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

SHIVAJI UNIVERSITY, KOLHAPUR - 416004, MAHARASHTRA
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शिवाजी विद्यापीठ, कोल्हापूर -४१६००४,महाराष्ट्र
दूरध्वनी-ईपीएबीएक्स -२६०९०००, अभ्याससमंडळे विभाग दुरध्वनी ०२३१—२६०९०९४
०२३१—२६०९४८७

SU/BOS/Science/350 **Date: 24/06/2024**

To,

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

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

Ref: SU/BOS/Science/876/ Date: 26/12/2023 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 Minor Change syllabi, nature of question paper of B.Sc. Part-I (Sem.I & II) as per NEP-2020 (2.0) degree programme under the Faculty of Science and Technology.

B.Sc.Part-I (Sem. I & II) as per NEP-2020 (2.0)			
1.	Botany	9.	Geology
2.	Physics	10.	Zoology
3.	Statistics	11.	Chemistry
4.	Astrophysics	12.	Geography
5.	Mathematics	13.	Electronics
6.	Microbiology	14.	Drug Chemistry
7.	Plant Protection	15.	Industrial Microbiology
8.	Astrophysics and Space Science	16.	Sugar Technology (Entire)

This syllabus, nature of question and equivalence shall be implemented from the academic year 2024-2025 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 2024 & March/April 2025. 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

Copy to:

1	The Dean, Faculty of Science & Technology	4	B.Sc. Exam/ Appointment Section
2	Director, Board of Examinations and Evaluation	5	Computer Centre/ Eligibility Section
3	The Chairman, Respective Board of Studies	6	Affiliation Section (U.G.) (P.G.)

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

B.Sc. Part-I

GEOLOGY

(Faculty of Science and Technology)

SEMESTER I AND II

(To be Implemented from Academic Year 2024-2025)

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**						
SEM I (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**
SEM II (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**

B.Sc (GEOLOGY) SEMESTER I

COURSE – DSC – I

Course Title: Physical Geology

[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 Universe, The Solar System and The Earth
5. To impart knowledge regarding the Atmosphere of the Earth
6. To introduce the students to changes going on the earth's surface through different geological processes like Weathering and Erosion
7. To impart knowledge regarding natural calamities like Earthquakes and Volcanoes
8. To make aware the students about the subject through field trips or study tours

Unit I/ Credit 1	**Physical Geology**	**No. of Hours: 15**
	1. Introduction to Geology and its scope 2. Earth and the Solar System: a. Brief study of the Universe and the members of the Universe b. Brief study of the different planets in the Solar system c. Earth: size, shape, mass, density and other parameters 3. Study of Atmosphere a. Different layers of atmosphere b. Importance of atmospheric layers 4. Origin of the Earth: a. Laplace and Kant Nebular Hypothesis b. Buffon, Chamberlain and Moulton Planetesimal Theory c. Jean and Jeffrey's Tidal Theory 5. Age of the Earth: a. Physical methods b. Chemical methods c. Biological methods d. Radioactive methods 6. Interior of the Earth: a. Use of seismic waves b. Crust – SIAL and SIMA c. Mantle – Upper mantle, Transition zone, Lower mantle, Lithosphere and Asthenosphere d. Core – Outer and Inner Core e. Discontinuities – Conrad, Mohorovicic, Gutenberg and Lehmann	

Unit II/ Credit 1	Physical Geology	No. of Hours: 15
	1. Weathering, Erosion, Transportation and Deposition: a. Definition b. Types of weathering c. Agents and controlling factors of weathering d. Erosion process e. Transportation process f. Deposition process 2. Earthquake: a. Seismology – definition b. Terminology – Focus, Epicentre, Seismic waves, Isoseismal lines c. Measurement of Earthquakes - Seismographs and Seismograms d. Intensity and Magnitude of Earthquake e. Modified Mercalli Intensity Scale f. Richter Magnitude Scale g. Causes of Earthquakes – Natural and Magnitude 3. Volcano: a. Types – Fissure and Central type b. Products of Volcano – Tephra (Ash, Lapilli, Volcanic Bombs), Pumice, Reticulate, Scoria, Lahars, Volcanic gases, liquid materials (different types of magmas and lavas) c. Causes of Volcanism: Tectonic cause	

F.Y. B.Sc (GEOLOGY) SEMESTER I

COURSE – DSC – II

Course Title: Structural Geology

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

Learning Objectives:

