Estd. 1962
"A++" Accredited by NAAC (2021)
With CGPA 3.52

SHIVAJI UNIVERSITY, KOLHAPUR - 416004, MAHARASHTRA
PHONE:EPABX-2609000, www.unishivaji.ac.in, bos@unishivaji.ac.in
शिवाजी विद्यापीठ, कोल्हापूर -४१६००४,महाराष्ट्र
दूरध्वनी-ईपीएबीएक्स -२६०९०००, अभ्यासमंडळे विभाग दुरध्वनी ०२३१—२६०९०९४
०२३१—२६०९४८७

Ref.No.SU/BOS/Science/434 **Date: 15/07/2025**

To,

The Principal,
All Concerned Affiliated Colleges/Institutions
Shivaji University, Kolhapur.

Subject: Regarding revised syllabi of B.Sc. Part-II (Sem.III & IV) degree programme under the Faculty of Science and Technology as per NEP-2020 (2.0)

Ref: No.SU/BOS/Science/270 & 271 Date: 03/05/2025 Letter.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the syllabi, nature of question paper of B.Sc. Part-II (Sem.III & IV) degree programme under the Faculty of Science and Technology as per NEP-2020 (2.0).

B.Sc.Part-II (Sem. III & IV) as per NEP-2020 (2.0)			
1.	Botany	8.	Geology
2.	Statistics	9.	Zoology
3.	Mathematics	10.	Chemistry
4.	Microbiology	11.	Electronics
5.	Plant Protection	12.	Industrial Microbiology
6.	B.A./B.A.B.Ed. Geography	13.	Biotechnology(Voc/Opt)
7.	Biotechnology(Entire)		

This syllabus, nature of question and equivalence shall be implemented from the academic year 2025-2026 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in NEP-2020@suk(Online Syllabus)

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October /November 2025 & March/April 2026. These chances are available for repeater students, if any.

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Dy Registrar
Dr. S. M. Kubal

Encl: As above

for Information and necessary action

Copy to:

1	Dean, Faculty of Science & Technology	6	Appointment Section A & B
2	Director, Board of Examinations and Evaluation	7	I.T.Cell /Computer Centre
3	Chairman, Respective Board of Studies	8	Eligibility Section
4	B.Sc.-M.Sc. Exam Section	9	Affiliation Section (T.1) (T.2)
5	Internal Quality Assurance Cell (IQAC Cell)	10	P.G. Seminar Section

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०२३१—२६०९४८७

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B.Sc.Part-II (Sem. III & IV) as per NEP-2020 (2.0)			
1.	Botany	8.	Geology
2.	Physics	9.	Zoology
3.	Statistics	10.	Chemistry
4.	Mathematics	11.	Electronics
5.	Microbiology	12.	Drug Chemistry
6.	Plant Protection	13.	Industrial Microbiology
7.	Astrophysics and Space Science	14.	Sugar Technology (Entire)

This syllabus, nature of question and equivalence shall be implemented from the academic year 2025-2026 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in NEP-2020@suk(Online Syllabus)

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By Registrar
Dr. S. M. Kubal

Encl: As above

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SHIVAJI UNIVERSITY, KOLHAPUR

Established: 1962

A++ Accredited by NAAC (2021) with CGPA 3.52

Structure and Syllabus in Accordance with

National Education Policy – 2020

With Multiple Entry and Multiple Exit

Syllabus for

Level 5.0

B.Sc. Part-II

GEOLOGY

(Faculty of Science and Technology)

SEMESTER III AND IV

(To be Implemented from Academic Year 2025-2026 as per NEP-2.0)

SHIVAJI UNIVERSITY, KOLHAPUR

NATIONAL EDUCATION POLICY (NEP-2020)

SYLLABUS WITH EFFECT FROM JUNE 2025

Bachelor of Science in Geology

A) BASIC INFORMATION

ORDINANCE AND REGULATIONS: -as applicable to Under-Graduate Degree / Program

1. **TITLE:** Subject Geology
   Optional under the Faculty of Science

2. **YEAR OF IMPLEMENTATION**: Revised Syllabus will be implemented from June 2025 onwards.

3. **PREAMBLE: -**
   The revised syllabus includes the foundation, core and applied components of the course/paper. The student should get into the prime objectives and expected level of study with required outcome in terms of basic and advance knowledge at examination level.

4. **GENERAL OBJECTIVES OF THE COURSE/ PAPER/:**
   The course is structured with a view to impart basic as well as advance knowledge of the subject to the students in the light of the present-day scenario in earth science.

Course Learning Outcomes-

1. students will get knowledge regarding the earth's building blocks i.e. Rocks.
2. students will come to know about the different types of igneous, sedimentary, and metamorphic rocks. Their formation, their textures, and structures.
3. Students will gain information about various terms and their significance in hydrogeology.
4. Students will become aware of various environmental issues, their reasons and mitigation.

Programme Learning Outcomes-

1. Students will develop an insight into the various earth materials, systems, and the interaction between them.
2. Students gain a knowledge of various factors affecting earth processes, their effects, and their manifestation.
3. Students can assess, analyze, and appreciate the phenomena, processes and issues related to the earth and their effects and mitigation.

5. DURATION-

The course shall be a full-time course.

TEACHING HOURS: All courses under the B. Sc. II will be of 2 credits each. The theory courses will be taught for 30 hours and practical courses for 60 hours. All the major and minor subjects will have Practical Courses. In addition, VSC, OE and SEC have practical modules.

6. PATTERN: -

Pattern of Examination will be Semester pattern for Theory papers. Practical Examination will be on yearly Pattern.

7. FEE STRUCTURE-

As per government/ university rules.

ELIGIBILITY FOR ADMISSION: -

The students passing or ATKT the B. Sc. Part-I (or Undergraduate Certificate in Science) shall be allowed to enter the B. Sc. Part-II (or Undergraduate Diploma in Science). OR An Examination of any other Statutory University or an examining Body recognized as equivalent there to. OR Completed 3-year diploma course with subjects allied / related to the subject at B.Sc. Part I OR completed first year of B.E./B. Tech. with subjects allied / related to the subject at B.Sc. Part I.

8. MEDIUM OF INSTRUCTION:

The medium of instruction shall be English.

10. **SCHEME OF TEACHING AND EXAMINATION PATTERN (THEORY/ PRACTICAL / INTERNAL):**

SCHEME OF TEACHING:

TEACHING HOURS: All courses under the B. Sc. II will be of 2 credits each. The theory courses will be taught for 30 hours and Practical courses for 60 hours. All the major and minor subjects will have Practical Courses. In addition, VSC, OE and SEC have practical modules.

EXAMINATION PATTERN (THEORY / PRACTICAL / INTERNAL):

Scheme of Examination: Total marks shall be 50 for 2 credit courses.

