Second Semester B.Sc., Degree Examinations

MAY/JUNE 2026

(NEP CBCS Scheme)

(New Syllabus 2021 onwards)

CHEMISTRY

NSB 0230: PAPER II: INORGANIC AND PHYSICAL CHEMISTRY – I

Time: 2 hrs] *[Max. Marks: 60*

Instructions to Students:

1. ***The Students should legibly write Section number along with question numbers within the margin ONLY.***
2. ***The answer without Section number and question numbers will not be valued.***
3. ***Draw neat and labelled diagram wherever necessary.***
4. ***Use of Scientific non programmed calculator is permitted.***
5. ***Section – I multiple Choice Questions should be answered in the first page of main answer book and same questions shall not be answered repeatedly.***
6. ***Any identifications like marking, ticking, dots etc., in the options of MCQ (Section – I) on the question paper is strictly prohibited. Do not write anything (except register number) on the question paper.***

SECTION – I

Each one the following questions is provided with four answers a, b, c and d. Choose the correct answer among them and write it along with the respective answer in the main answer book: 10 ×1 = 10

I - 1) Pauling scale of electronegativity is based on

a) Electron affinity b) Ionisation Energy
c) Bond energies d) Both ionization energy and electron affinity

I - 2) Electron affinity increases as the size of the atom.....

a) Increases b) Decreases
c) Stable d) None of the above

I - 3) If Aufbau principle is not followed, K-19 will be placed in

a) s-block b) p-block
c) d-block d) f-block

Contd..... 2

I - 4) Which of the following is s-block element?

a) $[Ar]4s^2 3d^{10} 4p^6 5s^1$ b) $1s^2 2s^2 2p^1$

c) $1s^2 2s^1 2p^1$ d) $[Ar]4s^1 4p^1$

I - 5) The correct order of increasing energy of atomic orbital is

a) 3s, 3p, 3d, 4s, 4p b) 3s, 3p, 4s, 3d, 4p

c) 3s, 3p, 4s, 4p, 3d d) 3s, 3p, 3d, 4p, 4s

I - 6) Real gases behave ideally at

a) Low temperature and high-pressure b) Low temperature and low pressure

c) High temperature and high pressure d) High temperature and low pressure

I - 7) Liquid crystals are usually composed of

a) circular molecules b) triangular molecules

c) oval molecules d) rod like molecules

I - 8) What happens to the surface tension of a liquid with increase in temperature?

a) it increases b) it decreases

c) No change d) it may increase or decrease

I - 9) The defect that occurs due to a displacement of an ion is known as

a) Vacancy defect b) Schottky defect

c) Interstitial defect d) Frankel defect

I - 10) Nernst distribution law is applicable when the two liquids are

a) miscible with each other b) immiscible with each other

c) partly miscible d) miscible at 50°C

SECTION – II

Answer any FIVE of the following: 5 × 3 = 15

II - 1) What are radial and angular wave functions? What information can we get from these functions?

II - 2) What are the possible values of l and m when n = 4?

II - 3) How does electronegativity vary with bond order, partial charge and hybridization?

II - 4) Define electron gain enthalpy. What is the trend of it in the periodic table?

II - 5) The critical temperature of CO_2 gas is 31.1 °C and its critical density is 0.455 g/cm³. Find out the values of a, b and P. for the gas (R=0.082 lit/atm/degree/mol).

II - 6) Explain the Maxwell's distribution of molecular velocities with temperature.

Contd..... 3

II - 7) State and explain the laws of crystallography.

II - 8) What are liquid crystals? How are they classified?



SECTION – III

Answer any THREE of the following: 3 × 5 = 15

III - 1) Calculate the effective nuclear charge for 3d electron, 4s electron and at the periphery of Copper atom.

III - 2) Define atomic radii and explain its variation in *s* and *p* block elements.

III - 3) Define viscosity of a liquid and discuss the factors affecting on it.

III - 4) Explain the determination of refractive index by using Abbe's refractometer.

III - 5) State Miller indices. Write the procedure for determining the Miller Indices for a plane of a crystal.

SECTION – IV

Answer the following: 2 × 10 = 20

IV - 1) a) i) What is Screening effect? How do you Calculate the screening constant using Slater's rule?

ii) Define electronegativity. Write a note on Mulliken scale and Allred-Rochow scale of electronegativity (5 + 5 = 10 Marks)

OR

b) i) What is probability distribution curve? Write a radial probability distribution curve for 1s, 2s, 2p and 3s orbitals.

ii) Define ionization energy. Discuss the factors affecting on it. (5 + 5 = 10 Marks)

IV - 2) a) i) Define surface tension. How do you determine it using stalagmometer.

ii) The first order reflections from the 100, 110, and 111 planes of a given cubic crystal were found to occur at angles 5.9°, 8.4° and 5.2° respectively. Determine the type of cubic lattice to which the crystal belong. (5 + 5 = 10 Marks)

OR

b) i) State and derive Nernst distribution law.

ii) Explain Andrew isotherm of CO_2. (5 + 5 = 10 Marks)

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