Govt. Nagarjuna P.G. College of Science
Raipur, C.G.

CURRICULUM & SYLLABI

(Based on CBCS & LOCF)

M.Sc. Geology
(I & II Sem)
Session : 2025-26

Approved by:	Board of Studies	Academic Council
Date:	07-07-2025	

Department of Geology
Govt. Nagarjuna P.G. College of Science
Raipur, C.G.

PROGRAMME SPECIFIC OUTCOMES (PSOs): At the end of the program, the student will be able to:

PSO1	Prepare the students to demonstrate respectful engagement with others' ideas, behaviours, beliefs and apply diverse frames of reference to decisions and actions
PSO2	Apply the knowledge of geological concepts in interdisciplinary fields and draw the inferences by finding appropriate solutions.
PSO3	Pursue research in challenging areas of pure/applied Geology.
PSO4	Employ confidently the knowledge of software and tools for treating the geological problems and scientific investigations.
PSO5	Effectively communicate and explore ideas of Geology for the propagation of knowledge and popularization of Geology in society.

M.Sc. Geology

PROGRAMME STRUCTURE

Semester	Course Nature	Course Code	Course Title	Course Type (T/P)	Hrs/ Week	Credits	Marks		
							CIA	ESE	Total
Semester-I	Core	GEO-101	Mineralogy, Mineral Optics & Crystallography	T	4	4	30	70	100
	Core	GE0-102	Structural Geology	T	4	4	30	70	100
	Core	GEO-103	Principles of Stratigraphy, Indian Geology & Palaeontology	T	4	4	30	70	100
	Core	GEO-104	Geodynamics and Geomorphology	T	4	4	30	70	100
	Core	GEO-105	Lab Course - I	P	4	3	30	70	100
	Core	GEO-106	Lab Course - II	P	4	3	30	70	100
SemesterII	Core	GEO-201	Igneous and Metamorphic Petrology	T	4	4	30	70	100
	Core	GEO-202	Sedimentary Petrology & Crustal Evolution	T	4	4	30	70	100
	Core	GEO-203	Economic Geology-I (Ore Forming Processes)	T	4	4	30	70	100
	Core	GEO-204	Economic Geology-II (Indian Mineral Deposits: Metallic, Non-Metallic and Fossil Fuel)	T	4	4	30	70	100
	Core	GEO-205	Lab Course - I	P	4	3	30	70	100
	Core	GEO-206	Lab Course – II Project/Field Work	P	4	3	30	70	100
Semester-III	Core	GEO-301	Hydrogeology	T	4	4	30	70	100
	Core	GEO-302	Mineral Exploration & Mining Geology	T	4	4	30	70	100
	Core	GEO-303	Geochemistry & Environmental Geology	T	4	4	30	70	100
	Core	GEO-304	Engineering Geology and Geotechnical Investigations	T	4	4	30	70	100
	Core	GEO-305	Lab Course – I	P	4	3	30	70	100
	Core	GEO-306	Lab Course - II	P	4	3	30	70	100
Semester-IV	Core	GEO-401	Mineral Resources of Chhattisgarh and their industrial applications	T	4	4	30	70	100
	Core	GEO-402	Photogeology, Remote Sensing and G.I.S.	T	4	4	30	70	100
	Core	GEO-403	Tools and Techniques in Field Geology	T	4	4	30	70	100
	Core	GEO- 404	Dissertation/ Project work Elective Paper – I Elective Paper - II	T	4	4	30	70	100
	Core	GEO-405	Lab Course – I	P	4	3	30	70	100
	Core	GEO-406	Lab Course - II	P	4	3	30	70	100

Note: The candidates who have joined the PG programme in college, shall undergo Course in Indian Knowledge System (IKS) and Skill Enhancement/Value Added Course (only in qualifying in nature) in Semester I and Semester III respectively.

Semester	Course Code	Course Title	Course Type (T/P)	Hrs/ Week	Credits	Marks		
						CIA	ESE	Total
I	GEO-501	Indian Knowledge System	T	4	2	30	70	100

Skill Enhancement/Value Added Courses:

Semester	Course Code	Course Title	Course Type (T/P)	Hrs/ Week	Credits	Marks		
						CIA	ESE	Total
III	GEO-502	Rainwater Harvesting	P	4	2	30	70	100

Name and Signature of BOS Chairman & Members:-

S.No.	Designation	Name	Signature
1	Head of Department	Dr. Sandeep Vansutre	
2	External Subject Expert 1	Dr. Neeraj Vishwakarma	
3	External Subject Expert 2	Dr. S.D. Deshmukh	
4	External Subject Expert 3	Dr. Ninad Bodhankar	
5	Representative from Industry	Mr. Alok Verma	
6	Student's Representative	Mr. Pradhumn Soni	

Evaluation & Assessment -

1. **Passing Criteria** – 40% of total marks (ESE+CIA)

Course	ESE	CIA	M.M.	P.M.	Remarks
Theory	70	30	100	40	For P.M. the ESE & CIA put together
Lab Course	70	30	100	40	For P.M. the ESE & CIA put together

2. **Continuous Internal Assessment (CIA) Evaluation** – Out of 30 marks allocated for CIA for each Theory/Lab Course:

Class Test- Two CT of 20 - 20 marks, Better marks out of 2 will be considered	20 Marks
Assignment/ Seminar	10 Marks
Total	**30 Marks**

3. **Marks Distribution in ESE Lab Course –**

Activities	Marks
Laboratory Performance- On spot Assessment Performed the Task based on Lab work	40
Spotting based on Tools and Technology (written)	20
Viva-Voce	10
Total Marks	**70**

4. **End Semester Examination (ESE)–**

Three Section A, B & C. **M.M-70**

Section A: MCQs/ Objective Type- 1 mark x 10 = 10 marks

Section B: Short Answer Type- 4 marks x 5 = 20 marks

Section B: Long Answer Type- 8 marks x 5 = 40 marks, (1 out of 2 from each unit).

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M.Sc. (Geology) Semester-I

Program	Subject	Year	Semester
M.Sc.	Geology	1	I
Course Code	**Course Title**		**Course Type**
GEO-101	**Mineralogy, Mineral Optics & Crystallography**		Core
Credit	**Hours Per Week (L-T-P)**		
	L	**T**	**P**
4	5	1	0
Maximum Marks	**CIA**		**ESE**
100	30		70

Learning Objective (LO):

This course aims to provide students with an understanding of mineralogy. It covers the physical and chemical behaviour of minerals, including crystal systems and symmetry elements. Furthermore, it offers in-depth knowledge of various mineral groups.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to :	CL
1	Describe the basic concepts of mineralogy, physical and chemical behaviour of minerals	U
2	Explain the basic concepts of mineralogy, physical and chemical behaviour of minerals	Ap
3	Explain the symmetry and crystal forms of major crystal system and basic of optical mineralogy.	U
4	Describe the properties and identification of minerals and crystals under polarizing microscope.	Ap
5	Discuss the characterization of mineral and mineral group using physical, chemical and optical parameters	An

CL: Cognitive Levels (**R**-Remember; **U**-Understanding; **Ap**-Apply; **An**-Analyze; **E**-Evaluate; **C**-Create).

