R0184	Sub. Code
	464101

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2023

First Semester

Applied Geology

PHYSICAL GEOLOGY AND GEOMORPHOLOGY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct / option.

1. Which of the following part of the earth's interior is composed mainly of silica and alumina as its major constituent? (CO1, K2)

   (a) Mantle (b) Crust

   (c) Core (d) All of these

2. Who proposed the seafloor spreading hypothesis? (CO1, K1)

   (a) Harry H. Hess

   (b) James Hutton

   (c) Alfred Wegener

   (d) M. S. Krishnan

3. When the roof of a magma chamber collapses after a volcanic eruption and forms a (CO2, K3)

(a) Caldera (b) Crater

(c) Lava dome (d) Vent

4. What are the characteristics that define epi-orogeny? (CO2, K2)

(a) Vertical crustal movements

(b) Lateral crustal movements

(c) Subsidence of the Earth's crust

(d) Formation of volcanic islands

5. Which of the following is NOT a type of weathering? (CO3, K1)

(a) Physical weathering

(b) Chemical weathering

(c) Biological weathering

(d) Geological weathering

6. What is the primary process responsible for shaping the Earth's landforms in denudational geomorphology? (CO3, K2)

(a) Tectonic uplift

(b) Volcanic activity

(c) Weathering and erosion

(d) Deposition

7. Where does a river that exhibits a meandering pattern typically form? (CO4, K2)

(a) In mountainous regions

(b) In arid deserts

(c) In areas with resistant bedrock

(d) In flat, low-energy environments

8. Which coastal landform is formed by the deposition of sediment where a river meets the sea, often resulting in a triangular shape? (CO4, K3)

(a) Lagoon

(b) Estuary

(c) Delta

(d) Fjord

9. Which of the following landforms is a result of wind erosion in arid environments? (CO5, K2)

(a) V-shaped valley

(b) Delta

(c) Moraine

(d) Yardang

10. How are sinkholes formed? Due to (CO5, K2)

(a) Glacial activity

(b) Wind erosion

(c) Volcanic eruptions

(d) Dissolution of rocks by groundwater

Part B (5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Explain the earth structure and its composition. (CO1, K5)

Or

(b) Explain the processes of sea floor spreading. (CO1, K5)

12. (a) Explain marine transgression and regression and its associate processes. (CO2, K5)

Or

(b) Classify the structure and types of volcanoes. (CO2, K4)

13. (a) Explain the processes of weathering and its types. (CO3, K5)

Or

(b) Explain in detail about the tectonic geomorphology. (CO3, K5)

14. (a) Classify the various drainage patterns formed by the river. (CO4, K4)

Or

(b) Explain in detail about the coastal zone processes. (CO4, K5)

15. (a) Explain in detail about the various landforms formed in ground water generated landforms. (CO5, K5)

Or

(b) Compare the major geomorphic features of India peninsular and extra peninsular. (CO5, K4)

Part C $(5 \times 8 = 40)$

Answer **all** the questions not more than 1000 words each.

16. (a) Explain in detail about the processes involved in plate tectonics and its types. (CO1, K5)

Or

(b) Explain in detail about Mid Oceanic Ridges, Types, Characteristics and Significance. (CO1, K5)

17. (a) Explain in detail about airy and pratt hypothesis. (CO2, K5)

Or

(b) Discuss about the effects of sea level changes. (CO2, K6)

18. (a) Explain the principles and laws of geomorphology (CO3, K5)

Or

(b) Explain in detail about denudational geomorphology. (CO3, K5)

19. (a) Explain in detail about life cycle of river systems. (CO4, K5)

Or

(b) Explain in detail about classification of shoreline. (CO4, K5)

20. (a) Explain in detail about the processes involved in forming various landforms in geomorphology. (CO5, K5)

Or

(b) Compare the resources and hazards of Aeolian geomorphology and volcanic geomorphology. (CO5, K5)

———————

R0185	Sub. Code 464102

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2023

First Semester

Applied Geology

ADVANCED CRYSTALLOGRAPHY AND MINERALOGY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct options.

1. Which crystal system is characterized by having three axes of equal length that are mutually perpendicular to each other? (CO2, K1)

   (a) Triclinic

   (b) Tetragonal

   (c) Cubic

   (d) Orthorhombic

2. Which projection has the property that all great circles on the sphere are projected as straight lines on the plane? (CO2, K2)

   (a) Spherical projection

   (b) Gnomonic projection

   (c) Stereographic projection

   (d) Lambert azimuthal equal-area projection

3. A crystal with a substitutional solid solution where a small impurity atom occupies a lattice site is an example of which type of defect? (CO3, K4)

(a) Vacancy defect

(b) Interstitial defect

(c) Substitutional defect

(d) Dislocation defect

4. Electron microscopy is particularly useful for examining which type of mineral features? (CO3, K2)

(a) Opaque minerals

(b) Colorful minerals

(c) Large mineral specimens

(d) Transparent minerals

5. Which mineral is used in the production of "gypsum plates" used for various applications including casting and art? (CO3, K1)

(a) Quartz (b) Calcite

(c) Mica (d) Gypsum

6. When using a gypsum plate to determine the sign of elongation in biaxial minerals, what is the relationship between the mineral's elongation and the direction of gypsum plate movement? (CO2, K3)

(a) Parallel

(b) Perpendicular

(c) At a 45-degree angle

(d) Random

7. Ring silicates are also known by which name? (CO2, K1)

(a) Nesosilicates

(b) Inosilicates

(c) Sorosilicates

(d) Cyclosilicates

8. Epidote group minerals are commonly found in which type of geological environments? (CO2, K2)

(a) Igneous rocks

(b) Sedimentary rocks

(c) Metamorphic rocks

(d) Extraterrestrial rocks

9. Chlorite group minerals are often found in which type of geological settings? (CO1, K2)

(a) Volcanic rocks

(b) Sedimentary rocks

(c) Igneous rocks

(d) Metamorphic rocks

10. In the spinel group, what term is used to describe the arrangement of cations in octahedral and tetrahedral sites? (CO3, K2)

