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

CURRICULUM & SYLLABI

(Based on CBCS & LOCF)

Bachelor of Science (Geology)
(NEP : Pilot Project)
(VII & VIII 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.

B.Sc. VII & VIII Semester

Program	Eligibility Criteria
B.Sc. Honours	Pass – Semester 1st to 6th
B.Sc. Honours with Research	Pass – Semester 1st to 6th with CGPA ≥ 7.5 or ≥75%

Course Structure

Semester	Course	Paper Title	T/P	ESE	CIA	M.M.	P.M.	Credit
VII	DSC	Mineralogy, Mineral Optics & Crystallography	T	40	10	50	20	4
	DSE – 1	Structural Geology	T	40	10	50	20	4
	DSE – 2	Principles of Stratigraphy, Indian Geology & Palaeontology	T	40	10	50	20	4
	DSE – 3	Geodynamics and Geomorphology	T	40	10	50	20	4
	Lab Course – A		P	50	-	50	20	2
	Lab Course – B		P	50	-	50	20	2
	Research Methodology		T	40	10	50	20	4
	Total		-	**300**	**50**	**350**	-	**24**

Semester	Course	Paper Title	T/P	ESE	CIA	M.M.	P.M.	Credit
VIII	DSC	Igneous and Metamorphic Petrology	T	40	10	50	20	4
	DSE – 1	Sedimentary Petrology and Crustal Evolution	T	40	10	50	20	4
	DSE – 2	Economic Geology (Processes & Deposits)	T	40	10	50	20	4
	Lab Course		P	50	-	50	20	2
	Dissertation / Research Project*		T	150	-	150	60	10
	Total		-	**320**	**30**	**350**	-	**24**

* The research outcome of their project work may be published in peer- reviewed journals or may be presented in conferences/seminars or may be patented.

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Question Paper pattern & Marks distribution in ESE-

No. of Units	Section	No. of Ques.	Marks per Question	Total Marks	Remarks
05	A	10	1	10	Two Ques. From each unit is compulsory
	B	5	2	10	One Ques. From each unit with internal choice
	C	5	4	20	One Ques. From each unit with internal choice
Total			-	**40**	

Marks distribution in Dissertation/Research Project-

Report	-	70
Presentation	-	30
Comprehensive viva-voce	-	20
Internal Assessment	-	30
Total	-	**150**

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Department of Geology
Syllabus (B.Sc. VII Sem)

THEORY

Part A – Introduction

SEM VII

Program: Bachelor in Science (Certificate/Diploma/Degree)	Class: B.Sc. VII Sem	Year: 2025	Session: 2025-26

Subject: Geology

1.	Course Code	S VII-GEO-1T	
2.	Course Title	Mineralogy, Mineral Optics & Crystallography (Paper I)	
3.	Course Type	Discipline Specific Course (DSC) Theory	
4.	Pre-requisite (if any)	To study this course, a student must pass B.Sc. I-VI Sem course with Geology as one subject.	
5.	Course Learning Outcomes (CLO)	On completion of course student will be able to- 1. Identify the rock-forming minerals. 2. Describe the characteristics of Nesosilicates, Sorosilicates and Ring Silicates. 3. Explain the characteristics of Inosilicates, Phyllosilicates, and Tectosilicates. 4. Explain the optical mineralogical characteristics of various rock forming silicates. 5. Discuss the symmetry characteristics and forms of various crystal systems.	
6.	Credit Value	4	
7.	Marks	Max. Marks- 10 + 40	Min. Marks - 20

Part B – Content of the Course

Total numbers of Lectures (in hours):60		
Unit	**Topics**	**Number of Lectures**
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.	12

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II	Structure, chemistry, physical properties, optical properties & Paragenesis of 1) Feldspars, Feldspathoid, 2) Quartz & Garnet. 3) Pyroxenes, Amphiboles, 4) Micas, Olivines.	12
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.	12
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.	12
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.	12

Part C – Learning Resources

Text Books, Reference Books, Other resources
Suggested Readings: 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
Suggested equivalent online courses:

Part D – Assessment and Evaluation

Suggested Continuous Evaluation Methods: Internal (CCE)+ External Assessment (ESE)				
Assessment	**Mode**	**Max. Marks**	**Min. Marks**	**Pattern**
CCE	Class Test/ Assignment/Presentation	10	04	Unit wise class test
ESE	University Exam	40	16	Objective 10 Ques.compulsory, 5-5 short ans. and long ans. type questions with choice within units.
	Total Marks	50	20	

