

Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,
CHHATRAPATI SAMBAJINAGAR.



NAAC- 'A+' Grade

CIRCULAR NO.SU/ Sci./College/NEP-2020/73/2025

It is hereby inform to all concerned that, the syllabi prepared by the Board of Studies/ Ad-hoc Boards/Committee and recommended by the Dean, Faculty of Science & Technology, the Academic Council at its meeting held on 09 May 2025 has been accepted the following B.Sc. Course Structure & Curriculum under the Faculty of Science & Technology as per National Education Policy - 2020 run at the Affiliated Colleges of Dr. Babasaheb Ambedkar Marathwada University as appended herewith.

Sr.No.	Courses	Semester
1	B.Sc. PHYSICS	III RD AND IV TH SEMESTER
2	B.Sc. ELECTRONICS	III RD AND IV TH SEMESTER
3	B.Sc. MATHEMATICS	III RD AND IV TH SEMESTER
4	B.Sc. INDUSTRIAL CHEMISTRY	III RD AND IV TH SEMESTER
5	B.Sc. AGROCHEMICAL AND FERTILIZE	III RD AND IV TH SEMESTER
6	B.Sc. HORTICULTURE	III RD AND IV TH SEMESTER
7	B.Sc. BIOCHEMISTRY	III RD AND IV TH SEMESTER
8	B.Sc. BOTANY	III RD AND IV TH SEMESTER
9	B.Sc. ZOOLOGY	III RD AND IV TH SEMESTER
10	B.Sc. BIOTECHNOLOGY	III RD AND IV TH SEMESTER
11	B.Sc. MICROBIOLOGY	III RD AND IV TH SEMESTER
12	B.Sc. DIARY SCIENCE AND TECHNOLOGY	III RD AND IV TH SEMESTER
13	B.Sc. STATISTICS	III RD AND IV TH SEMESTER
14	B.Sc. COMPUTER SCIENCE	III RD AND IV TH SEMESTER
15	B.Sc. GEOLOGY	III RD AND IV TH SEMESTER
16	B.Sc. CHEMISTRY	III RD AND IV TH SEMESTER
17	B.Sc. ANALYTICAL CHEMISTRY	III RD AND IV TH SEMESTER
18	B.Sc. POLYMER CHEMISTRY	III RD AND IV TH SEMESTER
19	B.Sc. ENVIRONMENTAL SCIENCE	III RD AND IV TH SEMESTER
20.	B.Sc. FISHERIES SCIENCE	III RD AND IV TH SEMESTER

21.	B.SC. HOME SCIENCE	III RD AND IV TH SEMESTER
22.	B.SC. DATA SCIENCE	III RD AND IV TH SEMESTER
23.	B.SC. INFORMATION TECHNOLOGY	III RD AND IV TH SEMESTER
24.	B.SC. NETWORKING AND MULTIMEDIA	III RD AND IV TH SEMESTER
25.	B.SC. AUTOMOBILE TECHNOLOGY	III RD AND IV TH SEMESTER
26.	B.SC. FORENSIC SCIENCE	III RD AND IV TH SEMESTER
27.	B.SC. FORENSIC SCIENCE & CYBER SECURITY	III RD AND IV TH SEMESTER
28.	B.SC. NON-CONVENTIONAL & CONVENTIONAL ENERGY	III RD AND IV TH SEMESTER
29.	B.SC. CLINICAL LABORATORY SCIENCE	III RD AND IV TH SEMESTER
30.	BACHELOR OF COMPUTER APPLICATION	III RD AND IV TH SEMESTER

This is effective from the Academic Year 2025-26 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Chhatrapati Sambhajanagar
-431 004.

Ref.No. SU/Sci./2025/ 827-29
Date:- 26/05/2025

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26/5/2025
**Deputy Registrar,
Syllabus Section.**

Copy forwarded and necessary action to :-

- 1] **The Principal of all Affiliated Colleges,**
Dr. Babasaheb Ambedkar Marathwada University,
- 2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.**

Copy to :-

- 1] The Director, Board of Examinations & Evaluation, Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajanagar.

Dr. Babasaheb Ambedkar Marathwada University

Chhatrapati Sambhajinagar- 431001



B.Sc. Degree Programme

(Three Year / Four Years (Hons) / Four Years (Hons with Research))

**BSc Second Year
Course Structure
(Revised)**

(AS PER NEP-2020)

Subject (Major): Geology

Effective from 2024-25


Principal
Deogiri College,
Chhatrapati Sambhajinagar

PREFACE

As we stand on the threshold of a new era in education, the dawn of the National Education Policy 2020 illuminates our path toward a holistic, inclusive, and progressive educational landscape. The Bachelor of Science (B. Sc.) curriculum outlined herein reflects the ethos and aspirations of this transformative policy, aiming to equip learners with the knowledge, skills, and values necessary to thrive in the dynamic world of the 21st century.

At its core, the National Education Policy 2020 envisions an educational framework that is learner-centric, multidisciplinary, and geared towards fostering creativity, critical thinking, and innovation. It emphasizes the integration of knowledge across disciplines, breaking down traditional silos to encourage holistic understanding and application of concepts. The Bachelor of Science (B. Sc.) curriculum embodies these principles by offering a diverse array of courses spanning various scientific domains, while also incorporating interdisciplinary studies to nurture well-rounded graduates capable of addressing complex challenges with agility and insight.

Furthermore, the curriculum is designed to promote experiential learning, research, and hands-on exploration, recognizing the importance of practical engagement in deepening understanding and cultivating real-world skills. Through laboratory work, field experiences, internships, and project-based learning opportunities, students will have the chance to apply theoretical knowledge in practical settings, develop problem-solving abilities, and cultivate a spirit of inquiry and discovery.

Integral to the National Education Policy 2020 is the commitment to inclusivity, equity, and access to quality education for all. The Bachelor of Science (B. Sc.) curriculum reflects this commitment by embracing diversity in perspectives, backgrounds, and experiences, and by fostering an inclusive learning environment where every student feels valued, supported, and empowered to succeed.

Moreover, the curriculum emphasizes the cultivation of ethical values, social responsibility, and global citizenship, instilling in students a sense of accountability towards society and the environment. By integrating courses on ethics, sustainability, and social sciences, the Bachelor of Science (B. Sc.) program aims to produce graduates who are not only proficient in their respective fields but also compassionate, ethical leaders committed to making a positive impact on the world.

As we embark on this journey of educational transformation guided by the National Education Policy 2020, the Bachelor of Science (B. Sc.) curriculum stands as a testament to our collective vision of a more equitable, inclusive, and enlightened society. It is our hope that through rigorous academics, innovative pedagogy, and unwavering dedication to excellence, we can inspire the next generation of scientists, scholars, and change-makers to realize their full potential and contribute meaningfully to the advancement of knowledge and the betterment of humanity.

Preamble:

The third semester focuses on refining mineralogical and petrological skills, beginning with a thorough examination of **Physical Mineralogy and Crystallography** and advancing to **Optical Mineralogy and Basic Gemstone** analysis. This is complemented by specialized studies in **Gemstone** properties and the classification and interpretation of **Rocks**. An interdisciplinary perspective is introduced through the study of **Major Rivers of India**, linking geological principles with geographical understanding. Practical skills are honed in **Advanced Mineralogy** and the analysis of **Texture and Structure of Rock**, preparing students for applied geological work.