(a) Cleavage

(b) Crystal lattice

(c) Stacking sequence

(d) Crystal structure

Part B (5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Describe the differences between the Hermann-Mauguin notation's application, structure and significance in the classification of crystal formation. (CO1, K4)

Or

(b) Explain and Relate the Significance, Principles of Interfacial Angles in the Context of Crystallography. (CO3, K6)

12. (a) Interpret the methods used for identifying irregularities in crystal structures. (CO2, K4)

Or

(b) Determine the physical properties of minerals. (CO3, K2)

13. (a) Examine how the function of Optic axial angles in minerals assists in simplifying the identification of minerals? (CO3, K4)

Or

(b) Simplify how the technique to identifying mica and gypsum plates works? (CO2, K2)

14. (a) Examine the olivine groups of minerals. (CO3, K4)

Or

(b) Discuss the geological occurrences, physical properties, and cultural significance of tourmaline as a gemstone. (CO3, K6)

15. (a) Examine the Role of Framework Silicates with a Focus on Quartz: Formation, Geological Occurrences and Diverse Applications. (CO3, K4)

Or

(b) Explore the Diversity and Significance of Carbonates and Phosphates: Formation, Crystal Structures, and their Roles in Earth's Processes and Industrial Applications. (CO3, K4)

Part C ($5 \times 8 = 40$)

Answer **all** the questions not more than 1000 words each.

16. (a) Explain and compare the applications of stereographic and gnomonic projections. (CO3, K4)

Or

(b) Examine the application and significance of Napier's Theorem. (CO2, K3)

17. (a) Evaluate the methods used to determine twinning and zoning. (CO2, K3)

Or

(b) Explain and analyse the fundamental concept, evaluate the techniques used, and defend the importance of X-ray diffraction. (CO3, K6)

18. (a) Examine the optical characteristics of minerals using Cross-Nicols and polarisation, emphasising how these methods make identification easier. (CO3, K4)

Or

(b) Determination of Signs of uniaxial and biaxial minerals by using optical accessory plates. (CO3, K4)

19. (a) Examine the role of Orthosilicates and Ring silicates play in the creation of geological structures. (CO3, K4)

Or

(b) Examine the Intricacies of the Garnet Group. (CO3, K4)

20. (a) Discuss the Chlorite Group and Clay Minerals: Formation, Properties, and Significance Geology and Industry. (CO3, K6)

Or

(b) Explore the Chain Silicate Groups: Pyroxene aid Amphibole, and the Significance of Pyroxenites in Geological Context. (CO3, K4)

———————

R0186	Sub. Code
	464103

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2023

First Semester

Applied Geology

STRATIGRAPHY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct options.

1. Chronostratigraphy primarily deals with: (CO2, K2)
   (a) Studying the lithologic properties of rock formations
   (b) Identifying the distribution of fossils in different layers
   (c) Establishing the relative sequence of rock layers based on their age
   (d) Determining the geographic distribution of sedimentary units

2. Chemostratigraphy involves the analysis of: (CO2, K2)
   (a) Fossil assemblages in sedimentary rocks
   (b) Changes in isotopic ratios and elemental compositions in rock layers
   (c) Physical characteristics and layering of rock formations
   (d) Radioactive decay of isotopes to determine absolute

3. Which geological feature is commonly associated with the Dharwar region? (CO1, K1)

(a) Glaciers and ice caps

(b) Coral reefs and atolls

(c) Vast sand dunes and deserts

(d) Cratons and greenstone belts

4. Cuddapah and Kurnool are cities located in which Indian state? (CO1, K1)

(a) Maharashtra (b) Gujarat

(c) Andhra Pradesh (d) Tamilnadu

5. The Triassic period in Spiti is characterized by the presence of which ancient life forms? (CO2, K3)

(a) Dinosaurs and flying reptiles

(b) Woolly mammoths and saber-toothed cats

(c) Giant marine reptiles and ammonites

(d) Giant ground sloths and early primates

6. The Paleozoic formations in India are associated with the evolution of which major group of organisms? (CO2, K3)

(a) Dinosaurs

(b) Mammals

(c) Reptiles

(d) Trilobites and early land plants

7. The term “Deccan Traps” is associated with: (CO1, K1)

(a) Underwater caverns

(b) An extensive volcanic plateau

(c) Deep-sea trenches

(d) Sand dunes

8. During which geological era did the Himalayan orogeny occur? (CO1, K1)

(a) Mesozoic Era (b) Paleozoic Era

(c) Cenozoic Era (d) Proterozoic Era

9. Evolutionary trends refer to; (CO2, K2)

(a) Predictions about future developments

(b) Changes in political ideologies

(c) Patterns of biological changes in species overtime

(d) Economic shifts in market demand

10. What is the fundamental principle of Sequence Stratigraphy? (CO1, K1)

(a) Identifying rock mineralogy

(b) Recognizing fossil assemblages

(c) Analyzing depositional sequences within a chronostratigraphic framework

(d) Studying volcanic activity

Part B (5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Explain how chronostratigraphy functions as a dynamic framework for unraveling Earth's geological history? (CO3, K4)

Or

(b) Outline the key divisions and significant events that classify different eons, eras, periods, and epochs. (CO2, K3)

12. (a) Compare the rock formations and mineral deposits found within the Aravalli region to other geological formations in India. (CO3, K4)

