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**M.Sc. – I (Semester – I) Examination, 2014
APPLIED GEOLOGY (New)
Igneous and Metamorphic Petrology (Paper – II)**

Day and Date : Monday, 17-11-2014
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

- Instructions :** 1) Answer **any five** questions.
2) **All** questions carry **equal** marks.
3) Question **1** is **compulsory**.
4) Answer **any two** essay questions from **2, 3, 4**.
5) Answer **any two** short note questions from **5, 6, 7**.
6) Draw **neat** and labelled diagrams **wherever** necessary.

1. Multiple choice question :

14

- 1) Which of the following rocks is characteristic to Post-Paleozoic orogenic belts ?
 - a) Granulites
 - b) Eclogite facies
 - c) Glaucophane schist
 - d) None
- 2) Pyroxene granulites on retrograde metamorphism give rise to
 - a) Hbl-granulites
 - b) Amphibolites
 - c) Eclogite
 - d) All the above
- 3) The lime bearing feldspar yield distinct of zoisite and epidote, due to the presence of
 - a) Sericitization
 - b) Saussaritization
 - c) Pneumatolysis
 - d) Diagenesis
- 4) The process by which a solid melts to a liquid and another solid, both of different composition than the original is called _____
 - a) Congruent melting
 - b) Incongruent melting
 - c) Equilibrium melting
 - d) Partial melting



2. What is regional metamorphism ? Add a note on the metamorphic products of pelites and impure calcareous rocks. **14**
 3. Describe fractional crystallization of magma. Add note on BADR sequence of igneous rocks. **14**
 4. Describe mineralogy, genesis and occurrence of carbonatite in India. **14**
 5. Enumerate in brief : **14**
 - a) Calc-alkaline rocks
 - b) IUGS classification of igneous rocks.
 6. Write short note on : **14**
 - a) I type granites and S type granites
 - b) Bowens reaction series.
 7. Explain in short : **14**
 - a) Significance of ACF
 - b) Thermal metamorphic facies.
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M.Sc. – I (Semester – I) Examination, 2014
APPLIED GEOLOGY (Paper – III) (New)
Sedimentology and Palaeontology

Day and Date : Wednesday, 19-11-2014
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- Instructions :** 1) *Q. 1 is compulsory.*
2) *Attempt any two questions from Section – A.*
3) *Attempt any two questions from Section – B.*
4) *All questions carry equal marks.*
5) *Neat diagrams should be drawn wherever necessary.*

1. Multiple choice question :

14

- 1) Sapropelites are generally deposited in _____
- a) Oxidising environments
 - b) Reducing environments
 - c) Partly oxidizing and partly reducing environments
 - d) None of the above
- 2) Which of the following is NOT erosional current structure ?
- a) Channel marks
 - b) Rill marks
 - c) Scour marks
 - d) Swash marks
- 3) Which of the following types of bedding is characterized by reversed foreset laminae in one coset ?
- a) Tidal bedding
 - b) Flaser bedding
 - c) Herringbone bedding
 - d) Convolute bedding
- 4) Which of the following is a flood basin deposit ?
- a) Point bar deposit
 - b) Lag deposit
 - c) Crevasse splay deposit
 - d) Marsh deposit

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- 5) According to Wentworth's scale particles having diameter between 64 mm – 4 mm are described as
- a) Gravels
 - b) Pebbles
 - c) Cobbles
 - d) Coarse sands
- 6) The fossils which are eroded, transported and re-deposited in younger age sediments is called as _____
- a) Fossil assemblage
 - b) Parental fossils
 - c) Reworked fossils
 - d) Infiltrated fossils
- 7) Petrified wood is an example of _____
- a) Substitution
 - b) Encrustation
 - c) Alteration
 - d) Desiccation
- 8) Which of the protozoans is not a member of foraminifera group ?
- a) Nummulites
 - b) Radiolaria
 - c) Globigerina
 - d) Lagena
- 9) 'TILOBITES' are _____
- a) Ancestors of trilobites
 - b) Trail like markings of trilobites
 - c) Temporary resting traces or burrows of trilobites
 - d) The most dominant type of gastropods during Ordovician
- 10) The thickness cross bedding are most often found in
- a) Alluvial deposits
 - b) Aeolian deposits
 - c) Glacial deposits
 - d) Lake deposits
- 11) Ripples formed by water and wind differ in
- a) Symmetry
 - b) Scale
 - c) Ripple index
 - d) Azimuth
- 12) Rocks having particles of gravel size is known as _____
- a) Arenaceous
 - b) Argillaceous
 - c) Rudaceous
 - d) None of the above