1. **Physical Mineralogy and Crystallography (Discipline-Specific Course)** – Covers the physical properties, classification, and crystallographic structures of minerals.
2. **Optical Mineralogy and Basic Gemstone (Discipline-Specific Course)** – Introduces optical properties of minerals, techniques for their identification under a petrographic microscope.
3. **Gemstone (Minor Course)** – Focuses on the identification, properties, and significance of gemstones in the gem and jewelry industry.
4. **Rocks (Minor Course)** – Provides insights into the formation, classification, and composition of igneous, sedimentary, and metamorphic rocks.
5. **Major Rivers of India (Open Generic Course)** – Explores the geological and geomorphological significance of India's river systems, their role in sediment transport, and their impact on landforms.
6. **Advanced Mineralogy (Vocational Skill Course)** – Covers advanced mineral identification techniques, analytical methods, and industrial applications of minerals.
7. **Texture and Structure of Rocks (Vocational Skill Course)** – Discusses rock textures and structures, essential for interpreting geological history and deformation processes.

The fourth semester expands upon these foundations, shifting towards the interpretation of geological history and structures. **Descriptive Petrology** provides detailed analyses of rock types, while **Structural Geology and Basic Palaeontology** introduce the principles of tectonic deformation and the study of ancient life. Students further their understanding of fossils through **Introduction to Fossils** and explore the fundamentals of rock structures in **Introductory to Basic Rock structures**. The **Mountains of India** course broadens their geographical and geological knowledge within the Indian context. Practical, hands-on skills are emphasized through **Geological Mapping** and **Identification of Tectonic Features in the Field**, equipping students with the tools necessary.

1. **Descriptive Petrology (Discipline-Specific Course)** – Examines the classification, composition, and genesis of igneous, sedimentary, and metamorphic rocks.
2. **Structural Geology and Basic Palaeontology (Discipline-Specific Course)** – Covers principles of structural geology.
3. **Introduction to Fossils (Minor Course)** – Introduces fossil classification, preservation, and their importance in understanding Earth's history.
4. **Introductory to Basic Rock Structures (Minor Course)** – Focuses on primary and secondary rock structures.
5. **Mountains of India (Open Generic Course)** – Discusses the geological evolution, tectonic significance, and distribution of mountain ranges in India.
6. **Geological Mapping (Skill Enhancement Course)** – Provides hands-on training in field mapping techniques, including data collection, interpretation, and preparation of maps.
7. **Identification of Tectonic Features in Field (Skill Enhancement Course)** – Focuses on recognizing and interpreting tectonic structures in the field, crucial for understanding Earth's dynamic processes.

Programme Educational Objectives (PEOs):

The **BSc Geology (Second Year) program** aims to provide students with a strong foundation in geological sciences, emphasizing both theoretical knowledge and practical applications. The curriculum is designed to develop analytical, observational, and field-based skills that will enable students to excel in academic, research, and professional careers in geology and allied sciences.

PEO 1: Comprehensive Understanding of Mineralogy and Petrology

Develop a thorough knowledge of minerals, rocks, and crystallographic structures, including their formation, classification, and physical and optical properties.

PEO 2: Practical and Analytical Skill Development

Enhance students' abilities in optical mineralogy, petrography, and crystallography, enabling them to analyze geological samples using advanced microscopic and laboratory techniques.

PEO 3: Interdisciplinary Learning and Applied Geosciences

Encourage interdisciplinary learning by integrating mineralogy, petrology, paleontology, geomorphology, and structural geology, providing a holistic understanding of Earth's dynamic processes.

PEO 4: Field and Mapping Skills for Geological Investigations

Equip students with essential geological field mapping, structural analysis, and tectonic feature identification skills, ensuring competency in real-world geological studies and research.

PEO 5: Understanding Geological Evolution and Indian Geography

Develop an in-depth understanding of India's geological structures, major river systems, and mountain formations, emphasizing their environmental, geomorphological, and socio-economic significance.

PEO 6: Vocational and Industry-Oriented Skill Enhancement

Prepare students for careers in geological exploration, mining, environmental geology, and gemology by providing vocational training in advanced mineralogy, rock texture analysis, and fossil identification.

PEO 7: Research, Problem-Solving, and Critical Thinking Abilities

Foster scientific inquiry, research aptitude, and analytical thinking, enabling students to pursue higher education, contribute to scientific advancements, and solve complex geoscientific problems.

PEO 8: Sustainable Development and Environmental Awareness

Instill knowledge of sustainable resource management, geological hazard mitigation, and environmental conservation, ensuring responsible geological practices for future generations.

PEO 9: Professional Ethics and Lifelong Learning

Encourage students to adhere to ethical standards in geological research and professional practice while fostering a lifelong learning mindset to keep pace with advancements in geosciences.

Programme Outcomes (POs):

The BSc Geology (Second Year) program is designed to provide students with essential knowledge and practical skills in mineralogy, petrology, paleontology, geomorphology, structural geology, and geological mapping.

PO 1: Understanding of Minerals and Crystallography

Develop a comprehensive understanding of physical and optical properties of minerals, their classification, crystallographic structures, and significance in Earth processes.

PO 2: Application of Optical Mineralogy and Gemology

Gain proficiency in optical mineralogy and gemstone identification techniques, enabling the recognition of minerals under the petrographic microscope and their commercial applications.

PO 3: Knowledge of Rock Formation and Petrology

Understand the classification, composition, and genesis of igneous, sedimentary, and metamorphic rocks, as well as their economic importance and geological significance.

PO 4: Geological Mapping and Fieldwork Skills

Acquire hands-on experience in field mapping, sample collection, structural interpretation, and tectonic feature identification, essential for real-world geological applications.

PO 5: Structural Geology and Tectonics

Develop an in-depth understanding of rock deformation, faulting, folding, and other structural geological features, crucial for analyzing tectonic activities and Earth's dynamic processes.

PO 6: Introduction to Paleontology and Fossil Studies

Learn the fundamentals of paleontology, fossil identification, and stratigraphic correlation, helping students understand the evolution of life on Earth and its geological record.

PO 7: Geomorphology and Indian Geography

Analyze the geomorphological characteristics of Indian rivers and mountains, their impact on landforms, climate, and human settlements, and their role in geological evolution.

PO 8: Skill Development in Advanced Mineralogy and Rock Analysis

Enhance industry-relevant skills in **advanced mineral identification, rock texture analysis, and petrological techniques**, preparing students for careers in mining, resource exploration, and geosciences.

PO 9: Sustainable Resource Management and Environmental Awareness

Understand the role of geology in natural resource management, environmental conservation, and disaster mitigation, ensuring sustainable practices in Earth sciences.

PO 10: Research, Critical Thinking, and Problem-Solving Abilities

Develop **scientific** inquiry, analytical thinking, and problem-solving skills, enabling students to conduct independent research and contribute to geological advancements.

Program Specific Outcomes (PSOs):

Third Semester PSOs:

PSO 1: Crystallographic Proficiency:

- Students will be able to accurately determine crystal systems and identify mineral structures using crystallographic principles.

PSO 2: Advanced Optical Mineralogy:

- Students will demonstrate proficiency in using a petrographic microscope to identify minerals based on their optical properties, including birefringence, extinction angles, and pleochroism.

PSO 3: Gemstone Evaluation:

- Students will be able to evaluate the quality and characteristics of gemstones, including cut, clarity, color, and carat weight.

PSO 4: Petrological Classification:

- Students will be able to classify igneous, sedimentary, and metamorphic rocks based on their mineral composition and textural features.

PSO 5: Indian River System Analysis:

- Students will be able to analyze the geological factors influencing the development and morphology of major Indian river systems.

PSO 6: Advanced Mineralogical Techniques:

- Students will be able to apply advanced mineralogical techniques, such as X-ray diffraction and basic electron microscopy, to analyze mineral samples.

PSO 7: Rock Fabric Interpretation:

- Students will be able to interpret rock textures and structures to determine the formation history and deformation events of rocks.