Or

(b) Relate how the Devonian and Carboniferous systems provide insights into ancient marine and terrestrial ecosystems. (CO5, K5)

13. (a) Relate the stratigraphic layers, fossil records, and Paleoenvironmental conditions of the Tertiary and Quaternary deposits. (CO6, K6)

Or

(b) Summarize the insights gained from studying the Siwalik Formations, shedding light on the intricate interplay between geology, paleontology, and the evolution of landscapes and species. (CO3, K5)

14. (a) Explain the geologically significant relationship between the Deccan Traps and the associated sedimentary formations. (CO3, K4)

Or

(b) Compare the origin and features of the volcanic layers and sedimentary layers, highlighting their complementary roles in capturing different aspects of environmental change? (CO4, K4)

15. (a) Outline how these methods are employed to assist in various industries, from resource exploration to environmental assessments? (CO2, K3)

Or

(b) Explain the pivotal role of biostratigraphic correlation in deciphering Earth's history and establishing chronological frameworks. (CO4, K4)

Part C (5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) Outline the various imperfections in geological records that can arise overtime in Tamilnadu. (CO2, K3)

Or

(b) Relate the practical applications of Nomenclature and the Modern Stratigraphic Code in fostering accurate geological interpretations, cross-disciplinary research, and effective resource management. (CO5, K5)

17. (a) Compare the mineral resources and stratigraphic layers found in the Vindhyan formations with those of other geological regions. (CO4, K4)

Or

(b) Summarize the importance of the Kaladgi and Badami rock formations in providing valuable clues about India's ancient geology and the intricate stories preserved within their layers. (CO4, K4)

18. (a) Explain the role of the Cretaceous of Trichinopoly in unraveling the evolution of life forms, geological processes, and the dynamic changes that have shaped our planet over millions of years. (CO5, K5)

Or

(b) Express how the Deccan Traps exemplify one of the most extensive volcanic events in Earth's past. (CO2, K2)

19. (a) Relate the fossil records, plant species, and animal taxa found within the Gondwana Super Group, emphasizing their role in reconstructing past environment. (CO2, K3)

Or

(b) Compare the distinct features of glacial and interglacial periods, highlighting their implications for global climate dynamics. (CO2, K3)

20. (a) Explain the fundamental principles and units of sequence Stratigraphy. (CO2, K2)

Or

(b) Compare how different fossil assemblages can be used to classify and correlate the rock layers in Stratigraphy'. (CO3, K4)

———————

R0187	Sub. Code
	464104

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2023

First Semester

Applied Geology

PALAEONTOLOGY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct options.

1. What is the name of the event that led to the extinction of 75% of all life on Earth? (CO1, K1)

   (a) Permian-Triassic (b) Cretaceous-Paleogene

   (c) End Ordovician (d) Late Devonian

2. Palynology is the study of (CO2, K2)

   (a) Microfossils (b) Pollen and spores

   (c) Plants (d) Porifera

3. The age range of Trilobites (CO1, K1)

   (a) Triassic – Cretaceous

   (b) Early Cambrian – End of Permian

   (c) Devonian – Jurassic

   (d) Silurian – Permian

4. What is the structure of a Glossopteris leaf? (CO2, K2)

   (a) Oval shaped (b) Spear shaped

   (c) Heart shaped (d) Tongue shaped

5. The opening of the test for foraminifera is called as (CO2, K2)

(a) Foramen (b) Aperture

(c) Chamber (d) Whorl

6. Radiolarian skeletons are composed of (CO2, K2)

(a) Calcareous (b) Siliceous

(c) Phosphatic (d) Sulphates

7. Which animal belongs to Proboscidea? (CO2, K2)

(a) Dinosaur (b) Horse

(c) Elephant (d) Crocodile

8. Stromatolites are formed by the fossilization of which organism? (CO1, K1)

(a) Virus (b) Bacteria

(c) Algae (d) Cyanobacteria

9. Brachiopods with a long and straight cardinal margin are classified as: (CO2, K2)

(a) Spiriferida (b) Megathyrid

(c) Terebratulida (d) Pectinidae

10. Acetolysis is to remove ———————— material from rocks during palynomorph extraction. (CO3, K3)

(a) Calcareous (b) Humic

(c) Cellulose (d) Ferric

Part B

$(5 \times 5 = 25)$

Answer **all** the questions not more than 500 words each.

11. (a) What is a mass extinction? Mention their periods. (CO2, K2)

Or

(b) Give a short notes on the origin of life and its theories. (CO2, K2)

12. (a) Define the Gondwana flora of the Indian subcontinent. (CO2, K2)

Or

(b) Describe the evolution of Elephas. (CO2, K2)

13. (a) Define micropalaeontology and explain how it is useful for geologists? (CO3, K3)

Or

(b) Give a brief note on continental drift and its evidence. (CO3, K3)

14. (a) Write a short note on foraminifera and their morphological characters. (CO3, K4)

Or

(b) Discuss the application of foraminifera in petroleum exploration. (CO3, K3)

15. (a) Give the ecology, structure, and morphological characteristics of stromatolite. (CO3, K5)

Or

(b) Write about the geological history, ecology, and paleoecology of Bryozoa. (CO3, K4)

Part C ($5 \times 8 = 40$)

Answer **all** the questions not more than 1000 words each.