- 13) The process in which new minerals are formed as out growth over detrital mineral grains.
- a) Authigenesis
 - b) Inversion
 - c) Neomorphism
 - d) Recrystallization
- 14) Limestone containing more than 30% of clay and sand is called _____
- a) Chalk
 - b) Argillaceous limestone
 - c) Shelly limestone
 - d) Kankar

SECTION – A

2. What are clastic sedimentary rocks ? Give an account of the general characteristics of major classes of sand stones. 14
3. Define shape of sedimentary particles. Discuss in brief different aspects of shape. 14
4. Discuss the microfossil foraminifera. 14

SECTION – B

5. Write note on **any two** : 14
- a) Classification of limestone
 - b) Mass extinction
 - c) Upper Gondwana flora.
6. Write an essay on **any two** : 14
- a) Continental environment
 - b) Reynold and Froude number
 - c) Origin of sediments
7. Write in brief (**any two**) : 14
- a) Genesis and environment of evaporate deposits
 - b) Dolomitisation and dedolomitisation
 - c) Cross bedding and their significance
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**M.Sc. – I (Semester – I) Examination, 2014
APPLIED GEOLOGY (Paper – IV) (New)
Structural Geology and Morphotectonics**

Day and Date : Friday, 21-11-2014
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- Instructions:** 1) Answer **any five** questions.
2) **All** questions carry **equal** marks.
3) Question **1** is **compulsory**.
4) Answer **any two** essay questions from **2, 3, 4**.
5) Answer **any two** short note questions from **5, 6, 7**.
6) Draw **neat** and labeled diagrams **wherever** necessary.

1. Fill in the blanks :

14

- 1) Parallel faults having a central upthrown block is a _____ faults.
a) Graben b) Horst c) Trench d) None
- 2) _____ is a dominant control factor in the evolution of landforms and is reflected in them.
a) Geomorphological structure b) Climate
c) Geological structure d) All of the above
- 3) Banded calcareous deposits are called
a) Tufa b) Drip stones c) Travertine d) Stalactites
- 4) The hinge line of a doubly plunging fold will be _____
a) Rectilinear b) Curvilinear
c) Horizontal d) Vertical
- 5) An unconformity is actually
a) A surface of erosion or non deposition or both as detected in a sequence of rocks
b) A layer of boulders and pebbles in a sequence of rocks
c) A layer of clay or shale in an igneous mass
d) None of the above



- 6) Most common characteristic drainage pattern of the Deccan trap is _____
a) Radial b) Dendritic c) Trellis d) None
- 7) Find odd one out.
a) Exfoliation b) Frost action
c) Carbonation d) Thermal effect
- 8) Factors for formation of soil.
a) Parent rock b) Climate
c) Topography d) All of the above
- 9) Boudins are formed under _____ regime.
a) Compressive stress b) Tensile stress
c) a) and b) both d) None of these
- 10) Deltas are formed when
a) Absence of any strong sea currents or wave
b) The slope of seashore where the stream enters the sea
c) Presence of good quantity of sediment load
d) All of the above
- 11) Slicken slides, gauge and breccia are field guides to recognise
a) Fault b) Angular unconformity
c) Joints d) Fold
- 12) Which of the following is secondary structure ?
a) Foliation b) Cleavage
c) Lineation d) Folds
- 13) All movements of the Earth's crust resulting from the tectonic processes is known as _____ movement.
a) Aggradational b) Diastrophic
c) Degradational d) Volcanic
- 14) _____ pattern is formed when the tributaries flow in opposite direction to their master stream.
a) Insequent b) Obsequent
c) Subsequent d) None



