



VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY

POST GRADUATE CENTRE, JNANASAROVARA, NANDIHALLI-583119

Department of GEOLOGY
I and II Semester SYLLABUS

Bachelor of Science

(I – II Semester)

With effect from

2024-25

Department Name: Geology

Semester – I

Course Title: Earth Science	Course Code: 24MJGEOL1L
Total Contact Hours: 54	No. of Credits: 4
L:T:P	4 – 0 – 0
Internal Assessment Marks: 20	Duration of SEE: 03 Hours
Semester End Exam Marks: 80	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Identify and describe Earth's materials and the processes that form and change them.
2. Explain the interactions between the atmosphere, hydrosphere, geosphere, and biosphere.
3. Understand the processes that shape the Earth's surface and interior.
4. Understand oceanographic processes and the physical and chemical properties of seawater.
5. Apply Earth sciences thinking to environmental issues.

Unit	Description	Hours
1	Introduction to planet Earth: Introduction to various branches of Earth Sciences. Total understanding of dynamic planet 'Earth' through Astronomy, Geology, Meteorology and Oceanography. General characteristics and origin of the Universe, Solar System and its planets. The terrestrial and jovian planets. Meteorites and Asteroids. Earth in the solar system - origin, size, shape, mass, density, rotational and revolution parameters and its age.	10
2	Plate Tectonics: <i>Introduction to plate tectonics:</i> Key concepts and definitions; Historical development of plate tectonic theory. Layers of the Earth - crust, mantle, core; Lithosphere and asthenosphere. <i>Plate Boundaries: Divergent Boundaries</i> - Mid-ocean ridges and seafloor spreading; Rift valleys; Volcanic activity at divergent	12

	boundaries. <i>Convergent Boundaries</i> : Subduction zones and oceanic trenches; Mountain building and continental collision; Volcanism and earthquakes at convergent boundaries. <i>Transform Boundaries</i> : Characteristics of transform faults; Major transform fault systems (e.g., San Andreas Fault); Earthquake activity at transform boundaries.	
3	Atmosphere: <i>Introduction to the Atmosphere</i> : Composition of the atmosphere; Structure and layers of the atmosphere. <i>Atmospheric Processes</i> : Solar radiation and Earth's energy balance; Heat transfer in the atmosphere; Atmospheric pressure and wind patterns. <i>Weather and Climate</i> : Weather vs. climate; Formation of clouds and precipitation; Major weather systems and patterns.	10
4	Hydrosphere: <i>Introduction to the Hydrosphere</i> : Composition of the hydrosphere; Distribution of water on Earth; Properties of water. <i>The Water Cycle</i> : Processes of the water cycle (evaporation, condensation, precipitation); Groundwater and surface water; Human impact on the water cycle.	9
5	Soil Science: <i>Introduction to Soil Science</i> : Definition and importance of soil; Components of soil. <i>Physical Properties of Soil</i> : Soil texture and structure; Soil colour and consistency; Soil water retention and drainage. <i>Chemical Properties of Soil</i> : Soil pH and nutrient availability; Cation exchange capacity; Soil fertility. <i>Biological Properties of Soil</i> : Soil microorganisms and their functions; Organic matter and humus; Soil food web. <i>Soil Formation and Classification</i> : Factors of soil formation; Soil horizons and profiles; Soil taxonomy and classification systems.	13

References:

1. Arthur Holmes, (1992) Principles of Physical Geology. Chapman and Hall, London.
2. Miller, (1949) An Introduction to Physical Geology. East West Press Ltd.
3. Spencer, E.V., (1962) Basic concepts of Physical Geology. Oxford & IBH.
4. Mahapatra, G.B., (1994) A text book of Physical Geology. CBS Publishers.
5. Press and Siever (1998) Understanding Earth, WH Freeman & Co.
6. Emiliani, C. (1992) Planet earth: cosmology, geology, and the evolution of life and environment.

Cambridge University Press

7. Duff, P. M. D., & Duff, D. (Eds.). (1993). *Holmes' principles of physical geology*. Taylor & Francis.
8. Emiliani, C. (1992). *Planet earth: cosmology, geology, and the evolution of life and environment*. Cambridge University Press.
9. Gross, M. G. (1977). *Oceanography: A view of the earth*.
10. Parbin Singh. (Reprint: 2018). *Engineering and General Geology*. S.K. Kataria and Sons, New Delhi.

Department Name: Geology

Semester - I

Course Title: Earth Science Lab	Course Code: 24MJGEOL1P
Total Contact Hours: 4 Hours per week	No. of Credits:
L:T:P	0 – 0 – 2
Internal Assessment Marks: 10	Duration of SEE: 03 Hours
Semester End Exam Marks: 40	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Understand the internal structure of the Earth layers.
2. Analyze topographic maps and geological features.
3. Interpret weather data and understand atmospheric processes.
4. Understand the basics of soil, including soil profile mapping and types.