16. (a) Narrate the origin and evolution of Humans. (CO3, K4)

Or

(b) Elaborate on the history and development of palaeontology and its importance for the remains of ancient organisms. (CO3, K4)

17. (a) Describe the morphology, evolution, age, and distribution of Ammonites. (CO3, K4)

Or

(b) Describe the taxonomy, morphology, age, and distribution of Brachiopods. (CO3, K4)

18. (a) Discuss in detail about the sea level rise and fall with historical records. (CO3, K5)

Or

(b) Write an essay on the application of palaeontology in paleoclimate and paleoenvironmental studies. (CO3, K4)

19. (a) Describe the morphology, classification, geological history, and paleoecology of Ostracods. (CO3, K4)

Or

(b) Discuss in detail the micropaleontological techniques used to recover fossils from consolidated and unconsolidated rocks. (CO3, K3)

20. (a) Give a detailed account of the morphology and age of conodonts and their significant role in paleontological studies. (CO3, K4)

Or

(b) Elucidate the spores pollen morphology and their importance in petroleum exploration. (CO3, K4)

———————

R0188	Sub. Code
	464501

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2023

First Semester

Applied Geology

Elective – NATURAL HAZARDS AND MANAGEMENT

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing tile correct option.

1. What is the basis for measuring the magnitude of earthquakes using the Richter scale? (CO1, K2)

   (a) Depth of the earthquake

   (b) Frequency of aftershocks

   (c) Energy released

   (d) Damage caused

2. Which is the primary toxic gas released in a Bhopal disaster in 1984? (CO1, K1)

   (a) Methyl Isocyanate

   (b) Chlorine

   (c) Carbon Monoxide

   (d) Hydrogen Sulphide

3. How is Light Detection and Ranging (LiDAR) used in floodplain mapping? (CO2, K3)

(a) Measuring water temperature

(b) Identifying flood warning signs

(c) Mapping topography and flood extent

(d) Predicting rainfall patterns

4. Which remote sensing technique is used to measure the rate of tectonic plate movement and deformation along fault lines? (CO2, K2)

(a) Thermal Imaging

(b) Synthetic Aperture RADAR

(c) Spectroscopy

(d) Passive Microwave Sensing

5. What is the primary source of anthropogenic carbon dioxide emissions? (CO3, K2)

(a) Deforestation and land use changes

(b) Industrial processes and waste

(c) Agriculture and livestock production

(d) Burning fossil fuels

6. Which of the following geological factors can exacerbate saltwater intrusion? (CO3, K2)

(a) Thick clay layers

(b) High precipitation

(c) Steep topography

(d) Abundant vegetation

7. What is the term for a large, steep-sided tower of rock formed by the erosion of a headland due to wave action? (CO4, K3)

(a) Sea arch

(b) Sea stack

(c) Sea cliff

(d) Sea cave

8. What is the primary role of mangroves in coastal protection? (CO4, K2)

(a) Providing habitat for invasive species

(b) Reducing wave energy and erosion

(c) Accelerating beach sedimentation

(d) Enhancing coastal erosion

9. Which of the international organization is responsible for monitoring and assessing the environmental impact of disasters is (CO5, K5)

(a) UNEP (b) IUCN

(c) UNDP (d) UNHCR

10. What is the primary mandate of the NIDM? (CO5, K3)

(a) Emergency response coordination

(b) Disaster recovery operations

(c) Disaster risk reduction and capacity building

(d) Humanitarian aid distribution

Part B (5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Compare natural hazard with man-made disaster. (CO1, K4)

Or

(b) Explain the concept of Disaster Management. (CO1, K5)

12. (a) Explain in detail on earthquake Zonation's - concept and applications. (CO2, K5)

Or

(b) Explain the processes of tsunami inundation mapping using both field and satellite. (CO2, K5)

13. (a) Distinguish between hot waves and cold waves (CO3, K4)

Or

(b) Compare the mechanisms and impacts of ozone depletion and climate change. (CO3, K4)

14. (a) Explain in detail about bio shield and its impact. (CO4, K5)

Or

(b) Explain in detail about the implementation CRZ regulations. (CO4, K5)

15. (a) Explain in detail about the role of NIDM in disaster management. (CO5, K5)

Or

(b) Explain in detail about the significance of disaster prevention by international organisations. (CO5, K5)

Part C (5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) Explain in detail about the cyclone and its types. (CO1, K5)

Or

(b) Explain in detail about any two man-made disaster events. (CO1, K5)

17. (a) Explain in detail about the remote sensing and GIS application flood and tsunami mapping. (CO2, K5)

Or

(b) Explain in detail about the uses of remote sensing and GIS in tsunami and flood. mitigation strategies. (CO2, K5)

18. (a) Make some comparisons between air, water and soil pollution. (CO3, K4)

Or

(b) Explain in detail about the soil erosion and its impact on reservoir siltation. (CO3, K5)

19. (a) Distinguish between bio shield and sea structures. (CO4, K4)

Or

(b) Explain in detail about different seal structures and their uses. (CO4, K5)

20. (a) Explain in detail about the role of international organizations in disaster management. (CO5, K5)

Or

(b) Explain in detail about Significance of NIOT, NIO in disaster management. (CO5, K5)

———————

R0189	Sub. Code
	464301

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2023

Third Semester

Applied Geology

GEOPHYSICS

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct option.