Fourth Semester PSOs:

PSO 8: Descriptive Petrology Expertise:

- Students will be able to produce detailed petrographic descriptions of various rock types, including their mineralogy, texture, and fabric.

PSO 9: Structural Geology and Paleontological Interpretation:

- Students will be able to interpret geological maps and cross-sections to identify and analyze geological structures, and identify and interpret basic fossil assemblages.

PSO 10: Introductory Fossil and Rock Structure Identification:

- Students will be able to identify common fossil types and rock structures in hand specimen and in outcrop.

PSO 11: Geological Mapping Skills:

- Students will be able to create geological maps, including the representation of geological formations, structures, and contacts.

PSO 12: Tectonic Feature Recognition:

- Students will be able to identify and interpret tectonic features in the field, such as folds, faults, and joints.

PSO 13: Indian Mountain Geology:

- Students will be able to describe the geological processes that formed the major mountain ranges of India.

PSO 14: Indian Mountain Geology: Sustainable Earth Resource Management

- Acquire knowledge about natural resource conservation, geological hazard mitigation, and sustainable practices in Earth sciences

**Structure of B. Sc. (Three / Four Years Honours / Honours with Research Degree)
Programme with Multiple Entry and Exit Options**

BSc Second Year: 3rd Semester

Students will have to select / declare choice of **one major subject** and **one minor subject** from three major options M1, M2 and M3 (which were opted in the first year)

Course Type	Course Code	Examination Code (To be given by respective BoS)	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
				Theory	Practical	Theor y	Practical	
Major (Core) Mandatory DSC	GEO/DSC/T/200	SAC00332003T	Physical Mineralogy and Crystallography (Theory Course)	2		2		2+2+2+2 = 08
	GEO/DSC/T/201	SAC00332013T	Optical Mineralogy and Basic Gemstone (Theory Course)	2		2		
	GEO/DSC/P/ 226	SAC00332263P	Physical-Mineralogy and Crystallography (Practical based on GEO/DSC/T/200)		4		2	
	GEO/DSC/P/ 227	SAC00332273P	Optical Mineralogy and Basic Gemstone (Practical based on GEO/DSC/T/201)		4		2	
Minor (Choose any two from pool of courses) It is from different discipline of the same faculty	GEO/Mn/T/ 200	SCC00332003T	(To be chosen from other discipline of same faculty)	2		2		2+2 = 04
	GEO/Mn/T/ 201	SCC00332013T	(To be chosen from other discipline of same faculty)	2		2		
Generic / Open Elective (GE/OE) (Choose any one from pool of courses) It should be chosen compulsorily from the faculty other than that of Major	GEO /GE/OE/T/200	SDC00332003T	(To be chosen from other faculty)	2		2		02
VSC (Vocational Skill Courses) (Choose any one from SUB/VSC/T/ 200 and SUB/VSC/T/ 201) and corresponding Practicals	GEO/VSC/T/ 200	SEC00332003T	Advanced Mineralogy (Theory Course)	1		1		1+1 =02
	GEO/VSC/T/ 201	SEC00332013T	Texture and structure of Rock (Theory Course)	1		1		
	GEO/VSC/P/ 226	SEC00332263P	Advanced Mineralogy (Practicals based on SUB/VSC/T/ 200)		2		1	
	GEO/VSC/P/ 227	SEC00332273P	Texture and structure of Rock (Practicals based on SUB/VSC/T/ 201)		2		1	
AEC, VEC, IKS	SUB/AEC/T/200		English (Common for all the faculty)	2		2		2 + 2 = 04
	SUB/VEC/T/201		Environmental Studies	2		2		
OJT/ FP/CEP/CC/RP	SUB/CC/P/ 226		Cultural Activity / NSS,NCC (Common for all the faculty)		4		2	02
				15	14	15	07	22

Minor Courses for other Discipline

GEO/Mn/T/ 200 **Gemstone** (SCC00332003T) : This is a 2 credit theory course to be designed for other discipline

GEO/Mn/T/ 201 **Rocks** (SCC00332013T) : This is a 2 credit theory course to be designed for other discipline

Generic /Open Elective Courses for other faculty

GEO/GE/OE/T/200 **Major Rivers of India** (SDC00332003T) : This is a 2 credit theory course to be designed for other faculty

B.Sc. Second Year**Semester: IIIrd****Subject: Geology**

Course Code: GEO/DSC/T/200

Examination Code: SAC00332003T

Course Name: Physical Mineralogy and CrystallographyTotal Credits: 02
(Theory)

Major (Core) Mandatory DSC

Total Contact Hours: 30 Hrs.

Maximum Marks : 50

Learning Objective of the Course

- Understanding Mineral formation
- Identification of megascopic Minerals and microscopic minerals
- Identification of Minerals

Course Outcomes:

- Student will be able to understand the genesis of mineral
- To understand the different mineral group formation
- To understand the difference between natural and artificial minerals
- To understand the difference between natural and artificial Semi precious gemstone.

Sr. No	Topics	Total Periods	Marks
UNIT I	Broad outline of crystalline and non-crystalline minerals Classification of Silicates, Oxides etc Study of the following rock forming silicates groups 1. Olivine 2. Pyroxene 3. Amphibole 4. Mica 5. Feldspar 6. Silica	10	10
UNIT II	Definition of crystal. Lattice, Concept of hemihedrism, hemimorphism Tetrahedrism Twinning, laws of Twins, Imperfections in crystals. Law of constancy of Interfacial angle	10	10
UNIT III	Crystallographic and geometrical symmetry.. Study of elements of symmetry and forms occurring in Normal classes All six crystal system	10	10

Book:

1. Ruttey's Elements of Mineralogy : H. H. Read
2. Mineralogy : I. G. Berry and B Mascon
3. A Text book of mineralogy : E. S. Dana
4. Principles of Petrology : G. W. Tyrrel
5. Igneous and Metamorphic Petrology : Turner & Verhogen
6. Mineralogy Oxford Publishers, New Delhi : A.V. Tejankar
7. Crystallography Oxford Publishers, New Delhi: A.V. Tejankar

B.Sc. Second YearSemester: IIIrd

Subject: Geology

Course Code: GEO/DSC/T/201

Examination Code: SAC00332013T

Course Name: **Optical Mineralogy and Basic Gemstone**

Total Credits: 02

Major (Core) Mandatory DSC

Total Contact Hours: 30 Hrs.

(Theory)

Maximum Marks : 50

Learning Objective of the Course

- Understanding Mineral formation
- Identification of megascopic Minerals and microscopic minerals
- Identification of Minerals

Course Outcomes:

- Student will be able to understand the genesis of mineral
- To understand the different mineral group formation
- To understand the difference between natural and artificial minerals
- To understand the difference between natural and artificial Semi precious gemstone.