1. The university exam question paper in each semester end examination for each theory course (paper) for B.Sc. (all Semesters) shall be of 40 marks. Total marks for each course shall be based on continuous assessments and semester-end examination. The division of internal assessment and semester–end examination for B.Sc. will be as follows:

Particulars	2 Credit	Course Duration
1. Semester-end Examination	40 Marks	1.5 hrs.

2. Internal Assessment	10 Marks	1.0 hrs.
Total marks for each course	50 Marks	–

2. The Examination for practical course will be of 50 marks at end of each semester. The rule for practical examination shall be as per the circular/ letter issued by respective board of studies.
3. The examination pattern for Co-Curricular Activities (CC), Field Project (FP), On Job Training (OJT), Community Engagement Program (CEP) and Research Project (RP) as per the University guidelines.

Internal Assessment Process shall be as follows:

(a) The internal assessment should be conducted after completing 50% of syllabus of the course/s.

(b) In case a student has failed to attend internal assessment on scheduled date, it shall be deemed that the student has dropped the test. However, in case of student who could not take the test on scheduled date due to genuine reasons, such a candidate may appeal to the Programme coordinator /Principal /Head of the Department. The Programme coordinator /Principal /Head of the Department in consultation with the concerned teacher shall decide about the genuineness of the case and decide to conduct special test to such candidate on the date fixed by the concerned teacher but before commencement of the concerned semester- end examination.

The outline for continuous internal assessment activities shall be as under:

Outline for continuous internal assessment activities:

Level	Semester	Activities Per Semester	Marks
4.5	Semester–I	Assignment	10 marks
	Semester–II	Unit test	10 marks
5.0	Semester–III	Unit test	10 marks
	Semester–IV	Oral examination/ Group discussion	10 marks
5.5	Semester– V	Seminar/ Group discussion/ Field Work	10 marks
	Semester– VI	Study tour / Field Work / Project Work /	10 marks
6.0	Semester– VII	Case Study /Field Work/ Project Work	10 marks
	Semester– VIII	Case Study/ Field Work/ Project Work	10 marks

EQUIVALANCE OF THE PAPER

Equivalence of papers and chances for the students in previous-Semester pattern: Two additional chances in subsequent semesters shall be provided for the repeater students of old three-year B.Sc. program. In such case the scores obtained by the students in NEP 1.0/CBCS scheme should be converted into equivalent credits in NEP 2.0. After that the students concerned shall have to appear for the examination as per this revised pattern. If a student fails in two consecutive chances, he/she

must take admission for the respective course in NEP 2.0. In such cases his previous performance of incomplete academic years (B. Sc. I, B. Sc. II, or B. Sc. III) will be cancelled

9. Course Structure

SHIVAJIUNIVERSITY,KOLHAPUR
NEP-2020 (2.0): Credit Framework for UG(B. Sc.) Programme under Faculty of Science and Technology

SEM (Level)	COURSES			OE	VSC/SEC	AEC/VEC/IKS	OJT/FP/CEP /CC/RP	Total Credits	Degree/Cum. Cr. MEME
	Course-1	Course-2	Course-3						
SEMI (4.5)	DSC-I(2) DSC-II (2) DSC P-I(2)	DSC-I(2) DSC-II (2) DSC P-I(2)	DSC-I(2) DSC-II (2) DSC P-I(2)	OE-1(2) (T/P)		IKS-I(2)		22	UG Certificate 44
SEMII (4.5)	DSC-III(2) DSC-IV (2) DSC P-II(2)	DSC-III(2) DSC-IV (2) DSC P-II(2)	DSC-III(2) DSC-IV (2) DSC P-II(2)	OE-2(2) (T/P)		VEC-I(2) (Democracy, Election and Constitution)		22	
Credits	8(T)+4(P)=12	8(T)+4(P)=12	8(T)+4(P)=12	2+2=4 (T/P)	--	2+2=4	--	44	Exit Option:4 credits NSQF/Internship/Skill courses
	MAJOR		MINOR						
SEMIII (5.0)	Major V(2) Major VI (2) Major P III (2)	--	Minor V(2) Minor VI (2) Minor P III(2)	OE-3(2) (T/P)	VSC I (2) (P) (Major specific) SEC I(2) (T/P)	AEC I(2) (English)	CC-I (2)	22	UG Diploma 88
SEMIV (5.0)	Major VII(2) Major VIII (2) Major P IV (2)	--	Minor VII(2) Minor VIII (2) Minor P IV (2)	OE-4(2) (T/P)	SEC-II(2) (T/P)	AEC-II(2) (English) VEC-II(2) (Environmental studies)	CEP-I(2)	22	
Credits	8(T)+4(P)=12		8(T)+4(P)=12	2+2=4(T/P)	4(T/P)+2(P)=6	2+4=6	2+2=4	44	Exit Option:4 credits NSQF/Internship/Skill courses
SEMV (5.5)	Major IX(2) Major X (2) Major P V (4)	Major I (ELEC)(2) Major P-I (ELEC) (2)	-	OE-5(2) (T/P)	VSC II (2) (Major specific)(P)	AEC III(2) (English)	OJT (04)	22	UG Degree 132
SEMVI (5.5)	Major XI(2) Major XII (2) Major P VI (4)	Major II (ELEC)(2) Major P-II(2) (ELEC)	-		VSC III (2) (Major specific) (P) SEC III(2) (T/P)	AEC IV(2) (English) IKS 2 (Major specific) (2)	FP-(02)	22	
Credits	8(T)+8(P)=16	4(T)+4(P)=8	-	2(T/P)	2(T/P)+4(P)=6	4+2=6	4+2=6	44	
Total Credits	40+20=60		24	10	12	16	10	132	Exit Option

SEMVII (6.0)	Major -XIII(4) Major -XIV(4) Major(P).-VII(4) Major (P) .-VIII(2)	MAJOR III (4) (ELEC)	RM-I(4)	-	-	-		22	UG Honours Degree 176
SEMVIII (6.0)	Major -XV(4) Major -XVI(4) Major (P)- IX(4) Major (P). - X(2)	MAJOR IV (4) (ELEC)	-	-	-	-	OJT(04)	22	
Credits	16(T)+12(P)=28	8(T)	4	-	-	-	04	44	
									Exit Option
Total Credits	68+28=96		28	10	12	16	14	176	
SEMVII (6.0)	Major -XIII (4) Major -XIV (4) Major(P).-VII (2)	MAJOR (4) (ELEC)	RM-I (4)	-		-	RP-4	22	UG Honours with Research Degree 176
SEMVIII (6.0)	Major -XV (4) Major -XVI (4) Major (P)-VIII (2)	MAJOR (4) (ELEC)		-		-	RP-8	22	
Credits	16(T)+4(P)=20	8(T)	4	-	-	-	12	44	
Total Credits	60+28=88		28	10	12	16	22	176	