1. To determine the structure of the Earth for mineral prospecting, which of the following is the appropriate geophysical method? (CO2, K2)

   (a) Electrical (b) Gravity

   (c) Magnetic (d) None of the above

2. Which of the following techniques is most suitable for defining groundwater pollution zones? (CO2, K2)

   (a) Water divining method

   (b) Self potential Method

   (c) Magnetic method

   (d) Seismic Method

3. Which of the following corrections is usually necessary when reducing the gravity data observed? (CO1, K1)

   (a) Latitude (b) Bouguer

   (c) Free-air (d) Terrain

4. The approximate velocity of seismic waves in granitic crust is. (CO1, K1)

(a) 16 km/s (b) 8 km/s

(b) 10 km/s (d) 12 km/s

5. Newton's Law of Gravitation formula is (CO2, K2)

(a) F = G m 1 m2 / r2

(b) F = G m3 m2 / r

(c) F = m2 m4 / r2

(d) F = m1 m2 / r2

6. The gravitational acceleration variations are expressed in the following Units. (CO1, K1)

(a) Milli gal (b) Nanotesla

(c) Gamma (d) Gram/cc

7. Which correction explains the extra mass beneath the observation stations at elevations higher than the elevation datum? (CO2, K2)

(a) Free Air (b) Terrain

(c) Bouguer (d) Latitude

8. The avenge velocity of the water is. (CO1, K1)

(a) 6000 m/s (b) 1500 m/s

(c) 2000 m/s (d) 4000 m/s

9. Seismic (P) waves can travel through (CO2, K2)

(a) Crust only

(b) Mantle only

(c) Crust and Mantle only

(d) Crust, Mantle and Core

10. The seismic geophysical survey is done for (CO1, K1)

(a) Hydrocarbon Exploration

(b) Coal Exploration

(c) Silica Sand Exploration

(d) Bauxite Exploration

Part B (5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Explain the geophysical survey and its various applications. (CO3, K3)

Or

(b) Write a short note on the field procedures carried out in the resistivity survey. (CO2, K2)

12. (a) Differentiate between the inclination and declination of the earth. (CO3, K4)

Or

(b) Describe the density variation in the interior of the earth. (CO3, K4)

13. (a) Distinguish between P waves and S waves. (CO3, K4)

Or

(b) Discuss the problems encountered in seismic surveys. (CO3, K4)

14. (a) Give the basic concepts and principles of magnetic prospecting. (CO3, K3)

Or

(b) What is paleomagnetism and explain normal and reverse polarity? (CO3, K4)

15. (a) Write a short note on the principle of radioactive prospecting. (CO3, K2)

Or

(b) Write a short note on half-life and radioactive decay. (CO3, K4)

Part C (5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) Describe in detail the self-potential and induced polarization methods. (CO3, K4)

Or

(b) Discuss in detail the electrical well-logging techniques. (CO3, K4)

17. (a) Enumerate the application of gravitational anomalies in geophysical prospecting. (CO3, K4)

Or

(b) Elaborate on the different types of gravity instruments. (CO3, K4)

18. (a) Explain in detail the seismic velocity variations in the interior of the Earth with a neat sketch. (CO3, K4)

Or

(b) Narrate the seismic reflection methods for oil exploration. (CO2, K2)

19. (a) Write an essay on Earth's Magnetism. (CO2, K2)

Or

(b) Elucidate the airborne magnetic survey and its application in mineral prospecting. (CO3, K3)

20. (a) Write a detailed account of the radioactive survey. (CO3, K3)

Or

(b) Give a detailed account of radiometric logging methods and their applications. (CO3, K3)

R0190	Sub. Code 464302

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2023

Third Semester

Applied Geology

REMOTE SENSING AND GIS

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct options.

1. Which of the following statements is correct regarding parallax, relief displacement, and vertical exaggeration in Photogrametary? (CO2, K2)

   (a) Relief displacement is the same as vertical exaggeration and used to increase the elevation of terrain in aerial imagery.

   (b) Parallax refers to the apparent shift in the position of an object when viewed from different angles in aerial photographs

   (c) Parallax and vertical exaggeration are unrelated concepts in Photogrametary

   (d) Vertical exaggeration is the same as parallax and is used to measure the horizontal shift of objects in aerial photographs.

2. Which of the following statements is correct about stereoscopy and stereoscopes? (CO1, K1)

(a) Stereoscopy is the study of stereo systems in audio equipment, and stereoscopes are used for 3D movie projection.

(b) Stereoscopy is a term used in geology to describe rock layers, while stereoscopes are used for viewing 2D photographs

(c) Stereoscopy and stereoscopes are unrelated concepts and have no connection in any field.

(d) Stereoscopy is a technique used to view three – dimensional images, while stereoscopes are devices used for viewing aerial photographs.

3. Which of the following statements is true regarding electromagnetic radiation and the electromagnetic spectrum? (CO1, K1)

(a) The electromagnetic spectrum is a term used exclusively in geology.

(b) Electromagnetic radiation refers to the flow of electric current through a conductor

(c) The electromagnetic spectrum consists of only visible light

(d) Electromagnetic radiation includes a wide range of waves, including visible light, radio waves, microwaves, and X-rays.

4. What are spectral signatures in remote sensing, and how do they vary for different Earth materials? (CO2, K2)

   (a) Spectral signatures are unique patterns of color found in geological formations.

   (b) Spectral signatures are physical characteristics used to identify materials in remote sensing.

   (c) Spectral signatures represent the audible sounds emitted by various Earth materials.

   (d) Spectral signatures are distinctive patterns of electromagnetic radiation reflected or emitted by soil, rock, water and vegetation.

5. What are the four primary types of resolution in remote sensing, and how it differ? (CO2, K2)

   (a) Radiometric, spatial, spectral, and thermal.

   (b) Visual, thermal, spectral and temporal

   (c) Spatial, spectral, temporal and radiometric

   (d) Spectral, spatial, thermal, and radiometric.

6. Which two main methods are commonly used for image classification in remote sensing? (CO1, K1)

   (a) Supervised and unsupervised

   (b) Spectral and spatial

   (c) Temporal and radiometric

   (d) Thermal and visual.

