

Solapur University, Solapur
Semester and CBCS (Choice Based Credit System) Pattern Syllabus of
B. Sc. (Part-I)
Core course subject (CS) – Geology
(w. e. f. June 2016)

Per Week – Theory - 2.5 Hrs/ per paper with credit 2.5
Practical – 4 Hrs/ per practical with credit 4
Total credit =14 = [2.5 x 4 (Theory papers) = 10+ 4(Practical)]

SEMESTER- I (Theory)

Paper	Title of the Paper	Marks	Periods
1	Mineralogy and Paleontology	100 (70+30)	45
2	Igneous, Sedimentary and Metamorphic Petrology	100 (70+30)	45

- ✓ 70 marks for university exams + 30 marks internal exams
- ✓ Minimum passing percentage = 40%
- ✓ Separate passing for both university and internal examinations.

SEMESTER- II (Theory)

Paper	Title of the Paper	Marks	Periods
3	Introduction to General Geology	100(70+30)	45
4	Introduction to Physical Geology	100(70+30)	45

- ✓ 70 marks for university exams + 30 marks internal exams
- ✓ Minimum passing percentage = 40%
- ✓ Separate passing for both university and internal examinations.

PRACTICAL (Annual) –

Practical / per week	Title of the practical	Marks
One day practical of 4 periods	Practical's are on the basis of theory papers 1 to 4	100(70+30)

(Annual Exam to be conducted at the end of the Semester II of 70 marks)
While two internal exams of 15 marks each in each semester i. e of 30 marks

- ✓ Minimum passing percentage = 40%
- ✓ Separate passing for both university and internal examinations.

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Semester and CBCS (Choice Based Credit System) Pattern Syllabus of B. Sc. (Part-I) - Core course subject (CS) – Geology w. e. f. June 2016)

Per Week – Theory - 2.5 Hrs/ per paper with credit 2.5
Practical – 4 Hrs/ per practical with credit 4
Total credit =14 = [2.5 x 4 (Theory papers) = 10+ 4(Practical)]

1) Title of the Course: B Sc I Geology (CS)

2) Introduction:

The course provides broad aspects of Geology; mainly minerals, rocks, physical & general geology, external & internal natural process affecting the earth surface and interior of the earth.

3) Objectives:

- a) To study minerals, rocks, (formation, properties, occurrence & uses)
- b) To study the general information regarding the universe, solar system, origin of the earth & relief features.
- c) To study endogenetic & exogenetic natural earth processes. Depositional & erosional features
- d) To understand the morphology & existence of past life (Paleontology)

4) Practical:

Identification of minerals, rocks and fossils - their occurrence and uses
Toposheet reading to understand the field conditions, etc.

5) Advantage of the Course:

- a) Student of B Sc Geology develops the sense to understand the basic nature of the earth & the earth related process.
- b) Student attains eligibility to seek further higher levels of the knowledge; mainly in geology & applied geology.
- c) At the end of the course the student are equipped with geological knowledge which be used for the welfare of individual & society in large; especially in the fields of mining, hydrogeology, environmental geology, evolution sciences, industries etc.

6) Eligibility of the course:

The student seeking admission to the B Sc Course should have passed 10+2 level science course from MHSC Board or the other government recognized institutions.

7) Duration of the course:

The duration of the B Sc course is full time three academic years with semester pattern of total six semesters. (Two semesters in each academic year)

8) Medium of Instruction: English.

9) Structure of the Course:

1. The structure of the B Sc course is full time three academic years with semester pattern. There will be two semesters in each academic year. There will be total six semesters.
2. B Sc I comprises of two semesters. Each semester syllabus contains two theory papers of 100 marks (70 university + 30 internal exams). Thus total marks for two semesters are 400 marks.
3. Credit of 2.5 per paper will be considered, totaling to 10 theory credits.
4. Total time periods for each section of each paper are 45 lecture hours that are utilized as per the requirement of the volume of the unit contents of the topics in a paper.
5. Geological field excursion as per the recommendation of the university will be conducted during the course.
6. Practicals as per the theory syllabus will be conducted during the complete academic years. One day practical examination will be conducted at the end of academic year for 70 marks, while two internal exams (one per semester) for 15 marks each will be conducted during regular practical. Their by total mark of practical is 100.
7. Credit of 4 per practical will be considered.
8. Total credit for Geology (CS) will be 14 = 10 + 4 (Theory + Practical)

SEMESTER- I

(Total periods 45)

Paper 1: Mineralogy and Paleontology

Unit 1: Mineralogy:

(25 periods)

Definition of mineral, Chemical Bonding, Compound formation, Physical properties of minerals, chemical composition of minerals. Study of following mineral groups with reference to general chemical and physical properties and their occurrence in rocks.

