SHIVAJI UNIVERSITY, KOLHAPUR.

********** **B+**

Accredited By NAAC

Revised Syllabus For

Bachelor of Science

(Part III)

(Subject to the modifications to be made from time to time)

Syllabus to be implemented from June 2008 onwards.

Shivaji University, Kolhapur

Revised Syllabus For

Bachelor of Science

1. TITLE : Subject GEOLOGY

Optional under the Faculty of Science

2. **YEAR OF IMPLEMENTATION**:- Revised Syllabus will be implemented from June 2008 onwards.

3. PREAMBLE:-

This syllabus of degree course includes foundation, core and applied components of the geology course. 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 :

(as applicable to the Degree /Subject- Paper concerned)

1) To impart basic knowledge in geology
2) To develop awareness in the fields of mineral resources, ground water, petroleum
3) Introduction to the concepts of Geotectonics
4) Fundamental concepts of Origin and age of Earth
5) Study of natural disasters and mitigation measures thereof
6) Study of environmental aspects in relation to geology
7) Understanding the earth through Remote Sensing
8) Understanding the concept of Geological time and geological history of the earth
9) Understanding the Evolutionary trends through geological time
10) To study the geology and tectonics of the Indian Subcontinent
11) To impart basic field training in geology

5. DURATION

- **The course shall be a full time course.**

6. PATTERN:-

Pattern of Examination will be Annual.

7. ELIGIBILITY FOR ADMISSION :-

As per eligibility criteria prescribed for each course and the merit list in the qualifying examination.

8. MEDIUM OF INSTRUCTION :

The medium of instruction shall be **English.**

9. STRUCTURE OF COURSE- -------

FIRST YEAR Geology (NO.OF PAPERS – 2)

Sr.No.	Subjects	Marks
1.	Paper I - General Geology and physical Geology	100
2.	Paper II - Introduction to Mineralogy, Crystallography and Petrology	100
	Total theory papers - Two	200
	Practical	50

SECOND YEAR Geology (NO.OF PAPERS - 2)

Sr.No.	Subjects	Marks
1.	Paper III - Mineralogy, Optics and Structural Geology	100
2.	Paper IV - Petrology – Igneous, Sedimentary and Metamorphic	100
	Total theory papers - Two	200
	Practical	100

THIRD YEAR Geology (NO.OF PAPERS - 4)

Sr.No.	Subjects	Marks
1.	**Paper V Dynamics of Earth, Stratigraphy and Palaeontology**	100
2.	**Paper VI: Stratigraphy of India**	100
3.	**Paper VII: Economic Geology**	100
4.	**Paper VIII: Environmental Geology, Geomorphology, Hydrogeology and Remote Sensing**	100
	Total theory papers - Four	400
	Practical	200

10. SCHEME OF TEACHING:-

FIRST YEAR Geology (B.Sc. Part I)

Sr. No.	Subject /Paper	Teaching Scheme (Hrs/Week)			
		L	T	P	Total
1	Paper I - General Geology and physical Geology				
2	Paper II - Introduction to Mineralogy, Crystallography and Petrology				
3	**Total = Two**	5			**5**
4	**Practical**			**4**	**4**

SECOND YEAR Geology (B.Sc. Part II)

Scheme of Teaching and Examination

Sr. No.	Subject/Paper	Teaching Scheme (Hrs/Week)			
		L	T	P	Total
1	Paper III - Mineralogy, Optics and Structural Geology	3		4	7
2	Paper IV - Petrology – Igneous, Sedimentary and Metamorphic	3		4	7
3	**Total= Two**	**6**		8	14

THIRD YEAR Geology (B.Sc. Part III)

Scheme of Teaching and Examination

Sr. No.	Subject/Paper	Teaching Scheme (Hrs/Week)			
		L	T	P	Total
1	**Paper V Dynamics of Earth, Stratigraphy and Palaeontology**	**3**	**--**	**5**	**8**

2	**Paper VI: Stratigraphy of India**	**3**	**--**	**5**	**8**
3	**Paper VII: Economic Geology**	**3**	**--**	**5**	**8**
4	**Paper VIII: Environmental Geology, Geomorphology, Hydrogeology and Remote Sensing**	**3**	**--**	**5**	**8**
	Total= 4 (Four)	**12**	**--**	**20**	**32**

13. SCHEME OF EXAMINATION :-

- Question Paper will be set in the view of the /in accordance with the entire Syllabus and preferably covering each unit of syllabi.