7. What is the process of converting vector data to raster data in Geographic Information Systems (GIS)? (CO1, K1)

   (a) Rasterization

   (b) Vectorization

   (c) Topology conversion

   (d) Digitization

8. What are the components of a Geographic Information System? (GIS) (CO2, K2)

(a) Maps, text documents, and spreadsheets

(b) Data analysis, data storage, and data sharing

(c) Maps, satellite images and GPS devices

(d) Hardware, software, and data

9. What does GIS stands for? (CO1, K1)

(a) General Information Software

(b) Geographic Information System

(c) General Information System

(d) Global Imaging System

10. What does the term "differential GPS" (DGPS) refer to in the field of navigation and positioning? (CO1, K1)

(a) A technique that improves the accuracy of GPS positioning by correcting for errors using reference stations

(b) A satellite-based navigation system that provides global coverage

(c) A specialized GPS mode used for military applications

(d) A method of determining the position of a receiver with high precision using only one GPS satellite.

Part B (5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Evaluate the properties of aerial photos, highlighting how these characteristics impact their usefulness in land surveying and environmental monitoring. (CO4, K4)

Or

(b) Explain the steps involved in flight planning for aerial photography missions. (CO2, K2)

12. (a) Evaluate the significance of understanding the spectral reflectance of earth objects and land covers in remote sensing. (CO5, K4)

Or

(b) Assess their respective advantages and limitations in capturing information about the Earth's surface for various applications. (CO4, K4)

13. (a) Explain the importance of the appropriate platform. sensors, and scanning mechanics for satellite data acquisition in remote sensing applications.(CO3, K3)

Or

(b) Compare the importance of spectral, spatial, temporal, and radiometric resolution in remote sensing. (CO4, K4)

14. (a) Explain the components of Geographic Information System. (CO2, K2)

Or

(b) Compare the methods and techniques used for linking of spatial and non-spatial data in a Geographic Information System (GIS). (CO2, K2)

15. (a) Explain and assess the various signal components contributing to errors in GPS observations.(CO2, K3)

Or

(b) Compare Real-Time Kinematic (RTK) Navigation System and GPS Mapping techniques. (CO3, K2)

Part C ($5 \times 8 = 40$)

Answer **all** the questions not more than 1000 words each.

16. (a) Explain the various types of aerial photographs and their applications in different fields. (CO3, K3)

Or

(b) Evaluate the fundamental principles of Photogrametary, illustrating how these principles are essential in the creation of accurate and reliable 3D models and maps from aerial imagery. (CO4, K4)

17. (a) Explain the significance of the electromagnetic radiation spectrum. (CO2, K2)

Or

(b) Interpret the spectral signatures of soil, rock, water, and vegetation in satellite imagery. (CO2, K2)

18. (a) Explain how the appropriate spatial resolution in digital image processing and utility of processed images. (CO2, K2)

Or

(b) Compare and contrast the concepts of supervised and unsupervised image classification in remote sensing. (CO6, K6)

19. (a) Compare the advantages and disadvantages of using point, line, and polygon data structures in geographic information systems. (CO5, K5)

Or

(b) Evaluate the process of converting vector data to raster data and raster data to vector data in geographic information systems. (CO6, K6)

20. (a) Explain the key differences between the basic, control, and user segments of the GPS (Global Positioning System? (CO2, K2)

Or

(b) Compare and evaluate the differences between a Digital Electronic Model (DEM) and a Digital Digital Terrain Model (DTM)? (CO5, K5)

———————

R0191	Sub. Code
	464303

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2023

Third Semester

Applied Geology

HYDROGEOLOGY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct option.

1. The water present in the rocks at the time of their deposition in aqueous environment is named as (CO2, K2)

   (a) Juvenile water (b) Vadose water

   (c) Connate water (d) Cosmic water

2. An impermeable rock through which there is no possibility of storage or movement of water is named as (CO2, K2)

   (a) Aquitard (b) Aquifuge

   (c) Aquifer (d) Aquiclude

3. How to identify seawater intrusion (CO1, K1)

   (a) Chloride ratio (b) Chloride-bicarbonate ratio

   (c) Bicarbonate ratio (d) Nitrate ratio

4. Excessive pumping in relation to recharge can cause : (CO2, K2)

(a) The water table to decline
(b) A cone of depression
(c) The well to go dry
(d) All of these

5. Which rock type below is likely to possess the highest porosity? (CO1, K1)

(a) Sandstone (b) Conglomerate
(c) Siltstone (d) Shale

6. The decline in the level of the water table around a pumping well is known as (CO2, K2)

(a) The porosity parameter
(b) The permeability gradient
(c) The cone of depression
(d) The sphere of influence

7. In which of the given formations will the capillary rise be higher? (CO2, K2)

(a) Gravel (b) Clay
(c) Medium Sand (d) Loam

8. In the electrical resistivity method, the resistance values are plotted against ———— in the semi-log paper. (CO1, K1)

(a) Current (b) Distance
(c) Time (d) Depth

9. Which one of the following features is shown in the sign of Karst? (CO2, K2)

(a) Sinkholes
(b) Artesian wells
(c) Cones of depression
(d) Speleothems

10. Which of the following is contaminating an aquifer? (CO2, K2)

(a) Landfills (b) Agricultural regions
(c) Gas stations (d) All of these

Part B (5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Explain the principles and objectives of hydrology. (CO3, K3)

Or

(b) Give a short note on porosity and its types with suitable examples. (CO3, K4)

12. (a) Briefly explain the rainwater harvesting techniques. (CO3, K3)

Or

(b) Write about the ground water recharge methods. (CO3, K3)

13. (a) Explain the occurrences and impacts of flooding. (CO2, K2)

Or

(b) Distinguish the objectives of the pumping test and its methods. (CO3, K3)

14. (a) Describe the types of springs. (CO3, K2)

Or

(b) Explain the different types of drilling techniques. (CO3, K3)

15. (a) Write a short note on the different physical parameters of the groundwater. (CO2, K2)

Or

(b) Discuss about the Schlumberger electrode configuration method. (CO3, K4)

Part C

$(5 \times 8 = 40)$

Answer **all** the questions not more than 1000 words each.