2. Explain in detail mechanisms of folding and its geometry. **14**
 3. Explain briefly the geological work of river with erosional and depositional features. **14**
 4. Explain fundamental concept in geomorphology with examples. **14**
 5. Write short notes on : **14**
 - a) Drainage pattern
 - b) Linear aspects of morphometric analysis.
 6. Write in brief on : **14**
 - a) Types of stresses and behaviour of material
 - b) Drag folds.
 7. Discuss in short : **14**
 - a) Geometrical classification of fault
 - b) Rejuvenation.
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M.Sc. (Part – I) (Semester – II) Examination, 2014
APPLIED GEOLOGY (Paper – VI)
Indian Stratigraphy

Day and Date : Tuesday, 18-11-2014
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- Instructions :** 1) Question No. 1 is **compulsory**.
2) Answer **any two** questions **each** from Section **A** and Section **B**.
3) Draw neat and labelled diagrams **wherever** necessary.
4) **All** questions carry **equal** marks.

1. Fill in the blanks with appropriate words : 14

- 1) The smallest time unit is known as _____
a) Phase b) Age c) Epoch d) Period
- 2) Karharbari formation from lower Gondwana is mainly composed is _____
a) Shales b) Coals c) Gritty d) None of these
- 3) A diamondiferous conglomerate of Panna formation belong to _____
a) Semri group b) Kaimur group
c) Rewa group d) Bhandar group
- 4) In the western part of cuddapah basin, _____ is exposed.
a) Kurnool group b) Chitravati group
c) Nallamalai group d) Papaghni group
- 5) The older succession of Kaladgi basin is called the _____
a) Bagalkot group b) Badami group
c) Kurnool group d) None of these



SECTION – A

2. Give detailed account on the stratigraphy of the Western Dharwar Craton. **14**
3. Define stratigraphy and write a note on Siwalik formation of India. **14**
4. Give detailed account on lithostratigraphy of cuddapah basin. **14**

SECTION – B

5. Write notes on : **14**
 - a) Intertrappean bed
 - b) Stratigraphy of Main Deccan Plateau.
 6. Describe in brief : **14**
 - a) Bhilwara supergroup
 - b) Bag beds.
 7. Write short notes on : **14**
 - a) Jurassic stratigraphy of Kachchh
 - b) Malanjkhhand granite and Dongargarh granite.
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M.Sc. – I (Semester – II) Examination, 2014
APPLIED GEOLOGY (Paper – VIII)
Geochemistry

Day and Date : Saturday, 22-11-2014
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- N. B. :** 1) Answer **any five** questions.
2) **All** questions carry **equal** marks.
3) Question No. 1 is **compulsory**.
4) Answer **any two** questions from **each** Section.
5) **Draw** and labeled diagrams **wherever** necessary.

I. Choose the correct answer :

14

- 1) A neutral fence is controlled by
 - a) limestone formation
 - b) pH
 - c) E^h
 - d) none
- 2) The Greek word lithophile means the love of an element to
 - a) sulphur
 - b) oxygen
 - c) free iron
 - d) atmosphere
- 3) The most stable mineral occurring on the earth surface according to Goldich rule is
 - a) quartz
 - b) olivine
 - c) pyroxene
 - d) feldspar
- 4) River water and sea water are opposite in chemical character, the sea water has
 - a) $Na > Mg > Ca$
 - b) $Mg > Ca > Na$
 - c) $Na > Ca > Mg$
 - d) None
- 5) The evolution of the atmosphere is on the aspect
 - a) primeval atmosphere
 - b) addition during geological time
 - c) losses during geological time
 - d) all the above



- 13) Presence of higher life forms, phytoplanton, zoo plantons and higher Do in water are in the zone of
- a) thermocline
 - b) hypolimnion
 - c) epilimnion
 - d) none
- 14) The half life of radionuclide ^{235}U is
- a) 4.47×10^9 Y
 - b) 1.31×10^9 Y
 - c) 5730 Y
 - d) none

SECTION – A

Attempt **any two** question from this Section.

- II. Discuss various concepts to propose geochemical model of the earth's interior.
- III. Describe the physico-chemical factors involved during deposition of elements in sedimentation. Add a note on geochemical fence.
- IV. What are accumulation and decay clocks ? Write on half life of various radio nuclides and the material used to date geological events.

