R3596

Sub. Code
464301

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2025

Third Semester

Applied Geology

GEOPHYSICS

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

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

1. Which of the following is not a geophysical method? (CO2, K2)

   (a) Resistivity

   (b) Seismic

   (c) Gravimetric

   (d) Stratigraphic

2. Which geophysical method is commonly used in electrical logging? (CO2, K2)

   (a) Magnetic

   (b) Induced Polarization

   (c) Resistivity

   (d) Seismicity

3. Gravity surveys help in detecting: (CO1, K1)

(a) Seismic waves

(b) Density variations

(c) Magnetic fields

(d) Electrical resistivity

4. The instrument used to measure gravity is called: (CO1, K1)

(a) Magnetometer

(b) Seismograph

(c) Gravimeter

(d) Geodimeter

5. Which wave travels fastest through the Earth? (CO1, K1)

(a) S-wave

(b) Surface wave

(c) P-wave

(d) Love wave

6. Snell's law governs the: (CO2, K2)

(a) Reflection of seismic waves

(b) Refraction of seismic waves

(c) Magnetic anomalies

(d) Radioactive decay

7. Which of the following is used in magnetic surveys? (CO1, K1)

(a) Galvanometer

(b) Proton Precession Magnetometer

(c) Seismometer

(d) Radiometer

8. Magnetic susceptibility is a measure of: (CO1, K1)

(a) Electrical conductivity

(b) Radioactive decay

(c) Magnetic property of rocks

(d) Elasticity of materials

9. Which isotope is commonly used in radiometric surveys? (CO2, K2)

(a) Potassium-40

(b) Carbon-14

(c) Lead-206

(d) Uranium-238

10. Radiometric methods help in: (CO1, K1)

(a) Finding water tables

(b) Determining rock magnetism

(c) Estimating mineral radioactivity

(d) Interpreting elastic waves

Part B (5 × 5 = 25)

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

11. (a) Briefly explain the types and applications of geophysical survey methods. (CO2, K2)

Or

(b) Write a note on self-potential and induced polarization methods. (CO3, K3)

12. (a) Explain how gravity data is processed and interpreted. (CO3, K4)

Or

(b) Discuss the principle and use of gravity instruments. (CO5, K5)

13. (a) Describe the difference between P-waves and S-waves. (CO6, K6)

Or

(b) Explain the critical refraction method in seismic exploration. (CO5, K5)

14. (a) Analyze the steps involved in interpreting magnetic survey data. (CO4, K4)

Or

(b) Discuss the working principle of a magnetometer. (CO4, K4)

15. (a) Evaluate the advantages and limitations of radiometric methods. (CO2, K3)

Or

(b) Discuss the instruments used for radioactive mineral detection. (CO4, K4)

Part C (5 × 8 = 40)

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

16. (a) Analyze the principle, instrumentation, and interpretation of resistivity and induced polarization methods. (CO3, K3)

Or

(b) Explain the field procedures and ambiguity problems in geophysical data. (CO5, K5)

17. (a) Describe the geodesy of the Earth and the interpretation of gravity anomalies. (CO4, K4)

Or

(b) Analyze the role of gravity surveys in identifying subsurface structures. (CO4, K4)

18. (a) Evaluate the field procedures and interpretation techniques in seismic reflection surveys. (CO5, K5)

Or

(b) Explain Snell's Law and its application in critical refraction seismic methods. (CO3, K3)

19. (a) Discuss the significance of land-based vs. airborne magnetic surveys. (CO3, K3)

Or

(b) Analyze how magnetic data is processed and interpreted for geological applications. (CO3, K3)

20. (a) Evaluate the working principle and geological application of radiometric logging methods. (CO3, K3)

Or

(b) Assess the role of radioactive methods in petroleum and mineral exploration. (CO4, K4)

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R3597

Sub. Code
464302

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2025

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 type questions by choosing the correct option.

1. Which type of photograph is most suitable for topographic mapping? (CO2, K2)

   (a) Oblique low angle
   (b) Vertical
   (c) High oblique
   (d) Panoramic

2. Parallax in aerial photos is mainly due to: (CO2, K2)

   (a) Cloud movement
   (b) Sensor errors
   (c) Relief displacement
   (d) Radiation

