stages of Metaphase of mitosis with diagram.
 19. Describe the clover leaf model of t-RNA.
 20. What is epistasis? Explain with suitable example.
 21. Explain the law of segregation with suitable example.
 22. Describe the structure of Mitochondria with neat labelled diagram.

SECTION - C

- III. Answer **any three** of the following : (3 × 10 = 30)
23. What are supplementary genes? Explain with suitable example.
 24. Explain the fluid mosaic model of plasma membrane with neat labelled diagram.
 25. Describe the mechanism of chromosomal theory of sex-determination.
 26. What is gene mutation? Explain the different types with suitable example.
 27. In Tomato red fruit color 'R' is dominant over yellow 'r' give the genotypes and phenotypes derived from the following cross in tomato
 - (a) $RR \times rr$
 - (b) $Rr \times rr$



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V Semester B.Sc. Degree Examination, September/October 2020

ZOOLOGY

Paper Z 5.2 – Environmental Science and Wild Life Zoology

(CBCS)

Time : 3 Hours

Max. Marks : 70

Instructions : 1) Answer **all** the questions.

2) Draw neat labelled diagrams wherever necessary.

SECTION – A

Answer **any five** of the following in one or two sentences each : **(5 × 2 = 10)**

1. What is artificial ecosystem?
2. List the types of conservations with example.
3. What is Green Data Book? Write its importance.
4. Define Syn ecology.
5. Define ammensalism with an example.
6. List any two NGO's involved in wild life conservation.

SECTION – B

Answer **any six** of the following in brief :

(6 × 5 = 30)

7. Write a short note on global warming.
8. Explain briefly about phosphor cycle.
9. Explain the adaptations in terrestrial organisms with examples.
10. Write short note on functions of an ecosystem.
11. Describe the types of food chain and its importance.
12. Explain briefly about limiting factors of ecosystem.
13. Write an essay on wild life of India.

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SECTION - C

Answer **any three** of the following in detail :

(3 × 10 = 30)

14. Discuss in detail about the role of ecology and human welfare.
 15. Explain in detail about the water pollution and causes and solutions of water pollution.
 16. Describe the effects of climate change on bio-diversity.
 17. Write a note on project lion.
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V Semester B.Sc. Degree Examination, September/October 2020

MATHEMATICS - IX

Paper 5.1 - Integral Transforms

(New)

Time : 3 Hours

Max. Marks : 80

Instructions : Answer all the Sections.

SECTION - A

Answer **any ten** of the following :

(10 × 2 = 20)

1. Find $L(1+t)^2$.
2. Find $L[8^t]$.
3. Find $L[t \sin at]$.
4. Find $L^{-1}\left[\frac{S}{(S+4)^2}\right]$.
5. State Convolution Theorem.
6. If $f(x) = \begin{cases} -x & \text{in } -\pi < x < 0 \\ x & \text{in } 0 < x < \pi \end{cases}$
find Fourier coefficient of b_n .
7. If $f(x) = e^{-ax}$ find the Fourier coefficient a_0 in $(-\pi, \pi)$.
8. Define infinite fourier sine transform of $f(x)$ and it inverse function.
9. (Shifting Property) If $f(S)$ is the fourier transform of $F(S)$ then $e^{-ias} f(S)$ is the fourier transform of $F(x-a)$.
10. Find $Z_T(1)$.

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11. Find the Z-transform $(n+1)$.
12. Find the inverse z-transform of $z \log\left(\frac{z}{z+1}\right)$.

SECTION - B

Answer **any five** of the following :

(5 × 6 = 30)

13. If $L[f(t)] = F(S)$ then prove that $L[t^n f(t)] = (-1)^n \frac{d^n}{dS^n} [F(S)]$.
14. Find the Laplace transform $f(t) = \frac{Kt}{p}$ for $0 < t < p$ and $f(t+p) = f(\phi)$.
15. Find $L^{-1}\left[\frac{3S^2 + 16S + 26}{S(S^2 + 4S + 13)}\right]$.
16. Solve the integral equation (i.e. find $f(t)$)
$$f(t) = at + \int_0^t f(u) \sin(t-u) du.$$
17. Solve $9y'' - 6y' + y = 0$ given $y(0) = 3$, $y'(0) = 1$ by Laplace transform.
18. Obtain the fourier series expansion of the function $f(x) = \frac{(\pi-x)^2}{2}$ in $0 < x < 2\pi$.
19. Expand $f(x) = 2x - 1$ as a cosine half range fourier series in $0 < x < 1$.