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Department of Geology
Syllabus (B.Sc. VII Sem)

THEORY **Part A – Introduction** **SEM VII**

Program: Bachelor in Science (Certificate/Diploma/Degree)	Class: B.Sc. VII Sem	Year: 2025	Session: 2025-26
Subject: Geology			

1.	Course Code	S VII-GEO-2T
2.	Course Title	Structural Geology (Paper II)
3.	Course Type	Discipline Specific Elective (DSE-1) Theory
4.	Pre-requisite (if any)	To study this course, a student must have had passed the preceding semester with Geology
5.	Course Learning Outcomes (CLO)	On completion of course student will be able to- 1. Explain the concept of strain and its effects on Geometry. 2. Identify Unconformity and idea about it. 3. Identify and distinguish various geological structures on photographs, geological maps and in 4. field. 5. Illustrate the planar and linear fabrics in deformed rock. 6. Predict the concept of stress forces acting in the earths and its resultant structural changes. The Geometry, Types and Mechanism of Faulting and Folding.
6.	Credit Value	4
7.	Marks	Max. Marks- 10 + 40 / Min. Marks - 20

Part B – Content of the Course

Total numbers of Lectures (in hours):60

Unit	Topics	Number of Lectures
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.	12

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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.	12
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.	12
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.	12
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.	12

Part C – Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Hobbs, B.E., Means, W.D. and Williams, P.F. (1976): An outline of Structural Geology, John Wiley and Sons, New York.
2. Park, R. (1997): Foundation of structural geology, Routledge
3. Twiss, R.J. and Moores, E.M. (2007).Structural Geology.
4. W.H.Freeman and Company, New York. 2nd Edition. ISBN: 10: 0-7167-4951.
5. Haakon Fossen (2010): Structural Geology, Cambridge University Press, New York.
6. Turner, F.J. and Weiss, L.E. (1963): Structural analysis of Metamorphic Tectonites, McGraw Hill

Suggested equivalent online courses:

Part D – Assessment and Evaluation

Suggested Continuous Evaluation Methods: Internal (CCE)+ External Assessment (ESE)

Assessment	Mode	Max. Marks	Min. Marks	Pattern
CCE	Class Test/ Assignment/Presentation	10	04	Unit wise class test
ESE	University Exam	40	16	Objec. 10 Ques are compulsory, 5-5 short ans. and long ans. type questions with choice within units.
	Total Marks	50	20	

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Department of Geology
Syllabus (B.Sc. VII Sem)

THEORY **Part A – Introduction** **SEM VII**

Program: Bachelor in Science (Certificate/Diploma/Degree)	Class: B.Sc. VII Sem	Year: 2025	Session: 2025-26

Subject: Geology

1.	Course Code	S VII-GEO-3T	
2.	Course Title	Principles of Stratigraphy, Indian Geology & Palaeontology (Paper III)	
3.	Course Type	Discipline Specific Elective (DSE-2) Theory	
4.	Pre-requisite (if any)	To study this course, a student must have had passed the preceding semester with Geology	
5.	Course Learning Outcomes (CLO)	On completion of course student will be able to- 1. Evaluate the principles of Stratigraphy and details of Geological Time scale 2. Identify Indian stratigraphic systems of Archean, Dharwar, Cuddapah, Kurnool, Vindhyan and Aravalli Supergroups 3. Describe the detailed insight into the Geological Time events of The Paleozoic, Gondwana, Triassic, Jurassic and Cretaceous and the Tertiary Group 4. Assess the detailed significance of the Siwalik, Pleistocene, Holocene, Himalayas, and Eocene systems. 5. Analyze the age and boundary problems of various ages. 6. Understand modern systematics, the evolution of Echinoderms, Mollusca, Graptolites, Trilobites and Brachiopods.	
6.	Credit Value	4	
7.	Marks	Max. Marks- 10 + 40	Min. Marks - 20

Part B – Content of the Course

Total numbers of Lectures (in hours):60

Unit	Topics	Number of Lectures
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.	12

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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.	12
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.	12
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.	12
V	Morphology and evolutionary trends in Brachiopoda, Echinoderms, Mollusca, Trilobites and Graptolites ; Elementary idea about Micro-palaeontology and its uses.	12

