

**SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2021**

(CCSS)

Applied Geology

GEL 2C 05—ADVANCED MINERALOGY

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

*Draw neat diagrams wherever necessary.***Part A***Write short notes on **all** of the following.**Each question carries 2 marks.*

1. Space lattice.
2. Pyritohedron.
3. Birefringence.
4. Pleochroic scheme.
5. Ray velocity surface.
6. Isomorphism.
7. Exsolution.
8. Nesosilicates.

(8 × 2 = 16 marks)

**Part B***Write short essays on any **six** of the following.**Each question carries 6 marks.*

9. Use of stereographic projection in crystal studies.
10. Discuss the concept of space group.
11. Describe sign of elongation in minerals.
12. What is meant by 2V ? How do you determine the 2V of a mineral using Mallard's method ?
13. Describe Michel Levy's interference colour chart. Add a note on its use.
14. Describe biaxial indicatrix.
15. Discuss different types of polymorphism with suitable examples.
16. Discuss the mineral transformations that take place in the mantle with depth.

**Turn over**

17. Discuss the structure and chemical composition of carbonate group of minerals.
18. Chemical composition and optical properties of feldspar group of minerals.

(6 × 6 = 36 marks)

### Part C

*Write essays on any **two** of the following.*

*Each question carries 14 marks.*

19. Describe biaxial interference figures with neat diagrams.
20. Describe the structure, chemistry and optical properties of pyroxene group of minerals.
21. Describe the different types of chemical bonding in minerals with suitable examples.
22. Describe X-ray Diffractometer and its uses in mineralogical studies.

(2 × 14 = 28 marks)

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**SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2021**

(CCSS)

Applied Geology

GEL 2C 06—HYDROGEOLOGY

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

*Draw neat diagrams wherever necessary.***Part A***Write short notes on **all** of the following.**Each question carries 2 marks.*

1. Aquiclude.
2. Hydrologic cycle.
3. Juvenile and connate water.
4. Groundwater mining.
5. Stiff's diagram.
6. Groundwater province.
7. Rainwater harvesting.
8. Flow net.

(8 × 2 = 16 marks)

**Part B***Write short essays on any **six** of the following.**Each question carries 6 marks.*

9. Preparation of water table contour maps and their use.
10. Physical properties of groundwater.
11. Discuss the concept of drainage basin and groundwater basin.
12. Describe the use radio isotopes in hydrogeological studies.

13. Describe the DTH method in exploiting groundwater.
14. Explain the use of Jacob's method in evaluating aquifer parameters.
15. Describe the problems related to excessive content of arsenic in groundwater.
16. Describe the use of satellite imageries for groundwater exploration.
17. Discuss the groundwater problems due to construction of tunnels, canals and buildings.
18. Define and explain Darcy's Law.

(6 × 6 = 36 marks)

### Part C

*Write essays on any two of the following.*

*Each question carries 14 marks.*

19. Derive Ghyben-Herzberg relation. Discuss the methods of preventing and controlling salt water intrusions in coastal aquifers
20. Discuss the use of radioactive and electrical properties of rocks for well logging.
21. Describe Wenner method of vertical electrical sounding in groundwater exploration.
22. Describe the different methods used in artificial recharge of groundwater.

(2 × 14 = 28 marks)

**SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2021**

(CCSS)

Applied Geology

GEL 2E01A—MINING GEOLOGY AND ENGINEERING GEOLOGY

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

*Draw neat diagrams wherever necessary.***Part A***Write short notes on **all** of the following.**Each question carries 2 marks.*

1. Run-of-mine ore.
2. Longwall mining.
3. Mohr-Coulomb (MC) failure criterion.
4. Road aggregate.
5. DTH drill.
6. Petroleum prospect.
7. Schlumberger configuration.
8. Piling.

(8 × 2 = 16 marks)

**Part B***Write short essays on any **six** of the following.**Each question carries 6 marks.*

9. Describe the aseismic desgin of buildings.
10. How does joint strike and dip orientations affect open excavation for road construction ?
11. Discuss the geotechnical aspects of bridge construction.

**Turn over**

12. 'Urulpottal' is the term used in Kerala for landslides. Describe the nature of this landslide and the suitable international nomenclature.
13. Describe the steps involved in the geological investigation for the siting of a nuclear power plant.
14. What is an arch dam, and what are its distinguishing features ?
15. What are the geotechnical issues that have resulted in the 'Leaning Tower of Pisa' ?
16. Write a note on the qualities of a good building stone.
17. Describe how sea bed mining could be undertaken, and the challenges involved.
18. What are the factors taken into consideration in preparing a landslide hazard zonation map ?