SECTION - C

Answer **any five** of the following :

(5 × 6 = 30)

20. Find the Fourier cosine transform of the function $f(x) = \begin{cases} x & 0 < x < a \\ 0 & \text{other} \end{cases}$.
21. Obtain the Fourier sine transform of the function $f(x) = \begin{cases} x & \text{for } 0 < x < 1 \\ 2-x & \text{for } 1 < x < 2 \\ 0 & \text{for } x > 2 \end{cases}$.



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22. Find the complex Fourier transform of $f(x) = e^{-a|x|}$ where $a > 0$ and x belongs to $(-\infty, \infty)$.
23. Using Parseval identity show that $\int_0^{\infty} \frac{dx}{(1+x^2)^2} = \frac{\pi}{4}$.
24. Obtain the z-transform of $\cosh(n\theta)$.
25. Obtain the inverse z-transform of $\frac{2z^2 + 3z}{(z+2)(z-4)}$.
26. Solve differential $y_{n+2} + 6y_{n+1} + 9y_n = 2^n$ with $y_0 = y_1 = 0$ applying z-transform.
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V Semester B.Sc. Degree Examination, September/October 2020

MATHEMATICS – IX

Paper 5.1 – Integral Transforms

(CBCS – New)

Time : 3 Hours

Max. Marks : 70

Instructions : Answer all the Sections.

SECTION – A

Answer **any five** of the following :

(5 × 2 = 10)

1. Find $L[e^{at}]$.
2. Prove that $L[t^n]$ is $\frac{n!}{s^{n+1}}$.
3. If $L[f(t)] = \bar{f}(s)$ then show that $L[e^{at}f(t)] = \bar{f}(s-a)$.
4. Find $L^{-1}\left[\frac{1}{s^2-36}\right]$.
5. If $f(x) = x^2$ in $(-\pi, \pi)$ then find fourier coefficient of b_n .
6. If $f(x) = |x|$ in $(-L, L)$ find fourier coefficient of a_0 .
7. Find the z-transform of $(K^n \cdot n)$.

SECTION – B

Answer **any five** of the following :

(5 × 6 = 30)

8. Evaluate $L\left[\frac{2 \sin 3t \cos t}{t}\right]$.
9. State and prove Laplace transform of periodic function.
10. Find the inverse Laplace transform of the function $\frac{s^2+3}{s^3-s^2-s+1}$.

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11. Given that $\frac{dy}{dt} - 9x = 0$, $\frac{dx}{dt} + 4y = 0$ and $y(0) = 1$, $x(0) = 2$. Use Laplace transform method to x and y in terms of t .
12. Obtain the Fourier series of $f(x) = e^{-ax} - \pi < x < \pi$ where $f(x)$ is periodic with period 2π .
13. Express $f(x)$ as a half range sine series $f(x) = x$ $0 < x < 2$.

SECTION - C

Answer **any five** of the following :

(5 × 6 = 30)

14. Find the Fourier transform of

$$f(x) = \begin{cases} x & |x| \leq a \\ 0 & |x| > a \end{cases}$$

15. Find the sine and cosine transform of $2e^{-5x} + 5e^{-2x}$.

16. If $f(p)$ and $g(p)$ are complex. Fourier of $F(x)$ and $G(x)$ respectively, then

$$(a) \quad 1/2\pi \int_{-\infty}^{\infty} f(p)\bar{g}(p)dp = \int_{-\infty}^{\infty} F(x)\bar{G}(x)dx$$

$$(b) \quad 1/2\pi \int_{-\infty}^{\infty} |f(p)|^2 dp = \int_{-\infty}^{\infty} |F(x)|^2 dx$$