14. STANDARD OF PASSING:-

As Prescribed under rules & regulation for each degree/programme of Shivaji University, Kolhapur.

15. EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS- (FOR REVISED SYLLABUS)

Equivalence of new syllabus given to old syllabus.

Old syllabus

Paper V - Earth's Physics and Dynamics and Earth's History: Stratigraphy and Palaeontology.
Paper VI - Stratigraphy of India
Paper VII - Economic Geology
Paper VIII - Environmental Geology, Geomorphology, Hydrogeology and Remote Sensing

New syllabus

Paper V - Dynamics of Earth, Stratigraphy and Palaeontology.
Paper VI - Stratigraphy of India
Paper VII - Economic Geology
Paper VIII - Environmental Geology, Geomorphology, Hydrogeology and Remote Sensing

1. Syllabus to be implemented from **June 2008.**
2. Students appearing with old syllabus to be given two chances. The question papers of the old syllabus of B.Sc. Part III Geology will be set for the examinations to be held in Oct/Nov 2008 and April/May 2009.

REVISED SYLLABUS

B.Sc. Part III Geology

(Introduced from June 2008 onwards)

(i) Paper – V

(ii)Title Of Paper: Dynamics of Earth, Stratigraphy and Palaeontology

Section I: Dynamics of Earth

Unit I - Crustal movements: Orogenic and Epiorogenic movements.

(10 Periods)

Unit II - Concept of geosynclines; Types of Mountains and their Origin: Volcanic, Tectonic, and Denudational

(10 Periods)

Unit III - Continental drift; Sea floor spreading; Plate tectonics- Concept, Characteristics of plates, Plate boundaries- divergent, convergent

(10 Periods)

Unit IV - Transform faults; Plate motion and causes; Hot plumes and Hotspots; triple junctions; limitations of Plate Tectonics; Tectonic Framework of India

(10 Periods)

Section II: Stratigraphy and Paleontology

Unit I - Stratigraphy- Introduction, Definition and Scope; Principles of Stratigraphy; Standard Stratigraphic Scale (Geological Time Scale); Stratigraphic units- Litho-stratigraphic, Bio- stratigraphic, Chrono-stratigraphic

(10 Periods)

Unit II - Facies concept in Stratigraphy – Lithofacies and Biofacies ; Methods of Stratigraphic Correlation.
Paleontology- Fossils; conditions of fossilization; Modes of preservation of fossils

(10 Periods)

Unit III - Uses of fossils; Index Fossils; Introduction to Microfossils and its significance in Petroleum Exploration.
Morphology, classification and geological distribution of following groups-

a. Phylum – Arthropoda
b. Phylum Coelentrata _ (Anthozoa)

(10 Periods)

Unit IV - Morphology, classification and geological distribution of following groups-

a. Phylum – Mollusca (Lamellbranch, Gastropods, Cephalopods)
b. Phylum- Brachiopoda
c. Phylum – Echinodermata

(10 Periods)

Reference Books:

1. The Dynamic Earth System - A.M. Patwardhan.
2. Principles of Physical Geology - A. Holmes (English Language Book Society)
3. General Geology- V.Radhakrishna.
4. Aspects of Tectonics - K.S. Valdiya (Universities Press, Hyderabad)
5. Stratigraphy and Sedimentation - W.C. Krumbein and L.L. Sloss
(W. H.Freeman and Company)
6. Stratigraphic Principles and Practice - J. M. Weller (Universal Book Stall)
7. Essentials of Earth History - W. L. Stokes (Prentice-Hall of India (Pvt.) Ltd.)
8. Outlines of Paleontology – H. H.Swinnerton. (Edward Arnold and Company)
9. Fundamentals of Invertebrate Palaeontology – M. A. Koregave.
(Book World Enterprise, Mumbai)
10. Invertebrate Palaeontolgy - H. Woods (CBS Publishers and Distributors)
11. Fundamentals of Micropalaeontology - M. A. Koregave

Paper VI:

Title Of Paper **Stratigraphy of India**

Section-I: Precambrian Stratigraphy of India

Unit I - Tectonic Divisions of India
Archaean Stratigraphy - Geographic distribution, classification, structure and economic importance of Sargur Schist Belt, Peninsular Gneissic Complex, Dharwar Supergroup of South India