SECTION – B

Attempt **any two** questions from this Section.

- V. Write short notes on **any two** of the following :
 - a) Cosmic abundance of elements
 - b) E^h – pH diagrams
 - c) Lithophiles.
 - VI. Write briefly on **any two** of the following :
 - a) Primary differentiation of elements
 - b) Composition of sea and river water
 - c) Composition of atmosphere.
 - VII. Bring out salient aspects on **any two** of the following :
 - a) Free energy
 - b) Average composition of sedimentary rocks
 - c) Losses and gains to hydrosphere.
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M.Sc. (Part – II) (Sem. – III) Examination, 2014
APPLIED GEOLOGY
Paper – IX : Structural Geology and Geotectonics

Day and Date : Friday, 14-11-2014

Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) *Question number I is compulsory.*
2) *Answer any two questions from Section A.*
3) *Answer any two questions from Section B.*
4) **All questions carry equal marks.**
5) **Draw neat labelled diagrams/sketches wherever necessary.**

I. Select the correct choice from those given below :

- 1) Folds with multiple hinges are called _____
 - a) homoclines
 - b) anticlinorium
 - c) polyclinal folds
 - d) synclinorium
- 2) Plutonic igneous rocks are essentially involved in _____
 - a) Disconformity
 - b) Discontinuity
 - c) Angular unconformity
 - d) Non conformity
- 3) A doubly plunging anticline on erosion exhibits _____ pattern of outcrops.
 - a) inlier
 - b) outlier
 - c) overlap
 - d) off-lap
- 4) An over thrust is a type of _____ fault.
 - a) normal
 - b) reverse
 - c) gravity
 - d) detachment
- 5) Under high temperature pressure conditions the rocks behave as _____ materials.
 - a) brittle
 - b) rigid
 - c) elastic
 - d) ductile
- 6) For stress-strain relation the Hooke's law holds true only in the _____
 - a) plastic deformation
 - b) anelastic limit
 - c) linear range of elasticity
 - d) permanent strain



- 7) The forces that pull apart a body in opposite direction generate _____ stresses in it.
a) compressive b) tensile c) shearing d) normal
- 8) New oceanic plates are formed at _____
a) subduction zones b) convergent boundaries
c) mid-oceanic ridges d) deep oceanic trenches
- 9) When two continental plates collide, _____
a) one of them subducts below the other
b) none of them subducts below the other
c) a rift valley is formed
d) a deep oceanic trench is formed
- 10) The Benioff zone occurs on _____
a) over-riding continental plate
b) subducting continental plate
c) subducting oceanic plate
d) over-riding oceanic plate
- 11) Strips of similar palaeomagnetic properties are parallel to and on either sides of _____
a) continental margins b) deep oceanic trenches
c) mid oceanic ridges d) convergent plate boundaries
- 12) Hot spots are a result of _____
a) Upward diverging mantle convection
b) Movements in the Earth's core
c) Descending convection currents
d) Isostatic adjustments
- 13) Palaeomagnetic studies on ocean floor have supported the concept of _____
a) Isostasy b) continental drift
c) Convection currents d) paired metamorphic belts
- 14) The transform fault boundary is characterised by _____ faults.
a) Normal b) Reverse c) Dip-slip d) Strike-slip



SECTION – A

Answer **any two** questions from this Section :

- II. Describe the behaviour rock material stress in detail.
- III. Discuss the mechanics of folding with examples.
- IV. Describe the physiographic divisions of India from geotectonic point of view.

SECTION – B

Answer **any two** questions from this Section :

- V. Write notes on :
 - a) Orogenesis
 - b) Tripple junction.
 - VI. Explain in detail :
 - a) Plume hypothesis
 - b) Foliation.
 - VII. Discuss the significance of the following :
 - a) Lineations in tectonics
 - b) Shear zones.
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M.Sc. (Part – II) (Semester – III) Examination, 2014
APPLIED GEOLOGY (Paper – X)
Mineral Exploration

Day and Date : Monday, 17-11-2014
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- N.B. :** 1) Attempt **not** more than **five** questions.
2) Question No. I is **compulsory**.
3) Attempt **atleast two** questions from Question Numbers **II, III and IV** and two questions from Question No.s **V, VI and VII**.
4) **All** questions carry **equal** marks.
5) **Neat** diagrams should be drawn **whenever** necessary.

