NB: Draw neat Diagrams wherever necessary. Max.Marks 100 Duration 3 Hours

Q1A Fill in the blanks. 10*1 = 10

i) Diamond and graphite are**POLYMORPH** of each other.

ii) The ratio between theweight of a volume of the mineral and the weight ofan equal volume of water at 4°C is known as the **SPECIFIC GRAVITY**

iii) **HARDNESS**is a measure of the relative ability of amineral to resist scratching,

iv) Quartz mineral shows no cleavage but **CONCHOIDAL**type of fracture.

v) A form having twelve faces in Isometric system - Normal class is called as **DODECAHEDRAL/DODECAHERDON** form.

vi) Amphiboles are**DOUBLE**-chain ionosillicates.

vii) Axinite is an example of a normal class of a**TRICLINIC** system.

viii) Biotite and muscovite are examples of **PHYLLO**-silicates.

ix) Yellow colour variety of quartz is identified as**CITRINE**

x) Calcite shows total **THREE** cleavage planes.

Q1B Define the following: **(2X5=10).**

i) Ionic bond and covalent bond.

Ans: In *ionic bonding*, the atoms are bound by attraction of oppositely charged *ions*, whereas, in covalent *bonding*, atoms are bound by sharing electrons to attain stable electron configurations.

ii) Vitreous luster and adamantine luster.

Ans: vitreous: exhibited by broken glass.

Adamantite: exhibited by mineral with high index of refraction, eg diamond.

iii) Neosilicate structure and cyclosilicate structure.

Ans: Nesosilicate: single tetrahedra with Si:O=1:4.

Cyclosilicate: silicate structure which has Si:O= 1:3, and appears ring like.

iv) Octahedron form and pedion form.

Ans: octahedron: closed form with eight equilateral faces.

Pedion: open form with one single face.

v) Conchoidal fracture and Hackly fracture.

Ans: conchoidal: curved fracture surface seen in broken glass.

Hackly : surface which is rough with sharp and jagged points.

Q2 Answer any two of the following : **(2X10=20)**

a) Define cleavage and describe different types of cleavage present in crystal. Does quartz shows cleavage?

Ans: tendency of mineral to break along parallel plane. Based on faces: cubic- 3set, octahedron-4 set, basal-one set, prismatic-2set.

Based on perfection: perfect, good, poor.

b) Describe fluorescence and phosphorescence in a mineral and give example for each.

Ans: fluorescence: mineral giving different colour than original when exposed to ultraviolet light.

Phosphorescence: mineral continue to glow even after removal of the source.

c) Define polymorphism and describe different mechanisms for polymorphism.

Ans: polymorphism: mineral having same composition but different crystal structure. Eg, diamond and graphite.

Types of polymorphism: reconstructive transformation, displacive transformation, order-disorder transformation.

d) Define habit. Write a short note on important habits shown by minerals.

crystal habit: general shape of a mineral, which includes irregularities due to growth.

Different types of habit: massive, granular, compact, lamellar, bladed, fibrous, acicular, radiating, dendritic, banded, botryoidal, oolitic, pisolitic,

Q3 Answer any two of the following : **(2X10=20)**

a) Name the class and crystal system in which granet mineral crystallizes. Describe its symmetry element.

Ans: isometric, hexaoctahedral class, axis: 13, plane:9 and centre is present.

b) Describe ditetragonal dipyramidal class of tetragonal system, giving its axes relationship and symmetry element.

Ans: $a_1=a_2\neq c$ and angle between three axes is 90^0.

Symmetry: axis: 5, plane : 5, centre is present.

c) Describe Dihexagonal dipyramidal class of hexagonal system, giving its axes relationship and symmetry element.

Ans: Crystallographic axes relationship: $a_1=a_2=a_3\neq c$,

$a_1 \wedge a_2 \wedge a_3$. Symmetry elements:

Axis of symmetry: 7, plane of symmetry: 7, center of symmetry is present.

d) Barite mineral crystallizes in which crystal system and class. Write its axes relationship and symmetry element.

Ans: rhombic dipyramidal class of orthorhombic.

$a \neq b \neq c$ and angle is 90^0.

Symmetry : axis: 3, plane: 3 and centre present.

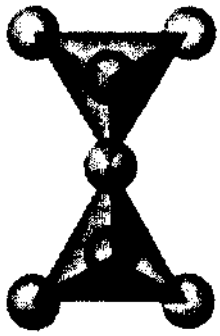
Q4 Answer any two of the following : **(2X10=20)**

a) Describe briefly tectosilicate structure and give one suitable mineral example.

Ans: tectosilicate, Si:O 1:2, quartz and feldspar.

b) Define the silicon oxygen ration in sorosilicate structure. Explain with neat sketch sorosilicate mineral by giving a suitable example.

c) **Ans: 2:7, hemimorphite.**



d) Olivine mineral shows which type of silicate structure, give its physical properties.

ans: nesosilicate, , physical properties of olivine: fracture: uneven to concoidal, hardness : 6-7, colour: olive green, luster: vireous to sub-vitreous.

e) Actinolite mineral belongs to which mineral group, define silicon oxygen ratio and write its physical properties.

Ans: pyroxene: Si:O 1:3, Physical properties: cleavage : 2 set, hardness: 5-6, sp. Gravity: 3.2 to 3.6, luster: vitreous, colour: grayish to greenish black.

Q5 Write short note on ANY FOUR of the following: **(4X5=20)**

i) Colour of a mineral.

Ans: absorption of certain wave length of light, remaining wavelength of white light gives colour to mineral.

(4)

00056615

ii) Electrical properties seen in quartz.
Ans: piezoelectricity and pyroelectricity.

iii) Prism, pyramid and pinacoid forms.
Ans: prism: open form with all faces parallel to c-axis.
Pyramid: faces non-parallel and when extrapolate intersects each other.
Pinacoid: two parallel similar faces.

iv) Crystallographic zone.
Ans: set of parallel faces in a crystal.

v) Physical properties of plagioclase.
Ans: physical property: cleavage : 1 set, hardness: 6, sp. Gravity: 2.54-2.57, luster: vitreous, colour: white , flesh-red, etc.

vi) Physical properties of muscovite.
Ans: cleavage: 1set, hardness: 2-2.5, sp.gravity: 2.76-2.88, colour: colourless, shades of green and brown.