1. To introduce the students to Structural Geology
2. To introduce the students to Topographical and Geological maps and interpretation of the maps
3. To impart knowledge related to mapping of the surface and subsurface of the Earth
4. To introduce students to important instruments like Clinometer and Brunton Compass used in mapping
5. To impart knowledge of different structural features on the surface and below the surface and their significance
6. To make known to the students the importance of structural features in the Evolution of Earth
7. To make aware the students about the Structural features through field trips or study tours

Unit I/ Credit 1	Structural Geology	No. of Hours: 15
	1. Introduction to Structural Geology and its importance 2. Basic Terminology in Rock formations – Bed, Attitude of bed (Dip and Strike), Contour, Outcrop 3. Effects of various structures like folds, faults and unconformities on outcrops 4. Topographic Maps: a. Scale, Symbols, Contours, Natural and Manmade features b. Reading of Topographic map c. Use of topographic map 5. Geological Maps: a. Scale, Symbols b. Geologic interpretation of the map – distribution of rock types, surficial features, structural features c. Use of geological map 6. Clinometer and Brunton Compass: a. Description b. Working procedure of the instruments c. Use 7. Folds: a. What is a fold b. Parts of a fold c. Types of fold	

	d. Causes of folding	
Unit II/ Credit 1	**Structural Geology**	**No. of Hours: 15**
	1. Fault: a. Definition b. Parts of Fault c. Relative movements in a fault – Slip, Net Slip, Strike Slip, Dip Slip, Rake, Plunge d. Geometrical Classification - * Classification based on Rake of net slip * Classification based on attitude of fault relative to attitude of adjacent beds * Classification based on fault patterns * Classification based on value of dip of fault * Classification based upon apparent movement e. Genetic Classification – * Classification based on relative movement along the Fault – Thrust fault, Normal fault, Wrench fault * Classification based on absolute movements 2. Joints: a. Definition b. Geometrical Classification – Strike Joints, Dip Joints, Oblique Joints, Bedding Joints c. Genetic Classification – Extension Joints, Release Joints, Sheeting, Exfoliation Domes, Columnar Joints 3. Unconformity: a. Definition b. Kinds of unconformities - Angular unconformity, Disconformity, Local unconformity, Non-conformity, Para-conformity c. Recognition of unconformities in the field	

F.Y. B.Sc (GEOLOGY) SEMESTER I

COURSE – Practical DSC Practical - I

Course Title: Practical Based on Subjects I and II

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

Paper I and II: Physical Geology and Structural Geology

Learning Objectives:

a. Solving problems regarding the measurements of different parameters of the Earth
b. Study of Atmosphere of the Earth
c. Study of Internal structure of the Earth
d. Solving problems related to Earthquakes
e. Study of Clinometer/Brunton Compass
f. Reading of Toposheets
g. Preparation of cross-sections from topographical maps – Horizontal/Inclined beds
h. Reading of Geological maps
i. Identification of folds, faults, unconformities from Block models

Unit I: Credit 01	**Physical Geology**	**No. of Hours: 15**
	1. Atmosphere – showing different layers in the given figure and giving the description 2. Calculating the different parameters of Earth from given data 3. Internal Structure – showing different portions of the Interior of Earth in given figure and giving the description 4. Earthquake – a. Plotting the different zones of Earthquakes in India from given map and describing the zones in detail b. Calculation of Epicentre, Magnitude and Travel Time of seismic waves from given data	
Unit I: Credit 01	**Structural Geology**	**No. of Hours: 15**
	1. Study of Clinometer and Brunton Compass 2. Reading of Toposheet 3. Preparation of cross-section profile of topographical map – Horizontal/inclined beds 4. Identification of Folds, Faults and Unconformities from Block models	

SEMESTER – II

F.Y. B.Sc (GEOLOGY) SEMESTER II

COURSE – DSC – III

Course Title: Mineralogy

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

Learning Objectives:

1. To introduce an important discipline of Mineralogy
2. To introduce students to Petrological Microscope and its use
3. To introduce students to different types of minerals
4. To study the different physical and optical properties of minerals

