

**2016**

( November )

**GEOLOGY**

( Major )

Course : 303

**( Crystallography and Mineralogy )**

Full Marks : 48

Pass Marks : 19 (Backlog) / 14 (2014 onwards)

Time : 2 hours

*The figures in the margin indicate full marks  
for the questions*

UNIT—5.1

**( Crystallography )**

( Marks : 12 )

1. Write short notes on any *two* of the following : 3×2=6
- (a) Crystal systems and axial ratio
  - (b) Parameters and Miller's indices
  - (c) Point group and space group
  - (d) Laws of twin

2. Describe the symmetry elements with stereograms and forms developed in either ditetragonal dipyramidal or monoclinic prismatic class. 5
3. State the crystal system of the following minerals :  $\frac{1}{2} \times 2 = 1$   
Garnet; Microcline

UNIT—5.3

( Thermodynamics and Crystal Chemistry )

( Marks : 10 )

4. What are thermodynamic properties? State the laws of thermodynamics.  $2+4=6$

Or

What do you mean by mineralogical phase rule? Discuss the phase equilibrium of albite-anorthite system.  $1+5=6$

5. Write short note on any one of the following : 3
- (a) Chemical potential and activities
  - (b) Inosilicates
  - (c) Polymorphism



6. Answer the following as directed :  $\frac{1}{2} \times 2 = 1$

(a) A phase diagram is graphical representation of chemical equilibrium.

( State True or False )

(b) — is the isomorphous mixture of  $\text{Mg}_2(\text{SiO}_4)$  and  $\text{Fe}_2(\text{SiO}_4)$ .

( Fill in the blank )

UNIT—5.2 & 5.4

( **Descriptive Mineralogy and Optical Mineralogy** )

( Marks :  $12+14=26$  )

7. (a) Define mineral and mineraloid. Give examples. 2

(b) Name three physical properties of minerals which are dependant upon the internal arrangement of atoms. Discuss in brief these physical properties.  $2+3=5$

8. What is polarized light? Describe the principle of construction of polarizer with the help of neat sketch.  $1+3=4$

Or

Discuss how the optic sign of an uniaxial mineral can be determined in the basal section.

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9. Write note on any *one* of the following : 3

- (a) Isoaxial, uniaxial and biaxial minerals
- (b) Pleochroism
- (c) Interference colour

10. Describe the atomic structure, physical and optical properties of either amphibole or olivine group of minerals. 9

Or

Write notes on chemical composition, physical and optical properties of any *three* of the following :  $3 \times 3 = 9$

- (a) Quartz
- (b) Plagioclase
- (c) Augite
- (d) Biotite
- (e) Nepheline
- (f) Sillimanite

11. Fill in the blanks :  $1 \times 3 = 3$

- (a) The lustre of haematite is —.
- (b) — mineral shows very good double-refraction.
- (c) The intergrowth of Na and K-feldspar is called —.

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