17. If $\bar{v}(z) = \frac{2z^2 + 3z + 12}{(z-1)^4}$ find the value of u_0, u_1, u_2, u_3 .

18. Compute the inverse z -transform $\frac{3z^2 + 2z}{(5z-1)(5z+2)}$.

19. Solve by using z -transform $y_{n+2} - 4y_n = a$ given that $y_0 = 0$ and $y_1 = 2$.



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V Semester B.Sc. Degree Examination, September/October 2020

MATHEMATICS

Paper XI (5.3) – Graph Theory – I

(New)

Time : 3 Hours

Max. Marks : 80

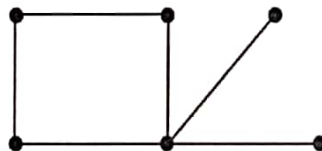
Instructions : Answer all Sections.

SECTION – A

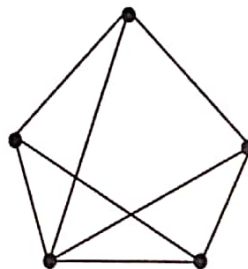
Answer **any ten** of the following :

(10 × 2 = 20)

1. Define a graph and draw a (5, 4) graph.
2. Define even and odd vertices.
3. Define complete graph and draw K_5 .
4. How many vertices and edges are there in complete bipartite graph $K_{3,5}$?
5. Define subgraph and draw subgraph of the following graph :



6. Define spanning tree and find spanning tree of the graph given below :



7. Show that K_p is $(p-1)$ regular.
8. How many edges are there in a tree with 17 vertices?
9. Define total graph and draw total graph of K_2 .

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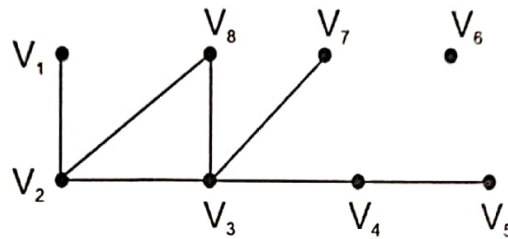
10. Define walk and trail of a graph.
11. Define Eulerian cycle with an example.
12. Show that Hamiltonian path is a spanning tree.

SECTION - B

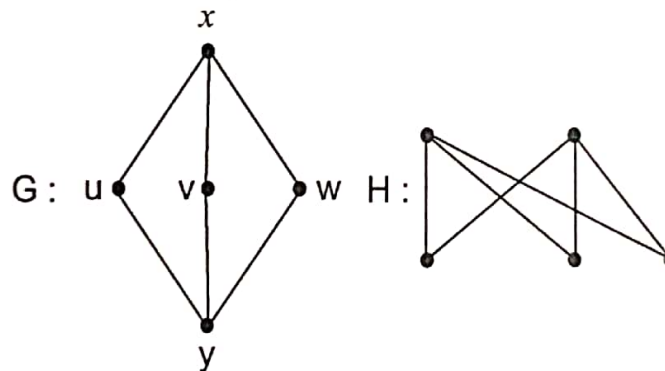
Answer **any five** of the following :

(5 × 6 = 30)

13. Show that in a graph G , the number of vertices of odd degree is even and verify it for the graph given below :



14. Show that the following graphs G and H are isomorphic



15. Define self complementary graphs and prove that every self complementary graph has $4n$ or $4n + 1$ vertices.
16. Show that a graph G is bipartite if and only if it has no cycle of odd length.
17. Prove that a closed walk of odd length contains a cycle.
18. Show that an edge of graph G is bridge if and only if e is not on any cycle of G .
19. Prove that if G is a tree then every two distinct vertices are joined by unique path.

