

**SYLLABI AND SCHEME OF
EXAMINATIONS
FOR
MULTIDISCIPLINARY COURSES
OF GEOLOGY FOR UNDER
GRADUATE PROGRAMS
(SINGLE MAJOR / PHYSICAL
SCIENCES PROGRAMS)**

**(Based on Curriculum and Credit Framework and formative assessment
guidelines for UG Programs under NEP 2020)**



**MAHARSHIDAYANANDUNIVERSITY
ROHTAK (HARYANA)**

SYLLABI AND SCHEME OF EXAMINATIONS FOR MULTIDISCIPLINARY COURSES FOR UNDERGRADUATE SINGLE MAJOR/MULTIDISCIPLINARY PROGRAMS/SINGLE MAJOR PROGRAM AFTER 2nd SEMESTER OF MULTIDISCIPLINARY PROGRAM

Name of the Department	Nomenclature of Multidisciplinary Course (MDC)@ 3 credits	Course Code	Credits Distribution			Total Credits	Workload			Total Workload	Total Marks
			L	T	P		L	T	P		
Geology	Introduction to Geosciences	24GOLX01MD01	3	0	0	3	3	0	0	3	75
Geology	World of Minerals and Rocks	24GOLX02MD01	3	0	0	3	3	0	0	3	75
Geology	Basics of Hydrology	25GOLX03MD01	3	0	0	3	3	0	0	3	75

L: Lecture; T: Tutorial; P: Practical

Note:

A student has to opt for three Multidisciplinary Courses in first three semesters from the pool of the courses offered in the disciplines other than those of Major disciplines and Minor disciplines and the one not studied at 10+2 or equivalent level.

Semester: I

Session: 2024-25

Name of Program	Not to be filled	Program Code	Not to be filled
Name of the Course	Introduction to Geosciences	Course Code	24GOLX01MD01
Hours per Week	03 Hours	Credits	03 (L:3, P:0)
Maximum Marks	75	Time of Examinations	-
Note: The Formative Assessment Criteria for this Course as Follows:			
Written Test (2x10)			:20
Lab Work (Practical File)/ Field Work (Report)/Portfolio			:20
Assignment/Case Study/Mini Project (2 x 10)			:20
Seminar/Presentation			:10
Attendance			:05
Total			:75
Course Learning Outcomes (CLO):			
CLO1: Understand Fundamental Concept Singeology, Meteorology, Oceanography and Environmental Science.			
CLO2: Identify Key Geological Processes Shaping Earth's Surface and Interior.			
CLO3: Analyze the Interactions Between Earth's Systems (Geosphere, Hydrosphere, Atmosphere and Biosphere).			
CLO4: Evaluate the Impact of Natural Processes and Human Activities on Earth's Environment.			
Unit 1: Earth's Structure and Processes: Introduction to Geoscience Branches, Overview of Earth's Structure: Core, Mantle, Crust, Rock Types and Formation Processes. Plate Tectonics Theory and Evidences.			
Unit 2: Earthquakes: Causes and Types of Earthquakes. Weathering, Erosion and Types of Weathering, Erosion and Deposition by River, Wind and Glacier.			
Unit 3: Principles of Geologic Time: Relative and Absolute Dating Methods, Stratigraphy and the Geologic Time Scale. Fossilization Processes, Major Events in the History of Life on Earth. Paleontology and Its Importance in Understanding Earth's History.			
Unit 4: Earth's Atmosphere and Climate Change: Composition and Structure of the Atmosphere. Human Impacts on the Environment and Climate.			
References:			
1. Marshak, S. (2015). <i>Earth: Portrait of a Planet</i> . 5 th ed. W.W. Norton & Company.			
2. Grotzinger, J.P., & Jordan, T.H. (2010). <i>Understanding Earth</i> . 6 th ed. W.H. Freeman & Company.			
3. Marshak, S. (2016). <i>Essentials of Geology</i> . 5 th ed. W.W. Norton & Company.			
4. Fletcher, C. (2015). <i>Physical Geology</i> . 11 th ed. W.W. Norton & Company.			
5. Christopherson, R.W., & Birkeland, G. (2018). <i>Geosystems: An Introduction to Physical Geography</i> . 10 th ed. Pearson.			