Sr. No	Topics	Total Periods	Marks
UNIT I	Different parts of petrological microscope and their function. Nature of light Ordinary and plane polarized light. Nicol prisms their construction and function, Double refraction. Optical properties of minerals as viewed under plane polarized light and cross nicols isotropism and anisotropism Type extinction. Extinction positions of minerals in different crystal system Observation of mineral sections under Conoscopic light study of uniaxial and biaxial interference figures.	10	10
UNIT II	Optical Properties of Rocks Identification of Microscopic minerals with properties in Igneous Rocks Microscopic Texture of Igneous rocks, (Panidiomorphi, Hypidiomorphic, alltriomorphic). Sedimentary Petrology Optical behavior of sedimentary minerals and Cementing material. Microscopic texture of sedimentary rocks.(Microscopic structure of sedimentary rocks, Oolitic , pisolitic , fosilleferous , concreations, secretions, dendrites, stratification , lamination , bedding , foot print, suture line etc. Clastic , Non clastic, oolitic , pisolitic, Fosssileferous,etc).	10	10
UNIT III	Metamorphic Petrology Identification, and physical changes in minerals, Microscopic texture of Porphyro blast, Idio- blast, Grano- blast , Alteration Zoning, Reaction rim, schistose, granulose, maculose, Gniessose Physical properties of Gemstone & Uses Classification of Gemstones	10	10

Book:

1. Ruttey's Elements of Mineralogy : H. H. Read
2. Mineralogy : I. G. Berry and B Mascon
3. A Text book of mineralogy : E. S. Dana
4. Optical Mineralogy : Paul F. Kerr
5. Minerology Oxford Publishers, New Delhi : A.V. Tejankar
6. Collins gem Gemstone : Cally Oldershaw

B.Sc. Second Year**Semester: IIIrd****Subject: Geology**

Course Code: GEO/DSC/P/ 226

Examination Code: SAC00332263P

Course Name: Physical-Mineralogy and CrystallographyTotal Credits: 02
(Practical)

Major (Core) Mandatory DSC

Total Contact Hours: 60 Hrs.
Maximum Marks : 50

Learning Objective of the Course

- Understanding Mineral formation
- Identification of megascopic Minerals and microscopic minerals
- Identification of Minerals

Course Outcomes:

- Student will be able to understand the genesis of mineral
- To understand the different mineral group formation
- To understand the difference between natural and artificial minerals
- To understand the difference between natural and artificial Semi precious gemstone.

Sr. No	Topics	Total Periods	Marks
UNIT I	Physical mineralogy : In addition to B.Sc, Ist year megascopic identification of following minerals with the help of physical properties. Apatite, Topaz, Corundum, Tour maline, Andalusite sillimanite, Olivine, Staurulite, Chlorite, Asbestos,	10	10
UNIT II	Megascopic identification of following minerals with the help of physical properties. Phlogopite, lepidolite Epidote, Rhodonite, Soda lite serpentine, wavellite hypersthene Thomosnite Natrolite .	10	10
UNIT III	Crystallography Study of axial characters, elements of symmetry and forms occurring in the crystal models belonging to the Normal class of six crystallographic system	10	10

Book:

1. Mineralogy : I. G. Berry and B Mascon
2. A Text book of mineralogy : E. S. Dana
3. Principles of Petrology : G. W. Tyrrel
4. Igneous and Metamorphic Petrology : Turner &Verhogen

B.Sc. Second Year**Semester: IIIrd****Subject: Geology**

Course Code: GEO/DSC/P/ 227

Examination Code: SAC00332273P

Course Name: Optical Mineralogy and Basic GemstoneTotal Credits: 02
(Practical)

Major (Core) Mandatory DSC

Total Contact Hours: 60 Hrs.
Maximum Marks : 50

Learning Objective of the Course

- Understanding Mineral formation
- Identification of megascopic Minerals and microscopic minerals
- Identification of Minerals

Course Outcomes:

- Student will be able to understand the genesis of mineral
- To understand the different mineral group formation
- To understand the difference between natural and artificial minerals
- To understand the difference between natural and artificial Semi precious gemstone.

Sr. No	Topics	Total Periods	Marks
UNIT I	Identification of following mineral thin sections with the help of optical properties under polarized microscope Quartz, orthoclase, plagioclase, Microcline calcite Augite, Hornblende muscovite Biotite Silliminite kaynite Olivine Garnet chlorite	10	10
UNIT II	Study of thin section of following igneous rocks Granite, Rhyolite, Basalt, porphyritic basalt, Dolerite, Gabbro Study of thin section of following sedimentary rocks Sand stone, Limestone, corals, shale, bauxite, Study of thin section of following Metamorphic rocks Marble, gneiss, quartzite, hornblende schist,	10	10
UNIT III	Physical Properties of Semi Precious Stones and Precious stones Identification of gemstone and classification of gemstone	10	10

Book:

1. Rutleys elements of Mineralogy : C.D. Gribble
2. A Textbook of Mineralogy : J.D. Dana
3. A Textbook of Geology: Dr. U.D. Kulkarni and Dr. I.A. Khan.
4. Economic Mineral Deposit: Mead L. Jensen and Alan M Bateman.

B.Sc. Second Year**Semester: IIIrd****Subject: Geology**

Course Code: GEO/Mn/T/ 200

Examination Code: SCC00332003T

Course Name: **Gemstone**

Minor (Choose any two from pool of courses)

Total Contact Hours: 30

Total Credits: 02
Hrs.

(Theory)

Maximum Marks : 50

Learning Objective of the Course

- Understanding Chemical composition Mineral formation
- Identification of Minerals
- Identification of Gemstones

Course Outcomes:

- Student will be able to understand the genesis of mineral
- To understand the physical properties of minerals
- To understand the difference between natural and artificial minerals
- To understand the difference between natural and artificial Semi precious gemstone.

Sr. No	Topics	Total Periods	Marks
UNIT I	Chemical composition of minerals Rock forming minerals and its uses Economic mineral ore minerals and gangue deposits and uses.	10	10
UNIT II	Physical properties of minerals Colour, Streak, Luster, Form or Habit, Cleavage, Fracture, Hardness, Specific Gravity (Sp.gr.) etc.	10	10
UNIT III	Introduction to Gemstone, Physical properties of Gemstone Classification of Gemstone	10	10

Book:

1. Engineering & General Geology: Parbin Singh
2. A Textbook of Geology: Mahapatra G. B.
3. A Textbook of Geology: Dr. U.D. Kulkarni and Dr. I.A.Khan.
4. Rutleys's Elements of Mineralogy: C.D. Gribble.
5. Text Books of Mineralogy: Dana and Ford
6. Rock Forming Minerals: Deer, Howie, Zussman
7. Collins gem Gemstone : Cally Oldershaw

B.Sc. Second YearSemester: IIIrd

Subject: Geology

Course Code: GEO/Mn/T/ 201

Examination Code: SCC00332013T

Course Name: **Rocks**Total Credits: 02
(Theory)

Minor (Choose any two from pool of courses)

Total Contact Hours: 30 Hrs.
Maximum Marks : 50

Learning Objective of the Course

- Understanding Rock formation
- Identification of Rocks
- Different types of rocks with their texture and structure

Course Outcomes:

- Student will be able to understand the genesis of rocks
- To understand the texture and structure of rocks
- To understand the different petrology

Sr. No	Topics	Total Periods	Marks
UNIT I	Rock Cycle. Types of Rocks (Igneous, Sedimentary and Metamorphic) Genesis Texture, Structure and Classification of Igneous Rocks and their uses Discordant and Concordant Bodies Rhyolite, Granite, Basalt, Dolerite, Gabbro, Pegmatite,	10	10
UNIT II	Genesis of Sedimentary Rocks and their uses Texture, Structure and Classification. Sandstone, limestone, Shale, Dolomite, Marl, Breccia and Conglomerate Laterite Bauxite	10	10
UNIT III	Genesis of Metamorphic Rocks Texture, Structure and Classification and their uses Quartzite, Marble, Schist, Gneiss, Slate, Phyllite and their varieties uses	10	10

Book:

1. Engineering & General Geology: Parbin Singh
2. A Textbook of Geology: Mahapatra G. B.
3. General Geology: Radhakrishan
4. General Geology: Pramod Pathrikar, Ashok Tejankar

B.Sc. Second Year**Semester: IIIrd****Subject: Geology**

Course Code: GEO /GE/OE/T/200

Examination Code: SDC00332003T

Course Name: **Major Rivers of India**Total Credits: 02
(Theory)

Generic / Open Elective (GE/OE)

Total Contact Hours: 30 Hrs.
Maximum Marks : 50**Learning Objective of the Course**

- Understanding the geomorphology of the river
- To understand the River morphology
- Different types of rivers of India

Course Outcomes:

- Student will be able to Understanding the geomorphology of the river
- To understand the River morphology
- Different types of rivers of India

Sr. No	Topics	Total Periods	Marks
UNIT I	Physiography divisions of India Introduction to Geomorphology, weathering , transportation, deposition of River, streams, tributary, river major river. Stages of River formation, waterfall , meanders, delta Geographical extend.	10	10
UNIT II	Major river, River system (parts of system), Ganga, Narmada, Brahmaputra ,Tapi, Godavari, Krishna, kaveri, Mahanadi, Indus Sindh	10	10
UNIT III	Importance of Dams ,Major Dams on river, Deltas of river, Benefits/floods of river	10	10

Book:

1. Physical Geography of India by B.R.C. Kumar
2. Rivers of India by S.D. Mishra
3. Water Resources of India by K.L. Rao
4. Dams and Reservoirs: Planning, Design, and Construction by Sharma, T.V.