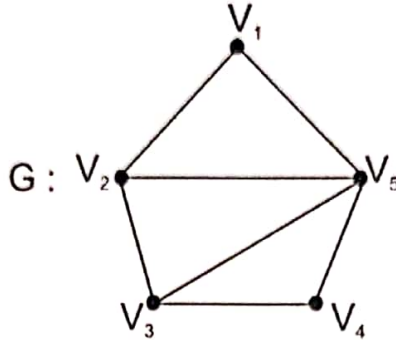


SECTION - C

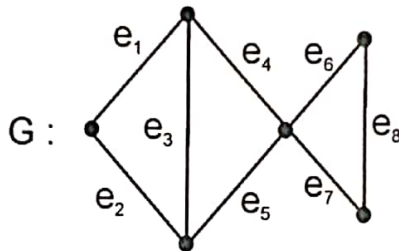
Answer **any five** of the following :

(5 × 6 = 30)

20. Define adjacency matrix and find the adjacency matrix of G given below :

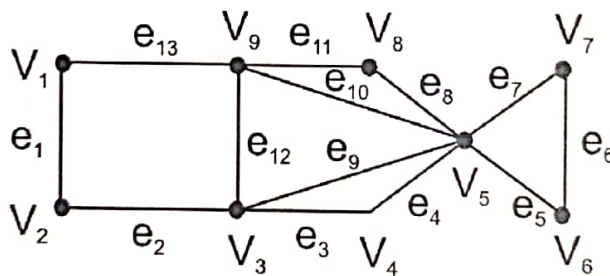


21. Define cycle matrix and find the cycle matrix of G.



22. Explain travelling salesman problem.

23. Find an Eulerian cycle of Graph shown below and find the partition of edges into cycles.



24. Find the graph G whose incidence matrix is

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 & 0 \\ 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 \end{bmatrix}$$

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25. If G is a graph with $P \geq 3$ vertices such that for all pairs of distinct non adjacent vertices u and v , $\deg u + \deg v \geq P$ then show that G is Hamiltonian graph.
26. Prove that G or \bar{G} is connected.
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MATHEMATICS - XI

Paper 5.3 - Graph Theory - I

(CBCS - New)

Time : 3 Hours

Max. Marks : 70

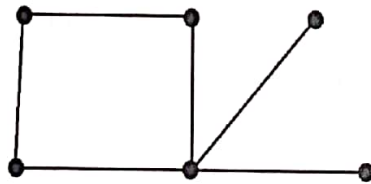
Instructions : Answer all Sections.

SECTION - A

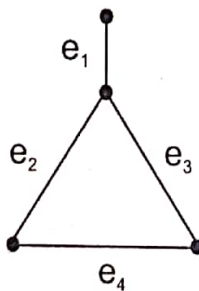
Answer **any five** of the following :

(5 × 2 = 10)

1. Define degree of a vertex of a graph with an example.
2. Define complete graph and draw K_5 .
3. Define subgraph and draw subgraph of the following graph :



4. Define block of a graph with an example.
5. Define line graph and draw line graph of



6. Define walk and trial of a graph.
7. Define Eulerian cycle with an example.

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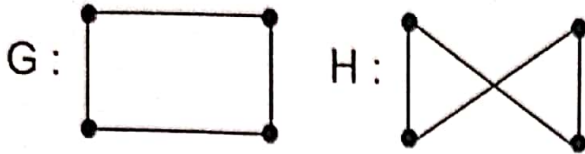


SECTION - B

Answer **any five** of the following :

(5 × 6 = 30)

8. Show that the following graphs G and H are isomorphic :



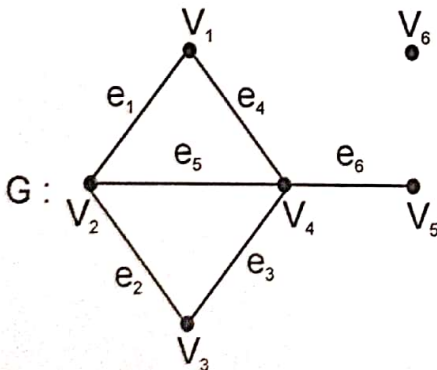
9. Prove that for any graph with 6 vertices G or \bar{G} contains a triangle.
10. Prove that a closed walk of odd length contains a cycle.
11. Show that a graph with p vertices and K components has at most $\frac{(P-K)(P-K+1)}{2}$ edges.
12. Define complete bipartite graph and find the number of vertices and edges in $K_{m,n}$.
13. Show that an edge e of a graph G is a bridge if and only if e is not on any cycle of G .
14. Prove that if G is a (p,q) graph then G is acyclic and $p = q + 1$.