Note:

- University may decide to offer maximum of three subjects (Courses) in the first year. The student may select one subject out of combination of three subjects (Courses), (which a student has chosen in the first year) as a **MAJOR** subject (Course) and one subject (Course) as **MINOR** Subject in the second year. Thereby it is inferred that the remaining third subject (Course) shall stand discontinued.
- **DSC:** Discipline Specific Course
- **MAJOR:** Mandatory/Elective
- **MINOR:** Course may be from different disciplines of same faculty of DSC Major
- **OE(Open Elective):** Elective courses/**Open Elective to be chosen compulsorily from faculty other than that of the Major.**
- **VSC/SEC: Vocational Skill Courses (MAJOR related)/Skill Enhancement Courses**
- **AEC/ VEC / IKS:** Ability Enhancement Courses (English, Modern Indian Language)/Value Education Courses/ Indian Knowledge System (Generic & Specific))
- **OJT/FP/RP/CEP/CC:** On-Job Training (Internship/Apprenticeship) / Field Project (Major related)/ Research Projects (Major related) Community Engagement **(Major related)/ Co-Curricular courses(CC)** such as Health& Wellness, Yoga Education, Sport, and Fitness, Cultural activities, NSS/NCC and Fine /applied/visual/performing Arts / Vivek Vahini etc.

STANDARD OF PASSING AND DETERMINATION OF SGPA/CGPA, GRADING AND DECLARATION OF RESULT

STANDARD OF PASSING:

The standard of passing shall be as per shown in the following table:

	Semester End Exam	**Internal Assessment**	**Course Exam (Total**
Maximum Marks	**40**	**10**	**50**
Minimum Marks required for passing	**14**	**04**	**18**

DETERMINATION OF SGPA/CGPA:

1. Semester Grade Point Average (SGPA)

$$SGPA = \frac{\sum(\text{Course credits} \times \text{Grade points obtained}) \text{ of a semester}}{\sum(\text{Course credits}) \text{ of respective semester}}$$

2. Cumulative Grade Point Average (CGPA)

$$CGPA = \frac{\sum(\text{Total credits of a semester} \times \text{SGPA of respective semester}) \text{ of all semesters}}{\sum(\text{Total course credits}) \text{ of all semesters}}$$

Gradation Chart:

% of Marks Obtained	**Numerical Grade (Grade Point)**	**CGPA**	**Letter Grade**
Absent	-	-	-
- 0 – 34	0	0.0 – 4.99	F (Fail)
35 – 44	5	5.00 – 5.49	C
45 – 54	6	5.50 – 6.49	B
55 – 64	7	6.50 – 7.49	B+
65 – 74	8	7.50 – 8.49	A
75 – 84	9	8.50 – 9.49	A+
85 – 100	10	9.50 – 10.0	O (Outstanding)

DECLARATION OF RESULT:

The result of each semester shall be declared as Pass or Fail with grade/grade points. However, ATKT rules will be followed as per university guidelines.

Revised Rules - These revised rules shall be gradually implemented with effect from the academic year 2025-26 for B.Sc. Degree Programme. However, the existing (i.e. pre-revised) rules shall remain in force for the students of old semester pattern during the transition period.

13: NATURE OF QUESTION PAPER, DURATION AND SCHEME OF MARKING NATURE OF QUESTION PAPER

Nature of Question Paper for B.Sc. Part – II (40 + 10 Pattern) according to Revised Structure as Per NEP – 2020 to be implemented from academic year 2025-26 Maximum Marks: 40 Duration:
1.5 hrs.

Choose the correct alternative from the following and rewrite the sentence [8] 1 to 8 MCQ one mark each with four options

a)

b)

c)

d)

Attempt any TWO of the following [16]

a)

b)

c)

Attempt any FOUR of the following [16]

a)

b)

c)

d)

e)

f)

SEMESTER – III

S. Y. B. Sc. (GEOLOGY) SEMESTER III

MAJOR COURSE – DSC – V

Course Title: Igneous Petrology

[CREDITS – 02; LECTURES – 30 hours; LEC/WEEK – 02]

Learning Objectives:

1. To introduce an important discipline of Earth Sciences
2. To introduce the different branches of Geology
3. To let know the students the scope and importance of Geology
4. To impart complete knowledge regarding the earth's building blocks i.e. Rocks.
5. To impart knowledge regarding the different types of igneous rocks.
6. To introduce the students to the processes responsible for formation of igneous rocks and magma.
7. To make students aware about the classification of igneous rocks.
8. To make aware the students about the subject through field trips or study tours

Unit I/ Credit 1	**Igneous Petrology**	**No. of Hours: 15**
	Unit-I: (15 Hours) (18-19 lectures) Magma: definition, composition, types, and origin; physical properties of magma (Temperature, Viscosity, Density) Types of magma- Basaltic, Andesitic, Rhyolitic Origin of magma, Forms of igneous rocks - Concordant and Discordant forms; Textures of igneous rocks – Crystallinity, Granularity, shapes of crystals, mutual relationship of crystals and glassy matter, Porphyritic, Poikilitic, Ophitic, Graphic, Trachytic, Xenolithic, Perthitic and Reaction rims Structures- Spherulitic, Vesicular, Amygdaloidal, Ropy, Flow, Pillow, Columnar (9 hours) Bowen's Reaction Series **Differentiation** – Liquid Immiscibility, Gravitational Differentiation, Filtration, Differentiation; Role of volatiles in Differentiation (3 hours) **Assimilation –** Reactions between Basaltic magma and acidic igneous rocks; Basaltic magma and Sedimentary rocks; Reactions with Granitic magma and basic igneous rocks; Granitic magma and Sedimentary rocks; Bowen's Reaction Series (3 hours)	
Unit II/ Credit 1	**Unit-II**: **(15 Hours) (18-19 lectures)**	**No. of Hours: 15**

	Classification of igneous rocks based on i. Mode of Occurrence, ii. Silica Percentage, iii. Colour Index iv. Feldspar Content v. Silica Saturation vi. Alumina Saturation (2 hours) Crystallization of unicomponent magma – Augite (2 hours) Crystallization of Bicomponent magma (two independent components) – Diopside – Anorthite system (3 hours Crystallization of Bicomponent magma (mixed crystals) – Albite-Anorthite system (4 hours) Crystallization of Ternary magma – Diopside – Albite – Anorthite system (4 hours) Crystallization of Ternary magma- Diopside- Albite-Anorthite system, Fractional Crystallization, Equilibrium Crystallization, Evolution of magma	

S. Y. B.Sc. (GEOLOGY) SEMESTER III

MAJOR COURSE – DSC –VI

Course Title:
SEDIMENTARY AND METAMORPHIC PETROLOGY

[CREDITS – 02; LECTURES – 30 hours; LEC/WEEK – 02]

Learning Objectives:

1. To introduce the students to sedimentary and metamorphic petrology.
2. To introduce the students to various processes of formation of sedimentary rocks.
3. To impart knowledge about various sedimentary textures and structures.
4. To introduce students to agents and types of metamorphism.
5. To impart knowledge of different structures of metamorphic rocks.
6. To make known to the students the concept of metamorphic facies and grades.
7. To make aware the students about the Structural features through field trips or study tours.

