

B.Sc Ist Sem

Roll No.

Total Pages : 4

3382

NGSE/D-24

CHEMISTRY

(Chemistry-I)

Paper-B23-CHE-101

(CC-1/MCC-1)

Time : Three Hours] [Maximum Marks : 50

Note : All questions carry equal marks. The candidate is required to attempt *five* questions in all, selecting *one* question from each Section. Question No. 1 is compulsory. Log table and nonprogrammable calculator is allowed.

Compulsory Question

1. (a) What is $(n + 1)$ rule? Give *two* examples. (2)
- (b) Explain why successive electron affinities have negative values? (2)
- (c) What are real gases? Why do they deviate from the ideal behaviour? (2)
- (d) Explain different types of Inductive Effect. (2)
- (e) What is the effect of temperature on surface tension and viscosity? (2)

SECTION-I

2. (a) What do you mean by Slater's rule? Calculate the effective nuclear charge at the periphery of the chromium atom. (Where At. No. of Cr = 24). (4)

- (b) Draw the radial probability distribution curves for :
(i) $n = 3, l = 0$ (ii) $n = 4, l = 2$. (3)
- (c) Calculate the momentum of a particle which has a de-Broglie wavelength of 1 nm. (Where $h = 6.626 \times 10^{-34} \text{ kg m}^2 \text{ s}^{-1}$) (3)
3. (a) Explain :
(i) Why chlorine has unexpectedly higher electron affinity than that of fluorine?
(ii) Why are electron affinities of noble gases zero? (4)
- (b) What are isoelectronic ions? Compare the sizes of N^{3-} , O^{2-} , F^- , Na^+ , Mg^{2+} and Al^{3+} ions. (3)
- (c) What do you mean by electronegativity? Discuss various factors which affect electronegativity. (3)

SECTION-II

4. (a) Define root mean square velocity, most probable velocity and average velocity with their mathematical expressions. (4)
- (b) Show diagrammatically, the effect of temperature on Maxwell distribution of speeds. (3)
- (c) What are the differences between ideal and non-ideal gases? (3)

5. (a) Define the terms collision diameter, collision number and collision frequency with their mathematical expressions. (4)
- (b) What are important features of Maxwell's distribution curve? (3)
- (c) Explain the significance of Van der Waal' constants 'a' and 'b'. (3)

SECTION-III

6. (a) Explain the relative stabilities of alkyl carbocations with inductive and hyperconjugation effects. (4)
- (b) What is the difference between resonance effect and inductive effect? (3)
- (c) Discuss the hybridization and basic structures of carbanions and carbenes. (3)
7. (a) Define various types of substitution reactions with examples. (4)
- (b) Define electrophile and nucleophile with examples. (3)
- (c) Discuss the hybridization and basic structures of Carbocation and free radicals. (3)

SECTION-IV

8. (a) Calculate the molar refractivity of acetic acid (CH_3COOH) at a temperature at which its density is 1.046 gm/cm^3 . The experimental observed value of refractive index at this temperature is 1.3715. (4)

(b) Define viscosity and refractive index. (3)

(c) Discuss various types of Van der Waals forces with examples. (3)

9. (a) Define the terms : centre of symmetry, plane of symmetry and axis of proper rotation. (4)

(b) Write a short note on isomorphism and polymorphism. (3)

(c) Why do NaCl and KCl have different diffraction patterns? (3)

Roll No.

BSL Ist sem

Total Pages : 3

3387

NGSE/D-24

PHYSICS

(Mechanics)

Paper : B23-PHY-101

(CC-1/MCC-1)

Time : Three Hours]

[Maximum Marks : 50

Note : Attempt *five* questions. Question No. 1 is compulsory. Attempt *four* more questions selecting *one* question from each unit. The symbol have their usual meaning.

Compulsory Question

1. (a) A solid sphere and a spherical shell each of same mass and radius roll down the same inclined plane. Which one will reach the bottom first ? (2)
- (b) Can the value of Poisson's ratio in actual practice be negative ? Explain. (2)
- (c) How will the rod moving with speed of light appear to a stationary observer? (2)
- (d) Give basic postulates of Einstein special theory of relativity. (2)
- (e) What are the characteristics of central force? (2)

3387/4600/KD/1365

[P.T.O.

27/1

UNIT-I

2. (a) State and prove the theorem of parallel axes. (6)
(b) Find the time taken by a solid sphere to roll down an inclined plane 10 m long and having a slope of 1m in 20 m. (4)
3. (a) Define kinetic energy of rotation. Derive an expression between kinetic energy of rotation, moment of inertia and angular velocity. (5)
(b) Derive an expression for the moment of inertia of a solid cylinder about an axis passing its centre and perpendicular to its length. (5)

UNIT-II

4. (a) Show that couple required to twist one end of a wire through a given angle is proportional to the fourth power of the radius. (6)
(b) Define Young's modulus, bulk modulus, coefficient of rigidity. If Y , K and η represent these moduli respectively, prove the relation $Y = \frac{9\eta k}{3k + \eta}$. (4)
5. (a) Derive an expression for the depression of a cantilever at a distance X from the fixed end. (6)
(b) A body of mass 10 kg is suspended at free end of a copper wire 3m long and 1mm in diameter. Calculate the extension and the lateral compression produced in the wire. If Young's modulus of wire is $Y = 1.25 \times 10^{11} \text{ Nm}^{-2}$ and Poisson's ratio is 0.25. (4)