Govt. Nagarjuna P.G. College of Science, Raipur (C.G.)

Department of Geology

M.Sc. I Semester Session – July-Dec-2025

Subject – Geology

Course/Paper – I (Code – GEO-101)

Course Title – Mineralogy, Mineral Optics and Crystallography

Detailed Syllabus/ Curriculum:

Unit No.	Topics	No. of Lectures	CO No.
I	Definition of mineral and classification of minerals on different bases, Physical Properties of minerals and their uses. Structures of Silicates and their classification. Special Properties of minerals like Luminescence, Thermal, Radioactive, electrical and magnetic properties. Polymorphism, Pseudomorphism and isomorphism in minerals with examples.	15	1
II	Structure, chemistry, physical properties, optical properties & Paragenesis of 1) Feldspars, Feldspathoid, 2) Quartz & Garnet. 3) Pyroxenes, Amphiboles, 4) Micas, Olivines.	15	2
III	Structure, chemistry, physical properties, optical properties & Paragenesis of 1) Epidote, chlorite, Alumino- silicates. 2) Staurolite, Cordierite, Talc. 3) Study of common oxides, carbonates &Sulphate mineral groups. 4) Study of common phosphate, Sulphide & Halide mineral groups	15	3
IV	General principles of optics, Polarization of light, double refraction. Interference phenomenon, Isotropic & Anisotropic minerals. Petrological microscope- its principle and working, Difference between petrological microscope and simple microscope. Important optical properties of minerals under plane polarized light and crossed nicol conditions. Optical properties of Uniaxial & biaxial minerals	15	4
V	Definition of Crystal, Crystal elements, Symmetry, laws of crystallography. Classification of crystals into various systems. Common holohedral, hemihedral & hemimorphic forms. Parameter & indices. Symmetry characters & forms of normal classes of – Cubic, Tetragonal, hexagonal, Orthorhombic, monoclinic & triclinic systems. Twinning in crystals, Spherical, Gnomonic & stereographic projections.	15	5

Books Recommended:

1. H.H. Read, Revised by C.D.Gribble- 27th Edition- Rutley's Elements of Mineralogy
2. William E. Ford, Fourth Edition- Dana's Textbook of Mineralogy
3. Cornelis Klein and Barbara Dutrow, The Manual of Mineral Science, Wiley Publication, 2007
4. Deer, W.A., Howie, R.A. and Zussman, 1966; The Rock forming Minerals – Longman
5. Putnis, Andrew, 1992; Introduction to Mineral Sciences – Cambridge University Press
6. Verma P.K. Optical Mineralogy, 1959, McGraw-Hill

7. Nesse W.D., Introduction of Optical Mineralogy, 2008, Oxford University Press
8. Phillips, Wm, R. and Griffen, D.T., 1966; Optical Mineralogy – CBS Edition

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M.Sc. (Geology) Semester-I

Program	Subject	Year	Semester
M.Sc.	Geology	1	I
Course Code	**Course Title**		**Course Type**
GEO-102	**Structural Geology**		Core
Credit	**Hours Per Week (L-T-P)**		
	L	**T**	**P**
4	5	1	0
Maximum Marks	**CIA**		**ESE**
100	30		70

Learning Objective (LO):

This course aims to provide students with elementary ideas about rock deformation in various stress conditions. It also covers the basic modes of strain in rocks and the fundamental concepts of the development of folds, faults, and joints. Furthermore, students will learn how to apply this knowledge in structural mapping and interpretations.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Discuss elementary ideas about rock deformation in various stress conditions.	U
2	Describe basics modes of strain in rocks and basic concepts of development of folds	U
3	Discuss the dynamics and kinematics of major structural features faults and joints	U
4	Discuss concepts of development of various structural features in different stress condition	An
5	Describe basic concepts of stereographic projection of various structural features and its interpretation, development of structural features in different settings.	U

CL: Cognitive Levels (**R**-Remember; **U**-Understanding; **Ap**-Apply; **An**-Analyze; **E**-Evaluate; **C**-Create).

Govt. Nagarjuna P.G. College of Science, Raipur (C.G.)

Department of Geology

M.Sc. I Semester Session – July-Dec-2025

Subject – Geology

Course/Paper – II (Code – GEO-102)

Course Title – Structural Geology

Detailed Syllabus / Curriculum:

Unit No.	Topics	No. of Lectures	CO No.
I	Concept of Stress & Strain and their relationship. Rock deformation, Factors controlling deformation, Type of Stress & Strain, Stress & Strain ellipsoid, Homogeneous & inhomogeneous strain, Finite & Infinitesimal Strain, Strain markers (Measurement of Strain in deformed rocks), Progressive deformation, Top & bottom Criteria. Unconformity-types & recognition in field & on geological map. Outlier and Inlier.	15	1
II	Folds: definition, elements, Geometric & Genetic classification, Mechanics of development of folds, Superimposed folds. Recognition of folds in field and on geological map. Effects of folds on outcrops, causes of folding.	15	2
III	Faults: Definition, elements and classification on different bases. Recognition of faults in field and on maps, causes & mechanism of faulting (with reference to principal stress orientation). Effects of faults on the outcrops, Nappe, klippe, and tectonic windows. Difference between fault and unconformity.	15	3
IV	Joints: Definition, Geometric & Genetic classification and importance. Lineation:- definition, types, and their relation to major structures, Foliation:- definition & types, and their relation to major structures. Rock cleavage and schistosity, their relation to major structures.	15	4
V	Stereographic projection and their use in structural analysis. Signification and limitation of pie and Beta diagram. Tectonites:- definition and types. Concept of petrofabric analysis, Types of fabric, fabric elements and interpretation of petrofabric data.	15	5

Books Recommended:

1. Ghosh, S.K. (1993): Structural Geology: Fundamental and Modern Development. Pergamon Press.
2. Hobbs, B.E., Means, W.D. and Williams, P.F. (1976): An outline of Structural Geology, John Wiley and Sons, New York.
3. Park, R. (1997): Foundation of structural geology, Routledge.
4. Ramsay, J.G. (1967): Folding and fracturing of rocks, McGraw Hill.
5. W.H.Freeman and Company, New York. 2nd Edition. ISBN: 10: 0-7167-4951.
6. Haakon Fossen (2010): Structural geology, Cambridge University Press, New York.

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M.Sc. (Geology) Semester-I

Program	Subject	Year	Semester
M.Sc.	Geology	1	I
Course Code	**Course Title**		**Course Type**
GEO-101	**Principles of Stratigraphy, Indian Geology & Palaeontology**		Core
Credit	**Hours Per Week (L-T-P)**		
	L	**T**	**P**
4	5	1	0
Maximum Marks	**CIA**		**ESE**
100	30		70

Learning Objective (LO):

This course aims to foster a deep understanding of stratigraphic units and their application. It will cover the Precambrian and Phanerozoic stratigraphic divisions and sequences of the Indian Shield. Additionally, the course will delve into the principles of palaeontology and the major invertebrates and vertebrates in geological time.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to :	CL
1	Discuss elementary idea of stratigraphic units and its application	U
2	Explain Precambrian stratigraphic divisions and sequences of Indian Shield	Ap
3	Explain Phanerozoic stratigraphic divisions and sequences of Indian Shield	U
4	Discuss principles of paleontological study and with detailed study of various microfossils and paleo-plant life.	Ap
5	Explain major invertebrates and vertebrates in geological time	An

CL: Cognitive Levels (**R**-Remember; **U**-Understanding; **Ap**-Apply; **An**-Analyze; **E**-Evaluate; **C**-Create).