Part C – Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Krishnan, M. S. (1982) Geology of India and Burma, CBS Publishers, Delhi
2. Ramakrishnan, M. &Vaidyanadhan, R. (2008) Geology of India Volumes 1 & 2, Geological society of India, Bangalore.
3. Ravindra Kumar. (2022), Fundamentals of Historical Geology and Stratigraphy of India, New Age Publishers.
4. P.C. Jain and M.S. Ananthram, (2022), Palaeontology- Evolution and Animal Distribution.
5. David M. Raup and Steven M. Stanley, Second Edition, Principles of Palaeontology. CBS Publishers

Suggested equivalent online courses:

Part D – Assessment and Evaluation

Suggested Continuous Evaluation Methods: Internal (CCE)+ External Assessment (ESE)

Assessment	Mode	Max. Marks	Min. Marks	Pattern
CCE	Class Test/ Assignment/Presentation	10	04	Unit wise class test
ESE	University Exam	40	16	Objec. 10 Ques are compulsory, 5-5 short ans. and long ans. type questions with choice within units.
	Total Marks	50	20	

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Department of Geology
Syllabus (B.Sc. VII Sem)

THEORY

Part A – Introduction

SEM VII

Program: Bachelor in Science (Certificate/Diploma/Degree)	Class: B.Sc. VII Sem	Year: 2025	Session: 2025-26

Subject: Geology

1.	**Course Code**	**S VII-GEO-4T**
2.	**Course Title**	**Geodynamics and Geomorphology (Paper IV)**
3.	**Course Type**	**Discipline Specific Elective (DSE-3) Theory**
4.	**Pre-requisite (if any)**	To study this course, a student must have had passed the preceding semester with Geology
5.	**Course Learning Outcomes (CLO)**	On completion of course student will be able to- 1. Summarize the theory of plate tectonics and describe how the outer part of the earth broken into large fragments (plates) that are always in motion relative to each other. 2. Describe the fundamental concepts of Geomorphology, Weathering, Soil processes and Karst Topography, Morphometric analysis. 3. Identify the landforms formed by the tectonic activities and the geological work done by a river , glacial , aeolian, groundwater processes.
6.	**Credit Value**	4
7.	**Marks**	Max. Marks- 10 + 40 / Min. Marks - 20

Part B – Content of the Course

Total numbers of Lectures (in hours):60

Unit	Topics	Number of Lectures
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.	**12**

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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.	12
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.	12
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.	12
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.	12

Part C – Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. William J. Miller, Fifth Edition, Introduction to Physical Geology, University of California.
2. A. Holmes, Third Edition, Principle of Physical Geology, A Halsted Press Book.
3. William D. Thornbury, Second Edition , Principles of Geomorphology.
4. Savindra Singh, Geomorphology, Pravalika Publications, Allahabad.

Suggested equivalent online courses:

Part D – Assessment and Evaluation

Suggested Continuous Evaluation Methods: Internal (CCE)+ External Assessment (ESE)

Assessment	Mode	Max. Marks	Min. Marks	Pattern
CCE	Class Test/ Assignment/Presentation	10	04	Unit wise class test
ESE	University Exam	40	16	Objec. 10 Ques are compulsory, 5-5 short ans. and long ans. type questions with choice within units.
	Total Marks	50	20	

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PRACTICAL

SEM VII

Part A – Introduction

Program: Bachelor in Science (Certificate/Diploma/Degree)	Class: B.Sc. VII Sem	Year:2025	Session:2025-26
Subject: Geology			

1.	Course Code	S VII-GEO-1P	
2.	Course Title	Lab Course - A	
3.	Course Type	Practical	
4.	Pre-requisite (if any)	This practical course is related to theory paper S VII-GEO-1T, 2T	
5.	Course Learning Outcomes (CLO)	On completion of this course students will able to identify megascopic and microscopic properties of minerals, solve various structural maps, identify structural models	
6.	Credit Value	2	
7.	Marks	Max. Marks- 10 + 40	Min. Marks - 20

Part B – Content of the Course

Total numbers of Lectures (in hours):30	
	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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PRACTICAL

SEM VII

Part A – Introduction

Program: Bachelor in Science (Certificate/Diploma/Degree)	Class: B.Sc. VII Sem	Year:2025	Session:2025-26