Unit I/ Credit 1	Sedimentary and Metamorphic Petrology	No. of Hours: 15
	Processes of formation of sedimentary rocks- Erosion, Transportation, Deposition, Welding, Cementation, Effect of Sediment Transport, Classification of Secondary rocks, Different types of Sedimentary Deposits, Residual, Rudaceous, Arenaceous, Argillaceous, Chemical deposits, Organic deposits; (6 hours) Textures based on grain size, sorting, shape, and roundness; - gravel, sand, silt, clay, Grain Shape- Angular, Subangular, Rounded, Textural Maturity (3 hours)'; Structures of sedimentary rocks – Primary and secondary; Depositional Environments – Continental, Transitional, Marine; Provenance (3 hours), Structures of secondary rocks- primary-Bedding, Ripple Marks, Mud cracks, Current Bedding, Graded Bedding, Secondary Structures- Rain Prints, Salt Pseudomorphs, Oolitic and Pisolitic, Tracks and Trails, Concretionary. (3 hours)	
Unit II/ Credit 1	**Sedimentary and Metamorphic Petrology**	**No. of Hours: 15**
	Definition of metamorphism; Agents of metamorphism; (1 hour), Types of metamorphism – Thermal, Cataclastic, Dynamo thermal and Plutonic metamorphism; Metasomatism (9 hours) Zones and grades of metamorphism; Outline of Facies of Metamorphism, Barrovian Zone (3 hours) Textures and structures of metamorphic rocks, Stress and Antistress Minerals (3 hours)	

S. Y. B. Sc. (GEOLOGY) SEMESTER III

MAJOR COURSE – Practical DSC Practical - III

Course Title: Practicals Based on Major Subjects V and VI

[CREDITS – 02; Practicals – 60 hours; PRACTICAL/WEEK – 04]

Paper V and VI: IGNEOUS, SEDIMENTARY AND METAMORPHIC PETROLOGY

Learning Objectives:

1. Study of different rock types.
2. Study of rocks of every type, i.e. igneous, sedimentary, and metamorphic.
3. Megascopic Study of rocks.
4. Microscopic Study of thin sections of rocks.
5. To study the formation of rocks.

6. To find out proportion of various elements in the rock.

Unit I: Credit 01	**Igneous Petrology:** -	**No. of Hours: 15**
	Identification of rocks: Based on their physical properties in hand specimen; and optical properties in thin sections, AFM diagram	
	Textures and Structures of igneous rocks: Megascopic and Microscopic	
Unit I: Credit 01	**Sedimentary and metamorphic Petrology**	**No. of Hours: 15**
	Identification of sedimentary and metamorphic rocks both in hand specimen and optical properties in thin sections. Textures and Structures of sedimentary and metamorphic rocks: Megascopic and Microscopic	

Books Recommended:

1. Turner, F.J. & Verhoogen, J., Igneous & Metamorphic petrology. McGraw Hill Co.
2. Bose, M.K. Igneous petrology. World press
3. Tyrell, G. W. Principles of Petrology. Methuren and Co (Students ed.).
4. Ehlers, WG, and Blatt, H., Petrology, Igneous, Sedimentary and Metamorphic rocks, CBS Publisher
5. Moorhouse, WW.,. The study of rocks in thin sections. Harper and sons.
6. Friedman & Sanders. -Principles of Sedimentology. John Wiley and sons.
7. Pettijohn, F.J. Sedimentary rocks, Harper & Bros. 3rd Ed.
8. Prasad, C. A text book of sedimentology.
9. Sengupta. S. Introduction to sedimentology. Oxford-IBH.
10. Turner, F.J. Metamorphic petrology. McGraw Hill.
11. Mason, R., Petrology of Metamorphic Rocks. CBS Publ.
12. Winkler, H.G.C. Petrogenesis of Metamorphic Rocks. Narosa Publ.

. S. Y. B. Sc. (GEOLOGY) SEMESTER III

MINOR COURSE – DSC – V

Course Title: Economic Geology

[CREDITS – 02; LECTURES – 30 hours; LEC/WEEK – 02]

Learning Objectives:

1. To introduce an important discipline of Earth Science.
2. To let know the students the scope and importance of Geology.
3. To impart complete knowledge regarding the earth's material.
4. To impart knowledge regarding the different types of ores.
5. To introduce the students to the processes responsible for formation of economic minerals.
6. To make aware the students about the subject through field trips or study tours.

Unit I/ Credit 1	**Economic Geology**	**No. of Hours: 15**
	Concept of ore and economic mineral deposits, ore minerals and gangue minerals; Ore reserve classification, Tenor of ores; Strategic, Critical and Essential minerals. Geothermometers, Refractory minerals, Gemstones, Processes of formation of ore deposits; Magmatic Concentration, Sublimation, Evaporation, Contact Metasomatism, Hydrothermal Processes, Oxidation and Supergene Enrichment, Residual and Mechanical Concentration, placer deposits (20 Lectures)	

Unit II/ Credit 1	**Unit-II**: **(15 Hours)** Metallic and non-metallic ore minerals; Study of important metallic (Cu, Pb, Zn Mn, Fe, Au, Al) and non-metallic (industrial Minerals - gypsum, magnesite, mica, graphite); Formation and Distribution of coal and petroleum in India. National mineral policy (20 Lectures)	**No. of Hours: 15**

S. Y. B. Sc. (GEOLOGY) SEMESTER III

MINOR COURSE – DSC – VI

Course Title: Photogeology And Remote Sensing

[CREDITS – 02; LECTURES – 30 hours; LEC/WEEK – 02]

Learning Objectives:

1. To introduce the students to photogeology.
2. To introduce the students to various elements of photogeology.
3. To impart knowledge about various remote sensing systems.
4. To introduce students to different types of sensors.
5. To impart knowledge of geographical information system.
6. To make known to the students the types of satellites.