(6 × 6 = 36 marks)

### Part C

*Write essays on any two of the following.*

*Each question carries 14 marks.*

19. Describe the physical methods used in separating ores.
20. Describe the National Mineral Policy and its salient features.
21. Describe the techniques in open cast mining of coal.
22. How are tunnels planned and constructed in a mountainous terrain ? Explain.

(2 × 14 = 28 marks)

**SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2021**

(CCSS)

Applied Geology

GEL 2E 02A—MARINE GEOLOGY

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

*Draw neat diagrams wherever necessary.***Part A***Write short notes on all of the following.**Each question carries 2 marks.*

1. ACD.
2. La Nina.
3. Jetties.
4. Bermuda triangle.
5. Pyrocline.
6. Phosphatic nodules of the ocean floor.
7. Tides.
8. Geostrophic currents.

(8 × 2 = 16 marks)

**Part B***Write short essays on any six of the following.**Each question carries 6 marks.*

9. Siliceous ooze.
10. Features of continental slope.
11. Submarine canyons.
12. MORB.
13. White smokers.

**Turn over**

14. Eustatic sea level changes.
15. Beach erosional and depositional features.
16. Types of marine sediments.
17. Gyres of Atlantic Ocean.
18. Horizontal and vertical distribution of pressure in oceans.

(6 × 6 = 36 marks)

### Part C

*Write essays on any **two** of the following.  
Each question carries 14 marks.*

19. Describe the coupled ocean-atmosphere model.
20. Describe the Coastal Regulation Zone (CRZ) notification.
21. Explain the mineral deposits on the floors of Indian Ocean.
22. Describe the global thermohaline circulations.

(2 × 14 = 28 marks)



**SECOND SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)  
EXAMINATION, APRIL 2021**

(CBCSS)

Applied Geology

GEL 2C 05—CRYSTALLOGRAPHY AND MINERALOGY

(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

**General Instructions**

1. *In cases where choices are provided, students can attend all questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

*Draw diagrams wherever necessary.*

I. Write Short Answers. Answer any *four* questions :

- 1 Translational periodicity in crystals.
- 2 Herman Maugin Symbols.
- 3 Birefringence.
- 4 Sign of elongation.
- 5 Homodesmic bonds.
- 6 Ringwoodite.
- 7 Nesosilicate structure.

(4 × 2 = 8 weightage)

II. Write Short Essays. Answer any *four* questions :

- 8 Bravais lattices.
- 9 Low velocity Zone.

**Turn over**

- 10 Structure and chemical composition of Feldspathoids.
- 11 Mallard's method of determining Optic Axial Angle.
- 12 Compare Schoenflies notations with International crystal notations.
- 13 Describe the chemical composition, physical and optical properties of corundum and zircon.
- 14 Briefly describe the optical properties of minerals observed in thin sections in a polarizing microscope.

(4 × 3 = 12 weightage)

III. Write Long Essays. Answer any *two* questions :

- 15 What is stereographic projection ? Describe the use of stereographic projection in the study of crystals with suitable examples.
- 16 Describe the structure of pyroxene group. Discuss the chemical composition and optical properties of the important members of the pyroxene group.
- 17 What is interference figure ? Describe Uniaxial interference figures and their use.
- 18 What is XRD ? Describe a Powder Diffractometer used in the study of crystals.

(2 × 5 = 10 weightage)

**SECOND SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)  
EXAMINATION, APRIL 2021**

(CBCSS)

Applied Geology

GEL 2C 06—ECONOMIC GEOLOGY

(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

**General Instructions**

1. *In cases where choices are provided, students can attend **all** questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

*Draw diagrams wherever necessary.*

**Part A**

I. Write Short Answers. Answer any *four* questions :

- 1 Tenor of ores.
- 2 Paragenetic sequence.
- 3 Strategic minerals.
- 4 Gas hydrates.
- 5 Stratabound ore deposits.
- 6 Metallogenic epochs.
- 7 Proximate analysis of coal.

(4 × 2 = 8 weightage)

**Part B**

II. Write Short Essays. Answer any *four* questions :

- 8 National Mineral Policy of India 2019.
- 9 Lindgren's classification of ores.

**Turn over**

- 10 Wall rock alteration.
- 11 Ores associated with carbonatites.
- 12 Geology of the Pb-Zn deposits of Zawar.
- 13 Stratigraphic traps.
- 14 Mineralization at divergent plate boundaries.