Subject: Geology

1.	Course Code	S VII-GEO-2P	
2.	Course Title	Lab Course - B	
3.	Course Type.	Practical	
4.	Pre-requisite (if any)	This practical course is related to theory paper S VII-GEO-3T, 4T	
5.	Course Learning Outcomes (CLO)	On completion of this course students will able to identify different stratigraphic rocks and formations of India, Understand plate tectonics and its morphology, and study of various geomorphological models.	
6.	Credit Value	2	
7.	Marks	Max. Marks- 10 + 40	Min. Marks - 20

Part B – Content of the Course

Total numbers of Lectures (in hours):30	
	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.

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Department of Geology
Syllabus (B.Sc. VII Sem)

THEORY **Part A – Introduction** **SEM VII**

Program: Bachelor in Science (Certificate/Diploma/Degree)	Class: B.Sc. VII Sem	Year: 2025	Session: 2025-26
Subject: Geology			

1.	Course Code	S VII-GEO-5T	
2.	Course Title	Research Methodology	
3.	Course Type	Research	
4.	Pre-requisite (if any)	To study this course, a student must have had passed the preceding semester with Geology	
5.	Course Learning Outcomes (CLO)	On completion of course student will be able to- 1. Formulate well-defined research problems within the context of Geological Sciences. 2. Design and execute comprehensive research plans suitable for geological investigations. 3. Apply appropriate quantitative and qualitative techniques for data collection and analysis in Geosciences. 4. Communicate scientific findings effectively through various written formats, adhering to academic standards. 5. Utilize relevant software tools for data analysis, presentation, and report generation in geological research.	
6.	Credit Value	4	
7.	Marks	Max. Marks- 10 + 40	Min. Marks - 20

Part B – Content of the Course

Total numbers of Lectures (in hours):60		
Unit	**Topics**	**Number of Lectures**
I	Definition of research problem: Theory and philosophy of research concept in context to Geological sciences; techniques involved in defining a problem. Surveying the related literature.	12
II	Research Design and Developing research plan: Subject of study; Place of study; Research objective; Type of data required; Method of data collection; Defining major concept in various operational terms; Periods of study; data analysis and interpretation.	12

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III	Techniques involved in solving the problem: Sampling technique/ field methods, parametric analysis and Quantitative and qualitative methods in Geosciences.	12
IV	Scientific writing: Concepts of article, notes, reports, review article, monographs, dissertations, popular science articles. Outline preparation, drafting title, sub titles, tables, illustrations; Formatting tables- title, body footnotes; figures & graphs- structure, title and legends, bibliographies, impact factor, citation indices, plagiarism	12
V	Computerised analysis: MS word™, MS excel™, MS power point™, Sigma plot™, Grapher™, Origin, Corel draw™, ArcGIS™ Numerical Analysis/figure plotting: Standard deviation/error; Correlation coefficient, types of correlation, regression equation, geological significance of correlation and regression; Test of significance, chi-square test, analysis of variance.	12

Part C – Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Qualitative Research Methods for Social Sciences by Bruce, L. B. 2001, Allyn and Bacon, Boston.
2. Computer Applications in the Social Sciences by Edward, E.B., 1990, Temple University Press, Philadelphia.
3. Survey Methodology by Robert, M. B, et al., 2009, Wiley, New Jersey.
4. Social Research Methods by Bryman, A. 2008, Oxford University Press, New York.
5. Research Design: Qualitative, Quantitative and Mixed Methods Approaches by John, W. C., 2011, Sage Publications, Thousand Oaks.
6. Against Method: Outline of an Anarchist Theory of Knowledge by Paul F., 1975, New Left Books, London.
7. Power/Knowledge: Selected Interviews and Other Writings by Michel, F., edited by Colin Gordon, 1980, Vintage, New York.