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Department of Geology

M.Sc. I Semester Session – July-Dec-2025

Subject – Geology

Course/Paper – III (Code – GEO-103)

Course Title – Principles of Stratigraphy, Indian Geology & Palaeontology

Detailed Syllabus/ Curriculum:

Unit No.	Topics	No. of Lectures	CO No.
I	Stratigraphy: History and principles. Geological Time Scale. Correlation: Definition, principles and different criteria of correlation. Units of Stratigraphy - Litho, Bio and Chrono Stratigraphic units. Magnetostratigraphy, Cyclostratigraphy, Event stratigraphy, pedostratigraphy, seismic stratigraphy and sequence stratigraphy. Chief Divisions of Indian Subcontinent and Their economic Character and Physiographic Character.	15	1
II	Stratigraphy, correlation and Economic Importance of five Archean cratons of Peninsular India viz. Dharwar, Bastar, Bundelkhand, Aravalli, Singhbhum. Stratigraphy, Correlation and economic importance of mobile belts (Eastern Ghat, Pandyan, Bhopalpatnam) and Proterozoic Sedimentary basins of India (Cudappah, Vindhyan, Chhattisgarh, Indravati, Delhi, Gwalior); Palaeozoic rocks of Salt range, Spiti and Kashmir ; Stratigraphy, classification, fossil content and economic importance of Gondwana Supergroup. Gondwana of Chhattisgarh and its correlation with other formations of India.	15	2
III	Stratigraphy, classification, fossil content and correlation of Mesozoic rocks of Spiti, Kutch and Tiruchirapalli ; Deccan Traps : Classification and geological age, petrological characters, distribution in Maharashtra, Gujrat, Chhattisgarh and Madhya Pradesh. Study of Intertrappean and infratrappean beds and their Fossil content. (Bagh and Lameta beds) ; Tertiary rocks of Assam and Siwalik Group ; Glacial periods : Causes of glacial ages and glacial-eustasy ; Detail study on evolution of Himalayas.	15	3
IV	Boundary Problems with Special reference to Indian Stratigraphy. Viz, Precambrian Cambrian (Eparchean Unconformity), Permian-Triassic and Cretaceous-Tertiary boundary problems ; Species concept, biometrics, molecular systematics, phylogeny. Origin of life. Major events in the history of Precambrian and Phanerozoic life. Evolution of life (flora and fauna) with reference to Geological Time Scale. Evolution of Man : Main Stages viz. Dryopithecus, Ramapithecus, Australopithecus. Homo Erectus. Homo Sapiens, Neanderthalensis.	15	4
V	Morphology and evolutionary trends in Brachiopoda, Echinoderms, Mollusca, Trilobites and Graptolites ; Elementary idea about Micro-palaeontology and its uses.	15	5

Books Recommended:

1. Ramakrishnan M. and Vaidyanadhan R. 2008. Geology of India (Volume 1). Geological Society of India.
2. Vaidyanadhan R.and Ramakrishnan M. 2010. Geology of India (Volume 2). Geological Society of India.
3. Valdiya K.S. 2016. The Making of India: Geodynamic Evolution. Springer.
4. Boggs, S. (2001): Principles of Sedimentology and Stratigraphy, Prentice Hall.
5. KrishnanM.S. (1982): Geology of India and Burma, C.B.S. Publ. and Distributors, Delhi.
6. Naqvi, S.M. and Rogers, J.J.W. (1987): Precambrian Geology of India, Oxford University Press.
7. Henry Woods (1958). Invertebrate Palaeontology. Cambridge, University Press.
8. Amal Dasgupta (2012). Introduction to Palaeontology. The World Press Pvt. Ltd. Kolkata.
9. Jain P.C. and Anantharaman M.S. 2015. Palaeontology Evolution and Animal Distribution. Vishal Publishing Co.

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M.Sc. (Geology) Semester-I

Program	Subject	Year	Semester
M.Sc.	Geology	1	I
Course Code	**Course Title**		**Course Type**
GEO-104	**Geodynamics and Geomorphology**		Core
Credit	**Hours Per Week (L-T-P)**		
	L	**T**	**P**
4	5	1	0
Maximum Marks	**CIA**		**ESE**
100	30		70

Learning Objective (LO):

The primary objective of this course is to educate students about the origin of the earth and the solar system. It covers major geodynamic theories and the evolution of supercontinents. Additionally, it delves into the major tectonic features associated with the vertical and lateral movement of plates. Moreover, the course explores the various agents and their resulting landforms, such as glacial, aeolian, and fluvial processes.

Course Outcomes (CO):

CO No.	**Expected Course Outcomes** **At the end of the course, the students will be able to :**	CL
1	Discuss origin of earth and solar system and study of major geodynamic theories	U
2	Describe elementary ideas of evolution of supercontinents and major tectonic features associated with vertical and lateral movement of plates	Ap
3	Discuss various geomorphic processes and Concept of drainage basin analysis	U
4	Explain various geomorphic landforms	Ap
5	Explain applications of Geomorphology in other fields.	An

CL: Cognitive Levels (**R**-Remember; **U**-Understanding; **Ap**-Apply; **An**-Analyze; **E**-Evaluate; **C**-Create).

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Department of Geology

M.Sc. I Semester Session – July-Dec-2025

Subject – Geology

Course/Paper – IV (Code – GEO-104)

Course Title – Geodynamics and Geomorphology

Detailed Syllabus/ Curriculum:

Unit No.	Topics	No. of Lectures	CO No.
I	Earth and Solar System, Different hypotheses of origin of the earth. Seismic Evidence for Internal Earth Structure and the density of various layers. Age of the earth. Palaeomagnetism, Continental drift: Theories, evidences and objections to Wegner's continental drift theory. Polar wandering, and remnant magnetism (TRM.DRM,CRM), sea floor spreading and its evidences.	15	1
II	Plate Tectonics: Origin of the theory, types of movements-Convergent, Divergent and transform and characteristics of resultant boundaries. Subduction Zone: Island Arcs, continental volcanoes, Benioff zones Mid Oceanic Ridge and formation of new oceanic crust. Triple Junction. Transform fault. Hot spots and their importance. Relation of plate tectonics with earthquakes, volcanism and ore deposits.	15	2
III	Volcanoes- Their form & structure, Types, Volcanic products, volcanic belts of the world. Earthquake: Definition & Causes. Types of earthquake waves, Epicenter, focus and their detection. Richter and Mercalli scale, earthquake zones of India and major Earthquake belts of the world. Tsunami and its causes. Geosynclines- Classification and evolution of geosynclines.	15	3
IV	Principles of Geomorphology, Theories of Geomorphology. Landforms in relation to climate, rock type, structure & tectonics. Weathering, Davis and Penck theories of cycle of erosion, upliftment, mass movement. Fluvial Geomorphology, fluvial land forms, Karst topography. Essential conditions for formation of Karst Topography.	15	4
V	Glacial features, type of glaciers & glacial land forms. Effect of wind erosion, Major aeolian landforms. Drainage patterns, Morphometric analysis of drainage basins & its significance. Applied Geomorphology- Application of Geomorphology in mineral prospecting, Civil engineering, Hydrology & environmental studies.	15	5