Unit I/ Credit 1	**Photogeology and Remote Sensing**	**No. of Hours: 15**
	Elementary idea about photogeology: electro-magnetic spectrum, types & geometry of aerial photographs; factors affecting aerial photography; types of cameras, film, and filters; factors affecting scale; Fundamentals of remote sensing; remote sensing systems; remote sensing sensors; Significance in Geology – geomorphological features like lineaments, fractures, faults, folds, unconformities, and dykes; Igneous, sedimentary, and metamorphic terrain identification, delineation of economic mineral deposits (20 Lectures)	

Unit II/ Credit 1	Photogeology and Remote Sensing	No. of Hours: 15
	Types of Indian and Foreign Remote Sensing Satellites, Introduction to Digital image processing; fundamental steps in image processing; elements of pattern recognition and image classification. Introduction to Geographic Information System (GIS); components of GIS; integration of GIS with remote sensing. (20 Lectures)	

S. Y. B. Sc. (GEOLOGY) SEMESTER III

MINOR COURSE – Practical DSC Practical - III

Course Title: Practicals Based on Major Subjects V and VI

[CREDITS – 02; Practicals – 60 hours; PRACTICAL/WEEK – 04]

Paper V and VI: ECONOMIC GEOLOGY & PHOTOGEOLOGY AND REMOTE SENSING

Learning Objectives:

1. Study of different ores and economic minerals.
2. Study of distribution of important mineral deposits.
3. To study aerial photographs.
4. To determine the scale of photograph.

Unit I: Credit 01	Economic Geology	No. of Hours: 15
	Study of ore and economic minerals in hand specimen, Preparation of maps showing distribution of important metallic and non-metallic deposits; Map of Important coal and oil fields of India	

Unit I: Credit 01	Photogeology And Remote Sensing	No. of Hours: 15
	Photogeology and Remote sensing- Study of aerial photographs, Determination of scale of photograph by comparison with toposheet; Study of imageries	

Books Recommended:

1. Brown, C. and Dey, A.K.; Indian Mineral Wealth. Oxford Univ.
2. Gokhale, K.V.G.K. and Rao, T.C., Ore Deposits of India. East West Press Pvt. Ltd.
4. Jense, M.L. and Bateman A.M., Economic Mineral Deposits. John Wiley and Sons.
5. Krishnaswamy, S., India's Minerals Resources. Oxford and IBH Publ.
6. Deb, S., Industrial minerals and Rocks of India. Allied Publishers Pvt. Ltd.
7. Umeshwar Prasad, Economic Geology. CBS Publishers and distributers.
9. A.I. Lavorsen -Geology of Petroleum, CBS Publishers and Distributers
10. Coal Deposits. Lilleasand, T.M. and Kiffer, R.W., Remote Sensing, and Image Interpretation. John Wiley.
11. Pandey, S.N., Principles and Application of Photogeology. Wiley Eastern, New Delhi.
12. Sabbins, F.F., Remote Sensing – Principles and Applications. Freeman.
13. Siegal, B.S. and Gillespie, A.R., Remote Sensing in Geology. John Wiley.
14. Rampal K.K. Hand book of aerial photography and interpretation. Concept publication.
15. e-PG Pathshala: https://epgp.inflibnet.ac.in/
16. MOOCS - NPTEL: https://nptel.ac.in/
17. MOOCS - SWAYAM: https://swayam.gov.in/
18. National Digital Library of India: https://ndl.iitkgp.ac.in/
19. e-PG Pathshala: https://epgp.inflibnet.ac.in/
20. MOOCS - NPTEL: https://nptel.ac.in/
21. MOOCS - SWAYAM: https://swayam.gov.in/
22. National Digital Library of India: https://ndl.iitkgp.ac.in/

B. Sc. PART – II SEMESTER – III (NEP 2.0)

OPEN ELECTVE COURSE – III (OE – III)

COURSE TITLE: Watershed Planning and Management

Credits: 02 Lectures: 30 Lectures/week: 02

Objectives of the Course:

1. To understand the different Watershed behavior
2. To study the impact of Land-use on Hydrological Cycle
3. To study the different Soil parameters
4. To study soil and water conservation techniques

Course Learning Outcomes:

1. Students will understand the importance of Watershed Management
2. Students will understand technical measures for soil erosion
3. Students will be able to suggest drought control measures and water conservation

structures

Credit 1	Watershed	No. of Lectures 15
	Watershed: 1. Introduction 2. Characteristics- a- Climatic Characteristics – Rainfall and its movement, Intensity, Duration, Temperature, Wind velocity, Humidity, Transpiration and Evaporation b- Physiographic Characteristics – size, shape, Slope, Drainage density, Elevation, Land-use, Vegetation Cover, Soil, Geology, Hydrology, Hydrogeology c- Socio-economic characteristics – People and their health, Cattle and farming practises, Participation of People in watershed development and management Watershed Development: 1. Problems and Prospects 2. Investigation 3. Topographical Survey 4. Soil Characteristics 5. Vegetative Cover 6. Present landuse practices	

	7. Socio-economic factors	
Credit 2	Watershed Management	No. of Lectures 15
	1. Concept and Objectives 2. Factors affecting Watershed Management 3. Watershed planning based on land capability classes 4. Watershed Codification 5. Watershed delineation 6. Watershed prioritization 7. Water budgeting in a watershed 8. Management measures: a. Rainwater Conservation techniques – in-situ and ex-situ storage, water harvesting and recycling b. Dry farming techniques- inter-terrace and inter-bund land management c. Integrated watershed management-concept and components, Arable land (Agriculture and Horticulture), non-arable land (Forestry, Fishery and animal Husbandry) 9. Effect of cropping systems 10. Watershed programme- execution, follow-up practices, maintenance, monitoring, and evaluation 11. Participatory watershed management – role of different groups	

Books recommended:

1. Soil Conservation and Land Management – S.K. Datta, International Book Distributors, Dehradun 1985
2. Soil and water Conservation Engineering – R. Suresh, Standard Publishers Distributors, Delhi, 2006
3. Watershed Planning and Management – R. Suresh, Standard Publishers Distributors, Delhi, 2017
4. Watershed Planning and Management – Rajvir Singh, Yash Publishing House, Bikaner, 2000
5. Field Manual on Watershed Management – B. Venkateswarlu, Mohammed Osman, MV Padmanabhan, K. Kareemulla, PK Mishra, GR Korwar and KV Rao, CRIDA, Hyderabad
6. Watershed Management – MM DAS and M Das Saikia, PHI Learning Private Limited, Delhi, 2022
7. Hydrology – HN Raghunath, New Age International Publishers, 2004
8. Watershed Management- VV Dhruvanarayana, G Shastry and US Patnaik, ICAR, New Delhi 1997