3. Which spectral region is most used in vegetation analysis? (CO1, K1)

   (a) Thermal Infrared
   (b) Visible blue
   (c) Near Infrared
   (d) Microwave

4. The spectral reflectance of water is generally: (CO1, K1)

(a) Very high in visible

(b) Very high in near infrared

(c) Very low across all brands

(d) High in thermal IR

5. Which satellite provides high-resolution data? (CO1, K1)

(a) LANDSAT (b) SPOT

(c) QuickBird (d) IRS-IC

6. Which of the following is a supervised classification method? (CO2, K2)

(a) K-Means

(b) ISODATA

(c) Maximum Likelihood

(d) Histogram equalization

7. Raster data structure represents data as: (CO1, K1)

(a) Points and lines

(b) Continuous cells or pixels

(c) Vectors

(d) Attributes only

8. Which of the following is NOT a spatial data format? (CO1, K1)

(a) Shapefile (b) Geo TIFF

(c) CSV (d) KML

9. DEM stands for: (CO2, K2)

(a) Digital Elevation Matrix

(b) Digital Elevation Map

(c) Digital Elevation Model

(d) Detailed Elevation Model

10. Which of the following GPS techniques offers centimeter-level accuracy? (CO1, K1)

(a) Standard Positioning

(b) Differential GPS

(c) Assisted GPS

(d) Real-Time Kinematic (RTK)

Part B (5 × 5 = 25)

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

11. (a) Explain the role of parallax in photogrammetry. (CO2, K2)

Or

(b) Describe the types of aerial photographs and their applications. (CO3, K3)

12. (a) Define electromagnetic spectrum and discuss its relevance in remote sensing. (CO3, K4)

Or

(b) What is spectral signature? Explain with examples for vegetation and soil. (CO5, K5)

13. (a) Write a note on LANDSAT and IRS satellites and their characteristics. (CO6, K6)

Or

(b) Describe the difference between supervised and unsupervised classification. (CO5, K5)

14. (a) Define GIS and explain its major components. (CO4, K4)

Or

(b) Distinguish between raster and vector data with examples. (CO4, K4)

15. (a) Write short notes on DEM and its uses in terrain analysis. (CO2, K3)

Or

(b) Explain basic components and functioning of GPS. (CO4, K4)

Part C (5 × 8 = 40)

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

16. (a) Analyze the principles of stereoscopy and explain how vertical exaggeration is achieved. (CO3, K3)

Or

(b) Describe the photogrammetric workflow and the importance of flight planning. (CO5, K5)

17. (a) Analyze how different materials (soil, water, rock) interact with EMR in remote sensing. (CO4, K4)

Or

(b) Discuss the atmospheric windows and their significance in satellite imaging. (CO4, K4)

18. (a) Evaluate various satellite data platforms based on their resolution, scanning type, and application. (CO5, K5)

Or

(b) Discuss digital image processing methods used in remote sensing analysis. (CO3, K3)

19. (a) Analyze the methods of linking spatial and non-spatial data in GIS. (CO3, K3)

Or

(b) Explain different types of data models and their relevance in spatial analysis. (CO3, K3)

20. (a) Evaluate the role of GPS and DEM in watershed and slope analysis. (CO3, K3)

Or

(b) Compare different GPS techniques like DGPS, RTK, and standard GPS in terms of accuracy and usage. (CO4, K4)

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Sub. Code
464303

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2025

Third Semester

Applied Geology

HYDROGEOLOGY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

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

1. Which property controls the ability of a rock to transmit water? (CO2, K2)

   (a) Porosity

   (b) Permeability

   (c) Specific gravity

   (d) Cohesion

2. An aquifer is best defined as a: (CO2, K2)

   (a) Rock with low water content

   (b) Zone with high salinity

   (c) Saturated porous formation that transmits water

   (d) Clayey layer blocking water flow

3. Which method is NOT a groundwater recharge technique? (CO1, K1)

(a) Flooding

(b) Pumping

(c) Recharge wells

(d) Watershed management

4. Seawater intrusion is commonly found in: (CO1, K1)

(a) Mountain aquifers

(b) Desert aquifers

(c) Coastal aquifers

(d) River catchments

5. The Theis method is used for analyzing: (CO1, K1)

(a) Soil moisture retention

(b) Hydraulic conductivity of clay

(c) Aquifer transmissibility and storativity

(d) River discharge

6. Which test is performed in stages to understand well performance? (CO2, K2)

(a) Constant discharge test

(b) Step drawdown test

(c) Slug test

(d) Tracer test

7. Which geophysical method is commonly used for aquifer detection? (CO1, K1)

(a) Magnetometer survey

(b) Electrical resistivity

(c) Seismic reflection

(d) Ground-penetrating radar

8. Self-potential logging is primarily used to detect: (CO1, K1)

(a) Groundwater salinity

(b) Flow direction in aquifers

(c) Clay layers

(d) Fractures

9. Which of the following is a major groundwater pollutant in agriculture? (CO2, K2)

(a) Lead

(b) Nitrates

(c) Fluoride

(d) Arsenic

10. Which isotope is widely used for groundwater dating? (CO1, K1)

(a) C-14

(b) O-18

(c) H-1

(d) Cl-36

Part B (5 × 5 = 25)