B.Sc. Second Year**Semester: IIIrd****Subject: Geology**

Course Code: GEO/VSC/T/ 200

Examination Code: SEC00332003T

Course Name: **Advanced Mineralogy**Total Credits: 01
(Theory)

VSC (Vocational Skill Courses)

Total Contact Hours: 15 Hrs.
Maximum Marks : 50

Learning Objective of the Course

- Understanding Mineral formation
- Identification of Minerals
- Identification of Gemstones

Course Outcomes:

- Student will be able to understand the genesis of mineral
- To understand the physical properties of minerals
- To understand the difference between natural and artificial minerals
- To understand the difference between natural and artificial Semi precious gemstone.

Sr. No	Topics	Total Periods	Marks
UNIT I	Definition of Minerals, Geological processes of mineral formation : Magmatic Evaporation, Sublimation, Precipitation Metamorphism Metasomatism.	10	10
UNIT II	Physical properties of minerals Colour, Streak, Luster, Form or Habit, Cleavage, Fracture, Hardness, Specific Gravity (Sp.gr.) magnetism, electricity , radioactivity etc.	10	10
UNIT III	Properties, occurrences and distribution of the following minerals Rock forming minerals Quartz, Chalcedony, jasper, Flint, Orthoclase, Plagioclase, Biotite, Muscovite, Olivine, Hornblende, Industrial minerals Kyanite, Talc, Calcite, Fluorite, Gypsum, Barytes, Graphite Metallic minerals Magnetite, Haematite, Chromites, Chalcopyrite, Galena, Pyrolusite, Bauxite Secondary Minerals Apophyllite, Stilbite, Thomsonite Calcite , Semi -Precious Minerals Amethyst, Opal, Agate, Garnet, Beryl, Corundum	10	10

Book:

1. Rutleys elements of Mineralogy : C.D. Gribble
2. A Textbook of Mineralogy : J.D. Dana
3. A Textbook of Geology: Dr. U.D. Kulkarni and Dr. I.A. Khan.
4. Economic Mineral Deposit: Mead L. Jensen and Alan M Bateman.

B.Sc. Second YearSemester: IIIrd

Subject: Geology

Course Code: GEO/VSC/T/ 201

Examination Code: SEC00332013T

Course Name: **Texture and structure of Rock**Total Credits: 01
(Theory)

VSC (Vocational Skill Courses)

Total Contact Hours: 15 Hrs.

Maximum Marks : 50

Learning Objective of the Course

- Understanding Rock formation
- Identification of Rocks
- Different types of rocks with their texture and structure

Course Outcomes:

- Student will be able to understand the genesis of rocks
- To understand the texture and structure of rocks
- To understand the different petrology

Sr. No	Topics	Total Periods	Marks
UNIT I	Texture, Structure, Classification & uses of different Igneous Rocks Varieties of Granitic Rocks, Varieties of Basaltic Rocks	10	10
UNIT II	Texture, Structure, Classification & uses of different Sedimentary Rocks Varieties of Sandstone , Varieties of Shale Varieties of Limestone	10	10
UNIT III	Texture, Structure , Classification & uses of different Metamorphic Rocks Varieties of Marble Varieties of Schist Varieties of Gniesses	10	10

Book:

1. A Introduction to Igneous Petrology : John D. Winter
2. Introduction to Sedimentology : S. M. Sengupta
3. Fundamentals of Sedimentary Rocks : N.W. Gokhale
4. Optical Mineralogy : Paul F. Kerr
5. Structural Geology : M P Billings
6. Principles of Invertebrate Paleontology : Twenhofel and Shrock
7. Petrography and petrochemistry of Deccan Basalt Oxford Book Company: A.V. Tejankar

B.Sc. Second Year**Semester: IIIrd****Subject: Geology**

Course Code: GEO/VSC/P/ 226

Examination Code: SEC00332263P

Course Name: **Advanced Mineralogy**Total Credits: 01
(Practical)

VSC (Vocational Skill Courses)

Total Contact Hours: 30 Hrs.
Maximum Marks : 50**Learning Objective of the Course**

- Understanding Mineral formation
- Identification of Minerals
- Identification of Gemstones

Course Outcomes:

- Student will be able to understand the genesis of mineral
- To understand the physical properties of minerals
- To understand the difference between natural and artificial minerals
- To understand the difference between natural and artificial Semi precious gemstone.

Sr. No	Topics	Total Periods	Marks
UNIT I	Chemical composition, crystal behavior of minerals. Rock Forming minerals, economic minerals etc.	10	10
UNIT II	Physical properties of minerals Colour, Streak, Luster, Form or Habit, Cleavage, Fracture, Hardness, Specific Gravity (Sp.gr.) magnetism, electricity , radioactivity etc.	10	10
UNIT III	Properties, occurrences and distribution of the following minerals Rock forming minerals Quartz, Chalcedony, jasper, Flint, Orthoclase, Plagioclase, Biotite, Muscovite, Olivine, Hornblende, Industrial minerals Kyanite, Talc, Calcite, Fluorite, Gypsum, Barytes, Graphite Metallic minerals Magnetite, Haematite, Chromites, Chalcopyrite, Galena, Pyrolusite, Bauxite Secondary Minerals Apophyllite, Stilbite, Thomsonite Calcite , Semi -Precious Minerals . Amethyst, Opal, Agate, Garnet, Beryl, Corundum	10	10

Book:

1. Rutleys elements of Mineralogy : C.D. Gribble
2. A Textbook of Mineralogy : J.D. Dana
3. A Textbook of Geology: Dr. U.D. Kulkarni and Dr. I.A. Khan.
4. Economic Mineral Deposit: Mead L. Jensen and Alan M Bateman.