SECTION - C

Answer **any five** of the following :

(5 × 6 = 30)

15. Define incidence matrix and find the incidence matrix of the following graph G show below :

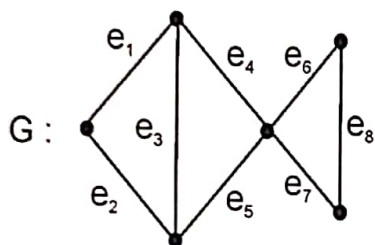




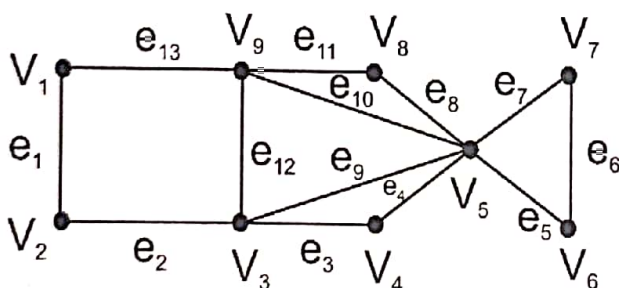
16. Define adjacency matrix and find the graph G whose adjacency matrix is

$$\begin{bmatrix} 0 & 1 & 1 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 & 1 & 0 \end{bmatrix}$$

17. Define cycle matrix and find the cycle matrix of the graph G shown below :



18. State Konigsberg bridge problem.
19. Show that a connected graph G is Eulerian if and only if every vertex of G is of even degree.
20. Find an Eulerian cycle of G shown below and find partition of edges of G into cycles :



21. If G is a graph with $p \geq 3$ vertices such that for all pairs of distinct non adjacent vertices u and v , $\deg u + \deg v \geq p$ then G is Hamiltonian graph.



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V Semester B.Sc. Degree Examination, September/October 2020

MATHEMATICS – X

Paper 5.2 – Applied Mathematics

(New)

Time : 3 Hours

Max. Marks : 70

Instructions : Answer all the Sections.

SECTION – A

Answer **any five** of the following :

(5 × 2 = 10)

1. Find the maximal directional derivative of $x^2y + yz^2 - xz^3$ at $(-1, 2, 1)$.
2. Show that $\text{curl}(\text{grad } \phi) = 0$.
3. Find $\text{curl } \vec{f}$ for the function $f = \text{grad}(x^3 + y^3 + z^3 - 3xyz)$.
4. Define functional and Geodesic.
5. Define a stationary function of the problem and write the stationary function when 'f' is independent of 'X'.
6. Write one-dimensional heat equation and write its appropriate solution.
7. Find the complete solution of $[D^2 - 2DD' + (D')^2]z = 0$.

SECTION – B

Answer **any five** of the following :

(5 × 6 = 30)

8. Find the angle between the normal to the surface $xy = z^2$ at the points $(1, 9, -3)$ and $(-2, -2, 2)$.
9. If ϕ is a scalar point function and \vec{f} is a vector function then prove that $\text{div}(\phi \vec{f}) = \phi(\text{div } \vec{f}) + (\text{grad } \phi) \cdot \vec{f}$.
10. Verify Green's theorem in the plane for $\oint_C [(xy + y^2)dx + x^2dy]$; where 'E' is the closed curve bounded by $y = x$ and $y = x^2$.

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11. Evaluate $\iint_S \vec{F} \cdot \hat{n} dS$ when $\vec{F} = 4xzi - y^2j + yzk$ and S is the surface of the cube bounded by $x=0$, $x=1$, $y=0$, $y=1$, $z=0$, $z=1$ by divergence theorem.
12. On which the curve the functional $\int_0^{\pi/2} [(y')^2 - y^2 + 2xy] dy$ with $y(0)=0$ and $y(\pi/2)=0$ be extremized?
13. If $u = x + y + z$, $v = x^2 + y^2 + z^2$ and $w = xy + yz + zx$, show that $[\nabla u, \nabla v, \nabla w] = 0$.