Suggested equivalent online courses:

Part D – Assessment and Evaluation

Suggested Continuous Evaluation Methods: Internal (CCE)+ External Assessment (ESE)

Assessment	Mode	Max. Marks	Min. Marks	Pattern
CCE	Class Test/ Assignment/Presentation	10	04	Unit wise class test
ESE	University Exam	40	16	Objec. 10 Ques are compulsory, 5-5 short ans. and long ans. type questions with choice within units.
	Total Marks	50	20	

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Department of Geology
Syllabus (B.Sc. VIII Sem)

THEORY

Part A – Introduction

SEM VIII

Program: Bachelor in Science (Certificate/Diploma/Degree)	Class: B.Sc. VIII Sem	Year: 2025	Session: 2025-26

Subject: Geology

1.	Course Code	S VIII-GEO-1T	
2.	Course Title	Igneous and Metamorphic Petrology (Paper I)	
3.	Course Type	Discipline Specific Course (DSC) Theory	
4.	Pre-requisite (if any)	To study this course, a student must pass B.Sc. I-VI Sem course with Geology as one subject.	
5.	Course Learning Outcomes (CLO)	On completion of course student will be able to- 1. Explain principles concepts of petrology, petrography & petrogenesis. 2. Identify various forms, structures and textures of igneous rocks. 3. Classify the igneous rocks and describe their megascopic and microscopic characters. 4. Describe the evolution of magma. 5. Identify various forms, structures and textures of metamorphic rocks. 6. Classify the metamorphic rocks and describe their megascopic and microscopic characters.	
6.	Credit Value	4	
7.	Marks	Max. Marks- 10 + 40	Min. Marks - 20

Part B – Content of the Course

Total numbers of Lectures (in hours):60

Unit	Topics	Number of Lectures
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	12

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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.	12
III	Petrography, Petrogenesis & Indian occurrences of the following Granite, alkaline rocks ; Monomineralic rocks (Dunite, Anorthosite) ; Basalt, Andesite, Spillite, Lamprophyre ; Ultramafic rocks, carbonatite, pegmatite, Kimberlite.	12
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.	12
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.	12

Part C – Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

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.

Suggested equivalent online courses:

Part D – Assessment and Evaluation

Suggested Continuous Evaluation Methods: Internal (CCE)+ External Assessment (ESE)

Assessment	Mode	Max. Marks	Min. Marks	Pattern
CCE	Class Test/ Assignment/Presentation	10	04	Unit wise class test
ESE	University Exam	40	16	Objective 10 Ques.compulsory, 5-5 short ans. and long ans. type questions with choice within units.
	Total Marks	50	20	

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Department of Geology
Syllabus (B.Sc. VIII Sem)

THEORY

Part A – Introduction

SEM VIII

Program: Bachelor in Science (Certificate/Diploma/Degree)	Class: B.Sc. VIII Sem	Year: 2025	Session: 2025-26

Subject: Geology

1.	**Course Code**	**S VIII-GEO-2T**
2.	**Course Title**	**Sedimentary Petrology & Crustal Evolution (Paper II)**
3.	**Course Type**	**Discipline Specific Elective (DSE-1) Theory**
4.	**Pre-requisite (if any)**	To study this course, a student must have had passed the preceding semester with Geology
5.	**Course Learning Outcomes (CLO)**	On completion of course student will be able to- 1. Evaluate the role of various sedimentary environments in the formation of sedimentary rocks. 2. Identify various forms, structures and textures of sedimentary rocks. 3. Classify the sedimentary rocks and describe their megascopic and microscopic characters. 4. Summarize Field and Laboratory techniques in Sedimentology. 5. Understand the concept of sedimentation in relation to plate tectonics.
6.	**Credit Value**	4
7.	**Marks**	Max. Marks- 10 + 40 / Min. Marks - 20

Part B – Content of the Course

Total numbers of Lectures (in hours):60

Unit	Topics	Number of Lectures
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.	12

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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.	12
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.	12
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.	12
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.	12

Part C – Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

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).

Suggested equivalent online courses:

Part D – Assessment and Evaluation

Suggested Continuous Evaluation Methods: Internal (CCE)+ External Assessment (ESE)

Assessment	Mode	Max. Marks	Min. Marks	Pattern
CCE	Class Test/ Assignment/Presentation	10	04	Unit wise class test
ESE	University Exam	40	16	Objec. 10 Ques are compulsory, 5-5 short ans. and long ans. type questions with choice within units.
	Total Marks	50	20	

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Department of Geology
Syllabus (B.Sc. VIII Sem)

THEORY

Part A – Introduction

SEM VIII

Program: Bachelor in Science (Certificate/Diploma/Degree)	Class: B.Sc. VIII Sem	Year: 2025	Session: 2025-26
Subject: Geology			