UNIT-III

6. (a) Derive the relation $m = \frac{m_0}{\sqrt{1 - v^2 / c^2}}$ where symbols stand for their usual meaning. (7)
- (b) Calculate the velocity at which the mass of a body become double of its mass at rest. (3)
7. (a) Describe Michleson Morley Experiment. Discuss the interpretation of the negative results so obtained with reference to various hypothesis. (8)
- (b) What is 'Twin Paradox'? How can it be explained? (2)

UNIT-IV

8. (a) Derive expression for the Gravitational field due at a point :
(i) outside.
(ii) inside.
(iii) on the surface of spherical shell. (5)
- (b) Discuss a two body problem reduces into a one body problem. (5)
9. (a) What are Normal mode? Determine normal modes of vibration for a spring mass system using normal coordinate. (5)
- (b) Obtain the time period of oscillation of a compound pendulum in the form of an elliptical lamina. (5)

Roll No. B.sc 1st Sem Total Pages : 3

3384

**NGSE/D-24
CHEMISTRY**

(Minor Chemistry-I)
Paper : B23-CHE-103
(CC-M1)

Time : Two Hours]

[Maximum Marks : 20

Note : Attempt *four* questions selecting one question from each Unit. Question No. 1 is compulsory.

Compulsory Question

1. (a) What is bond angle in SP hybridization?
- (b) What is unit of rate constant of zero order reaction?
- (c) Define isomerism with example.
- (d) What is effect of temperature on conductivity of semiconductor? (1×4=4)

UNIT-I

2. (a) Explain shape of NH_3 and H_2O molecule as per VSEPR (valence shell electron pair repulsion) Theory. (2)
- (b) Explain shape and hybridization of $\text{CH}_2=\text{CH}_2$ (Ethene). (2)

3384/2100/KD/381

[P.T.O.]

3. (a) What is sp^2 hybridization? Explain with atleast one example. (2)
- (b) Explain Valence shell electron pair repulsion (VSEPR) theory. (2)

UNIT-II

4. (a) What is difference between order & molecularity of a reaction? (2)
- (b) Give expression for integrated rate for zero order & first order reaction. (1,1)
5. (a) What is average rate of reaction and instantaneous rate of reaction? (2)
- (b) How reaction rate is affected by a catalyst? (2)

UNIT-III

6. (a) Give IUPAC name of
- (i) $\begin{array}{c} \text{CH}_3-\text{CH}-\text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$
- (ii) $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_3$. (1,1)
- (b) Write down any one method of preparation of alkane and Corey-House reaction. (1,1)
7. What is isomerism? Write down isomers of C_5H_{12} . (4)

UNIT-IV

8. (a) What is band theory of semiconductors? (3)
(b) What is Conductivity of semiconductor at absolute zero temperature. (1)
9. Define following terms :
(a) Valence band.
(b) Conduction band.
(c) Insulator.
(d) Conductor. (4)
-

Roll No.

Total Pages : 3

B.Sc 1st Sem

3415

NGSE/D-24

COMPUTER SCIENCE

(Problem Solving through-C)

Paper-B23-CSE-101

(CC-1/MCC-1)

Time : Three Hours]

[Maximum Marks : 50

- Note :** (i) All questions carry equal marks.
(ii) Attempt *five* questions by selecting *one* question from each unit.
(iii) Question number 1 is compulsory for all.

Compulsory Question

1. Define following terms with suitable examples for each.
- (a) Symbolic Constant.
 - (b) Address (&) Operator.
 - (c) Value of (*) Operator.
 - (d) Break statement.
 - (e) Format Specifiers. (5×2=10)

UNIT-I

2. Why C is also called middle level language? Explain the structure, elements and features of C language in detail. (10)

3415/2900/KD/1345

[P.T.O.
20/1

3. Differentiate between following :
- (a) Constant Vs Variable. (3)
 - (b) getch() Vs getche() Vs getchar(). (4)
 - (c) putch() Vs puts() Vs putchar(). (3)

UNIT-II

4. (a) What do you mean by type casting? How type conversion is implemented in C language? Explain both implicit and explicit type conversions with examples. (5)
- (b) Write a program to find the roots of quadratic equation. (5)
5. Explain following control structures in detail.
- (a) Else-If Ladder. (4)
 - (b) While do. (3)
 - (c) For Loop. (3)

UNIT-III

6. What do you mean by parameter passing in a function? Explain in detail the various types of parameter passing techniques in C language. Give example for each. (10)
7. (a) Define Array alongwith its types. Explain the concept of array of strings in detail. (5)
- (b) Write a program to find sum of two matrices. (5)

UNIT-IV

8. (a) Differentiate Between following :
- (i) Union Vs. Structures.
 - (ii) Arrays Vs. Structures. (3×2=6)
- (b) Define and implement array using Pointers. (4)
9. (a) What is the need of pointers in a program? Does pointer increases or decreases complexity of program? Explain and give example in the support of your answer. (4)
- (b) Explain the advantages and disadvantages of using pointers in C program. (3)
- (c) Write a program to swap two numbers. (3)
-