SECTION - C

Answer **any five** of the following :

(5 × 6 = 30)

14. Find the plane curve of fixed perimeter and maximum area.
15. Solve : $[D^2 - 3DD' + 2(D')^2]z = e^{x+3y} + \sin(x - 3y)$.
16. Solve : $[D + D' - 1]z = x^2y$.
17. Solve : $[D^2 - 6DD' + 9(D')^2]z = 3x + y$.
18. Reduce the equation $\frac{\partial^2 z}{\partial x^2} = x^2 \frac{\partial^2 z}{\partial y^2}$ into a canonical 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 variables.



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CHEMISTRY – V

Paper 5.1

(CBCS)

Time : 3 Hours

Max. Marks : 70

Instructions :

- 1) Section-A contains questions from Inorganic, Organic and Physical Chemistry.
- 2) Section-B contains questions from Inorganic Chemistry, Section-C contains questions from Organic Chemistry and Section-D contains questions from Physical Chemistry.
- 3) Answer all the four Sections A, B, C and D.

SECTION – A

Answer **any ten** of the following questions :

(10 × 1 = 10)

1. What are Orgel diagrams?
2. Define magnetic moment.
3. Write the structure of $(\text{NPCl}_2)_4$.
4. What is meant by Spectrochemical series?
5. What are thiols? Give an example.
6. What is Chemical shift?
7. What are Basic amino acids? Give an example.
8. What are equivalent protons?
9. Write the Clausius-Mosotti equation.
10. What is photo inhibition?
11. State Grothus-Draper's law.
12. What is Phosphorescence?

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SECTION - B

Answer **any two** of the following questions :

(2 × 10 = 20)

13. (a) Explain the determination of magnetic susceptibility and magnetic moment by Goy's method. (6)
(b) Write a note on temperature independent paramagnetism. (4)
14. (a) Discuss the electronic spectrum of $[\text{Ti}(\text{H}_2\text{O})_6]^{+3}$ ion. (6)
(b) Explain the types of electronic spectra of complexes. (4)
15. (a) Describe the preparation and structure of $\text{C}_2\text{B}_{10}\text{H}_{12}$. (6)
(b) Write a note on structure of silicates. (4)

SECTION - C

Answer **any two** of the following questions :

(2 × 10 = 20)

16. (a) Give the methods of preparation and chemical reactions of ethane thiols. (6)
(b) Write a note on spin-spin coupling. (4)
17. (a) Give any two methods of synthesis of α - amino acids. (6)
(b) Write a note on basic components of spectrophotometer. (4)
18. (a) Explain the principle and applications of NMR spectra. (6)
(b) Write a note on applications of IR spectroscopy. (4)

SECTION - D

Answer **any two** of the following questions :

(2 × 10 = 20)

19. (a) Discuss the mechanism of photochemical combination of H_2 and Cl_2 . (6)
(b) State and explain Beer's law. (4)



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20. (a) What is Quantum yield? Give reasons for
- (i) High quantum yield
 - (ii) Low quantum yield (6)
- (b) Give the difference between photochemical and thermochemical reactions. (4)
21. (a) Write a note on orientation polarisation. (6)
- (b) Discuss the applications of dipole moment in elucidating the structure of CCl_4 and H_2O . (4)
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V Semester B.Sc. Degree Examination, September/October 2020

CHEMISTRY – VI

Paper 5.2

(New Syllabus)

Time : 3 Hours

Max. Marks : 80

Instructions :

- 1) Section-A contains questions from all the sections.
- 2) Section-B contains questions from Inorganic Chemistry, Section-C contains questions from Organic Chemistry and Section-D contains questions from Physical Chemistry.
- 3) Answer all the four Sections A, B, C and D.

SECTION – A

Answer **any ten** of the following questions :

(10 × 2 = 20)

1. What is standard deviation?
2. What are significant figures?
3. What are protonic solvents?
4. What is mass defect?
5. What are detergents?
6. Define Epimerisation.
7. Write any one use of nylon.
8. What are chromophores?
9. Define specific conductance.
10. State the Kohlrausch's law.
11. Define mass average molecular weight.
12. Define ionic mobility.