1.	**Course Code**	**S VIII-GEO-3T**	
2.	**Course Title**	**Economic Geology (Processes & Deposits) (Paper III)**	
3.	**Course Type**	**Discipline Specific Elective (DSE-2) Theory**	
4.	**Pre-requisite (if any)**	To study this course, a student must have had passed the preceding semester with Geology	
5.	**Course Learning Outcomes (CLO)**	On completion of course student will be able to- 1. Explain various processes of ore formation. 2. Describe ores of various affiliations. 3. Explain mode of occurrence of ore bodies and ore textures. 4. Explain mode of occurrence of coal, petroleum in India. 5. Understand the characteristics of various metallic and non-metallic deposits.	
6.	**Credit Value**	4	
7.	**Marks**	Max. Marks- 10 + 40	Min. Marks - 20

Part B – Content of the Course

Total numbers of Lectures (in hours):60

Unit	Topics	Number of Lectures
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. Ore localization: structural, physico-chemical and stratigraphic controls of ore localization. Wall rock alteration and Skarn deposits with Indian examples. Metallogenetic epoch and provinces in global as well as Indian context.	12

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II	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. 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.	12
III	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. Processes of formation and Deposits 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. Petroleum Deposits of India	12
IV	Mineralogical characteristics, geological setting, genesis (in short), distribution and uses of following ore deposits in India: Iron, Manganese, Lead – Zinc, Chromium, Nickel, Aluminium, Platinum, Cobalt, Gold, Silver, Tin, Tungsten, Molybdenum, Copper	12
V	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, Baryte (heavy spar), Mica, Graphite, Talc, Diamond, Garnet, Corundum, Gem mineral deposits Characteristics, grades, origin, geological setting, distribution and uses of Indian coal deposits with special reference to Chhattisgarh.	12

Part C – Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

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.
5. Gokhale, K.V.G.K. and Rao, T.C. (1978) Ore deposits of India their distribution and processing, Tata-McGraw Hill, New Delhi.
6. Deb, S. (1980) Industrial minerals and rocks of India. Allied Publishers.

Suggested equivalent online courses:

Part D – Assessment and Evaluation

Suggested Continuous Evaluation Methods: Internal (CCE)+ External Assessment (ESE)

Assessment	Mode	Max. Marks	Min. Marks	Pattern
CCE	Class Test/ Assignment/Presentation	10	04	Unit wise class test
ESE	University Exam	40	16	Objec. 10 Ques are compulsory, 5-5 short ans. and long ans. type questions with choice within units.
	Total Marks	50	20	

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PRACTICAL

SEM VIII

Part A – Introduction

Program: Bachelor in Science (Certificate/Diploma/Degree)	Class: B.Sc. VIII Sem	Year:2025	Session:2025-26

Subject: Geology

1.	Course Code	S VIII-GEO-1P
2.	Course Title	Lab Course
3.	Course Type	Practical
4.	Pre-requisite (if any)	This practical course is related to theory paper S VIII-GEO-1T, 2T,3T
5.	Course Learning Outcomes (CLO)	On completion of this course students will able to identify megascopic and microscopic properties of ore minerals, igneous, sedimentary and metamorphic rocks and also learn various diagrammatic representation.
6.	Credit Value	2
7.	Marks	Max. Marks- 10 + 40 / Min. Marks - 20

Part B – Content of the Course

Total numbers of Lectures (in hours):30

	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.

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PRACTICAL

SEM VIII

Part A – Introduction

Program: Bachelor in Science (Certificate/Diploma/Degree)	Class: B.Sc. VIII Sem	Year:2025	Session:2025-26

Subject: Geology

1.	Course Code	S VIII-GEO-2P
2.	Course Title	Dissertation / Research Project
3.	Course Type	Practical
4.	Pre-requisite (if any)	This practical course is related to field / research work to be done by student.
5.	Course Learning Outcomes (CLO)	The successful completion of a dissertation/research project demonstrates the student's ability to conduct independent, rigorous geological research.
6.	Credit Value	2
7.	Marks	Max. Marks- 150 / Min. Marks - 60

Part B – Content of the Course

1.	Student will have to submit a dissertation/project work of 100 marks on the topic allotted to him by the supervisor.

Marks distribution in Dissertation/Research Project-

Report	-	70
Presentation	-	30
Comprehensive viva-voce	-	20
Internal Assessment	-	30
Total	-	**150**

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