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Q. P. Code - 54443

M.U.P./J.Exam.2069-40,000x8pp.-2-14.

Page No. ....

Questions should be —  
WRITTEN IN LEGIBLE HANDWRITING IN BLACK INK.  
SIGNS, SKETCHES OR FIGURES IF ANY BE DRAWN IN NEAT BLACK INK,  
so as to avoid mistakes in the printed question papers.

Duration ..... Hours.

Total Marks assigned to the paper .....

Q. No.	N.B. :	<u>Answer Key</u>	Q.P. 54443	Marks
7A. i)	Sphenoidal			
ii)	3			
iii)	7			
iv)	trigonal class of Hexagonal system.			
v)	Brachy.			
vi)	Holohedral.			
vii)	Polysynthetic / repetitive contact twin.			
viii)	tetragonal.			
ix)	15			
x)	Hexagonal / trigonal.			
7B. i)	Hemimorphic :- Crystal forms in which faces occur only on one end of the vertical crystallographic axis.			
ii)	Crystal which do not possess plane of Centrosymmetry, contain a form that occurs in two positions and which are mirror image of each other. It is known as Enantiomorphous forms.			

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ii) Plane of Symmetry :- known as mirror plane.  
 Roto-inversion :- Rotation + inversion symmetry.

iii) Twin axis :- at 180° axis give symmetry in twin crystal.

Twin plane :- plane which are mirror image in twin crystal.

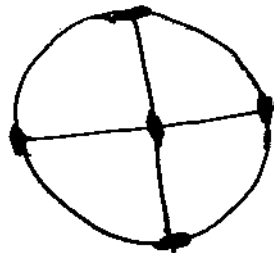
iv) Primitive :- node at the corner of lattice

Body center :- node with corner and middle of the lattice.

2.

i)  $a \rightarrow 4$   
 $b \rightarrow 1 \Rightarrow \frac{1}{4}, \frac{1}{1}, \frac{1}{2}$   
 $c \rightarrow 2 \Rightarrow \{1, 4, 2\}$

ii)  $\frac{2}{m} \quad \frac{2}{m} \quad \frac{2}{m}$



iii) All 14 Bravais lattices.

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IV) Classified of crystal system.

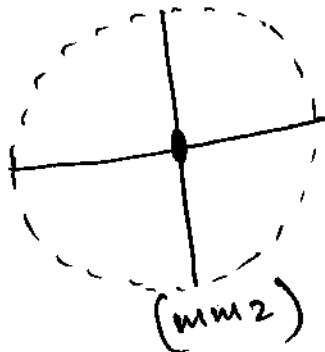
- I) Isometric      II) Tetragonal  
 III) Hexagonal    IV) Orthorhombic  
 V) Triclinic      VI) Monoclinic.
- its axes & angle relationship.

3.

i) Orthorhombic domoidal class / Rhombic pyramidal class.  
 $a \neq b \neq c$ ,  $\alpha = \beta = \gamma = 90^\circ$

Symmetry element:  $1 A_2 \rightarrow$  along  $c$ -axis  
 2 - mirror plane

Centre of Symmetry  $\rightarrow$  absent.



ii) Trigonal trapezohedral class of trigonal division.

$$a_1 = a_2 = a_3 \neq c \Rightarrow \alpha_1, \alpha_2, \alpha_3 = 120^\circ$$

$$a_1, a_2, a_3 \perp c$$



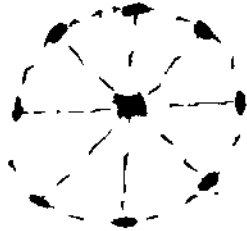
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iii) Tetragonal rhombohedral class.

$$a_1 = a_2 \neq c, \alpha, \gamma = 90^\circ$$



iv) prismatic class of ~~unit~~ monoclinic system

$$a_1 \neq b \neq c \quad \alpha = \gamma = 90^\circ \\ \beta \neq 90^\circ$$



4) i) X-ray  $\rightarrow$  electromagnetic wave having wavelength  $10^{-8}$  to  $10^{-12}$  m.

X-ray spectra  $\rightarrow$  continuous & characteristic.

$$n) \quad d = \frac{n\lambda}{2 \sin \theta}$$

iii) application in mineralogy.

iv) Manabach, Bavens, Carlsbad.

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5. i)

Crystallographic axes relationship.  
 Symmetry element  
 H. M.

ii)

Crystallographic axes relationship  
 Symmetry element  
 H. M.

iii)

with neat sketch production of X-ray

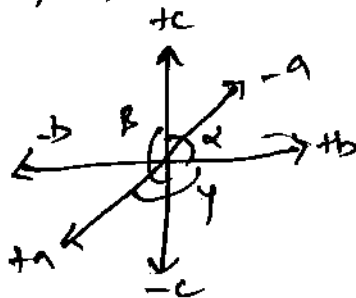
iv)

Simple twin → contact twin where twin law is twin plane.

penetration → crystal appears to have another mineral. ~~penetration~~ twin axis is the twin law.

v)

Crystallographic axes.



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(vi) Axis of symmetry:— imaginary line through the crystal about which if the crystal is rotated the faces appear more than one time.

2-fold axis, 3-fold axis, 4-fold axis, 6-fold axis