Books Recommended:

1. Condie, K. C. 1989. Plate Tectonics and Crustal Evolution. Oxford: Pergamon.
2. Philip Kearey, Keith A. Klepeis, Frederick J. Vine,2009. Global Tectonics.Wiley-Blackwell.
3. Beloussov, V.V. (1962). Basic Problems in Geotectonics. McGraw-Hill Book Co., New York.
4. A. Holmes, Third Edition, Principle of Physical Geology, A Halsted Press Book.
5. William D. Thornbury, Second Edition , Principles of Geomorphology.

6. Savindra Singh, Geomorphology, Pravalika Publications, Allahabad.

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M.Sc. (Geology) Semester-I

Program	Subject	Year	Semester
M.Sc.	Geology	1	I
Course Code	**Course Title**		**Course Type**
GEO-105	**Lab Course - I**		Core
Credit	**Hours Per Week (L-T-P)**		
	L	**T**	**P**
3	0	0	6
Maximum Marks	**CIA**		**ESE**
100	30		70

Learning Objective (LO):

The primary goal of this course is to provide students with a comprehensive understanding of both the macroscopic and microscopic details of minerals. Additionally, the course aims to instruct students in the calculation of mineral formulae, enabling them to analyze and interpret the composition of various minerals. Furthermore, students will be equipped with a thorough understanding of the concepts of lines and planes, including the attitude of planes and lines. This will encompass the study of bedding planes, as well as the measurement and interpretation of dip and strike. Moreover, the course will cover the preparation and interpretation of geological maps, allowing students to analyze and understand geological features and formations on a map. Lastly, students will also learn to prepare stereographic projections and solve the Three-Point Problem, enhancing their ability to represent and analyze geological structures in three dimensions.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to :	CL
1	Morphological study of crystal models and twins	U
2	Megascopic study of common rock forming minerals. Microscopic study of common rock forming minerals.	U
3	Preparation and interpretation of geological maps for simple structure contour maps, as well as, for fold, fault and unconformity	Ap
4	Stereographic projection – problems in angular relationship true dip, apparent dip plunge and rake of the intersection of planes	An
5	Three point problems: Geometric solutions for three-point problems	E

CL: Cognitive Levels (**R**-Remember; **U**-Understanding; **Ap**-Apply; **An**-Analyze; **E**-Evaluate; **C**-Create).

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Department of Geology

M.Sc. I Semester Session – July-Dec-2025

Subject – Geology

Course/Paper – V (Code – GEO-105)

Course Title – Lab Course - I

Detailed Syllabus / Curriculum:

	List of experiments
1	Megascopic and microscopic study of common rock forming minerals.
2	Determination of pleochroic scheme, anorthite content of plagioclase feldspar, estimation of birefringence.
3	Determination of order of interference colour and sign of elongation.
4	Study of interference figures and determination of optic sign.
5	Study of holohedral and hemihedral, hemimorphic and allotriomorphic forms of all crystal system
6	Stereographic projection.
7	Concept on line & plane, altitude of line & plane, dip & strike their measurements.
8	Stereographic projection: problems in angular relationship- True dip, apparent dip, Plunge & Rock of the intersection of plane, Beta and Pi diagrams.
9	Study of minor structure in Hand specimens.
10	Preparation and interpretation of Geological maps- for inclined strata, folds, faults & unconformity.
11	Exercise related to Three point problems and completion of outcrop.

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M.Sc. (Geology) Semester-I

Program	Subject	Year	Semester
M.Sc.	Geology	1	I
Course Code	**Course Title**		**Course Type**
GEO-106	**Lab Course - II**		Core
Credit	**Hours Per Week (L-T-P)**		
	L	**T**	**P**
3	0	0	6
Maximum Marks	**CIA**		**ESE**
100	30		70

Learning Objective (LO):

The primary objective of this course is to enable students to identify the various stratigraphic rocks and formations found in India. Students will also gain an understanding of plate tectonics and its morphology as part of the curriculum. Additionally, the course will cover the study of various geomorphological models to provide a comprehensive understanding of the subject matter.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to :	CL
1	Identify Various stratigraphic rocks and formations of India	**U**
2	Identify world major cratons and shields and mark them on map of world	**U**
3	Make a well structured geological time scale depicting various aspects viz, flora and fauna, palaeogeography, etc.	**Ap**
4	Mark on the map of India, the Physiographic and Tectonic divisions of Indian Subcontinent	**An**
5	Identify fossils in hand specimens	**E**

CL: Cognitive Levels (**R**-Remember; **U**-Understanding; **Ap**-Apply; **An**-Analyze; **E**-Evaluate; **C**-Create).

Govt. Nagarjuna P.G. College of Science, Raipur (C.G.)

Department of Geology

M.Sc. I Semester Session – July-Dec-2025

Subject – Geology

Course/Paper – VI (Code – GEO-106)

Course Title – Lab Course - II

Detailed Syllabus / Curriculum

	List of experiments
1	Study of stratigraphic rocks from important geological formation of India.
2	Plotting of important stratigraphic formation of World and India on the map and discussion about them
3	Exercise related to the stratigraphic correlation and principles of stratigraphy.
4	Exercise related to geological time scale in context of evolution of flora and fauna.
5	Exercise related to geological time scale on type area and pioneer workers.
6	Study of typical vertebrate and invertebrate fossils from different Indian stratigraphic horizons.
7	Study of plant fossils of Gondwana formation
8	Pictorial representation and its interpretation exercise related to plate tectonics.
9	Study of geomorphological models related to fluvial, glacial, Aeolian and volcanic landforms.
10	Exercise on various type of drainage patterns.
11	Morphometric analysis of drainage patter; bifurcation ratio, number of stream, length of streams, stream frequency, drainage density and interpretation their of
12	Exercise on Earthquake belt of India and World.
13	Exercise on volcanic belt distribution in World.