B. Sc. PART – II SEMESTER – III (NEP 2.0)

SKILL ENHANCEMENT COURSE (SEC – I)- Theory

Course Title: Mineral Medicines in Ayurveda

Credit: 02 Lectures: 30 Lectures/Week: 02

Course Objectives:

1. To introduce the students to Indian Knowledge System (IKS)
2. To create awareness among the students about the role of geological materials used in medicines in Rasa shastra, a branch of Ayurveda
3. To impart knowledge regarding the preparation of medicines

Course Outcome:

1. Students will understand the importance of Indian Knowledge System
2. Students will understand the importance of minerals, ore minerals, metals, precious and semiprecious stones in Rasa shastra
3. Students will be able to prepare simple medicines using geological materials

Credit 1	Indian Knowledge System and Ayurveda	No. of Lectures: 15
	1. Indian Knowledge System: a. Introduction b. Goals 2. Introduction to Ayurveda 3. Introduction to Rasashastra 4. Elements in rock forming minerals a. Periodic Table of Elements b. Periodic properties of Elements c. Chemical Bonding 5. Trace Elements and Human Health 6. Calcium compounds – a. Inorganic origin- Churnaka, Khatika, Dugdhapashana, Godanti, Kousheyashma, Badarashma b. Organic Origin – Fossil Encrinite, Oyster shell, Gastropod shell (Strombus, Cypraiedae), Corals	
Credit 2	Medical Geology	No. of Lectures: 15
	1. Introduction and Definition 2. The Geomedical Cycle	

	3. Geological Health Hazards 4. Mineral Medicines in Ayurveda a. Mercury b. Maharasa c. Upsara d. Sadharana Rasa 5. Metals – Suvarna, Rajat, Aara, Tamra, Vanga, Naga, Tikshna 6. Gemstones- Nav Ratnas- Manikya, Nilam, Takshya, Pushparaga, Vajra, Mukta, Pravala, Gomeda, Vaidurya 7. Semiprecious stones- Vaikrant, Suryakanta, Chandrakanta, Rajavarta, Perjaka, Sphatika, Vyomashma, Palanka, Rudhira, Puttika, Trinakanta	

Books recommended:

1. Indian Knowledge Systems Volume 1 and 2 – Avadhesh Singh and Kapil Kapur, D.K. Print World Ltd.
2. Introduction to Indian Knowledge System: Concepts and Application – B. Mahadevan, VR Bhat, Nagendra Pavana RN, PHI Learning
3. Traditional Knowledge System in India – Amit Jha, Atlantic Publication
4. A Textbook of Rasashastra – Dr. Ravindra Angadi
5. Mineralogy – Dexter Perkins, PHI
6. An introduction to the Rock-forming Minerals – WA Deer, RA Howie, J.Zussman
7. Gems and Gem Industry in India- RV Karanth, Geological Society of India, Bangalore
8. Metallic and Mineral Drugs in Ayurveda – SR Sudarshan, Divine Book
9. Mineral Drugs: Used in Ayurveda and Unani Medicine- SB Vohara, Mohd. Athar
10. Elements of Geochemistry, Geochemical Exploration and Medical Geology
11. Ancient Indian Knowledge – Implications to Education system – Boski Singh

B. Sc. PART – II SEMESTER – III (NEP 2.0)

VOCATIONAL SKILL COURSE (VSC) – I (MAJOR SPECIFIC)

Geochemistry of rocks

PRACTICAL: 60 HRS. MARKS-50 (CREDITS: 02)

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Course outcome –

1. Analyzing geochemical data to understand rock origins, geological history, and ore deposit formation.

2. Analysing whole-rock geochemistry to understand the composition and evolution of magmas.

3. To analyse and interpret the chemical composition of rocks.

Practicals-

1. Calculation of CIPW norms and QAPF diagram.
2. Niggli calculations.
3. Plotting of Harkar diagram.
4. Igneous rock analysis using mineral Calculations- Plagioclase and pyroxenes
5. Sieve analysis of sediments.
6. Calculation and plotting of chemographic diagrams like ACK, AKF and AFM diagrams and their interpretation.

Books recommended:

1. Igneous and metamorphic petrology- F. J. Turner, J. Verhoogen.
2. Experimental Petrology- Alok Gupta
3. Sedimentary Petrology- Pettijhon F. J., CBS Publication
4. Rollinson, H. R. (2014). Using geochemical data: evaluation, presentation, interpretation. Routledge.

SEMESTER – IV

S.Y. B. Sc (GEOLOGY) SEMESTER IV

MAJOR COURSE – DSC – VII

Course Title: Hydrogeology

[CREDITS – 02; LECTURES – 30 hours; LEC/WEEK – 02]

Learning Objectives:

1. To introduce an important discipline of Hydrogeology
2. To introduce students to different terms in hydrogeology
3. To introduce students to different hydrogeological properties of rocks
4. To impart knowledge about various exploration methods of groundwater.

Unit I/ Credit 1	**Hydrogeology**	**No. of Hours: 15**

	Definition of hydrogeology, Hydrological cycle; Hydrological parameters - Precipitation, evaporation, transpiration, and infiltration, interception, soil moisture, Hydrological properties of rocks - Porosity and Permeability, Transmissivity, Specific yield, Specific retention, Hydraulic Conductivity, Storage Coefficient; Origin and sources of groundwater, Vertical distribution of groundwater (20 lectures)	
Unit II/ Credit 1	**Hydrogeology**	**No. of Hours: 15**
	Types of aquifers- Confined, Unconfined, Perched, Artesian, groundwater exploration methods- Geobotanical, Electrical Resistivity, Remote Sensing, Seismic, Movement of Groundwater, Darcy's Law, Hydraulic Gradient, Groundwater provinces of India, (20 lectures)	

Books Recommended:

1. Karanth, K. R., Hydrogeology. Tata McGraw Hill Publ.
2. Raghunath, H. M., Groundwater. Wiley Eastern Ltd.
3. Subramaniam, V., Water-Kingston Publ. London.
4. Todd, D.K.; Groundwater; John Wiley and Sons.
5. e-PG Pathshala: https://epgp.inflibnet.ac.in/
6. MOOCS - NPTEL: https://nptel.ac.in/
7. MOOCS - SWAYAM: https://swayam.gov.in/
8. National Digital Library of India: https://ndl.iitkgp.ac.in/
9. Shivaji University Library (E-Resources): http://www.unishivaji.ac.in/library/E-Resources D

SEMESTER – IV

S.Y. B. Sc (GEOLOGY) SEMESTER IV

MAJOR COURSE – DSC – VIII

Course Title: Environmental Geology

[CREDITS – 02; LECTURES – 30 hours; LEC/WEEK – 02]

Learning Objectives:

1. To introduce an important discipline of environmental geology.
2. To introduce students to different concepts in environmental geology.
3. To introduce students to different geological hazards.
4. To impart knowledge about resource management and global environment.