16. (a) Write a detailed account of the hydrogeological cycle, origin and occurrence of groundwater. (CO3, K4)

Or

(b) Elaborate on the vertical distribution of groundwater with neat sketches. (CO3, K4)

17. (a) Write an essay on seawater intrusion and the impacts of coastal groundwater with a neat sketch. (CO3, K4)

Or

(b) Describe the seawater intrusion in detail. How to prevent and control seawater intrusion? (CO3, K3)

18. (a) Write an essay on groundwater provinces of India. (CO2, K2)

Or

(b) Differentiate between pumping test of constant discharge test and constant draw down test in non-flowing wells. (CO3, K4)

19. (a) Elaborate on the geophysical exploration methods for the identification of groundwater. (CO3, K3)

Or

(b) Discuss the techniques of resistivity well logging and self-potential logging. (CO3, K3)

20. (a) Describe the use of radioisotopes in hydrogeological studies. (CO3, K3)

Or

(b) Write a detailed account of the anthropogenic sources of water contamination. (CO3, K4)

R0192	Sub. Code
	464304

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2023

Third Semester

Applied Geology

GEOCHEMISTRY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct option

1. The Earth's lithosphere is primarily composed of which two elements? (CO1, K1)

   (a) Iron and Nickel

   (b) Silicon and Oxygen

   (c) Carbon and Hydrogen

   (d) Aluminum and Magnesium

2. Which geochemical cycle is responsible for the movement of carbon between the atmosphere, plants, animals, and soil? (CO2, K2)

   (a) Nitrogen Cycle (b) Water Cycle

   (c) Carbon Cycle (d) Oxygen Cycle

3. Which element is often used as an indicator of anthropogenic pollution in river water? (CO2, K2)

   (a) Calcium (Ca) (b) Magnesium (Mg)

   (c) Iron (Fe) (d) Lead (Pb)

4. In geochemical exploration, what role do pathfinder elements play? (CO2, K2)

   (a) They indicate the presence of valuable minerals.

   (b) They are used to create geological maps

   (c) They measure temperature variations in rocks.

   (d) They help locate underground water sources.

5. Which of the following methods is commonly used for determining isotopes? (CO1, K1)

   (a) Radiometric dating

   (b) Spectroscopy

   (c) Electrolysis

   (d) Chromatography

6. Which is commonly used to analyze oxygen and sulfur isotopes in geological samples? (CO1, K1)

   (a) Ultraviolet (UV) spectroscopy

   (b) Mass spectrometry

   (c) Infrared (IR) spectroscopy

   (d) Nuclear magnetic resonance (NMR)

7. What does geochemical sampling involve? (CO1, K1)

   (a) Studying geological formations

   (b) Analyzing chemical reactions in a laboratory

   (c) Measuring seismic activity in an area

   (d) Collecting and analyzing samples of rocks, soils, or other materials to measure their chemical composition

8. What is the primary focus of principles and techniques used in the design and implementation of a geochemical exploration survey? (CO2, K2)

(a) Analyzing plant and animal life in the survey area

(b) Collecting and interpreting geological samples to identify potential ineral resources

(c) Studying the Earth's magnetic field

(d) Measuring atmospheric pressure in the survey region

9. Which is the best defines environmental geochemistry?

(CO2, K2)

(a) The study of earthquakes and tectonic plate movements

(b) The study of the distribution and behaviour of chemical elements in the Earth's environment

(c) The study of rocks and minerals in the Earth's crust

(d) The study of chemical reactions in the laboratory

10. What does the term "geochemical instrumentation" refer to?

(CO2, K2)

(a) The analysis of rock formations

(b) The study of Earth's geological history

(c) The study of celestial bodies and their compositions

(d) The equipment and tools used for measuring and analyzing chemical elements in geological and environmental samples

Part B (5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Evaluate the geochemistry of the geosphere and explain how the chosen elements and minerals determine the composition of the Earth's crust?

(CO5, K5)

Or

(b) Justify the importance of studying geochemical cycles to interpret the Earth's environment.

(CO6, K6)

12. (a) Explain and assess the key geochemical parameters used to measure and evaluate the quality of river water (CO4, K4)

Or

(b) Assess and compare the interactions between groundwater and lakes. (CO4, K4)

13. (a) Assess and compare the utility of carbon, oxygen, and sulphur isotopes in geochemical research.

(CO4, K4)

Or

(b) Explain and evaluate the principles of first-order decay and growth equation in the context of natural processes. (CO4, K4)

14. (a) Compare and evaluate the primary and secondary dispersion patterns in ecological systems. (CO4, K4)

Or

(b) Explain and evaluate the factors contributing to the formation of geochemical anomalies in geological environments. (CO4, K4)

15. (a) Explain the impact of lacustrine and aerosol processes on regional climate patterns. (CO3, K3)

Or

(b) Justify the importance of selecting appropriate instrumentation and data interpretation in various geological applications. (CO5, K5)

Part C ($5 \times 8 = 40$)

Answer **all** the questions not more than 1000 words each.