List of Experiments

Sl.No	Experiments
1	Study the applications for various branches of Earth Science subjects with neat sketches
2	Study of solar system planets with drawings
3	Draw a model of the Earth's layers (crust, mantle, outer core, inner core) and discussion of the properties and composition of each layer
4	Study of topographic feature distribution of India
5	Study of divergent, convergent, and transform boundaries and observation of geological features formed at each type of boundary (e.g., mid-ocean ridges, trenches, faults).
6	Study of atmospheric layers with its applications
7	Study of water cycle with its applications
8	Study of different soil types in India
9	Study of soil profile any specific area

Department Name: Geology

Semester – II

Course Title: Mineral Science	Course Code: 24MJGEOL2L
Total Contact Hours: 54	No. of Credits: 4
L:T:P	4 – 0 – 0
Internal Assessment Marks: 20	Duration of SEE: 03 Hours
Semester End Exam Marks: 80	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Identify and classify minerals based on their physical and chemical properties.
2. Understand the crystallographic and structural properties of minerals.
3. Explain the processes that lead to the formation and transformation of minerals.
4. Use laboratory techniques for mineral identification and analysis.
5. Recognize the role of minerals in the Earth's system and human society

Unit	Description	Hours
1	Mineral and Crystallography: Definitions and importance of minerals; Basic concepts in mineralogy. <i>Introduction to Crystallography:</i> Elementary ideas about crystal morphology in relation to internal crystal structures and symmetry; Unit cells and lattice parameters; classification of crystals into six systems and 32 point groups	12
2	Properties of Minerals <i>Physical Properties of Minerals:</i> Hardness, cleavage, and fracture; Luster, color, and streak; Density and specific gravity. <i>Chemical Properties of Minerals:</i> Mineral chemistry and bonding; Chemical formulas and compositional variation; Isomorphism and polymorphism.	10
3	Optical Mineralogy: Polarized light and mineral optics; Nature of light and principles of optical mineralogy; Refractive index and birefringence; Optical identification techniques. Introduction to the petrological microscope and identification of common rock forming minerals.	10
4	Mineral Groups: <i>Silicate Minerals:</i> Structure and classification of silicates; Common silicate	12

	minerals; Silicate mineral groups. <i>Non-Silicate Minerals</i> : Oxides and hydroxides; Sulfides and sulphates; Carbonates, phosphates, and halides.	
5	Economic Minerals and Resources: Ore minerals and industrial minerals; Mineral exploration and mining; Environmental impact of mining; Toxic minerals and health impacts; Sustainable mineral resource management	10

References:

1. Ram S. Sharma and Anurag Sharma (2013) Crystallography and Mineralogy - Concepts and Methods. Text Book Series, Geological Society of India, Bangalore
2. Dana, E.S. and Ford, W.E., (2002) A textbook of Mineralogy (Reprints).
3. Flint, Y., (1975) Essential of crystallography, Mir Publishers.
4. Phillips, F.C., (1963) An introduction to crystallography. Wiley, New York.
5. Berry, L.G., Mason, B. and Dietrich, R. V., (1982) Mineralogy. CBS Publ.
6. Read, H.H., (1968) Rutley's Element of Mineralogy (Rev. Ed.). Thomas Murby and Co.
7. Berry and Mason, (1961) Mineralogy. W.H. Freeman & Co.
8. Kerr, B.F., (1995) Optical Mineralogy 5th Ed. McGraw Hill, New York.
9. Deer, Howie and Zussman (1996) Introduction to Rock forming Minerals, Pearson (3rd Edition)
10. Wahlstrom E.E. (1971) Optical crystallography, John Wiley and sons.
11. R.N. Hota (2012) Practical approach to Mineralogy and Crystallography, CBS Publications & Distributions.
12. Perkin Dexter. (2010) Mineralogy, Pearson.
13. Klein, C., Dutrow, B., Dwight, J., & Klein, C. (2007). The 23rd Edition of the Manual of Mineral Science (after James D. Dana). J. Wiley & Sons. 2. Kerr, P. F. (1959). Optical Mineralogy. McGraw-Hill.
14. Verma, P. K. (2010). Optical Mineralogy (Four Colour). Ane Books Pvt Ltd. 4. Deer, W. A., Howie,
15. R. A., & Zussman, J. (1992). An introduction to the rock-forming minerals (Vol. 696). London: Longman.
16. Parbin Singh. (Reprint: 2018). Engineering and General Geology. S.K. Kataria and Sons, New Delhi.

Department Name: Geology

Semester - II

Course Title: Mineral Science Lab	Course Code: 24MJGEOL2P
Total Contact Hours: 4 Hours per week	No. of Credits:
L:T:P	0 – 0 – 2
Internal Assessment Marks: 10	Duration of SEE: 03 Hours
Semester End Exam Marks: 40	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Identify and classify minerals based on their physical and chemical properties.
2. Use laboratory techniques for mineral identification and analysis.
3. Understand the crystallographic and structural properties of minerals.

List of Experiments

Sl.No	Experiment
1	Observation and documentation on symmetry of crystals
2	Study of physical properties of minerals in hand specimens
3	Study of silicate minerals (any ten): [Olivine, Garnet, Andalusite, Sillimanite, Kyanite, Staurolite, Beryl, Tourmaline, Augite, Actinolite, Tremolite, Hornblende, Serpentine, Talc, Muscovite, Biotite, Phlogopite, Quartz, Orthoclase, Plagioclase, Microcline, Nepheline, Sodalite, Zeolite]
4	Study of Quartz varieties: [Chert, Flint, Chalcedony, Agate, Jasper, Amethyst, Rose quartz, Smoky quartz]
5	Study of metallic and non-metallic minerals: [Iron, Copper, Gold, Sulfur, Graphite, Pyrite, Corundum, Magnetite, Halides, Carbonates, Psilomelane, Fluorite, Calcite, Malachite, Gypsum, Apatite]
6	Study of minerals under optical microscope and their characteristic properties

References:

1. Cornelis Klein and Cornelius S. Hurlbut, Jr. (1999). Manual of Mineralogy (After James D. Dana). John Wiley and Sons, INC.

PROVIDE QUESTION PAPER PATTERNS FOR ALL THEORY PAPERS AND EVALUATION METHODS FOR LABOARATORY AND RESEARCH PROJECT SEMESTER END EXAMINATION.

QUESTION PAPER PATTERNS FOR ALL SKILL PAPERS IS 40 MULTIPLE CHOICE QUESTIONS. HOWEVER, IT NEEDS TO BE APPROVED IN RESPECTIVE BOS