(4 × 3 = 12 weightage)

### Part C

III. Write Long Essays. Answer any *four* questions :

- 15 Give an account of structural controls of ore localization.
- 16 Give an account of the genesis and geology of Neyveli Lignite Field.
- 17 Describe the geology and genesis of East Coast Bauxite deposits.
- 18 Give an account of the textures and structures of ore minerals.

(2 × 5 = 10 weightage)

**SECOND SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)  
EXAMINATION, APRIL 2021**

(CBCSS)

Applied Geology

GEL 2C 07—HYDROGEOLOGY

(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

**General Instructions**

1. *In cases where choices are provided, students can attend **all** questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

*Draw diagrams wherever necessary.*

I Write Short Answers. Answer any *four* questions :

- 1 Hydrographs.
- 2 Water table contour maps.
- 3 Stiff diagram.
- 4 Specific capacity.
- 5 Artificial recharge.
- 6 Confined flow.
- 7 Seawater ingression.

(4 × 2 = 8 weightage)

II Write Short Essays. Answer any *four* questions :

- 8 Fluoride problem in groundwater in Kerala.
- 9 Ghyben-Herzberg relation and its significance.

**Turn over**

- 10 Use of radioisotopes in hydrogeology.
- 11 Pump tests.
- 12 Groundwater pollution with special reference to micro plastics.
- 13 Darcy's law and its applications.
- 14 Hydrologic cycle.

(4 × 3 = 12 weightage)

III Write Long Essays. Answer any *two* questions :

- 15 Discuss in details the methods used to evaluate aquifer parameters.
- 16 Narrate how remote sensing is useful in groundwater exploration.
- 17 Briefly describe the subsurface geophysical methods used for delineation of aquifers.
- 18 Describe the groundwater provinces of India.

(2 × 5 = 10 weightage)

**SECOND SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)  
EXAMINATION, APRIL 2021**

(CBCSS)

Applied Geology

GEL 2C 08—APPLIED PALAEOLOGY AND SEDIMENTOLOGY

(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

**General Instructions**

1. *In cases where choices are provided, students can attend **all** questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

*Draw diagrams wherever necessary.*

**Part A**

I. Write Short Answers. Answer any *four* questions :

- 1 Spores and pollens.
- 2 Conodonts.
- 3 Quilon Formation.
- 4 ZTR index.
- 5 Herringbone structure.
- 6 Sedimentary facies.
- 7 Plate divergent basins.

(4 × 2 = 8 weightage)

**Part B**

II Write Short Essays. Answer any *four* questions :

- 8 Palaeoecology.
- 9 Modes of preservation of hard parts of fossils.

**Turn over**

- 10 Extinction of dinosaurs.
- 11 Ediacaran fossils.
- 12 Lithification and diagenesis.
- 13 Bouma sequence.
- 14 Types of deltas.

(4 × 3 = 12 weightage)

**Part C**

III. Write Long Essays. Answer any *two* questions :

- 15 Discuss the evolution of Equus.
- 16 Elaborate the use of microfossils in petroleum exploration.
- 17 Describe heavy minerals and their significance in provenance studies.
- 18 Describe the different statistical methods of representation of grain size data.

(2 × 5 = 10 weightage)



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(CCSS)

Applied Geology

GEL 2C 05—ADVANCED MINERALOGY

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

*Draw neat diagrams wherever necessary.***Part A***Write short notes on all of the following.**Each question carries 2 marks.*

1. Translation periodicity in crystals.
2. Optical isotropism.
3. Birefringence.
4. Relief.
5. Biaxial minerals.
6. Optic sign.
7. Pleochroic haloes.
8. Parallel extinction.

(8 × 2 = 16 marks)

**Part B***Write short essays on any six of the following.**Each question carries 6 marks.*

9. Describe the different crystal forms in the normal class of isometric system.
10. Describe the basic principles of X-ray crystallography.
11. Describe refractive index and relief in minerals.

**Turn over**

12. Describe Michel Levy's interference colour chart.
13. Discuss the mineral composition of the mantle. Add a note on the stability of minerals in the mantle.
14. Describe the procedure for determining the optic axial angle by Mallard's method.
15. Types of chemical bonds in minerals.
16. Describe the different properties of minerals studied under polarized light.
17. Discuss the different types of optical indicatrices.
18. Describe the different types of silicate structures.

(6 × 6 = 36 marks)

### Part C

*Write essays on any two of the following.*

*Each question carries 14 marks.*

19. Describe the conoscopic arrangement in a polarizing microscope. Also discuss uniaxial interference figures.
20. Describe the structure, chemistry and optical properties of mica group of minerals.
21. Discuss the different types of polymorphism in minerals.
22. Define Unit cell and Space lattice. Explain the concept of space group.