B.Sc. Second YearSemester: IIIrd

Subject: Geology

Course Code: GEO/VSC/P/ 227

Examination Code: SEC00332273P

Course Name: **Texture and structure of Rock**Total Credits: 01
(Practical)

VSC (Vocational Skill Courses)

Total Contact Hours: 30 Hrs.
Maximum Marks : 50

Learning Objective of the Course

- Understanding Rock formation
- Identification of Rocks
- Different types of rocks with their texture and structure

Course Outcomes:

- Student will be able to understand the genesis of rocks
- To understand the texture and structure of rocks
- To understand the different petrology

Sr. No	Topics	Total Periods	Marks
UNIT I	Igneous Rocks Texture, Structure and Classification Granite, Basalt, Diorite, Dolerite, Gabbro, Pegmatite, Synite, Trachyte, Dunite,	10	10
UNIT II	Sedimentary Rocks Texture, Structure and Classification. Sandstone, limestone, Shale, Dolomite, , Breccia and Conglomerate Laterite Bauxite	10	10
UNIT III	Metamorphic Rocks Texture, Structure and Classification Quartzite, Marble, Schist, Gneiss, Slate, Phyllite	10	10

Book:

1. A Textbook of Geology: Mahapatra G. B.
2. A Textbook of Geology: Dr. U.D. Kulkarni and Dr. I.A.Khan.
3. General Geology : Pramod Pathrikar, Ashok Tejankar
4. A Geography & General Geology: Parbin Singh

**Structure of B. Sc. (Three / Four Years Honours / Honours with Research Degree)
Programme with Multiple Entry and Exit Options**

BSc Second Year: 4th Semester

Course Type	Course Code	Examination Code (To be given by respective BoS)	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
				Theory	Practical	Theory	Practical	
Major (Core) Mandatory DSC	GEO/DSC/T/250	SAC00332504T	Descriptive Petrology (Theory Course)	2		2		2+2+2+2 = 08
	GEO /DSC/T/ 251	SAC00332514T	Structural Geology and Basic Palaeontology (Theory Course)	2		2		
	GEO /DSC/P/ 276	SAC00332764P	Descriptive Petrology (Practical based on SUB/DSC/T/250)		4		2	
	GEO /DSC/P/ 277	SAC00332774P	Structural Geology and Basic Palaeontology (Practical based on SUB/DSC/T/ 251)		4		2	
Minor (Choose any two from pool of courses) It is from different discipline of the same faculty	GEO /Mn/T/250	SCC00332504T	(To be chosen from other discipline of same faculty)	2		2		2+2 = 04
	GEO /Mn/T/ 251	SCC00332514T	(To be chosen from other discipline of same faculty)	2		2		
Generic / Open Elective (GE/OE) (Choose any one from pool of courses) It should be chosen compulsorily from the faculty other than that of Major	GEO /GE/OE/T/250	SDC00332504T	(To be chosen from other faculty)	2		2		02
SEC (Skill Enhancement Courses) (Choose any one from SUB/SEC/T/250and SUB/SEC/T/ 251) and corresponding Practicals	GEO /SEC/T/250	SEC00332504T	Geological Mapping (Theory Course)	1		1		1+1 =02
	GEO /SEC/T/ 251	SEC00332514T	Identification of Tectonic feature in field (Theory Course)	1		1		
	GEO /SEC/P/ 276	SEC00332764P	Geological Mapping (Practical based on SUB/SEC/T/250)		2		1	
	GEO /SEC/P/ 277	SEC00332774P	Identification of Tectonic feature in field (Practical based on SUB/SEC/T/ 251)		2		1	
AEC, VEC, IKS	SUB/AEC/T/250		Modern Indian Language (MIL-2) (Choose any one from pool of language courses)	2		2		02
	SUB/FP/P/ 276		Field Project		4		2	2+2= 04
OJT/ FP/CEP/CC/RP	SUB/CC/P/ 277		(Fine/ Applied/ Visual/ Performing Arts) (Common for all the faculty)		4		2	
				13	18	13	09	22

Exit Option : Award of UG Diploma in major and minor with 88 credits and an additional 4 credits NSQF course (related to major / minor) / Internship during summer vacation OR Continue with Major and Minor

Minor Courses for other Discipline

GEO/Mn/T/ 250 **Introduction to Fossils** (SCC00332504T) : This is a 2 credit theory course to be designed for other discipline

GEO/Mn/T/ 251 **Introductory to Basic Rock structures** (SCC00332514T) : This is a 2 credit theory course to be designed for other discipline

Generic /Open Elective Courses for other faculty

GEO/GE/OE/T/250 **Mountains of India** (SDC00332504T) : This is a 2 credit theory course to be designed for other faculty

B.Sc. Second YearSemester: IVth

Subject: Geology

Course Code: GEO/DSC/T/250

Examination Code: SAC00332504T

Course Name: **Descriptive Petrology**

Total Credits: 02

Major (Core) Mandatory DSC

Total Contact Hours: 30 Hrs.

(Theory)

Maximum Marks : 50

Learning Objective of the Course

- Understanding Rock formation
- Identification of Rocks
- Different types of rocks with their texture and structure

Course Outcomes:

- Student will be able to understand the genesis of rocks
- To understand the texture and structure of rocks
- To understand the different petrology

Sr. No	Topics	Total Periods	Marks
UNIT I	Magma, Physicochemical constitution of magma, concept of primary magma, Crystallization of Uni-component, Binary & Ternary magma. Bowen reaction series, differentiation of magma and its assimilation Igneous rocks texture with respective characters and Various structures.	10	10
UNIT II	Weathering genesis of sediments, Mineral composition of sediments, Transportation and deposition, Lithification and diagenesis process. Textures of sedimentary rocks Clastic and Non Clastic Texture. Important mechanical and chemical structures found in sedimentary rocks. Residual rocks:- Laterite, Bauxite and soil Rudaceous rocks:- conglomerate and Breccia Arenaceous rocks:- – sandstones, grit, arkose, greywacke, siltstone, Argillaceous rocks:- – shales and Mud stone Chemical rocks:- Limestone, shelly limestone Organic rocks:- Coral , Kankar	10	10
UNIT III	Metamorphic minerals, textures of Eskola's metamorphic facies, Structures and textures in metamorphic rock Gneissose, schistose, granulose and maculose. Different metamorphism on i) Argillaceous rock ii) Quartzo-feldspathic rocks iii) Basic igneous rocks iv) Granitic rocks v) Pure and impure limestone vi) Sandstone and shale and there products.	10	10

Book:

1. Principles of Petrology : G. W. Tyrrel
2. Igneous and Metamorphic Petrology : Turner & Verhogen
3. Igneous Petrology : Anthony Hall
4. Igneous rocks : Mc Birney
5. Igneous and Metamorphic Petrology : Myron Best
6. Principles of Petrology : GW Tyrrell.
7. Igneous, metamorphic and sedimentary Rocks : Elher and Blatt

B.Sc. Second YearSemester: IVth

Subject: Geology

Course Code: GEO/DSC/T/ 251

Examination Code: SAC00332514T

Course Name: **Structural Geology and Basic Palaeontology**

Total Credits: 02

Major (Core) Mandatory DSC

Total Contact Hours: 30 Hrs.

(Theory)

Maximum Marks : 50

Learning Objective of the Course

- Understanding structural Geology
- Identification of fossils
- Recognition of structure

Course Outcomes:

- Student will be able to understand the structural Geology
- To understand the Palaeontology
- To understand the Geological time scale

Sr. No	Topics	Total Periods	Marks
UNIT I	Introduction to structural Geology Definition and its relation with other branches of Geology Attitude of planar and inclined beds strike and dip Tectonic and non-tectonic structures Clinometer compass and its application.	10	10
UNIT II	Definition and nomenclature of folds. Classification of fold, geometric, genetic and non-tectonic folds Recognition of fold in the field. Definition and nomenclature of joints Geometric and genetic classification of joints with examples Recognition of joints in rocks. Definition and nomenclature related to faults. Geometric and genetic classification of fault. Recognition of faults in the field. Unconformity, classification of unconformities Recognition of unconformity in the field.	10	10
UNIT III	Palaeontology : Significance of fossils, Modes of preservation, living fossil, index fossil and zonal guide fossils Their geographical distribution, geological history, and Morphological feature in brief of Gastropods, Lamellibranchia, cephalopods. Echinodea, ammonites, trilobites, and fossil wood.(polmoxylin) Introduction to Gondwana plant fossils.(Gondwana Flora Glassopteris, gangamopteris, and ptillophyllum) Introduction to micropaleontology and stratigraphy Geological time scale	10	10

Book:

1. Palaeontology Evolution and Animal Distribution : Dr. P.C. Jain & Dr. M.S. Anantharaman
2. Engineering & General Geology: [Parbin Singh](#)
3. A Textbook of Geology: [Mahapatra G. B.](#)
4. A Textbook of Geology: Dr. U.D. Kulkarni and Dr. I.A.Khan.
5. Structural Geology : M P Billings

B.Sc. Second Year**Semester: IVth****Subject: Geology**

Course Code: GEO /DSC/P/ 276

Examination Code: SAC00332764P

Course Name: **Descriptive Petrology**

Total Credits: 02

Major (Core) Mandatory DSC

Total Contact Hours: 60 Hrs.