1. Olivine Group,
2. Pyroxene group: Augite, Hypersthene, Diopside,
3. Amphibole group: Hornblende, Actinolite, Trimolite, and Asbestos.
4. Mica Group: Muscovite, Biotite, Phlogopite, Lepidolite,
5. Feldspar Group
6. Silica Group.

Unit 2: Palaeontology:

(20 periods)

Definition of Fossil, Conditions of fossilization, Modes of preservation, Uses of fossils. Study of morphology of hard parts of the fossil, classification & geological distribution of following phylum and class.

1. Phylum Mollusca:

Class Lamellibranchia – Gryphea, Cardita, Cardium, Pecten.

Class Gastropoda – Voluta, Conus, Turritella, Turbo, Physa.

Class Cephalopoda – Nautilus, Goniatites

2. Phylum Brachiopoda – Productus, Spirifer, Terebratula

3. Phylum Echinodermata – Echinus, Micraster, Hemiaster

4. Phylum Arthropoda – Trilobites: Paradoxide, Trinucleus, Ogygia

5. Phylum Coelentera –

Class Anthozoa –

Order Zoanthoria – Calceola, Montlivaltia

Order Alcyonaria – Tubipora, Favosite

Reference Book -

1. Rutley's elements of Mineralogy – H. H. Read
2. Invertebrate palaeontology – H. Wood

(Total periods 45)

Paper 2 - Igneous, Sedimentary and Metamorphic Petrology (equal weight age).

Unit 1. Petrology: Introduction of petrology, Definition of rocks, Major subdivisions of petrology, The Rock Cycle (3periods)

Unit 2. Igneous Petrology: Definition, composition and origin of magma, lava and igneous rocks; concept of Primary Magma; Pyrogenetic Minerals, Primary, Essential and Accessory minerals, and Secondary Minerals; Intrusive and Extrusive Forms of Igneous Rocks: Concordant and Discordant Intrusions; Sills, Dykes, Ring Dykes, Cone Sheets, Composite and Multiple intrusions, Laccoliths, Lopoliths, Phacoliths, Batholiths, Stocks, Boss, Roof Pendent, and Volcanic plug. Megascopic Structures:- Vesicular, Amygdaloidal, Ropy, Block, Flow, Pillow and Columnar structures, Granitic , Porphyritic, Graphic and Glassy. (14 periods)

Unit 3. Sedimentary Petrology: Formation of Secondary rocks. Deposition, Consolidation. and Cementation of sediments; Sedimentary Processes; Classification of secondary rocks Source of material for Secondary rocks; Sedimentary Textures and mega-structures - Bedding, Current Bedding Graded bedding, Stratification, Lamination, Ripple Marks, Rain prints, Mud cracks (Sun cracks) Concretionary, Nodular, Stalactitic, Oolitic, Pisolitic Structure. (14 periods)

Unit 4. Metamorphic Petrology: Definition Agents and Types of Metamorphism: Cataclastic, Dynamo thermal, Thermal, and Plutonic Metamorphism. Depth Zones; Megascopic structures in Metamorphic rocks - Slaty, Maculose, Flaser Granulose, Schistose, Gneissose, Augen and banded Structures. Stress and Antistress Minerals. (14 periods)

Recommended Books: -

1. Principles of Petrology – G. W. Tyrrell

SEMESTER- II

Paper-3: Introduction to General Geology

(Total periods 45)

Unit 1. Introduction: Meaning, scope, interdisciplinary nature and significance of geology. Brief outline of - (1) Universe- origin: Galaxies and. Nebulae (2) Solar system - characteristics, members, constitution and mechanism of the system, Planetary laws (8 periods)

Unit 2. Origin of the Earth: Brief account on Nebular and Planetesimal hypothesis. Modern theories of origin of the earth. Physical data of the Earth- shape, size, mass, density, rotation, revolution, Galactic movements; Solstices, Equinox, (7 periods)

