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[3730] - 101

M.Sc.

GEOLOGY

**GL - 101 : Mineralogy
(2008) (Sem.-I)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) You are advised to attempt not more than 5 questions.*
- 2) All questions carry equal marks.*
- 3) Neat diagrams must be drawn wherever necessary.*

Q1) Define a crystal. Give classification of crystal into seven crystal systems.

Q2) Explain the determination of optic sign of biaxial minerals with the help of interference figure.

Q3) Give an account of structure , chemical composition and paragenesis of orthopyroxenes.

Q4) Write in details on accessory plates used in optical mineralogy.

Q5) Write notes on any two:

- a) Convergent polarised light.
- b) Dioctahedral micas.
- c) Standard symmetry operations.
- d) Bragg's law.

P.T.O.

Q6) Give an account of structure, chemical composition and paragenesis of clay minerals.

Q7) Give an account of chemical composition, physical and optical properties and alteration products of mica mineral group.

Q8) Write notes on any two.

- a) Structural classification of zeolites.
- b) Uniaxial indicatrix.
- c) Mg - Fe amphiboles.
- d) Alkali feldspars.



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[3730]- 102

M.Sc.

Geology (Sem.-I)

**GL - 102 : Principles of Stratigraphy and Palaeontology
(New) (2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) Neat diagrams must be drawn wherever necessary.*
- 2) All questions carry equal marks.*
- 3) You are advised to attempt not more than 5 questions.*

Q1) What is stratigraphy? Enumerate your answer with example on the Lithostratigraphic classification. Also discuss its significance in Basinal Correlation.

Q2) Attempt any two :

- a) Uniformitarianism.
- b) Unconformity.
- c) Extinction.
- d) Geological Time scale.

Q3) What do you mean by the term 'facies' Enumerate your answer with special reference to Lithofacies and Biofacies.

Q4) Attempt any two:

- a) Sequence stratigraphy.
- b) Basinal Correlation.
- c) Magnetostratigraphy.
- d) Marker Bed.

P.T.O.

Q5) Explain 'Fossil'. Write in details on the various types of microfossils. Add a note on their utility in paleoecology and correlations.

Q6) Attempt any two:

- a) Apertures and chambers in foraminifera.
- b) Suture lines in cephalopods.
- c) Preparation of microfaunal slides.
- d) Pollen and spores.

Q7) Write in detail on the Morphology of hard parts in Ammonoides Add a note on its stratigraphic range and significance.

Q8) Attempt any two :

- a) Hinge in Ostracods.
- b) Comparison between bivalves and Brachiopod.
- c) Types of Microfossils
- d) Corals and their significance.



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[3730]- 103

M.Sc.

GEOLOGY

**GL - 103 : Physics & Chemistry of The Earth
(New Course) (2008)(Sem. -I)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) Neat diagrams must be drawn wherever necessary.*
- 2) All questions carry equal marks.*
- 3) You are advised to attempt not more than 5 questions.*

Q1) Which are the various theories of origin of solar system.

Q2) Discuss the application of seismic waves in interpretation of the internal structure of the earth.

Q3) What are radioactive elements? Discuss the radioactive behaviour of each element.

Q4) Write short notes on (Any Two) :

- a) Protostars.
- b) Asthenosphere.
- c) Age of the earth.
- d) Density distribution within the earth.

Q5) What is palaeomagnetism?. Write in brief .

P.T.O.

Q6) Write a concise account of the classification of galaxies.

Q7) Write in detail the geochemical differentiation of the earth.

Q8) Write short notes on (Any Two) :

- a) Meteor showers.
- b) C^{14} dating
- c) Nucleosynthesis.
- d) Magnetic dip & magnetic declination.



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[3730]- 201

M.Sc. I

GEOLOGY

**GL - 201 : Igneous Petrology
(New) (Sem.-II)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) You are advised to attempt not more than 5 questions.*
- 2) All questions carry equal marks.*
- 3) Neat diagrams must be drawn wherever necessary.*

Q1) What are the textures and structures of igneous rocks? Give the detailed account of textures of igneous rocks.

Q2) Give the historic perspective of the classification of igneous rocks.

Q3) Explain importance of trace elements in igneous rocks.

Q4) Write short notes on (Any two) :

- a) Anatomy of Earth.
- b) Magma generation.
- c) MORB (Mid - Oceanic Ridge Basalt)
- d) Structure of Oceanic crust and upper mantle.

Q5) What is phase rule? Explain it with the help of phase diagram in the system SiO_2 .

Q6) Give an account of Amba Dongar carbonatites with respect to its geographical distribution and structural character.

P.T.O.

