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WT—256—2024

FACULTY OF SCIENCE

M.Sc. (First Year) (First Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

CHEMISTRY

Paper IV (CH-414)

(Physical Methods in Chemistry)

(Tuesday, 17-12-2024)   **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 Hours   *Maximum Marks*—75

N.B. :— (*i*)   Attempt *all* questions.

        (*ii*)   Use of calculator and logarithm table is allowed.

1.   Attempt any *three* of the following :   15

    (*a*)   Explain improper axis of rotation and identity-symmetry operations with suitable example.

    (*b*)   Explain the input devices of computers.

    (*c*)   Explain various symbols of flowchart.

    (*d*)   Calculate Miller indices of crystal plane which cut through the crystal axes at :

        (*i*)   (–*a*, *b*, *c*)

        (*ii*)   (2*a*, *b*, 3*c*)

    (*e*)   Give the *four* different postulates of the group.

P.T.O.

2. Attempt any *three* of the following : 15

(*a*) Explain types of groups with suitable example.

(*b*) Discuss the use of algorithm in the development of computer system.

(*c*) "Diffraction angle '2θ' equal to 16.8° for crystal having inter planer distance in the crystal is 0.400 nm when second order diffraction was observed. Calculate the wavelength of X-ray used.

(sin 8.4° = 0.146)

(*d*) What is principle of neutron diffraction ? Explain the measurement technique.

(*e*) Explain the applications of electron diffraction.

3. Attempt the following :

(*a*) Explain the following :

(*i*) Data processing

(*ii*) RAM and ROM 8

Or

Explain the principle of programming and give the programming steps for study of zero order reaction.

(b) List symmetry elements and locate them diagrammatically for H_2, BF_3, NH_3, HCN. 7

Or

What is character table and construct character table for C_{3v} group ?

4. Attempt the following :

(a) Discuss the comparison between UNIX operating system. 8

Or

Derive Bragg's equation and describe Laue method for determination of crystal structure of NaCl.

(b) Give an account of structure of simple lattice and X-ray intensities. Explain the factor affecting X-ray intensities. 7

Or

Explain Wierl equation. Calculate the wavelength of electron beam accelerated by potential difference 10 kilo-volt to produce a diffraction pattern. (h = 6.626 × 10^{-34} Js, m_e = 9.1 × 10^{-31} kg, charge of electron 1.6 × 10^{-19} C).

P.T.O.

5. Write short notes any *three* : 15

    (*i*)   Primary storage device

    (*ii*)   Group multiplication table for H_2O

    (*iii*)   Magnetic scattering

    (*iv*)   Point groups

    (*v*)   Ramachandran diagram.