I. Choose the correct answer :

- 1) Threshold is the concentration of an element above which a sample is considered as _____
a) Dispersive b) Anamolors c) Background d) Cut-off
- 2) The rocks which have lithium bearing minerals _____
a) Pegmatites b) Syenites c) Granites d) Anorthosites
- 3) Pyrite of sedimentary origin has _____
a) Co < Ni b) Co > Ni c) K > Ni d) Na > Ni
- 4) Eclogites are _____ derived rocks carried on to the surface by kimberlite pipes.
a) Mantle b) Core c) Crust d) Terrestrial
- 5) The geobotanical indicator of sulphide ore deposit is _____
a) Halophytic flora b) Selenium flora
c) Galmi flora d) None of the above
- 6) Well logging is _____ technique in exploration.
a) Surface b) Sub-surface
c) S. P. Method d) Gamma-Gamma logging
- 7) In electrical resistivity, apparent resistivity (ρ) is denoted by _____
a) $\rho = \frac{V}{I}$ b) $\rho = 2\pi a \frac{V}{I}$ c) $\rho = V \times I$ d) $\rho = \frac{I}{V}$



- 8) The best geophysical method used in oil structures is _____
a) Gravity b) Magnetic c) Electrical d) Seismic
- 9) Find the odd one out ?
a) Sonic logging b) Neutron logging
c) S. P. logging d) Sampling
- 10) The gravity at any point on the earth's surface depends on
a) Latitude b) Elevation c) Density d) All the above
- 11) The bauxite deposits of Eastern Ghats are due to _____ concentration.
a) Mechanical b) Magmatic c) Hydrothermal d) Residual
- 12) Nepheline syenites are the host rocks for _____
a) Diamonds b) Uranium c) Corundum d) Graphite
- 13) Which among is the airborne exploration techniques ?
a) Remote sensing b) G.I.S.
c) G.S.I. d) Field mapping
- 14) Chromite is associated with _____
a) Sedimentary rocks b) Granites
c) Nepheline syenites d) Ultramafic rocks

II. Define prospecting and exploration. Explain structural guides with neat sketches.

III. Explain how do you evaluate mineral resources of bedded type and vein type ? Briefly explain categorisation of reserves.

IV. Define geochemical dispersion of elements. Explain the strategy for exploration of kimberlite pipes.

V. Write short notes on :

- a) Electrical resistivity
- b) Magnetic surveys.

VI. Write short notes on :

- a) Resistivity logging
- b) Radiometric surveys.

VII. Write short notes on :

- a) Types of sampling
 - b) Mineral provinces.
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M.Sc. – II (Semester – III) Examination, 2014

APPLIED GEOLOGY

Paper – XII : Natural Resources and Watershed Management

Day and Date : Friday, 21-11-2014

Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Answer **five** questions.
2) **All** questions carry **equal** marks.
3) Question **1** is **compulsory**.
4) Answer **any two** questions from **each** Part.
5) Draw **neat** and labeled diagrams **wherever** necessary.

1. Answer with correct choice :

14

- 1) The scale used for cadastral map is 1 cm = _____
 - a) 10 m
 - b) 50 m
 - c) 40 m
 - d) 25 m
- 2) The ethic that believes that mankind should not disturb natural features but retain them as pure form is called as _____
 - a) Management
 - b) Conservation
 - c) Development
 - d) Preservation
- 3) By the standard of the Indian metrological department if rainfall is more than 60% of normal rainfall then it is a _____
 - a) Abnormal
 - b) Excess
 - c) Normal
 - d) Scanty
- 4) The New National Mineral Policy (NNMP) was announced in _____
 - a) August 1990
 - b) August 2004
 - c) March 1993
 - d) January 1994
- 5) The fresh water suitable for human use on the earth surface is approximately _____ billion cubic Kilometer
 - a) 1.4
 - b) 2.7
 - c) 1×10^{-5}
 - d) 10×0^{-5}