(2 × 14 = 28 marks)

**SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2020**

(CCSS)

Applied Geology

GEL 2C 06—HYDROGEOLOGY

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

*Draw neat diagrams wherever necessary.***Part A***Write short notes on all of the following.**Each question carries 2 marks.*

1. Juvenile and meteoric water.
2. Hydraulic conductivity.
3. Darcy's Law.
4. Confined aquifer.
5. USSL diagram.
6. VES.
7. Well log.
8. Groundwater mining.

(8 × 2 = 16 marks)

**Part B***Write short essays on any six of the following.**Each question carries 6 marks.*

9. Causative factors of water table fluctuations.
10. Vertical distribution of groundwater.
11. Explain how Theim's method is used in evaluating aquifer parameters.

**Turn over**

12. Describe the use of Piper's tri-linear diagram in the study of groundwater quality.
13. Describe the different types of wells used in exploiting groundwater.
14. Derive Ghyben-Herzberg relation. Add a note on sea water intrusion in coastal aquifers.
15. Describe the problems related to excessive content of fluoride in groundwater.
16. Describe the geologic methods employed in groundwater exploration.
17. Discuss the groundwater problems related to clay mining in Kerala.
18. Use of radioisotopes in groundwater studies.

(6 × 6 = 36 marks)

### Part C

*Write essays on any two of the following.*

*Each question carries 14 marks.*

19. Describe the hydrological properties of rocks.
20. Discuss the use of remote sensing in ground water exploration.
21. Describe the rotary method of drilling for groundwater.
22. Describe the groundwater provinces of India.

(2 × 14 = 28 marks)

**SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2020**

(CCSS)

Applied Geology

GEL 2E 01A—MINING GEOLOGY AND ENGINEERING GEOLOGY

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

*Draw neat diagrams wherever necessary.***Part A***Write short notes on all of the following.**Each question carries 2 marks.*

1. Float Ore.
2. Isopach map.
3. Regional Geological Mapping.
4. Indicator minerals.
5. P-waves.
6. Froth flotation.
7. Aggregates.
8. Richter scale.

(8 × 2 = 16 marks)

**Part B***Write short essays on any six of the following.**Each question carries 6 marks.*

9. Describe how ilmenite can be separated from beach placers of Kerala.
10. Write a note on geobotanical indicators used in exploration for mineral deposits.
11. Discuss the environmental problems associated with processing of bauxite.
12. Write a note on the tri-axial compression test.
13. Amongst marble, granite and sandstone, which would be best suited for foundations of major structures in a tropical monsoonal environment ? Why ?
14. Draw and label the parts of a typical gravity dam.
15. Write a note on the geological aspects to be considered in constructing tunnels.
16. How can buildings be constructed to resist earthquake motions ?

17. Write a note on beach placer mining.
18. Write a note on Kolar Gold Mine.

(6 × 6 = 36 marks)

### Part C

*Write essays on any two of the following.*

*Each question carries 14 marks.*

19. Write an essay on the site investigation procedures for siting a nuclear power plant.
20. Describe the causes of landslides, and discuss the types of landslides in Kerala.
21. Write an essay on the salient features of the National Mineral Policy.
22. How is exploration for petroleum undertaken ? Explain.

(2 × 14 = 28 marks)

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**SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2020**

(CCSS)

Applied Geology

GEL 2E 02A—MARINE GEOLOGY

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

*Draw diagrams wherever necessary.***Part A***Write short notes on all the following.**Each question carries 2 marks.*

1. Groins.
2. Doldrums.
3. Mariana Trench.
4. Thermocline.
5. Coriolis effect.
6. CCD.
7. Waves.
8. Manganese nodules of the ocean floor.

(8 × 2 = 16 marks)

**Part B***Write short essays on any six of the following.**Each question carries 6 marks.*

9. Features of continental shelf.
10. Volcanic arc.
11. Horizontal and vertical distribution of temperature in the oceans.

**Turn over**

12. Controlling factors and distribution of gas hydrates.
13. Coastal geomorphic features of Kerala.
14. Consequences of sea level changes.
15. Classification of coasts.
16. Types of marine sediments.
17. Gyres of Pacific Ocean.
18. Black smokers.

(6 × 6 = 36 marks)

### Part C

*Write essays on any two of the following.*

*Each question carries 14 marks.*

19. Describe the topographic features of the ocean floor with the aid of diagrams.
20. Describe the chemical properties of sea water.
21. Explain the various soft engineering coastal protection measures.
22. Describe the global thermohaline circulations.

(2 × 14 = 28 marks)