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

11. (a) Define transmissibility, specific yield and specific retention. (CO2, K2)

Or

(b) Explain the vertical distribution of groundwater zones. (CO3, K3)

12. (a) Explain the causes and control measures for seawater intrusion. (CO3, K4)

Or

(b) Discuss any two artificial groundwater recharge methods. (CO5, K5)

13. (a) Compare constant discharge test and step drawdown test. (CO6, K6)

Or

(b) Explain the procedure for conducting a pump test in flowing wells. (CO5, K5)

14. (a) Explain the role of drilling methods in groundwater exploration. (CO4, K4)

Or

(b) Describe the principle of resistivity well logging. (CO4, K4)

15. (a) Explain methods of water purification for domestic use. (CO3, K3)

Or

(b) Write a note on the health impact of nitrate and fluoride in groundwater. (CO4, K4)

Part C (5 × 8 = 40)

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

16. (a) Describe the hydrologic cycle with reference to aquifer recharge. (CO3, K3)

Or

(b) Analyze the factors affecting porosity and permeability in aquifers. (CO5, K5)

17. (a) Evaluate the impact of artificial recharge on groundwater sustainability. (CO4, K4)

Or

(b) Assess the effectiveness of watershed management in recharge. (CO4, K4)

18. (a) Explain Jacob's and Chow's methods with assumptions and graphs. (CO5, K5)

Or

(b) Analyze the data interpretation process using Theis method. (CO3, K3)

19. (a) Discuss the process of cumulative curve and slope interpretation in resistivity surveys. (CO3, K3)

Or

(b) Analyze the significance of SP logging in groundwater exploration. (CO3, K3)

20. (a) Discuss water pollution control strategies in urban groundwater systems. (CO3, K3)

Or

(b) Evaluate the importance of isotope hydrogeology in tracing groundwater sources. (CO4, K4)

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R3599

Sub. Code
464304

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2025

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 most abundant element in the Earth's crust is: (CO2, K2)

   (a) Silicon (b) Aluminum

   (c) Iron (d) Oxygen

2. Geochemical cycles describe the movement of elements through the : (CO2, K2)

   (a) Magnetic field

   (b) Biosphere, lithosphere, hydrosphere, atmosphere

   (c) Earth's core

   (d) Outer space

3. Which of the following properties is used to determine eutectic melting point? (CO1, K1)

   (a) Density

   (b) Magnetic susceptibility

   (c) Thermal conductivity

   (d) Temperature composition diagram

4. Pathfinder elements are most useful in : (CO1, K1)

(a) Geological mapping

(b) Soil classification

(c) Geochemical exploration

(d) Petrological analysis

5. Potassium-Argon dating is mainly used for : (CO1, K1)

(a) Organic material (b) Sediments

(c) Volcanic rocks (d) Groundwater

6. Which isotope is commonly used in carbon dating? (CO2, K2)

(a) C-12 (b) C-13

(c) C-14 (d) C-11

7. The term "geochemical anomaly" refers to: (CO1, K1)

(a) A region with no geochemical interest

(b) Average elemental concentration

(c) Unusual concentration of elements compared to background levels

(d) Weathered rock surface

8. Primary dispersion pattern is found: (CO1, K1)

(a) In ocean water (b) Near mineral deposits

(c) In glacial till (d) In soil only

9. The main contaminant in acid mine drainage is: (CO2, K2)

(a) Lead (b) Iron

(c) Mercury (d) Sulphur compounds

10. Aerosol geochemistry refers to: (CO1, K1)

(a) Underground water chemistry

(b) Marine isotope ratios

(c) Airborne particulate matter

(d) Soil pH balance

Part B (5 × 5 = 25)

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

11. (a) Describe the geochemical mobility of ions in the lithosphere and hydrosphere. (CO2, K2)

Or

(b) Explain the geochemical classification of elements. (CO3, K3)

12. (a) What are pathfinder elements? Give two examples and their uses. (CO3, K4)

Or

(b) Describe compositional changes in minerals under different conditions. (CO5, K5)

13. (a) Describe the concept of radioactive decay and isotope fractionation. (CO6, K6)

Or

(b) Briefly explain Carbon and Oxygen isotopes in geochemistry. (CO5, K5)

14. (a) Distinguish between primary and secondary dispersion patterns. (CO4, K4)

Or

(b) Explain geochemical anomalies with examples. (CO4, K4)

15. (a) Describe the significance of bio-geochemical surveys. (CO2, K3)

Or

(b) Write short notes on marine and lacustrine environments in environmental geochemistry. (CO4, K4)

Part C (5 × 8 = 40)

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

16. (a) Analyze the structure and composition of the Earth based on geochemical principles. (CO3, K3)