Unit I/ Credit 1	Environmental Geology	No. of Hours: 15
	Significance and concepts of environmental geology, Earth, and its spheres: atmosphere, hydrosphere, lithosphere, biosphere, and Man; Earth Material. Energy budget: Solar radiation; Global environments: coastal, riverine, desertic, tropical, cold, polar; Concept of global warming and climate change. watershed management, land use planning, management of water resources, land reclamation. (20 lectures)	
Unit II/ Credit 2	Geological hazards: Earthquakes, volcanism, landslides, avalanches, floods, droughts; Hazard mitigation. Resource Management: Energy resources (Conventional and non-conventional), Recent trends in environmental geology- Risk assessment, Biomonitoring, Green energy, green technology, Digital models, Remote sensing, and Geoinformatics Applications, Waste management (20 lectures)	

Books Recommended:
1. Valdiya, K. S., Environmental Geology - Indian Context. Tata McGraw Hill New Delhi.
2. Keller, E. A., Environmental Geology. Shales E. Merril Publishing Co., Columbus, Ohio.
3. Montgomery, C., Environmental Geology. John Wiley and Sons, London.
4. Bird, Eric, Coastal Geomorphology: An Introduction. John Wiley & Sons, Ltd. Singapore.
5. Liu, B.C., Earthquake Risk and Damage, Westview.
6. e-PG Pathshala: https://epgp.inflibnet.ac.in/ 11. MOOCS - NPTEL: https://nptel.ac.in/
7. MOOCS - SWAYAM: https://swayam.gov.in/ 13. National Digital Library of India: https://ndl.iitkgp.ac.in/
8. Shivaji University Library (E-Resources): http://www.unishivaji.ac.in/library/E-Resources

S.Y. B. Sc (GEOLOGY) SEMESTER IV

MAJOR COURSE – Practical DSC Practical - IV

Course Title: Practicals Based on Major Subjects VII and VIII

[CREDITS – 02; Practicals – 60 hours; PRACTICAL/WEEK – 04]

Paper VII and VIII: **Hydrogeology and Environmental Geology**

Learning Objectives:

1. To make students aware about the distribution of water zones in India.
2. To impart knowledge of preparation of water table maps.

3. To introduce students the climatic zones of India.
4. To introduce students the earthquake zones of India.
5. To make students able to interpret the wind patterns.

Unit I: Credit 01	Hydrogeology	No. of Hours: 15
	Estimation of porosity and permeability from given data; Preparation and interpretation of water table maps Water potential zones of India (Map)	
Unit II: Credit 01	**Environmental Geology**	**No. of Hours: 15**
	Study of distribution of major climatic zones of India (Map) Distribution of wind patterns on World Map Earthquake zonation Map of India Study of Soil Profile	

SEMESTER – IV

S.Y. B. Sc (GEOLOGY) SEMESTER IV

MINOR COURSE – DSC – VII

Course Title: STRATIGRAPHY

[CREDITS – 02; LECTURES – 30 hours; LEC/WEEK – 02]

Learning Objectives:

1. To introduce an important discipline of stratigraphy.
2. To introduce students to different principles in stratigraphy.
3. To introduce students to physiographic divisions of India.
4. To impart knowledge about different stratigraphic successions in India.

Unit I/ Credit 1	Stratigraphy	No. of Hours: 15
	Definition, Principle of stratigraphy- stratigraphic correlation, Concepts of Uniformitarianism, and catastrophism; Geological Time Scale and stratigraphic classification; Physiographic division of India. Study of following Precambrian succession: Dharwar, Cuddapah, Vindhyan and Delhi Supergroups; (20 lectures)	
Unit II/ Credit 1	**Stratigraphy**	**No. of Hours: 15**

	Brief idea of Palaeozoic succession of northwestern Himalaya; Brief idea of Mesozoic succession: Triassic of Spiti; Jurrasic of Kutch; Cretaceous of Tiruchirapalli; Study of following type localities: Gondwana with flora and fauna; Deccan Volcanic Province (20 lectures)	

Books Recommended:

1. Wadia, D. Geology of India. Mc Graw Hill Book co.
2. Krishnan, M.S. Geology of India and Burma, 6th Edition. CBS Publ.
3. Stratigraphic Principles and Practice- J. M. Weller
4. Principles of Stratigraphy- Michael E. Brookfield
5. e-PG Pathshala: https://epgp.inflibnet.ac.in/
6. MOOCS - NPTEL: https://nptel.ac.in/
7. MOOCS - SWAYAM: https://swayam.gov.in/
8. National Digital Library of India: https://ndl.iitkgp.ac.in/

SEMESTER – IV

S.Y. B. Sc (GEOLOGY) SEMESTER IV

MINOR COURSE – DSC – VIII

Course Title: PALEONTOLOGY

[CREDITS – 02; LECTURES – 30 hours; LEC/WEEK – 02]

Learning Objectives:

1. To introduce an important discipline of paleontology.
2. To introduce students to principles of paleontology.
3. To introduce students to invertebrate paleontology.
4. To impart knowledge about vertebrate paleontology.

Unit I/ Credit 1	**Paleontology**	**No. of Hours: 15**
	Definition, Fossils: definition, characters, binomial nomenclature in taxonomy, mode of preservation, condition of fossilization and significance of fossils; Morphology, geological distribution, and age of brachiopods, pelecypods, cephalopods (20 lectures)	
Unit II/ Credit 2	Morphology, geological distribution, and age of Trilobite, Echinoid. Microfossils – Introduction; Foraminifera and its significance Vertebrate Paleontology – Introduction; Evolution of Horse, Elephant, and Man.	**No. of Hours: 15**

	Plant Fossils – Morphology, Distribution, and age of Ptilophyllum, Glossopteris and Gangamopteris (20 lectures)	

Books Recommended:

1. Shrock, R.R. & Twenhoffel, W.H. Principles of Invertebrate Paleontology. CBS Publ.
2. Swinerton, HH.,. Outlines of Paleontology. Edward Arnold Publishers
3. Jain, P.C. & Anantharaman, M.S. Paleontology: Evolution & Animal Distribution. Vishal Publ.
4. Lehmann, U. Fossil Invertebrate. Cambridge Univ. Press.
5. Rastogi, Organic evolution. Kedrnath and Ramnath Publ.
6. e-PG Pathshala: https://epgp.inflibnet.ac.in/ 11. MOOCS - NPTEL: https://nptel.ac.in/
7. MOOCS - SWAYAM: https://swayam.gov.in/ 13. National Digital Library of India: https://ndl.iitkgp.ac.in/
8. Shivaji University Library (E-Resources): http://www.unishivaji.ac.in/library/E-Resources

S.Y. B. Sc (GEOLOGY) SEMESTER IV

MINOR COURSE – Practical DSC Practical - IV

Course Title: Practicals Based on Minor Subjects VII and VIII

[CREDITS – 02; Practicals – 60 hours; PRACTICAL/WEEK – 04]

Paper VII and VIII: **Stratigraphy and Paleontology**

Learning Objectives:

1. To make students aware about the distribution of geological formations in India.
2. To impart knowledge of lithological and fossil assemblage of different stratigraphic groups.
3. To impart knowledge to the students about morphological characters and age of different fossils.