Unit 3. Divisions and Geomorphic features of the Earth: A brief introduction to principal divisions of the earth; Atmosphere, hydrosphere and biosphere. Distribution and description of 1st, 2nd and 3rd order relief features and Hypsographic curve. (7 periods)

Unit 4. Earthquakes: Definition and effects of Earthquake, Causes of Earthquake natural and man made, Seismology: Focus, Epicenter, Seismic waves, isoseismic lines. Measurement of Earthquake-seismographs and Seismograms, intensity and Magnitude earthquake Scales: Richter scale. Locating the epicenter and depth of the Focus, Classification of Earthquakes, Distribution of earthquake centers (i.e. Earthquake Belts; predictions and precautions of earthquakes, Major Seismic centers and zones of India. (8 periods)

Unit 5. Interior of the Earth: Internal structure of the Earth and discontinuities. Importance and use of seismic waves in understanding the internal structure of the Earth, inner Core, Outer Core, Mantle, Crust (Sial and Sima). Lithosphere & Asthenosphere, (7 periods)

Unit 6. Volcano: Definition and structure of volcano, types of Volcanoes, their characteristics. Causes of volcano. Products of volcano. Classification based on modes of eruption (Fissure and central). Associated features like fumaroles, solfatras, hot springs and geysers. Volcanic belt. (8 periods)

Reference Book:-

- 1) Principles of Physical Geology A Holmes
- 2) General Geology V Radhakrishna

Paper 4: Introduction to Physical Geology

Total periods – 45

Unit 1. Weathering: Exogenic and endogenic forces acting on the earth, Definition of weathering, Types, Agents, and factors controlling weathering. Weathering processes - mechanical weathering, chemical weathering and biophysical weathering. Rate of Weathering, Differential Weathering. Products of weathering – Tors, Cliffs, Talus, Scree, Regolith, *Murrum*, Soil - formation & profiles. (9 periods)

Unit 2. Geological work of a Stream: Main and tributary stream. Types of flows. Stream Processes of erosion, transportation and deposition. Play fairs concepts of Valley Development. Headword, Downward and Lateral Erosion by a stream. Erosional Features- River piracy, waterfalls, rapids, cascades, potholes, river terraces, meanders and ox-bow lake, graded profile and base level. Transportation by river. Depositional features- point bar, natural levees alluvial fans and cones, delta. Concept of Watershed in brief. (9 periods)

Unit 3. Geological work of Ocean / Sea: Movement of sea water - waves, tides, currents, tsunamis. Generation of oceanic currents. Wave erosion and beach processes, erosional features - wave cut terrace, sea notch, sea caves, blow holes cave and headland, stacks, sea arch, Transportation by sea. Depositional features developed by ocean- beaches and barriers wave-built terrace spits, bars and hooks (9 periods)

Unit 4. Geological work of glaciers: Snow caps, snow lines. Definition & origin of glaciers. Types of glaciers, movement of glaciers, Surface features of glaciers, Glacier erosion, Erosional features of glaciers like- striations, grooves, and polished surfaces, U-shaped valley, hanging valley, cirque, fjords. Glacial and glacio-fluvial deposition. Depositional features like- boulder, clays, erratics, moraines, drumlins, eskers, kems & Kettle holes, outwash plains, and varves. (9 periods)

Unit 5. Geological work of wind: Definition, Origin of wind, Erosion by wind- Deflation, abrasion and attrition, hollows, deflation armors, deflation pavements, ventifacts, yardangs, pedestal rocks, alance stone, mushroom rock, striated and grooved rocks, Earth pillars, Transportation by wind. Causes of wind deposition. Depositional features like- Sand dunes, their types and loess. Deserts, kinds of deserts. Playas, Bajadas and pediments. (9 periods)

Recommended Books:-

- 1 Principles of Physical Geology A Holmes
- 2 General Geology V Radhakrishna

Semester Pattern Syllabus of a Practical Course in B.Sc. Part - I (Geology)

There are in all 24 practicals, 1 Practical is of 4 periods. The practical course will depend on the theory papers, practical experiments and field training. The practical course is subdivided into five units as follows. Each unit carries 10 marks. Thus the practical course is of 50 marks.

Unit-I: General Geology and Physical Geology.