(Practical)

Maximum Marks : 50

Learning Objective of the Course

- Understanding Rock formation
- Identification of Rocks
- Different types of rocks with their texture and structure

Course Outcomes:

- Student will be able to understand the genesis of rocks
- To understand the texture and structure of rocks
- To understand the different petrology

Sr. No	Topics	Total Periods	Marks
UNIT I	Megascopic study of the following igneous rocks. Basalt, dolerite, Gabbro, Syenite, Diorite, Trachyte, Dunite, Grano-diorite, Rhyolite Pegmatite, granite. Megascopic study of the following sedimentary rocks Laterite , Bauxite, breccias, conglomerate, Sandstone, grit, greywacke, Arkoses, shale, mudstone, siltstone, limestone, coral, kankar.	10	10
UNIT II	Megascopic study of the following metamorphic rocks Gneiss, granite gneiss, Marble, dolomite, slate, Phyllite schist quartzite, Mica schist, hornblende schist, chlorite schist, Mica garnet schist, kaynite schist.	10	10
UNIT III	Megascopic texture and structure: Flow structure, Amygdaloidal structure , vesicular structure , Ropy lava, Porphyritic , Poiklitic, Clastic , non Clastic , pisolitic, schistose, gneissose, granoluse, maculose,	10	10

Book:

1. Igneous rocks : McBirney
2. Igneous and Metamorphic Petrology : Myron Best
3. Principles of Petrology : GW Tyrrell.
4. Igneous, metamorphic and sedimentary Rocks : Elher and Blatt

B.Sc. Second YearSemester: IVth

Subject: Geology

Course Code: GEO /DSC/P/ 277

Examination Code: SAC00332774P

Course Name: **Structural Geology and Basic Palaeontology**Total Credits: 02
(Practical)

Major (Core) Mandatory DSC

Total Contact Hours: 60 Hrs.
Maximum Marks : 50

Learning Objective of the Course

- Understanding Geological maps
- Identification of fossils
- Different types of Structural problem

Course Outcomes:

- Student will be able to understand the Topographically, structural and Geological maps
- To understand the Report writing and sample collection
- To understand the identifications fossils

Sr. No	Topics	Total Periods	Marks
UNIT I	Study of Topographically, structural and Geological maps; horizontal beds, inclined beds, unconformity, dykes , sills, outcrops	10	10
UNIT II	Map of Fold and fault. Structural problem. Attitude of beds strike and dip. Geological excursion in selected area, Geological excursion of one day in district and long tour of ten days is compulsory. Report writing and sample collection	10	10
UNIT III	Study of the following fossils and their identifications. nautica, Turitella, Physa, murex, Unio, Arca, Cardita, Pecten ,Venus Nautilus, Tarebratula, Ammonite, Echinodea, trilobite, fossil wood Gondwana plant fossils Glossopteris, ptillophyllum, Gangamopteris.	10	10

Book:

1. Palaeontology Evolution and Animal Distribution : Dr. P.C. Jain & Dr. M.S. Anantharaman
2. Engineering & General Geology: [Parbin Singh](#)
3. A Textbook of Geology: [Mahapatra G. B.](#)
4. A Textbook of Geology: Dr. U.D. Kulkarni and Dr. I.A.Khan.

B.Sc. Second YearSemester: IVth

Subject: Geology

Course Code: GEO/Mn/T/250

Examination Code: SCC00332504T

Course Name: **Introduction to Fossils**Total Credits: 02
(Theory)

Minor (Choose any two from pool of courses)

Total Contact Hours: 30 Hrs.
Maximum Marks : 50

Learning Objective of the Course

- Able to various processes of fossilization (modes of preservation).
- Describe and compare the standard and Indian geological time scales.
- To understand the significance of fossils in understanding past life, evolution.
- Develop a foundational understanding of palaeontology.
- Improve scientific communication skills through the description and illustration of fossils.

Course Outcomes:

- Understand fundamental paleontological concepts.
- Analyze the significance of fossils.
- Apply geological time scales
- Communicate effectively about paleontology
- Interpret evolutionary trends

Sr. No	Topics	Total Periods	Marks
UNIT I	Introduction to fossils, Modes of Preservation of Fossils, Introduction to micropaleontology and stratigraphy Standard Geological Time scale, Indian Geological Time scale	10	10
UNIT II	Significance of fossils, Living Fossils, index Fossils and zonal guide fossils. Geological and geographical distribution and history Morphological feature with neat diagrams of fauna of nautica, Turitella, Physa, murex, Unio, Arca, Cardita, Pecten, Venus Nautilus, Tarebratula, Ammonite, Echinodea, trilobite,	10	10
UNIT III	Geological and geographical distribution and history Morphological feature with neat diagrams of floras Glassopteris, gangamopteris, ptillophyllum, calamine, and fossil wood	10	10

1. Palaeontology Evolution and Animal Distribution : Dr. P.C. Jain & Dr. M.S. Anantharaman
2. Engineering & General Geology: [Parbin Singh](#)
3. A Textbook of Geology: [Mahapatra G. B.](#)
4. A Textbook of Geology: Dr. U.D. Kulkarni and Dr. I.A.Khan.

B.Sc. Second YearSemester: IVth

Subject: Geology

Course Code: GEO /Mn/T/ 251

Examination Code: SCC00332514T

Course Name: **Introductory to Basic Rock structures**

Total Credits: 02

Minor (Choose any two from pool of courses)

Total Contact Hours: 30 Hrs.

(Theory)

Maximum Marks : 50

Learning Objective of the Course

- Able to understand fundamental structural geological terms.
- Apply the principles of strike and dip to represent geological structures on maps.
- Describe how to recognize geological structures like Fold, Joints, Faults Unconformity.
- Develop a fundamental understanding of the principles of structural geology.
- Improve skills in interpreting cross-sections to visualize subsurface structures.

Course Outcomes:

- Understand fundamental concepts.
- Determine and interpret attitude.
- Classify and describe folds, joints, faults, unconformities.
- Apply structural geology principles.