Q7) Give the stratigraphic sequence of Deccan volcanic province and describe the structure of Deccan trags.

Q8) Write short notes on (any two):

- a) Assimilation by melting.
- b) Binary system showing complete solid solution.
- c) Bushveld complex.
- d) Origin and occurrence of Anorthosites.



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[3730]- 202

M.Sc. - I

GEOLOGY

GL - 202 : Metamorphic Petrology

(Sem. - II) (New)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) You are advised to attempt not more than 5 questions.*
- 2) All questions carry equal marks.*
- 3) Neat diagrams must be drawn wherever necessary.*

Q1) Define metamorphism. Enlist the minerals commonly found in metamorphic rocks. Also comment on their genesis and occurrence.

Q2) Describe in details the various metamorphic reactions which take place during metamorphism of rocks.

Q3) Explain in details the prograde and retrograde metamorphism.

Q4) Write notes on any two of the following :

- a) AKF diagram.
- b) Types of metamorphism.
- c) Textures of recrystallization.
- d) Mineralogical phase rule.

Q5) Give an account of thermal metamorphism of pelitic rocks.

Q6) Give an account of regional metamorphism of impure, siliceous, carbonate rocks.

Q7) Explain the concept of paired metamorphic belts. With the help of a suitable example. Explain their significance & origin.

P.T.O.

Q8) Write notes on any two of the following :

- a) Impact / shock metamorphism.
- b) Metasomatism.
- c) Metamorphic facies of regional metamorphism.
- d) Charnockites.



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[3730]- 203

M.Sc. - I

GEOLOGY

GL - 203 : Structural Geology and Tectonics

(Sem. - II) (New)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) You are advised to attempt not more than 5 questions.*
- 2) All questions carry equal marks.*
- 3) Neat diagrams must be drawn wherever necessary.*

Q1) What are faults? Discuss their genesis and classify them accordingly.

Q2) What are lineations? Describe the linear structures in detail.

Q3) Discuss the concept of fabric domain.

Q4) Write notes on (any two) :

- a) Response of rocks to stress.
- b) Objectives of mesoscopic analysis.
- c) Flexure fold.
- d) Fold systems.

Q5) Enumerate the observations of geophysical explorations of the ocean floor, which led to the concept of sea floor spreading?

Q6) Discuss the drift of the Indian subcontinent.

Q7) Discuss the Earth's planetary dynamics and its possible effects on climate.

Q8) Write notes on any two :

- a) Subduction zone.
- b) Magnetic strips.
- c) Greenhouse effect.
- d) Ophiolites.



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P1145

[3730]- 204

M.Sc. - I

GEOLOGY

**GL - 204 : Geomorphology and Remote Sensing in Geology
(Sem. - II) (New Course)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) You are advised to attempt not more 5 questions.*
- 2) All questions carry equal marks.*
- 3) Neat diagrams must be drawn wherever necessary.*

Q1) Describe endogenous and exogenous forces responsible for landforms.

Q2) Define “Soil”. Describe the products of soil. Draw neat sketch of soil profile and discuss different horizons.

Q3) What are Neotectonic movements? Comment on geomorphic indicators of neotectonism.

Q4) Write notes on any three of the following :

- a) Fluvial process on hill slopes.
- b) Process involved in coastal erosion.
- c) Glaciofluvial deposits.
- d) Application of geomorphology in Engineering Geology.

Q5) What is “Electromagnetic radiation”? Write note on its interaction with matter. Discuss the characteristics of Electromagnetic Spectrum.

Q6) Describe orthogonal and central perspective projections. Discuss the advantages and disadvantages of aerial photos over the topographical map.

P.T.O.

Q7) Write an account of different photorecognition elements for the following :

- a) Faults.
- b) Dykes.
- c) Folds.
- d) Sandstone.
- e) Shale.
- f) Limestone.

Q8) Write notes on any three of the following :

- a) Seasat.
- b) Thematic Mapper.
- c) Stefan Boltzman Law.
- d) Drainage density and frequency.



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[3730]- 301

M.Sc.

GEOLOGY

**GL - 302 : Exploration Methods
(Sem. - III) (New Course)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *All questions carry equal marks.*
- 3) *You are advised to attempt not more than 5 questions.*

- Q1)** Describe the principle of gravimeter. Describe unstable kind of gravimeter.
- Q2)** Explain the principle of seismic reflection method. How the reflection from a two layered model is represented? Explain the terms zero offset time, Normal Move Out, CDP technique and multiple coverage.
- Q3)** What is geochemical prospecting? Describe the geochemical association of elements.
- Q4)** Write notes on any two of the following :
- a) Bonger correction and bonger anomaly.
 - b) Electrode arrangements in resistivity methods.
 - c) Types of drilling bits.
 - d) Soil as geochemical indicator.
- Q5)** What is induced potential? Describe the concept of electrode polarisation. How is induced potential data represented?
- Q6)** What is the self potential? How is it generated? Describe the instruments field procedures in self potential method.
- Q7)** What is geochemical dispersion? Describe the path finder elements and geochemical distribution pattern.