Or

(b) Discuss the distribution of geochemical elements in different Earth systems. (CO5, K5)

17. (a) Analyze the role of hydrothermal systems in mineral geochemistry. (CO4, K4)

Or

(b) Explain the geochemistry of seawater and its role in mineral distribution. (CO4, K4)

18. (a) Discuss the lead and sulphur isotope systems and their environmental implications. (CO5, K5)

Or

(b) Evaluate the use of isotopic systems (e.g., K-Ar, U-Pb, C-O) in geochronology. (CO3, K3)

19. (a) Explain methods for interpreting geochemical anomalies using dispersion patterns. (CO3, K3)

Or

(b) Analyze the role of geochemical sampling techniques in mineral exploration. (CO3, K3)

20. (a) Discuss the instrumentation and field techniques in environmental geochemical surveys. (CO3, K3)

Or

(b) Evaluate the effects of pollution in different aquatic geochemical environments. (CO4, K4)

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M.Sc. DEGREE EXAMINATION, NOVEMBER – 2025

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 objective type questions by choosing the correct option.

1. The main source of petroleum is (CO2, K2)
   (a) Igneous rocks
   (b) Organic-rich sedimentary rocks
   (c) Metamorphic rocks
   (d) Volcanic rocks

2. The migration of petroleum is mainly due to: (CO2, K2)
   (a) Capillary forces (b) Density differences
   (c) Evaporation (d) Tectonic uplift

3. Kerogen is: (CO1, K1)
   (a) Gas hydrate
   (b) Solid organic matter in source rocks
   (c) Bitumen in traps
   (d) Reservoir pore fluid

4. The best reservoir rocks generally have (CO1, K1)
   (a) Low porosity & low permeability
   (b) High porosity & high permeability
   (c) Low porosity & high permeability
   (d) High porosity & low permeability

5. Which method uses elastic wave reflections for subsurface mapping? (CO1, K1)

(a) Resistivity survey (b) Gravity survey

(c) Seismic survey (d) Magnetic survey

6. Well logging is used to (CO2, K2)

(a) Determine surface lithology

(b) Measure reservoir properties in boreholes

(c) Detect surface traps

(d) Calculate drilling mud weight

7. The blowout preventer (BOP) is used for: (CO1, K1)

(a) Enhancing porosity

(b) Preventing uncontrolled fluid flow

(c) Increasing permeability

(d) Core sample collection

8. The rotary drilling method uses: (CO1, K1)

(a) Cable tool (b) Rotating drill bit

(c) Explosive charges (d) Piston hammer

9. Primary recovery of petroleum relies mainly on: (CO2, K2)

(a) Artificial lift systems

(b) Natural reservoir pressure

(c) Steam injection

(d) Gas reinjection

10. Enhanced oil recovery includes (CO1, K1)

(a) Drilling deeper wells

(b) Water flooding & gas injection

(c) Using larger rigs

(d) Increased mud circulation

Part B (5 × 5 = 25)

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

11. (a) Describe the geological conditions necessary for petroleum formation. (CO2, K2)

Or

(b) Explain the classification of petroleum reserves. (CO3, K3)

12. (a) Describe the process of hydrocarbon migration. (CO3, K2)

Or

(b) Write short notes on traps and seals. (CO5, K3)

13. (a) Explain the principle of seismic reflection method. (CO6, K3)

Or

(b) Discuss the role of gravity survey in petroleum exploration. (CO5, K2)

14. (a) Explain the different types of drilling muds used in petroleum wells. (CO4, K3)

Or

(b) Describe the function of casing in drilling operations. (CO4, K2)

15. (a) Write short notes on reservoir drive mechanisms. (CO2, K3)

Or

(b) Explain the concept of secondary oil recovery. (CO4, K2)

Part C (5 × 8 = 40)

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

16. (a) Discuss the structural and stratigraphic traps in petroleum geology with examples. (CO3, K4)

Or

(b) Explain the geological and geochemical methods used in petroleum exploration. (CO5, K6)

17. (a) Describe in detail the formation, maturation, and migration of hydrocarbons. (CO4, K4)

Or

(b) Write an essay on the classification and characteristics of reservoir rocks. (CO4, K4)

18. (a) Explain the sequence of steps in seismic data acquisition, processing, and interpretation. (CO5, K5)

Or

(b) Discuss the integration of geological, geophysical, and geochemical methods in hydrocarbon exploration. (CO3, K6)

19. (a) Describe in detail the rotary drilling process with a neat diagram. (CO3, K5)

Or

(b) Explain the various well completion techniques in petroleum production. (CO3, K4)

20. (a) Discuss the planning and development of a petroleum field from discovery to production. (CO3, K5)

Or

(b) Explain the principles and methods of tertiary recovery techniques. (CO4, K4)