Unit I/ Credit 1	**Mineralogy**	**No. of Hours: 15**
	1. Introduction to Mineralogy: a. Definition of mineral b. Chemical bonding in mineral 2. Physical Properties of Minerals: a. Form b. Colour c. Transparency d. Streak e. Lustre f. Cleavage g. Fracture h. Hardness i. Specific Gravity 3. Study of mineral groups with respect to chemical composition and Physical properties: a. Silica Group b. Feldspar Group c. Pyroxene Group d. Amphibole Group e. Mica Group f. Garnet Group g. Olivine Group h. Zeolites i. Aluminosilicates	
Unit II/ Credit 1	Mineralogy	**No. of Hours: 15**
	1. Optics: a. Introduction b. Ordinary Light and Polarized Light c. Reflection and Refraction of Light d. Reflective Index e. Polarizing Microscope – Parts and their functions	

	2. Optical properties of minerals in Plane Polarized light (IPL) a. Colour b. Pleochroism c. Form d. Relief e. Cleavage f. Fracture 3. Optical properties between Crossed Nicols (BCN) a. Isotropism/ Anisotropism b. Extinction and Extinction Angle c. Interference/ Polarization colours 4. Study of optical properties of following mineral groups: a. Silica Group b. Feldspar Group c. Pyroxene Group d. Amphibole Group e. Mica Group f. Garnet Group g. Olivine Group	

SEMESTER – II

F.Y. B.Sc (GEOLOGY) SEMESTER II

COURSE – DSC – IV

Course Title: Crystallography

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

Learning Objectives:

1. To introduce an important discipline of Crystallography
5. To introduce students to various elements mineral crystals
6. To study six Normal Classes of six crystal systems
7. To study the characteristics of minerals belonging to six crystal systems

Unit I/ Credit 1	**Crystallography**	**No. of Hours: 15**
	1. Introduction to Crystallography: a. Definition of Crystal b. Crystal Elements: Faces, Edges, Solid angles, Forms (Open and Closed), Zones c. Interfacial Angle and Law of Constancy of Interfacial Angle d. Contact Goniometer 2. Crystallographic Axes and Angles: a. Systems with three crystallographic axes b. System with four crystallographic axes 3. Parameters and Indices, Law of rational Indices 4. Six Crystal Systems: a. Introduction – 32 Classes of Crystal systems 5. Elements of Symmetry: a. Planes of symmetry b. Axes of symmetry c. Centre of symmetry	
Unit II/ Credit 1	Crystallography	**No. of Hours: 15**
	1. Detail Description of: a. Normal Class of Isometric system b. Normal Class of Tetragonal system c. Normal Class of Hexagonal system d. Normal Class of Orthorhombic system e. Normal Class of Monoclinic system f. Normal Class of Triclinic system 2. Characteristics of minerals belonging to six crystal system	

F.Y. B.Sc (GEOLOGY) SEMESTER II

COURSE – Practical DSC Practical - II

Course Title: Practical Based on Subjects III and IV

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

Paper III and IV: Mineralogy and Crystallography

Learning Objectives:

a. To study different physical properties of minerals
b. Introduce the students to the working of Walker's Steelyard Balance
c. Introduce the students to the working of Petrological Microscope
d. To study different optical properties of minerals
e. To identify and study the crystals of different systems
f. Introduce the students to the working of Contact Goniometer

Unit I: Credit 01	**Mineralogy**	**No. of Hours: 15**
	1. Walker's Steelyard Balance to calculate Specific Gravity 2. Study of Physical properties of minerals belonging to: a. Silica Group b. Feldspar Group c. Pyroxene Group d. Amphibole Group e. Mica Group f. Garnet Group g. Olivine Group 3. Study and Use of Petrological Microscope 4. Study of optical properties of minerals belonging to: a. Silica Group b. Feldspar Group c. Pyroxene Group d. Amphibole Group e. Mica Group f. Garnet Group g. Olivine Group h. Carbonates i. Aluminosilicates j. Zeolites	
Unit II: Credit 01	**Crystallography**	**No. of Hours: 15**

	1. Study of Normal Class of: a. Isometric system b. Tetragonal system c. Hexagonal system d. Orthorhombic system e. Monoclinic system f. Triclinic system	

OPEN ELECTIVE COURSE – I (OE – I)
TITLE: SOLID MATERIALS OF THE EARTH
Credits: 02 Lectures: 30 Lectures/week: 02

Objectives of the Course:

1. To introduce the students to Solid materials of the Crust
2. To study the formation of different minerals, ore minerals and rocks
3. To study the properties of minerals, ore minerals and rocks
4. To study the use of minerals, ore minerals and rocks