P.T.O.

Q8) Write notes on any two of the following :

- a) Generation of magnetic anomalies in the exploration.
- b) Electrolytic polarisation.
- c) Geobotanical indicators.
- d) Caliper log.



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[3730]- 302

M.Sc.

GEOLOGY

**GL - 303 : Petroleum Geology
(New Course) (2008) (Sem.-III)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) Neat diagrams must be drawn wherever necessary.*
- 2) All questions carry equal marks.*
- 3) You are advised to attempt not more than 5 questions.*

Q1) Discuss chemical composition of petroleum. write brief account of classification of petroleum.

Q2) What are source rocks ? Explain conditions responsible for the formation of source rocks.

Q3) Describe the characteristics of a reservoir rock. Explain chemical reservoir rocks and miscellaneous reservoir rocks.

Q4) Write notes on any two of the following:

- a) Surface occurrence of petroleum.
- b) Inorganic origin of petroleum.
- c) Mumbai (Bombay) High oil field.
- d) Functions of drilling mud.

P.T.O.

- Q5)** Enlist different methods of geophysical prospecting used in hydrocarbon exploration. Discuss efficacy of seismic prospecting in hydrocarbon exploration.
- Q6)** What do you mean by migration of petroleum? on which factors the petroleum migration depends. Add note on accumulation of petroleum.
- Q7)** Write an account of stratigraphy, structure and reservoir characteristics of Krishna Godavari basin.
- Q8)** Write notes on any two of the following:
- a) Drill stem testing.
 - b) Demand and production of crude oil in India.
 - c) Borehole environment.
 - d) Classification of petroliferous basins of India.



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[3730]- 303

M.Sc.

GEOLOGY

GL - 304 : Engineering Geology and Geotechniques

(Sem. - III) (New Course) (2008)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) Neat diagrams must be drawn wherever necessary.*
- 2) All questions carry equal marks.*
- 3) You are advised to attempt not more than 5 questions.*

Q1) What is rock failure? Give the mechanism of rock failure.

Q2) What are dams? State the geological criteria for the selection of dam sites.

Q3) Describe in detail different types of aggregates.

Q4) Write notes on (any two) :

- a) Use of remote sensing methods in engineering geology.
- b) Preparation of engineering geological report.
- c) Tunnel alignment in folded and faulted strata.
- d) Scope of engineering geology.

Q5) What is soil? Describe in detail the types of soils with examples.

Q6) Describe the different types of bridges. Comment on the geological considerations for the selection of bridge sites.

Q7) Describe in detail the phases involved in crushed stone quarrying.

Q8) Write notes on (any two) :

- a) Types of synthetic materials used as remedial measures.
- b) Estimation of overburden thickness.
- c) Hardness and impact test.
- d) Silting of reservoirs.



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[3730]- 304

M.Sc.

GEOLOGY

**GL - 305 : Computer Applications in Geology and Geographical Information System
(Sem. - III)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) Neat diagrams must be drawn wherever necessary.*
- 2) All questions carry equal marks.*
- 3) You are advised to attempt not more than 5 questions.*

Q1) What is GIS? Explain in brief the history of GIS. What are the components of GIS?

Q2) What is the difference between a positional and non-positional number system. Give examples of both types of number systems.

Q3) What is TIN? How are TINs constructed?

Q4) What is secondary storage? How does it differ from primary storage? Explain how information is stored in a disk pack.

Q5) Write notes on any two :

- a) Attribute data.
- b) System software.
- c) Conic projection.
- d) Addition of 1011 and 101 in decimal and binary forms.

Q6) What is data encoding? What problems are faced when encoding digital and analogue data?

Q7) What is an algorithm? What are the characteristics necessary for a sequence of instruction to qualify as an algorithm?

P.T.O.

Q8) Write notes on any two :

- a) DTM (Digital Terrain Model).
- b) Universal gates.
- c) Containment and connectivity.
- d) Principle of duality in Boolean Algebra.



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[3730]- 401
M.Sc. - II
GEOLOGY
(GL - 401) Economic Geology
(Sem. - IV) (New)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) You are advised to attempt not more than 5 questions.*
- 2) All questions carry equal marks.*
- 3) Neat diagrams must be drawn wherever necessary.*

Q1) Explain the structural controls for ore localizations.