Semester: II

Session: 2024-25

Name of Program	Not to be filled	Program Code	Not be filled
Name of the Course	World of Minerals and Rocks	Course Code	24GOLX02MD01
Hours per Week	03 Hours	Credits	03 (L:3, P:0)
Maximum Marks	75	Time of Examinations	-
Note: The Formative Assessment Criteria for this Course as Follows: Written Test (2x10) :20 Lab Work (Practical File)/ Field Work (Report)/Portfolio :20 Assignment/Case Study/Mini Project (2 x 10) :20 Seminar/Presentation :10 Attendance :05 Total :75			
Course Learning Outcomes(CLO): CLO1: Identify and Classify Common Minerals Based on Their Physical and Chemical Properties. CLO 2: Explain the Crystallographic Structure and Symmetry of Minerals. CLO3: Classify Igneous, Sedimentary and Metamorphic Rocks Based on their Mineral Composition, Texture and Geological Setting. CLO4: Interpret Rock Textures and Structures to Infer Geological Processes (e.g., Magmatic Differentiation, Sedimentary Deposition, Metamorphic Re-Crystallization). CLO5: Describe the Petrogenesis of Different Rock Types, Including the Processes of Rock Formation and Alteration.			
Unit 1: Introduction to Minerals: Definition, Classification and Importance. Crystallography and Crystal Systems. Physical Properties of Minerals: Cleavage, Fracture, Hardness, Luster, and Streak etc.			
Unit2: Classification of Igneous Rocks: Texture, Mineral Composition and Geological Settings. Processes of Magma Formation, Crystallization and Differentiation of Uni-Component System. Bowen Reaction Series.			
Unit3: Sedimentary Processes: Weathering, Erosion, Transportation, and Deposition. Diagenesis and Lithification of Sedimentary Rocks. Classification of Sedimentary Rocks.			
Unit4: Metamorphism and Types of Metamorphism, Factors Affecting Metamorphism. Types and Classification of Metamorphic Rocks: Texture, and Metamorphic Structures.			
References: 1. Nesse, W.D. (2011). <i>Introduction to Mineralogy</i> . 2 nd ed. Oxford University Press. 2. Winter, J.D. (2010). <i>Principles of Igneous and Metamorphic Petrology</i> . 2 nd ed. Pearson Education, Inc. 3. Best, M.G., and Christiansen, E.H. (2001). <i>Igneous Petrology</i> . Blackwell Science Ltd. 4. Blatt, H., Tracy, R.J., and Owens, B.E. (2006). <i>Petrology: Igneous, Sedimentary, and Metamorphic</i> . 3 rd ed. W. H. Freeman & Co. 5. Philpotts, A.R., and Ague, J.J.(2009). <i>Principles of Igneous and Metamorphic Petrology</i> . 2 nd ed. Cambridge University Press. 6. Boggs Jr. and S.(2006). <i>Principles of Sedimentology and Stratigraphy</i> . 4 th ed. Pearson Education, Inc.			

Semester: III

Session:2025-26

Name of Program	Not to be filled	Program Code	Not be filled
Name of the Course	Basics of Hydrology	Course Code	25GOLX03MD01
Hours per Week	03 Hours	Credits	03 (L:3, P:0)
Maximum Marks	75	Time of Examinations	-
Note: The Formative Assessment Criteria for this Course as Follows: Written Test (2x10) :20 Lab Work (Practical File)/ Field Work (Report)/Portfolio :20 Assignment/Case Study/Mini Project (2 x 10) :20 Seminar/Presentation :10 Attendance :05 Total :75			
Course Learning Outcomes (CLO): CLO 1: Understand the Basic Principles and Concepts of Hydrology, Including the Water Cycle, Precipitation Mechanisms and Run off Processes. CLO 2: Describe and Analyze Various Hydrological Processes Such as in Filtration, Ground Water Flow, and Surface Water Dynamics. CLO 3: Analyze the Impact of Human Activities and Environmental Changes on Hydrological Processes and Water Resources. CLO 4: Evaluate Strategies for Sustainable Water Resource Management, Considering Both Quantity and Quality Aspects. CLO 5: Apply hydrological models and tools for the assessment and prediction of water flow, storage, and distribution in various catchment areas.			
Unit 1: Hydrologic Cycle; Origin of Ground Water, Vertical Distribution of Subsurface Water. Genetic Classification of Groundwater			
Unit 2: Water Bearing Properties of Rocks- Porosity and Permeability, Specific Yield, Specific Retention and Storage Coefficient. Theory of Ground Water Flow, Introduction to Well Hydraulics.			
Unit 3: Types of Aquifer–Unconfined, Confined and Semi-Confined. Water Table and Piezometric Surface. Darcy's Law; Ground Water Velocity. Intrinsic Permeability and Hydraulic Conductivity, Transmissivity.			
Unit 4: Physical, Chemical and Bacteriological Properties of Water and Water Quality. Introduction to Methods of Interpreting Ground Water Quality Data using Standard Graphical Plots.			
References: 1. Fetter, C. W. (2020). <i>Applied Hydrogeology</i> (5 th ed.). Pearson Education. 2. Todd, D. K., & Mays, L. W. (2005). <i>Groundwater Hydrology</i> (3 rd ed.). John Wiley & Sons. 3. Shaw, E. M. (2011). <i>Hydrology in Practice</i> . CRC Press. 4. Anderson, M. G., & Burt, T. P. (2010). <i>Hydrology: An Introduction</i> (5 th ed.). Routledge. 5. Viessman Jr., W., Lewis, G. L., & Knapp, J. W. (2013). <i>Introduction to Hydrology</i> (5 th ed.). Pearson. 6. Chow, V. T., Maidment, D. R., & Mays, L. W. (1988). <i>Applied Hydrology</i> . McGraw-Hill. 7. Dingman, S. L. (2015). <i>Physical Hydrology</i> (3 rd ed.). Waveland Press. 8. Ward, R. C., & Robinson, M. (2000). <i>Principles of Hydrology</i> (4 th ed.). McGraw-Hill. 9. Karanth, K. R. (1987). <i>Ground Water Assessment, Development and Management</i> . Tata McGraw-Hill. 10. Singh, V. P. (1992). <i>Elementary Hydrology</i> . Prentice Hall India.			