Name and Signature of BOS Chairman & Members:-

S.No.	Designation	Name	Signature
1	Head of Department	Dr. Sandeep Vansutre	
2	External Subject Expert 1	Dr. Neeraj Vishwakarma	07/12/25
3	External Subject Expert 2	Dr. S.D. Deshmukh	
4	External Subject Expert 3	Dr. Ninad Bodhankar	02.07.25
5	Representative from Industry	Mr. Alok Verma	7/7/25
6	Student's Representative	Mr. Pradhumn Soni	

M.Sc. (Geology) Semester-I

Program	Subject	Year	Semester
M.Sc.	Geology	1	I
Course Code	**Course Title**		**Course Type**
GEO-501	**Indian Knowledge System**		Core
Credit	**Hours Per Week (L-T-P)**		
	L	**T**	**P**
2	5	1	0
Maximum Marks	**CIA**		**ESE**
100	30		70

Learning Objective (LO):

This subject aims to enable students to critically analyze traditional Indian observations related to geological features, soil types, and water bodies, and connect them with modern geological concepts. Students will understand how indigenous knowledge has informed sustainable practices in resource utilization and environmental management, particularly relevant to the diverse geological settings across India.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Understand the historical evolution and foundational principles of geological knowledge within ancient Indian texts and traditions.	U
2	Identify and interpret concepts related to Earth sciences, minerals, and natural phenomena as described in classical Indian literature and practices.	An
3	Compare and contrast traditional Indian perspectives on geology with modern scientific understanding.	An
4	Analyze the practical applications of traditional Indian knowledge in areas like water management, mineral identification, and construction.	Ap
5	Appreciate the holistic approach of Indian knowledge systems towards Earth and natural resources, fostering interdisciplinary thinking.	E

CL: Cognitive Levels (**R**-Remember; **U**-Understanding; **Ap**-Apply; **An**-Analyze; **E**-Evaluate; **C**-Create)

Govt. Nagarjuna P.G. College of Science, Raipur (C.G.)

Department of Geology

M.Sc. I Semester Session – July-Dec -2025

Subject – Geology

Course/Paper – Indian Knowledge System (Code – GEO-501)

Course Title – Indian Knowledge System

Detailed Syllabus / Curriculum:

Unit No.	Topics	No. of Lectures	CO No.
I	Introduction to Indian Knowledge System (IKS): Definition, origin, and evolution of IKS. Philosophical foundations of Indian cosmology and Earth science. Overview of key texts: Vedas, Puranas, Upanishads, Smritis, and their geological relevance. Concept of Panchamahabhuta (five elements) and its correlation with Earth systems. Concept of Vasudhev kutumbakam, Concept of ten takten bhunjita, concept of Advait, aduality or non duality. Relation between matter and energy and concept of quantum entanglement.	15	1
II	Ancient Indian Perspectives on Earth and the Universe:- Indian cosmogony: Srishti (Creation), Pralaya (Destruction), and cycles of Yugas. Concepts of time (Kalachakra), space, and geocentric universe. Indian astronomical-geological linkages: motion of planets, eclipses, and Earth processes. Earthquake, volcano, and other natural phenomena in ancient texts (e.g., Brihat Samhita). Indigenous methods of predicting natural disasters.Earthquake-resistant architecture in historical temples and forts in context of Geological Perspective.	15	2
III	Traditional Geological Knowledge in Ancient India:- Mineral and rock knowledge in Ayurveda and Rasashastra. Ancient classifications of soils (Bhumi Vijnana): types, fertility, and use in agriculture and construction. Ancient Indian mining practices and documentation (e.g., Kautilya's Arthashastra, Rasaratna Samuccaya). Traditional mining and metallurgy (iron, gold, copper, zinc): tools, furnaces, and smelting. Use of minerals and rocks in medicine, construction, and rituals. Traditional ecological knowledge (TEK) and geoconservation ethics.	15	3
IV	Integration with Modern Geological Science:- Comparative analysis of ancient knowledge with modern lithology, mineralogy, seismology, and hydrology. Sustainability and environmental ethics in ancient Indian texts. Role of IKS in sustainability, climate change mitigation, and disaster resilience. Contributions of historical figures like Varahamihira, Aryabhata, and Nagarjuna to Earth Science.	15	4
V	Importance of rivers and causes of their worship. Plants as a bioindicator of minerals and groundwater in IKS. Knowledge of groundwater and hydrogeology: wells, stepwells (Baolis), talabs (Ponds), as a source of conjunctive use of groundwater with special reference to ponds of Raipur. Groundwater mapping and well-digging traditions based on rock-soil understanding. Ancient Water management System with special reference to Chhattisgarh.	15	5

Books Recommended:

1. Varahamihira. (1996). *Brihat Samhita* (M. Ramakrishna Bhat, Trans.). Motilal Banarsidass Publishers.
   (Original work ~6th century CE)
2. Kautilya. (1992). *Arthashastra* (L. N. Rangarajan, Trans.). Penguin Books.
   (Original work ~4th century BCE)
3. Anonymous. (1909). *Rasaratna Samuccaya* (P. C. Ray, Ed. & Trans.). Calcutta University Press.
   (Original Sanskrit work ~13th century CE)
4. Surapala. (1996). *Vrikshayurveda: The Science of Plant Life* (G. P. Majumdar, Trans.). The Asian Agri-History Foundation.
   (Original work ~10th century CE)
5. Agrawal, D. P. (1985). *Science and technology in ancient India*. Rupa Publications.
6. Subbarayappa, B. V. (2001). *Science in India: A historical perspective*. National Book Trust.
7. Paranjape, M. R. (2015). *The death and afterlife of Mahatma Gandhi*. Penguin Random House India. *(For philosophical context relevant to time, space, and cosmology in IKS)*
8. Kapoor, K. (Ed.). (2012). *Encyclopedia of Hinduism* (Vols. 1–11). Rupa Publications & Indira Gandhi National Centre for the Arts.
9. Dhar, M. L. (2017). *Ancient Indian mining and metallurgy*. Rupa Academic / IGNCA.
10. Iyengar, R. N. (Ed.). (Various years). Articles in *Indian Journal of History of Science*. Indian National Science Academy. *(Especially issues covering earthquakes, hydrology, cosmology in Indian texts)*

Name and Signature of BOS Chairman & Members:-

S.No.	Designation	Name	Signature
1	Head of Department	Dr. Sandeep Vansutre	
2	External Subject Expert 1	Dr. Neeraj Vishwakarma	
3	External Subject Expert 2	Dr. S.D. Deshmukh	
4	External Subject Expert 3	Dr. Ninad Bodhankar	
5	Representative from Industry	Mr. Alok Verma	
6	Student's Representative	Mr. Pradhumn Soni	

M.Sc. (Geology) Semester-II

Program	Subject	Year	Semester
M.Sc.	Geology	1	II
Course Code	**Course Title**		**Course Type**
GEO-201	**Igneous and Metamorphic Petrology**		Core
Credit	**Hours Per Week (L-T-P)**		
	L	**T**	**P**
4	5	1	0
Maximum Marks	**CIA**		**ESE**
100	30		70

Learning Objective (LO):

The primary objective of this course is to offer students a comprehensive understanding of magma composition. It aims to cover the fundamental aspects of different magmatic processes and various classification schemes for igneous rocks. Additionally, the course will delve into the connection between plate tectonics and magma generation. Furthermore, it will explore phase diagrams and their practical applications in the field. Moreover, the course will focus on the petrogenesis of various rock types, providing in-depth knowledge to the students. Another key goal of this course is to educate students about the concepts, processes, and structures involved in metamorphism. It will cover the fundamentals of metamorphic textures, structures, and mineral assemblage, offering a detailed understanding of these aspects. Furthermore, the course will involve the estimation of P-T conditions using mineral reactions and the thermodynamic system.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Explain principles concepts of petrology, petrography & petrogenesis.	U
2	Classify the igneous rocks and describe their megascopic and microscopic characters. Describe the evolution of magma.	U
3	Identify various forms, structures and textures of metamorphic rocks. Classify the metamorphic rocks and describe their megascopic and microscopic characters.	U
4	Demonstrate the metamorphic mineral assemblages in ACF, AKF, and AFM, diagrams.	An
5	Explain paired metamorphic belts with reference to Plate Tectonics.	U

CL: Cognitive Levels (**R**-Remember; **U**-Understanding; **Ap**-Apply; **An**-Analyze; **E**-Evaluate; **C**-Create)

Govt. Nagarjuna P.G. College of Science, Raipur (C.G.)