Q2) Enlist various ore forming processes. Explain in details the primary ore forming processes.

Q3) What are ore forming fluids? Write about their origin, type, nature & migration.

Q4) Write notes on any two of the following :

- a) Early magmatic deposits.
- b) Wall rock alteration.
- c) Gangue, grade and tenor of ore.
- d) Placer deposits.

Q5) Write classification and genesis of iron deposits and give their geological and geographical distribution.

Q6) Write classification and genesis of uranium deposits and give their geological and geographical distribution.

Q7) Explain the term 'mineral Economics'. Write on National Mineral Policy.

Q8) Write notes on any two of the following :

- a) Chromite deposits.
- b) Applications of Uranium and Thorium.
- c) Mode of occurrence and genesis of coal deposits.
- d) Skarn deposits.



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[3730]- 402

M.Sc. - II

GEOLOGY

**GL - 402 : Mining Geology, Gemmology and Industrial Mineralogy
(Sem. - IV) (New)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) You are advised to attempt not more than 5 questions.*
- 2) All questions carry equal marks.*
- 3) Neat diagrams must be drawn wherever necessary.*

Q1) What are stratigraphic guides? Explain them in details with the help of suitable examples.

Q2) Write in details about diamond drills. Explain how sampling is done when diamond drill is used.

Q3) Explain various methods of underground mining.

Q4) Write notes on any two of the following :

- a) Placer deposits.
- b) Ringed target.
- c) Pseudochromatic gemstones.
- d) Gem varieties of garnet.

Q5) What are inclusions in gemstones? Explain various types of inclusions found in gemstone. Which instruments are used in studying them. Explain with the help of figures six different types of gemstones showing typical inclusions.

Q6) What are imitation stones? Give their properties. How can they be identified? Give examples of different types of imitation stones.

Q7) Which minerals are used as raw material in refractory industry? Give detailed account of any three of them with respect to their characteristic properties chemical composition and industrial specification.

Q8) Write notes on any two of the following :

- a) Asbestos as an industrial mineral.
- b) Building stones.
- c) Mineral Pigments/Natural pigments.
- d) Utilization and specifications of mica.



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[3730]- 403

M.Sc. - II

GEOLOGY

**GL - 403 : Environmental Geology
(Sem. - IV) (New)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *You are advised to attempt not more than 5 questions.*
- 2) *All questions carry equal marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*

Q1) What is hydrosphere? Describe the importance of Hydrosphere.

Q2) Describe classification of soil. Add a note on soil salinity and alkalinity and its causes.

Q3) Describe the wastes from mining industry. Comment on heavy metal pollution due to mining.

Q4) Write notes on any two of the following :

- a) Importance of resources management.
- b) Causes of Tsunamis.
- c) Concept of environmental science.
- d) Mitigation Measures for Drought.

Q5) Explain the term 'Pollution'. Enumerate your answer with special reference to significance of drinking water source and types of water pollution.

Q6) Explain the term 'Hazard'. Enumerate your answer with special reference to the types of hazards and impact of catastrophic geological hazards.

Q7) Write on the causes of Landslids. Comment on the prediction and mitigation of Landslids.

Q8) Write notes on any two of the following :

- a) Richters scale of earthquake.
- b) Case history of Arsenic Poisoning.
- c) Nitrogen cycle.
- d) Fly Ash and its related problems.



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[3730]- 404

M.Sc. - II

GEOLOGY

**(GL - 404) Hydrogeology, Watershed Development and Management
(Sem. - IV) (New)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) You are advised to attempt not more than 5 questions.*
- 2) All questions carry equal marks.*
- 3) Neat diagrams must be drawn wherever necessary.*

Q1) What are different geological methods of groundwater exploration? Explain the hydrochemical methods in detail.

Q2) Describe how the concept of porosity is applied to groundwater. Describe factors controlling the porosity in case of unconsolidated sediments.

Q3) Explain the groundwater scenario in Maharashtra State.

Q4) Write short notes on (any two) :

- a) Electrical resistivity interpretation in groundwater exploration.
- b) Adverse effects of fluoride.
- c) Flow nets.
- d) Use of aerial photographs in groundwater interpretation.

Q5) Explain the importance of geology in watershed works.

Q6) Describe the importance of conjunctive use of surface and groundwater resources.

Q7) Role of NGO's and state Government in watershed management.

Q8) Write short notes on (any two) :

- a) State Government's initiative in watershed development.
- b) Gullies and plugs.
- c) Water balance equation.
- d) Horton's law of stream.