Course Learning Outcomes:

1. Students will be able to identify different minerals, ore minerals and rocks
2. Students will have a detail information about the Crust portion of the Earth
3. Students will understand the economic importance of minerals, ore minerals and rocks
4. Students will understand the importance of minerals and ore minerals in Medicine

Credit 1	Magma and Minerals	No. of Lectures 15
	1. Magma a. Definition b. Types c. Composition of magma d. Formation of Pyrogenetic Minerals 2. Mineral Groups: • Study of mineral groups with respect to their chemical composition, physical and optical properties and their economic importance 1. Silica Group 2. Feldspar Group 3. Pyroxene Group 4. Amphibole Group 5. Mica Group 6. Garnet Group 3. Ore Minerals: • Ores of Iron • Ores of Magnesium • Ores of Copper • Ores of Aluminium 4. Medicinal use of minerals and ore-minerals	
Credit 2	Rocks	No. of Lectures 15
	1. Types of Rocks a. Definition of Rock b. Three types of Rocks – Igneous, Secondary and Metamorphic	

	2. Igneous Rocks: a. Classification of Igneous rocks based on • Mode of Occurrence • Silica Content • Silica Percentage • Feldspar Content • Alumina Content 3. Textures and Structure of Igneous rocks • Megascopic textures and structures • Microscopic textures and structures 4. Secondary Rocks: a. Types of Secondary Rocks • Residual Deposits • Sedimentary Deposits • Chemical Deposits • Organic Deposits 5. Textures and structures of Secondary Rocks • Megascopic textures and structures • Microscopic textures and structures 6. Metamorphic Rocks a. Rocks formed due to Thermal Metamorphism b. Rocks formed due to Cataclastic Metamorphism c. Rocks formed due to Dynamothermal Metamorphism d. Rocks forms due to Plutonic Metamorphism 7. Textures and structures of Metamorphic rocks • Megascopic textures and structures • Microscopic textures and structures	

OPEN ELECTIVE COURSE – II (OE – II)

COURSE TITLE: Historic Water Management Systems

Credits: 02 Lectures: 30 Lectures/week: 02

Objectives of the Course:

1. To understand the Concept of Water Resources and its impact
2. To study the ancient water management systems

Course Learning Outcomes:

1. Students will come to know the Historic water management systems in India
2. Students will understand different Hydraulic structures and systems of water storage
3. Students will understand the different methods of harvesting water for drinking purposes

Credit 1		No. of Lectures 15
	1. Introduction 2. Water Resources and their impact 3. Water Resource management during Ancient times 4. Water Supply and Drainage system in Indus Valley Civilization 5. Zings of Ladakh 6. Kuhls of Himachal Pradesh 7. Bamboo Drip Irrigation in NE India	
Credit 2		No. of Lectures 15
	1. Zabo in Nagaland 2. Ahar Pynes of Bihar 3. Pat system of Madhya Pradesh 4. Kund and Talab of Rajasthan 5. Virdas of Rann of Kutch, Gujarat 6. Kattas of Kerala and Karnataka 7. Eris of Tamil Nadu 8. Historic water systems of Maharashtra 9. Water Conservation Techniques in Forts of Maharashtra 10. Hydraulic linkages between Ancient Indian and Nearby Cultures	

Books :

1. Land and Water Resource Management System in Ancient India – Dr. Mohan Lal Chadhar Radha Publication
2. Traditional Water Management Systems of India – Editors KK Chakravarty, GL Badam and Vijay Paranjpe – Aryan Books International, New Delhi
3. Ancient Water Technologies – L. Mays, Springer
4. Handbook of Ancient water Technologies- Orjan Wikander, Publisher Brill
5. The Flow of Power: Ancient water Systems and Landscapes (School for Advanced Research Scholar Book – VL Scarborough

Modality of Assessment

Students appearing for the NEP B.Sc I Geology will be evaluated as per the 80: 20 scheme, 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	05
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 2.00 hours or 120 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

Semester I

Practical Course	**Marks 45**	**Journal Marks 5**	**Total Marks 50**
DSC Practical I	Based on Papers DSC I and DSC II		

Semester II

Practical Course	**Marks 45**	**Journal Marks 5**	**Total Marks 50**
DSC Practical II	Based on Papers DSC III and DSC IV		