- 6) A man made structure _____ is installed offshon to act as a barrier to wave action to protect shore and property.
- a) Dyke
b) Bulkhead
c) Sill
d) Break water
- 7) In favorable zones fractured and vericular basalts a recharge rate of _____
- a) 10 to 15%
b) 2 to 3%
c) 7 to 9%
d) None of these
- 8) The rain, snow, atmospheric moisture with pH less than 7 is called _____
- a) Acid precipitation
b) Tonential rain
c) Rain
d) Desaling
- 9) The earthquake is said to be deep when the depth of origin is more than
- a) 58 kmr
b) 110 kmr
c) 200 kmr
d) 300 kmr
- 10) Culturable waste lands are _____
- a) Water logged land
b) Stony wastes
c) Degraded forest land
d) Both a) and c) are correct
- 11) Drought difference widely depending on _____
- a) Macro soil
b) Micro soil
c) Climatic condition
d) All of the above
- 12) Soil formed in place by the disintegration and decomposition of rock _____
- a) Residual soil
b) Cumulose soil
c) Peat soil
d) Muck soil
- 13) Of total geographic area of Maharashtra _____ % is drought prone.
- a) 30
b) 35.2
c) 45
d) 20
- 14) Find odd man out
- a) Farm bunding
b) Nalla bunding
c) Drip imigatic
d) Check damr



PART – I

2. Describe various types of coastal erosions and their management.
3. Write in detail about integrated resources survey.
4. Highlights the legislation aspects of mining sector with respect to issues on environment.

PART – II

5. Write notes on :
 - a) Disposal of Hazardous Haster.
 - b) Satellite data for resource management.
 6. Write in brief :
 - a) Soil management
 - b) Moisture stress in vegetation.
 7. Write short note :
 - a) Land slide management
 - b) Conservation principles used in mineral resources.
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SLR-EK – 1

Seat No.	
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**M.Sc. (Semester – I) Examination, 2014
APPLIED GEOLOGY (Paper – I) (New)
Mineralogy and Optics**

Day and Date : Friday, 14-11-2014

Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

- N. B. :**
- 1) *Objective Question No. 1 is compulsory.*
 - 2) *Answer **any two** questions from Section – A.*
 - 3) *Answer **any two** questions from Section – B.*
 - 4) ***All** questions carry **equal** marks.*
 - 5) ***Draw** neat sketches **wherever** necessary.*

1. Fill in the blanks with correct choice :

14

1) Which of the following minerals is an ortho-pyroxene ?

- | | |
|----------------|-----------------|
| a) Angite | b) Diopside |
| c) Hypersthene | d) Wollastonite |

2) Which of the following minerals is an isotropic mineral ?

- | | |
|------------|-------------|
| a) Biotite | b) Chlorite |
| c) Garnet | d) Olivine |

3) Find the 'Odd Man Out'

- | | |
|--------------|----------------|
| a) Muscovite | b) Plagioclase |
| c) Olivine | d) Garnet |

4) Glaucophanes belongs to which of the following groups ?

- | | |
|-------------|--------------|
| a) Pyroxene | b) Olivine |
| c) Feldspar | d) Amphibole |

5) $Ba(Al_2Si_2O_8)$ is the chemical composition of which of the following minerals ?

- | | |
|-------------|-----------------|
| a) Celsian | b) Anorthoclase |
| c) Adularia | d) Albite |

P.T.O.



SECTION – A

2. Write an essay on mineralogy and optical characters of feldspathoid group. **14**
3. Write an essay on structure, optical properties and paragenesis of aluminosilicates. **14**
4. What is an interference figure ? Describe procedure for finding interference figure of uniaxial mineral. **14**

SECTION – B

5. Write short notes on **(any two)** : **14**
 - a) Paragenesis of base metals
 - b) Diagnostic properties Olivine
 - c) Flash figure.
 6. Write in brief **(any two)** : **14**
 - a) Silicate structures of minerals.
 - b) Structure and chemistry of epidote.
 - c) Laws of twinning in feldspar.
 7. Describe the following **(any two)** : **14**
 - a) Acute bisetrix
 - b) Structure and chemistry and garnet
 - c) Nomenclature of mica group of minerals.
-