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SECTION - B

(2 × 10 = 20)

Answer **any two** of the following questions :

13. (a) Explain different types of errors. (6)
(b) Define accuracy and precision. (4)
14. (a) Describe the classification of solvents. (6)
(b) Give any two chemical reactions of liquid ammonia. (4)
15. (a) Describe Nuclear fusion and Nuclear fission. (6)
(b) Write a note on radioactive equilibrium. (4)

SECTION - C

(2 × 10 = 20)

Answer **any two** of the following questions :

16. (a) Explain the mechanism of osazone formation. (6)
(b) Write any two synthetic applications of ethyl acetoacetate. (4)
17. (a) What is iodine number? Explain determination of iodine number of oils and fats. (6)
(b) Write the synthesis of malachite green. (4)
18. (a) Elucidate open chain structure of D-Glucose. (6)
(b) Write a note on thermoplast and thermosetting polymers. (4)

SECTION - D

(2 × 10 = 20)

Answer **any two** of the following questions :

19. (a) Explain conductometric titration of
(i) Strong acid and strong base
(ii) Weak acid and strong base (6)
- (b) Explain the determination of molecular weight of polymer by viscosity method. (4)



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20. (a) Explain Debye-Huckel Onsagar's equation for strong electrolyte. (6)
- (b) Explain the variation of equivalent conductance and specific conductance upon dilution. (4)
21. (a) Explain the determination of solubility and solubility product of sparingly soluble salt. (6)
- (b) The resistance of a 0.1 N 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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V Semester B.Sc. Degree Examination, September/October 2020

CHEMISTRY

Paper 5.2

(CBCS)

Time : 3 Hours

Max. Marks : 70

Instructions :

- 1) Section-A contains questions from Inorganic, Organic and Physical Chemistry.
- 2) Section-B contains questions from Inorganic Chemistry, Section-C contains questions from Organic Chemistry and Section-D contains questions from Physical Chemistry.
- 3) Answer all the four Sections A, B, C and D.

SECTION - A

Answer **any ten** of the following questions :

(10 × 1 = 10)

1. Define the term accuracy.
2. Define absolute error.
3. State Radioactive displacement law.
4. What are Non protonic solvents?
5. What are Soaps?
6. Define Mutarotation.
7. What are active methylene compounds?
8. What are chromophores?
9. Define specific conductance.
10. Define cell constants.
11. State Kohlrauch's law.
12. Define mass average molecular weight.

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SECTION - B

Answer **any two** of the following questions : (2 × 10 = 20)

13. (a) Explain determinate and indeterminate errors. (6)
(b) Differentiate between accuracy and precision. (4)
14. (a) Write any three chemical reactions of liquid ammonia as a solvent. (6)
(b) Describe the general properties of solvents. (4)
15. (a) Describe Nuclear fission and Nuclear fusion. (6)
(b) Describe the Nuclear stability based on N/P ratio. (4)

SECTION - C

Answer **any two** of the following questions : (2 × 10 = 20)

16. (a) Explain the mechanism of Claisen condensation of synthesis of ethyl acetoacetate. (6)
(b) Elucidate the open chain structure of D-Glucose. (4)
17. (a) Explain the mechanism of osazone formation. (6)
(b) Give the synthesis and uses of teflon. (4)
18. (a) Describe the manufacture of soap by hydrolyser process. (6)
(b) Write the synthesis of methyl orange. (4)

SECTION - D

Answer **any two** of the following questions : (2 × 10 = 20)

19. (a) Explain Debye-Huckel-Onsagar's equation for strong electrolyte. (6)
(b) Explain degree of dissociation of weak electrolyte. (4)



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20. (a) Explain the viscosity method for determination of molecular weight of polymers. (6)
- (b) How do you determine solubility product of sparingly soluble salt by conductance method? (4)
21. (a) Explain the variation of equivalent conductance of electrolyte with dilution. (6)
- (b) Write a note on degree of polymerisation. (4)
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