Department of Geology

M.Sc. II Semester Session – Jan-June -2026

Subject – Geology

Course/Paper – I (Code – GEO-201)

Course Title – Igneous and Metamorphic Petrology

Detailed Syllabus / Curriculum:

Unit No.	Topics	No. of Lectures	CO No.
I	Magma, Definition, Composition, Characteristics, Factors causing diversity in igneous rocks - Differentiation, Assimilation. Origin & evolution of magma, magmatism related to plate tectonics. Classification of Igneous rocks important chemical, mineralogical, textural CIPW & IUGS classification. Reaction Principles and Bowen's reaction Series. Significance of Bowen's Reaction Series	15	1
II	Principles and general concept of petrology, petrography & petrogenesis. Various forms, structures and textures of igneous rocks & their significance in petrogenesis. Phase equilibria of unicomponent, Binary (mixed & Eutectic), Ternary (Albite Anorthite- Diopside) Silicate system. Petrographic Provinces of India.	15	2
III	Petrography, Petrogenesis & Indian occurrences of the following Granite, alkaline rocks ; Monomineralic rocks (Dunite, Anorthosite) ; Basalt, Andesite, Spillite, Lamprophyre ; Ultramafic rocks, carbonatite, pegmatite, Kimberlite.	15	3
IV	Metamorphism: Definition, Agents, Types . Structure & texture of metamorphic rocks, metamorphic grades, Zones. Metamorphic Facies, Graphic representation of metamorphic mineral assemblages, ACF, AKF, and AFM, diagrams Classification of metamorphic rocks.	15	4
V	Regional and Thermal metamorphism of mafic, ultramafic rocks, pelitic sediments, and impure calcareous rocks. Retrograde metamorphism. P-T-t paths and their significance Metasomatism and its types. Facies of low, medium and high-grade metamorphism Paired metamorphic Belts. Ultrahigh-pressure metamorphism, Ultra high temperature metamorphism. Study of important metamorphic rocks- Granulite, Charnockite, Eclogite, migmatites, Khondalite, Gondites.	15	5

Books Recommended:

1. G.W. Tyrell, Principles of Petrology
2. H. William, F.J. Turner & E.M. Gilbert, Petrology
3. S.C. Chatterjee, Petrology of Igneous and metamorphic rocks of India.
4. John D. Winter, Second Edition, Principles of Igneous and Metamorphic Petrology, Pearson New international Edition.

Name and Signature of BOS Chairman & Members:-

S.No.	Designation	Name	Signature
1	Head of Department	Dr. Sandeep Vansutre	
2	External Subject Expert 1	Dr. Neeraj Vishwakarma	07/2/25
3	External Subject Expert 2	Dr. S.D. Deshmukh	
4	External Subject Expert 3	Dr. Ninad Bodhankar	07.02.25
5	Representative from Industry	Mr. Alok Verma	7/7/25
6	Student's Representative	Mr. Pradhumn Soni	

M.Sc. (Geology) Semester-II

Program	Subject	Year	Semester
M.Sc.	Geology	1	II
Course Code	**Course Title**		**Course Type**
GEO-202	**Sedimentary Petrology & Crustal Evolution**		Core
Credit	**Hours Per Week (L-T-P)**		
	L	**T**	**P**
4	5	1	0
Maximum Marks	**CIA**		**ESE**
100	30		70

Learning Objective (LO):

The course is designed to provide students with a comprehensive understanding of sedimentary processes and the formation of sedimentary rocks. It covers the examination of structures and textures, as well as the classification of sedimentary rocks. Additionally, it delves into the study of sedimentary environments and facies, exploring their application in paleo-current and paleo-slope analysis, as well as diagenesis and lithification. Students will also gain knowledge about sedimentary basins and sequence stratigraphy, and how these concepts are applied in sedimentary petrogenesis.

Course Outcomes (CO):

CO No.	**Expected Course Outcomes** **At the end of the course, the students will be able to:**	**CL**
1	Evaluate the role of various sedimentary environments in the formation of sedimentary rocks	**U**
2	Identify various forms, structures and textures of sedimentary rocks.	**U**
3	Classify the sedimentary rocks and describe their megascopic and microscopic characters.	**U**
4	Summarize Field and Laboratory techniques in Sedimentology.	**An**
5	Understand the concept of sedimentation in relation to plate tectonics.	**U**

CL: Cognitive Levels (**R**-Remember; **U**-Understanding; **Ap**-Apply; **An**-Analyze; **E**-Evaluate; **C**-Create)

Govt. Nagarjuna P.G. College of Science, Raipur (C.G.)

Department of Geology

M.Sc. II Semester Session – Jan-June -2026

Subject – Geology

Course/Paper – II (Code – GEO-202)

Course Title – Sedimentary Petrology and Crustal Evolution

Detailed Syllabus / Curriculum:

Unit No.	Topics	No. of Lectures	CO No.
I	Sedimentary Rock, Processes of sedimentation. Classification of Sedimentary Rocks; Clastic (Rudaceous, arenaceous and argillaceous), Non-clastic (biogenic, chemically precipitated and evaporites). Mineral stability, Quartz, Felspar and heavy minerals as Province indicator. Rudaceous rocks - Conglomerate and Breccia and their classification. Arenaceous rock - Dot's Classification of Sandstone, Argillaceous Sedimentary rocks (lutaceous), their composition and environment of deposition. Folks and Dunham's Classification of Limestone.	15	1
II	Textural analysis of sediments, Grain size measurements Udden-Wentworth and Krumbin Phi scale. Porosity and Permeability. Graphical representation and statistical treatment and geological significance in clastic sedimentary rocks. Petrogenesis of arkoses, greywacke and quartz arenites. Definition and Process of formation of Evaporite and Volcanoclastic sediments and Dolomite.	15	2
III	Sedimentary structures: Mechanical, Chemical and biogenic sedimentary structures and their significance including top and bottom criteria. Palaeocurrent analysis for paleoenvironmental studies and basin analysis. Post depositional changes: Lithification and diagenesis in clastic and non-clastic rocks and their effects. Application of Trace, REE and stable isotope geochemistry in sedimentological interpretations.	15	3
IV	Introduction to Sedimentary facies, Depositional environments: Marine, Transitional, Continental. Types of delta, Recognition of ancient Delta, Walthers law, Sequence stratigraphy, Elementary idea of Basin analysis, Basin evolution and tectonics. Clay mineralogy: Introduction, Classification, Origin and Economic importance.	15	4
V	Development of Proterozoic sedimentary basins in India, Concept of intracratonic basins and rift basins. Wilson cycle and crustal evolution. Relation of sedimentary basins with Plate tectonics. Greater Indian continental plate during Proterozoic and Palaeozoic. Plate Tectonics and sedimentation, fore arc basins, back arc basins, flysch and molasse facies.	15	5