(14 Marks)

1. Study of important and common geomorphologic models. (Minimum five models)

2. **Reading of toposheets:** Introduction of toposheets, Definition and function of Contours, Contour Interval, Map symbols and Scales. Identification of natural physical Features: Hill, Hill Range, Mountains, Peaks, Cliffs, Divides, Bench Marks, Streams and stream patterns Catchment Areas of streams, Basins, lakes, slopes, Flood Plains, Islands in River Courses, Rocky and Sandy Beaches, Deltas and Tributaries, Sand dunes, Deserts, marshy lands, Marine transgression areas. Identification of Man-made features: Settlements, Roads, Railways, Canals, Transmission lines Dams and Reservoirs, Tanks, Aerodromes, Post offices Temples, Mosques, Monasteries and Church etc.

3. **Drainage Analysis:** Stream ordering (Strahler's method), Stream number, Stream length, Bifurcation Ratio, Basin Area, Drainage Density Drainage frequency and Drainage Pattern.

Unit-II: Mineralogy (Megascopic)

(14 marks)

1. The Study of Physical Properties of Minerals: Colour, Streak. Lustre Form, Fracture, Hardness. Cleavage, Determination of specific gravity by Walkers' steelyard

2. The study of Individual Minerals:-Quartz, Rock crystal, Amethyst, Flint Agate, jasper, Chalcedony Opal, Natrolite, Stilbite Apophyllite Muscovite, Biotite, Phlogopite, Orthoclase, Microcline, Plagioclase, Hornblende, Actinolite, Tremolite, Asbestos, Augite, Hypersthene, Diopside, Olivine, Beryl, Barytes, Tourmaline, Fluorite, Corundum, Calcite, Garnet, Talc, kyanite

Unit III: Palaeontology

(14 marks)

Identification, classification and description of hard part morphology of following fossil specimens:

1. Phylum Mollusca:

Class Lamellibranchia – Gryphaea, Cardita, Cardium, Pecten.

Class Gastropoda – Voluta, Conus, Turritella, Turbo, Physa.

Class Cephalopoda – Nautilus, Goniatites

2. Phylum Brachiopoda – Productus, Spirifer, Terebratula

3. Phylum Echinodermata – Echinus, Micraster, Hemiaster

4. Phylum Arthropoda – Trilobites: Paradoxide, Trinucleus, Ogygia

5. Phylum Coelentera –

Class Anthozoa –

Order Zoanthoria – Calceola, Montlivaltia

Order Alcyonaria – Tubipora, Favosite

Unit-IV: Petrology

(18 marks)

Identification, description and classification of hand specimen of following rocks on the basis of their megascopic texture, structure, mineral composition

1. **Igneous Rocks:** Structures and Textures: Vesicular, Amygdaloidal, Flow Ropy, Pillow, Granular and Columnar Structures; Granitic, Porphyritic, Graphic and Glassy textures; Igneous Rocks: Granite, Porphyritic Granite, Diorite, Dolerite, Gabbro, Dunite, Pegmatite, Pitchstone, Rhyolite, Obsidian, Trachyte and basalt

2. **Secondary Rocks:** Structures: Porous, Oolitic, Pisolitic, Lamination, Bedding, Graded Bedding, Current Bedding, Ripple Marks and Mud cracks; Texture: Clastic. Rocks: Laterite, Bauxite Breccia, Conglomerate, Grit, Sandstone and it's varieties Shale, Limestone and it's varieties

3. **Metamorphic Rocks:** Structures: Slaty, Schistose, Granulose, Gneissose, Augen, Banded, Rocks: Slates Phyllites Mica-Garnet-Schist, Hornblende Schist, Granite Gneiss, Hornblende Gneiss, Quartzite and Marble

Unit-V: Fieldwork and Practical records:

(10 marks)

Fieldwork Report or Field trip report: Study Tour to Geologically interesting and important places for about one to three days is compulsory to each student. Field trips to nearby quarries and mines are to be conducted to get acquainted with field conditions.

Submission of written Field Report is compulsory (5 marks)

A Journal (Laboratory record) is compulsory (5 marks)

Internal Examination marks of two practical exams (out of 15 each) – totaling to out of 30 will be included in final mark list

Note: To appear for the practical examination a certified journal and a certified Field Work Report or Field Trip Report is **compulsory**. If the student does not present these certified documents, then the University appointed examiners will have the authority to **disallow the student from appearing for the annual practical examination**.

Submitted by - Dr. Vadagbalkar S.K. Chairman Adhoc Geology BOS