16. (a) Compare the distribution patterns of essential elements in the geosphere and determine how these patterns relate to geological processes? (CO4, K5)

Or

(b) Justify the significance of understanding biosphere-atmosphere interactions through the lens of geochemical cycles. (CO5, K5)

17. (a) Justify the importance of selecting appropriate measurement techniques to evaluate and interpret these geochemical phenomena. (CO5, K5)

Or

(b) Evaluate and compare the mechanisms governing the partitioning of trace components between rocks and metals during geological processes. (CO4, K4)

18. (a) Justify the importance of selecting appropriate isotopic ratios for dating the geological events. (CO5, K5)

Or

(b) Assess and prioritize the significance of isotope geochemistry in advancing our knowledge of Earth's past and present. (CO5, K5)

19. (a) Explain how the selection of sampling techniques and locations can impact the accuracy of geochemical data. (CO3, K2)

Or

(b) What is the Principles and techniques used in the design and implementation of geochemical exploration surveys. (CO2, K3)

20. (a) Justify the importance of selecting appropriate monitoring techniques and priorities for preserving the delicate balance of the atmosphere in aquatic ecosystems. (CO3, K4)

Or

(b) Compare and assess the methodologies and objectives of hydro-geochemical and bio-geochemical surveys. (CO2, K3)

———————

R-0193	Sub. Code
	464503

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2023

Third Semester

Applied Geology

Elective — PETROLEUM GEOLOGY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following questions by choosing the correct option.

1. Type of traps in petroleum exploration can be classified as structural, stratigraphic and combination (CO2, K2)

   (a) Structural (b) Stratigraphic

   (c) Combination (d) All of the above

2. Which of the following terms are fundamental properties of rocks and crucial in assessing reservoir quality in petroleum exploration? (CO2, K1)

   (a) Porosity and Permeability

   (b) Viscosity

   (c) Density

   (d) Salinity

3. What is the significance of reservoir pressure measurement in petroleum engineering? (CO2, K1)

(a) It provides information about reservoir fluid properties

(b) It aids in calculating the well's depth

(c) It helps evaluate environmental impacts

(d) It helps determine the reservoir's geological age

4. What do geothermal gradients and their measurements primarily help in understanding? (CO2, K2)

(a) Soil composition in a given area

(b) Solar radiation patterns

(c) Heat flow within the Earth's crust

(d) Ocean currents and tides

5. Which step in the seismic data processing workflow involves the removal of unwanted noise and enhancement of signal quality? (CO2, K2)

(a) Data interpretation

(b) Data migration

(c) Data acquisition

(d) Data pre-processing

6. Which geophysical method is primarily used to detect variations in the Earth's magnetic field caused by subsurface geological features? (CO2, K2)

(a) Gravity exploration

(b) Electromagnetic exploration

(c) Seismic exploration

(d) Magnetic exploration

7. Which of the following processes is NOT a part of the carbon cycle? (CO1, K1)

(a) Photosynthesis (b) Respiration

(c) Volcanic eruptions (d) Ocean circulation

8. What geological process is responsible for the accumulation of organic matter and the subsequent generation of hydrocarbons? (CO1, K1)

(a) Plate tectonics (b) Volcanic activity

(c) Diagenesis (d) Meteorite impacts

9. Which geological technique is commonly used at well sites to analyze rock cuttings and evaluate the composition of subsurface formations? (CO1, K1)

(a) Seismic survey

(b) Electromagnetic logging

(c) Mud logging

(d) Gravity survey

10. What does project management in oil well exploration primarily involve? (CO2, K2)

(a) Geological analysis of strategies

(b) Drilling techniques

(c) Coordination of activities

(d) Marketing

Part B $(5 \times 5 = 25)$

Answer **all** the questions not more than 500 words each.

11. (a) Explain the inorganic and organic theories concerning the formation of petroleum? (CO2, K2)

Or

(b) Determine the migration and accumulation of oil and gas occur within geological formations and what factors influence their distribution and concentration? (CO2, K2)

12. (a) What methods are commonly used for reservoir pressure measurement? (CO1, K1)

Or

(b) How do geothermal gradients vary across different regions, and what methods are employed to measure these gradients in geothermal studies? (CO1, K1)

13. (a) Discuss the challenges and methodologies involved in seismic interpretation, and how this process aids in subsurface characterization for the oil and gas industry. (CO3, K3)

Or

(b) Compare and contrast the principles, applications and limitations of gravity and magnetic exploration methods in the field of geophysics. (CO4, K4)

14. (a) Explain the composition and structural diversity of organic matter impact its role in ecological. (CO2, K2)

Or

(b) What are the optical and geochemical methods commonly employed for analyzing the composition and characteristics of source rock in petroleum exploration? (CO2, K2)

15. (a) What key factors and considerations should be taken into account when developing a comprehensive well plan? (CO2, K2)

Or

(b) Justify the selection of specific monitoring techniques and technologies used in the drilling industry. (CO3, K3)

Part C (5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) Evaluate the key principles and considerations involved in Geo Technical Orders (GTOs). (CO4, K4)

Or

(b) Explain the petroleum basins in India, and determine which ones prioritize exploration and production activities based on their geological potential and economic significance. (CO3, K3)

17. (a) Interpret the recovery of hydrocarbons from petroleum reservoirs relate to effective reservoir management. (CO3, K3)

Or

(b) Explain the primary natural sources of heat energy on Earth, and geological processes. (CO3, K3)

18. (a) Determine the seismic refraction method is better than the seismic reflection method. (CO5, K5)

Or

(b) Assess the advantages and limitations of VSP compared to conventional surface seismic surveys. (CO4, K4)

19. (a) Explain the Characterization and maturation assessment of sedimentary shale rocks. (CO3, K3)

Or

(b) How does the carbon cycle influence global climate change, and what are the key natural and anthropogenic processes that contribute to carbon dioxide emissions and sequestration in various Earth reservoirs? (CO3, K3)

20. (a) What are the different drilling methods used in the oil and gas industry and how do factors such as geology, depth, and location influence the choice of drilling technique? (CO2, K2)

Or

(b) What are the criteria and considerations involved in the classification and selection of drilling pits in the oil and gas industry and how do these choices impact the drilling process, safety, and environmental compliance? (CO2, K2)

———————