Books Recommended:

1. S.M. Sengupta. Second Edition, Introduction to Sedimentology , CBS Publishers
2. Blatt, H., Middleton, G.V. and Murray, R.C., Second Edition, Origin of Sedimentary Rocks
3. Collinson, J.D., and Thompson, D.B., Fourth Edition, Sedimentary Structures

4. Palaeocurrents and Basin analysis By Potter, P.E., & Pettijohn, F. J.
5. A Practical Approach to Sedimentology, George Allen and Unwin, London.
6. Sedimentary Rocks (3rd Ed.), Pettijohn; F.J. (1975).

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1	Head of Department	Dr. Sandeep Vansutre	
2	External Subject Expert 1	Dr. Neeraj Vishwakarma	
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5	Representative from Industry	Mr. Alok Verma	
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M.Sc. (Geology) Semester-II

Program	Subject	Year	Semester
M.Sc.	Geology	1	II
Course Code	**Course Title**		**Course Type**
GEO-203	**Economic Geology-I (Ore Forming Processes)**		Core
Credit	**Hours Per Week (L-T-P)**		
	L	**T**	**P**
4	5	1	0
Maximum Marks	**CIA**		**ESE**
100	30		70

Learning Objective (LO):

This course aims to provide students with a comprehensive understanding of the fundamental geological, physical, and chemical processes that lead to the concentration of economic minerals. Students will learn to classify different ore deposit types based on their formation mechanisms and to recognize the geological settings conducive to their development. Ultimately, the objective is to equip students with the knowledge necessary to explore for and assess potential ore deposits by applying principles of ore genesis.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Explain various processes of ore formation.	U
2	Describe ores of various affiliations.	U
3	Explain mode of occurrence of ore bodies and ore textures.	U
4	Explain mode of occurrence of coal, petroleum in India.	An
5	Understand the concept of ore deposition in relation to plate tectonics.	U

CL: Cognitive Levels (**R**-Remember; **U**-Understanding; **Ap**-Apply; **An**-Analyze; **E**-Evaluate; **C**-Create)

Govt. Nagarjuna P.G. College of Science, Raipur (C.G.)

Department of Geology

M.Sc. II Semester Session – Jan-June -2026

Subject – Geology

Course/Paper – III (Code – GEO-203)

Course Title – Economic Geology-I (Ore Forming Processes)

Detailed Syllabus / Curriculum:

Unit No.	Topics	No. of Lectures	CO No.
I	Historical development of theories of ore genesis and classification of mineral deposits. Ore bearing fluids, their origin and migration. Morphology of ore bodies. and their classification. Textures, paragenesis and zoning in ores and their significance in the ore genesis studies	15	1
II	Ore localization: structural, physico-chemical and stratigraphic controls of ore localization. Wall rock alteration and Skarn deposits with Indian examples. Sedimentary processes: precipitation, residual and mechanical concentration, evaporation and their resulting deposits. Oxidation and supergene enrichment processes. Chemical reactions in zone of oxidation and zone of enrichment	15	2
III	Magmatic deposits: Early and late magmatic processes, assimilation, filter pressing, gravity accumulation, dissemination. Pegmatites and process of pneumatolysis. Hydrothermal processes of ore formation. Essential conditions for the formation of hydrothermal deposits. Cavity filling and replacement. Morphology of various cavity filling deposits.	15	3
IV	Fundamental idea about principle and applications of fluid inclusion studies. Metamorphic and metasomatic processes of ore deposition. Study of geothermobarometry and its implication in metamorphic process. Plate tectonics and mineral deposits- global and Indian perspective	15	4
V	Processes of formation of radioactive minerals. Basic concepts of origin of coal. Origin of petroleum. Petroleum system: Concepts and definitions. Migration and accumulation of Petroleum. Structural, stratigraphic and Mixed Traps. Metallogenetic epoch and provinces in global as well as Indian context.	15	5

Books Recommended:

1. Guilbert, J.M. and Park Jr., C.F. (1986) The Geology of Ore deposits. Freeman & Co.
2. Bateman, A.M. and Jensen, M.L. (1990) Economic Mineral Deposits. John Wiley.
3. Evans, A.M. (1993) Ore Geology and Industrial minerals. Wiley
4. Laurence Robb. (2005) Introduction to ore forming processes. Wiley.

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3	External Subject Expert 2	Dr. S.D. Deshmukh	
4	External Subject Expert 3	Dr. Ninad Bodhankar	07.07.25
5	Representative from Industry	Mr. Alok Verma	7/7/25
6	Student's Representative	Mr. Pradhumn Soni	

M.Sc. (Geology) Semester-II

Program	Subject	Year	Semester
M.Sc.	Geology	1	II
Course Code	**Course Title**		**Course Type**
GEO-204	**Economic Geology-II (Indian Mineral Deposits: Metallic, Non-Metallic and Fossil Fuel)**		Core
Credit	**Hours Per Week (L-T-P)**		
	L	**T**	**P**
4	5	1	0
Maximum Marks	**CIA**		**ESE**
100	30		70

Learning Objective (LO):

This course aims to familiarize students with the distribution, characteristics, and economic significance of India's major metallic, non-metallic, and fossil fuel resources. Students will gain an understanding of the geological settings and controls on the formation of these deposits within the Indian subcontinent. The objective is to provide a foundation for assessing resource potential and their role in the nation's development.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Describe various ore deposits of India..	**U**
2	Describe distribution of coal, petroleum and radioactive minerals in India.	**U**
3	Understand the deposit in relation to geological setting.	**U**
4	Understand the characteristics of various metallic and non-metallic deposits.	**An**
5	Understand the distribution of various metallic and non-metallic deposits.	R

CL: Cognitive Levels (**R**-Remember; **U**-Understanding; **Ap**-Apply; **An**-Analyze; **E**-Evaluate; **C**-Create)

Govt. Nagarjuna P.G. College of Science, Raipur (C.G.)