Unit I: Credit 01	**Stratigraphy**	**No. of Hours: 15**
	Preparation of lithostratigraphic maps of India showing distribution of important geological formations.	
Unit II: Credit 01	**Paleontology**	**No. of Hours: 15**
	Morphological characters, systematic position and age of fossil genera pertaining to brachiopods, pelecypods, cephalopods, trilobite and Echinoid.	

B. Sc. PART – II SEMESTER – III (NEP 2.0)

OPEN ELECTVE COURSE – IV (OE – IV)- theory

Natural Hazards and Disaster Management

Credits: 02 Total Marks: 50 Contact hours: 3

Objectives of the course:

1. To create awareness and knowledge base of different types of natural disasters.
2. 2. To understand the management of natural disasters.
3. To impart knowledge regarding the risks, vulnerability, and disaster risk reduction.

Course Learning Outcomes

1. Students understand disaster, types of natural disasters.

2. Students also understand role of geology for natural disasters, landslide causes & mapping techniques, Disaster management techniques in day today life.

Credit 1	Natural Disaster	No. of Lectures: 15
	Definitions of Hazard, Disaster and Natural disasters: study of different natural hazards viz. Floods, cloud burst, drought, Earthquakes, Volcano and Landslides, cyclones.	
Credit 2	Management of Disaster	No. of Lectures: 15
	Meaning, nature, importance, and scope of disaster management. Disaster Management Cycle, Stages of disaster management. Disaster risk reduction, prevention, mitigation, and preparedness to Natural hazard	

Books recommended:

1. Geological Hazards - Bell, F.G. Routledge, London.

2. Environmental Hazards- Smith, K. Routledge, London.

3. Textbook in Environmental Science - Subramaniam, V. Narosa International

4. Disaster Management- Mukesh Dhunna Vayu Education of India.

5. Disaster Education and Management- Rajendra K. Bhandari, 2014., Springer India

B. Sc. PART – II SEMESTER – III (NEP 2.0)

SKILL ENHANCEMENT COURSE (SEC – II)- Theory

COURSE TITLE: **Geotourism and Geoheritage**

Credits: 02 Lectures: 30 Lectures/week: 02

Objectives of the Course:

1. To understand the importance of geological features
2. To conserve the geological features formed due to geological processes over a period.
3. To develop the concept of Geoparks and Geotourism

Course Learning Outcomes:

1. Students will come to understand the importance of spectacular geological formation in India
2. A source of income through geo-tourism and creation of geo-parks
3. Students will understand the geological forces working throughout the evolution of Earth to create the geological features.

Credit 1	Geodiversity and Geoheritage	No. of Lectures 15
	1. Geodiversity:	
	a. Definition b. Outline of geological work carried River, Wind, Glacier, Sea waves, Groundwater c. Different geomorphological features formed by different agents 2. Concept of Geo-heritage, Geoparks and Geotourism 3. Geoparks of India and National Geological Monuments 4. A brief idea about Geopark networks across the World 5. Geoheritage sites in India	
Credit 2	Geotourism	No. of Lectures 15
	1. Potential Geoparks and Geo-sites in India 2. Regulations related to geotourism a. Guidelines for selection of Geosites b. Geoheritage laws c. Role of the Local, State and Central Governing bodies d. Geoheritage protection Laws 3. Conservation, Protection, Maintenance of Geological sites and geological features of National importance	

Books:

1. Geoheritage and Geo conservation: The Challenges – Jose Brilha and Emmanual

Reynard – Elsevier Inc.
2. Geoheritage – Assessment, Protection and Management – Jose Brilha and Emmanual Raymond
3. Handbook of Geotourism and Geoheritage – Kelvin Palmer – NY Research Press
4. Potential Geoheritage and Geotourism Sites in India, - PS Ranawat, S George, International Journal of Scientific and Research Publications, Volume 9, Issue 6, June 2019

Modality of Assessment

Students appearing for the NEP B. Sc II Geology will be evaluated as per the 80: 20 schemes, wherein the term end exam will be of 80 marks while 20 marks will be through internal Evaluation

I. THEORY

A. Internal Assessment: 20%

Sr. No.	Evaluation Type	Marks 15
1.	Evaluation Modalities: 1. Two Assignments per paper covering the whole paper syllabus and can include: a. Essay Type Questions b. Objective Questions c. Problem Solving d. Figure based Questions 2. Two Tests per paper cover the whole paper syllabus	10
2.	1. Participation in Group Discussions/Debates related to the subject 2. Participation in Workshops/Seminars/ Poster Presentation competitions 3. Participation in Exhibitions 4. Attendance in the Class-room	
3.	1. Study Tour Participation*	05

* Study Tour is Compulsory for all students. The students will have to submit a tour report after the successful completion of the tour.

B. External Assessment: 80%

- Semester End Theory assessment is of 40 marks for each paper separately
- Duration of each Theory paper will be of 1.30 hours or 90 minutes
- Question paper will cover all the units of the syllabus
- Question paper will have three questions which are compulsory
- Question No. 1 will be of objective type and will be of 8 marks
- Question No.2 will be of subjective type with internal choice and will be of 16 marks
- Question No. 3 will be notes or brief answers with internal choice and will be of 16 marks

II. PRACTICAL EXAMINATION PATTERN

- Practical Examination will be held at the end of each semester
- Practical will be of one day duration and of six-hour duration
- Practical will be of 50 marks each

- Practical Journal is compulsory for the practical

Particulars	2 Credit Course	Duration
1. Semester-end Examination	40 Marks	1.5 hrs.
2. Internal Assessment	10 Marks	1 hrs.
Total marks for each course	50 Marks	--

Semester III

Practical Course	Marks 45	Journal Marks	Total Marks 50
DSC Practical I	Based on Papers DSC 5 and DSC 6	05	
SEC Practical I	-		
VEC practical			50

Semester IV

Practical Course	Marks 45	Journal Marks 5	Total Marks 50
DSC Practical II	Based on Papers DSC 7 and DSC 8	05	
SEC Practical II		viva-05	
		Tour report-05	