Sr. No	Topics	Total Periods	Marks
UNIT I	Introduction to structural Geology Strata, bed, bedding plane, Outcrop, Tectonic and non-tectonic structures. fold, fault , joints unconformity , dykes, and sills Attitude of planar and inclined feature strike and dip Clinometers compass, brunton compass and its application.	10	10
UNIT II	Definition, nomenclature of folds. Classification of fold geometric, genetic and non- tectonic folds, Recognition of folds in the field Definition and nomenclature of joints Geometric and genetic classification of joints with examples . Recognition of joints in rocks.	10	10
UNIT III	Definition and nomenclature related to faults. Geometric and genetic classification of fault. Recognition of faults in the field. Unconformity Definition, structural classification of unconformities Recognition of unconformity and non conformity.	10	10

1. Engineering & General Geology: Parbin Singh
2. A Textbook of Geology: Mahapatra G. B.
3. A Textbook of Geology: Dr. U.D. Kulkarni and Dr. I.A.Khan.
4. Structural *Geology* : M P Billings

B.Sc. Second YearSemester: IVth

Subject: Geology

Course Code: GEO /GE/OE/T/250

Examination Code: SDC00332504T

Course Name: **Mountains of India**Total Credits: 02
(Theory)

Generic / Open Elective (GE/OE)

Total Contact Hours: 30 Hrs.
Maximum Marks : 50

Learning Objective of the Course

- Understanding the geomorphology of the river
- To understand the River morphology
- Different types of rivers of India

Course Outcomes:

- Student will be able to Understanding the geomorphology of the river
- To understand the River morphology
- Different types of rivers of India

Sr. No	Topics	Total Periods	Marks
UNIT I	Earth and position of India in the globe, Physiography divisions of India Introduction to Geomorphology, erosion, weathering, transportation, deposition and upliftment. . Volcanoes, Hill, valleys, Plateau, plains, lakes, basins, deltas, and coral reefs.	10	10
UNIT II	Formations of Mountains, Volcanic eruption, folded, faulted relict and residual mountains. Uplifted basins, Tethys sea- Himalaya, Basic rock formations of Mountain ranges of Himalayan Formation (upper, Middle, Lower)	10	10
UNIT III	Geological settings and Geographical depiction of Himalayan Formation (upper, Middle, Lower), Vindhyan, cuddapha, eastern Ghats, balaghat ranges ., Dharwar hill ranges, western ghats, sahyadri, nilgiri, Aravali, batholiths of bundhelkhandh	10	10

Book:

1. "Up The Mountains Of India" by Mala Kumar
2. Structural *Geology* : M P Billings
3. Engineering & General Geology: [Parbin Singh](#)

B.Sc. Second Year**Semester: IVth****Subject: Geology**

Course Code: GEO /SEC/T/250

Examination Code: SEC00332504T

Course Name: **Geological Mapping**Total Credits: 01
(Theory)

SEC (Skill Enhancement Courses)

Total Contact Hours: 15 Hrs.
Maximum Marks : 50

Learning Objective of the Course

- Understanding the reading of Toposheet
- To understand use of Clinometers and Brunton Compass
- Different types rock Beds

Course Outcomes:

- Student will be able to Marking location in Toposheet
- To understand the measurement of Dip and Strike
- To understand the Junction Beds

Sr. No	Topics	Total Periods	Marks
UNIT I	Reading of Toposheet (Toposheet Number, Scale, Latitude Longitude, Conventional Signs and Symbols) Marking location in Toposheet, Bearing (Back and Fore), Concept of Map reading (Contour, Hill, Valley, Highground, Spur, Saddle and Basin)	10	10
UNIT II	Study of Clinometers and Brunton Compass (Dip and Strike)	10	10
UNIT III	Junction Beds, Horizontal and Inclined Beds, Thickness Of Beds, Discordant and Concordant Bodies, Fold, fault and Unconformity.	10	10

Book:

1. "Geological Mapping: An Introduction" by F. G. Bell
2. "Manual of Geological Maps" by P.K. Mukherjee
3. "Geology of India" by M.S. Krishnan (for regional geological understanding)
4. "Geological Maps and Their Interpretation" by D. V. Reddy

B.Sc. Second YearSemester: IVth

Subject: Geology

Course Code: GEO /SECT/ 251

Examination Code: SEC00332514T

Course Name: **Identification of Tectonic feature in field**Total Credits: 01
(Theory)

SEC (Skill Enhancement Courses)

Total Contact Hours: 15 Hrs.

Maximum Marks : 50

Learning Objective of the Course

- Understanding the structural Geology
- To understand the Field Geology
- Different types Mountain, Volcano

Course Outcomes:

- Student will be able to Understanding the geological structure
- To understand the Mountain volcano and earthquake
- Able to geological field work

Sr. No	Topics	Total Periods	Marks
UNIT I	Introduction to structural geology; Diastrophic and non-diastrorphic structures; Components of structural elements: planar and linear features, concept of dip and strike, trend and plunge, rake/pitch Fold, its Morphology and Classification and Fault its Morphology and Classification In Field as well as by using Models of Fold, fault and their Types.	10	10
UNIT II	Application of primary and secondary structures for determining order of Superposition; Unconformity and its types. In Field as well as by using Models of Structures, Inlier and Outlier, Types of Unconformity.	10	10
UNIT III	Mountain, Volcano and earthquake In Field as well as by using Models, Charts of Mountains, Volcanoes and Earthquake.	10	10

Book:

1. "Structural Geology" – M.P. Billings
2. "Structural Geology" – D.V. Reddy
3. "Textbook of Geology" – G.B. Mahapatra
4. "Physical Geology" – Mahapatra G.B.
5. "Geology of India" – M.S. Krishnan

B.Sc. Second YearSemester: IVth

Subject: Geology

Course Code: GEO /SEC/P/ 276

Examination Code: SEC00332764P

Course Name: **Geological Mapping**Total Credits: 01
(Practical)

SEC (Skill Enhancement Courses)

Total Contact Hours: 30 Hrs.
Maximum Marks : 50

Learning Objective of the Course

- Understanding the Latitude Longitude
- To understand the use of Clinometers and Brunton Compass
- Different types of Discordant and Concordant bodies

Course Outcomes:

- Student will be able to Understanding the Conventional Signs and Symbols
- To understand the Practical study of Clinometers
- Different types Hill, Valley, High ground, Spur, Saddle and Basin

Sr. No	Topics	Total Periods	Marks
UNIT I	Reading of Toposheet (Toposheet Number, Scale, Latitude Longitude, Conventional Signs and Symbols) Marking location in Toposheet, Bearing (Back and Fore)	10	10
UNIT II	Practical study of Clinometers and Brunton Compass (Dip and Strike)	10	10
UNIT III	Concept of Map (Contour, Hill, Valley, High ground, Spur, Saddle and Basin) Junction Beds, Horizontal and Inclined Beds, Thickness Of Beds, Discordant and Concordant Bodies, Fold, fault and Unconformity.	10	10

Book:

1. "Textbook of Geology" – G.B. Mahapatra
2. "Manual of Geological Maps" – P.K. Mukherjee
3. "Structural Geology" – D.V. Reddy

B.Sc. Second Year**Semester: IVth****Subject: Geology**

Course Code: GEO /SEC/P/ 277

Examination Code: SEC00332774P

Course Name: **Identification of Tectonic feature in field**Total Credits: 01
(Practical)

SEC (Skill Enhancement Courses)

Total Contact Hours: 30 Hrs.
Maximum Marks : 50

Learning Objective of the Course

- Understanding the application of primary and secondary structures
- To understand the Outcrop Map
- Different types of Mountain, Volcano

Course Outcomes:

- Student will be able to Understanding structures for determining order of Superposition
- To understand the Structures, Inlier and Outlier
- Different types of Mountains, Volcanoes and Earthquake

Sr. No	Topics	Total Periods	Marks
UNIT I	Application of primary and secondary structures for determining order of Superposition; Unconformity and its types. In Field as well as by using Models of Structures, Inlier and Outlier, Types of Unconformity.	10	10
UNIT II	Outcrop Map, Structural Maps, Fold, Fault. Unconformity, Joints	10	10
UNIT III	Mountain, Volcano In Field as well as by using Models, Charts of Mountains, Volcanoes and Earthquake	10	10

Book:

1. "Structural Geology" – M.P. Billings
2. "Structural Geology" – D.V. Reddy
3. "Textbook of Geology" – G.B. Mahapatra
4. "Physical Geology" – Mahapatra G.B.
5. "Geology of India" – M.S. Krishnan