Department of Geology

M.Sc. II Semester Session – Jan-June -2026

Subject – Geology

Course/Paper – IV (Code – GEO-204)

Course Title – Economic Geology-II (Indian Mineral Deposits: Metallic, Non-Metallic and Fossil Fuel)

Detailed Syllabus / Curriculum:

Unit No.	Topics	No. of Lectures	CO No.
I	Mineralogical characteristics, geological setting, genesis (in short), distribution and uses of following ore deposits in India: Iron; Manganese; Lead; Zinc; Chromium; Nickel; Aluminium	15	1
II	Mineralogical characteristics, geological setting, genesis (in short), distribution and uses of following ore deposits in India: Platinum; Cobalt; Gold; Silver; Tin; Tungsten; Molybdenum; Copper	15	2
III	Characteristics, geological setting, genesis (in short), distribution and application of following non metallic deposits of India: Limestone; Dolomite; Gypsum and various Clays; Phosphorite; Feldspars; Sillimanite, kyanite, Andalusite	15	3
IV	Characteristics, geological setting, genesis (in short), distribution and application of following non metallic deposits of India: Baryte (heavy spar), Micas; Asbestos, Graphite, Talc; Diamond, Garnet, Corundum; Gem mineral deposits	15	4
V	Study of coal and petroleum economics in global perspective. Petroleum deposits of India. Characteristics, grades, origin, geological setting, distribution and uses of Indian coal deposits with special reference to Chhattisgarh. Radioactive mineral deposits of India	15	5

Books Recommended:

1. Gokhale, K.V.G.K. and Rao, T.C. (1978) Ore deposits of India their distribution and processing, Tata-McGraw Hill, New Delhi.
2. Deb, S. (1980) Industrial minerals and rocks of India. Allied Publishers.
3. Sarkar, S.C. and Gupta, A. (2014) Crustal Evolution and Metallogeny in India. Cambridge Publications.

Name and Signature of BOS Chairman & Members:-

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M.Sc. (Geology) Semester-II

Program	Subject	Year	Semester
M.Sc.	Geology	1	II
Course Code	**Course Title**		**Course Type**
GEO-205	**Lab Course - I**		Core
Credit	**Hours Per Week (L-T-P)**		
	L	**T**	**P**
3	0	0	6
Maximum Marks	**CIA**		**ESE**
100	30		70

Learning Objective (LO):

This lab course aims to develop students' practical skills in identifying and characterizing igneous, sedimentary, and metamorphic rocks and minerals through hand specimen and microscopic analysis. Students will learn to interpret textures, structures, and mineral assemblages to deduce rock origins, geological processes, and reconstruct earth history. Furthermore, the course will focus on the megascopic and microscopic identification of economically important minerals and ores, linking their characteristics to their formation processes and potential applications.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to :	CL
1	Megascopic and Microscopic identification & description of Igneous & Metamorphic rocks.	U
2	Megascopic and Microscopic study of sedimentary rocks	U
3	Plotting the geographic distribution of igneous, sedimentary and metamorphic rock types on outline map of India.	Ap
4	Megascopic study of ore minerals in hand specimens. Identification of ore minerals in polished sections.	An
5	Plotting of famous ore deposits of world as well as India on the maps their off	E

CL: Cognitive Levels (**R**-Remember; **U**-Understanding; **Ap**-Apply; **An**-Analyze; **E**-Evaluate; **C**-Create).

Govt. Nagarjuna P.G. College of Science, Raipur (C.G.)

Department of Geology

M.Sc. II Semester Session – Jan-Jun -2025

Subject – Geology

Course/Paper – V (Code – GEO-205)

Course Title – Lab Course - I

Detailed Syllabus / Curriculum:

	List of experiments
1	Megascopic identification & description of Igneous & Metamorphic rocks.
2	Study of textures & Structures of Igneous & Metamorphic rocks.
3	Microscopic Identification of igneous & metamorphic rocks.
4	Plotting the geographic distribution of igneous & metamorphic rock types in outline map of India.
5	C.I.P.W. norm calculation
6	Construction of variation diagram.
7	Construction of ACF & AKF diagram.
8	Application of MVPM software
9	Megascopic study of clastic sedimentary rocks (conglomerates, breccias, sandstones and shales) and non clastic sedimentary rocks (limestones, fossiliferous limestones including stromatolitic limestones and dolomites).
10	Microscopic study of clastic and non- clastic rocks as given above.
11	Estimation of sphericity and roundness of grains.
12	Identification of sedimentary structures and interpretation of depositional environments.
13	Construction and interpretation of rose diagrams using palaeocurrent data
14	Interpretation of texture, structures, based on line drawing.
15	Megascopic study of ore minerals in hand specimens.
16	Identification of ore minerals in polished sections.
17	Study of ore textures and structures.
18	Practical related to application of ores in various industries.
19	Plotting of famous ore deposits of world as well as India on the maps their off.

Name and Signature of BOS Chairman & Members:-

S.No.	Designation	Name	Signature
1	Head of Department	Dr. Sandeep Vansutre	
2	External Subject Expert 1	Dr. Neeraj Vishwakarma	03/2/25
3	External Subject Expert 2	Dr. S.D. Deshmukh	
4	External Subject Expert 3	Dr. Ninad Bodhankar	07.02.25
5	Representative from Industry	Mr. Alok Verma	11/2/25
6	Student's Representative	Mr. Pradhumn Soni	

M.Sc. (Geology) Semester-II

Program	Subject	Year	Semester
M.Sc.	Geology	1	II
Course Code	**Course Title**		**Course Type**
GEO-206	**Lab Course - II (Project/Field Work)**		Core
Credit	**Hours Per Week (L-T-P)**		
	L	**T**	**P**
3	0	0	6
Maximum Marks	**CIA**		**ESE**
100	30		70

Learning Objective (LO):

This project/fieldwork course aims to develop students' essential practical skills in geological data acquisition, analysis, and interpretation in natural settings. Students will learn to apply theoretical geological knowledge to real-world problems, conducting independent observations, measurements, and mapping to characterize geological features and processes. The objective is to foster critical thinking, problem-solving, and scientific communication skills through hands-on experience in geological fieldwork and project execution.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to :	CL
1	Independently plan and execute geological fieldwork, including site selection, safety protocols, and data collection strategies.	Ap
2	Conduct accurate geological mapping, measure structural features, and collect representative samples in various geological settings.	Ap
3	Analyze and interpret field-collected geological data to construct geological sections, maps, and models.	An
4	Prepare a comprehensive project report documenting methodologies, findings, interpretations, and conclusions of the field investigation.	E
5	Effectively communicate geological observations and interpretations through oral presentations and discussions.	E

CL: Cognitive Levels (**R**-Remember; **U**-Understanding; **Ap**-Apply; **An**-Analyze; **E**-Evaluate; **C**-Create).

Govt. Nagarjuna P.G. College of Science, Raipur (C.G.)

Department of Geology

M.Sc. II Semester Session – Jan-Jun -2025

Subject – Geology

Course/Paper – VI (Code – GEO-206)

Course Title – Lab Course - II (Project/Field Work)

Detailed Syllabus / Curriculum:

Content
Lab course II will consist of submission of a project report on the topic allotted to student by the supervisor and evaluation of the report by an external examiner.

Name and Signature of BOS Chairman & Members:-

S.No.	Designation	Name	Signature
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3	External Subject Expert 2	Dr. S.D. Deshmukh	
4	External Subject Expert 3	Dr. Ninad Bodhankar	07-02-25
5	Representative from Industry	Mr. Alok Verma	7/7/25
6	Student's Representative	Mr. Pradhumn Soni	