(10 Periods)

Unit II - Archaean Stratigraphy - Geographic distribution, classification, structure and economic importance of -
Khandalites and Charnockite Series of Eastern Ghats
Sakoli Group, Sauser Group and Dongargarh Granite of Central India
Iron-Ore Group of Singhbhum-Orissa area
Bundelkhand Gneiss and Aravalli Group of Aravalli-Bundelkhand area

(10 Periods)

Unit III - Proterozoic Stratigraphy - Geographic distribution, classification, structure and economic importance of -
a. Cuddapah Supergroup b. Delhi Supergroup

(10 Periods)

Unit IV- Proterozoic Stratigraphy - Geographic distribution, classification, structure and economic importance of -
a. Kaladgi Supergroup b. Vindhyan Supergroup
c. Kurnools and Bhimas

(10 Periods)

Section-II: Phanerozoic Stratigraphy of India

Unit I - Phanerozoic stratigraphy of Peninsular India - Geographic distribution, classification, structure, fossil content and economic importance of Gondwana Supergroup

(10 Periods)

Unit II - Phanerozoic stratigraphy of Peninsular India - Geographic distribution, classification, structure, fossil content and economic importance of Mesozoic formations - Jurassic of Kuchchh , Cretaceous of Narmada Valley (Bagh beds), Cretaceous of Tiruchirapalli

(10 Periods)

Unit III - Phanerozoic stratigraphy of Extra-peninsular India - Geographic distribution, classification, structure , fossil content and economic importance of -

a. Spiti area b. Siwalik Group

(10 Periods)

Unit IV - Stratigraphy of Maharashtra.
Deccan Traps and Lameta Beds

(10 Periods)

Reference Books:

1. Fundamentals of Historical Geology and Stratigraphy of India – Ravindrakumar (Wily Eastern Limited, New Delhi)
2. Stratigraphy of India and Burma - M. S. Krishnan. (CBS Publishers and Distributors)
3. Geology of Maharashtra - G. G. Despande (GSI Publications, Bangalore)
4. Geology of Karnataka - B. P. Radhakrishna (GSI Publications, Bangalore)
5. Geology of Gujarat - S. S. Merh (GSI Publications, Bangalore)
6. Geology of Rajasthan - (GSI Publications, Bangalore)
7. Singhbhum-Orissa Iron-ore Craton - Sinha Roy (GSI Publications, Bangalore)
8. Precambrian Stratigraphy - V. J. Gupta

Paper- VII-
Economic Geology

Section I- Processes of formation of Mineral deposits

Unit I - Materials of Metalliferous and non-Metalliferous deposits.
Processes of formation of mineral deposits - Magmatic Concentration

(10 Periods)

Unit II - Processes of formation of mineral deposits - Contact Metasomatism, Hydrothermal processes

(10 Periods)

Unit III - Processes of formation of mineral deposits - Oxidation and Supergene enrichment, Residual and Mechanical concentration.

(10 Periods)

Unit IV - Formation of Hydrocarbon deposits (Petroleum and Coal)

(10 Periods)

Section II - Prospecting and Mineral Exploration

Unit I - Meaning of Prospecting ; Principle involved - Background value, threshold , Anomaly ; Brief outline or various methods of prospecting ; Hitting the Target ; Description of geological methods , Geochemical methods and Geobotanical methods -Principle , instruments, field procedures, interpretation and applications.

(10 Periods)

Unit II - Description of the following geophysical methods

a. Electrical method - i. Self Potential method
   ii. Resistivity method - Wenner and Schlumberger array
b. Magnetic method - Aeromagnetic
c. Seismic method - i. Refraction ii. Reflection
d. Gravity method
e. Radioactivity method
f. Remote sensing method - i. Aerial photographs ii. Satellite imageries

(10 Periods)

Unit III - Meaning of Mineral Exploration; Sampling methods - Pitting , Trenching , Drilling ; Assaying ; Outline of Mining methods - i. Open cast mine
ii. Underground mine

(10 Periods)

Unit IV - Geological Organizations - Name, Head-Quarters , Aims and Objectives ; Conservation of Mineral Resources ; National Mineral policy

(10 Periods)

Reference Books :

1. Economic mineral deposits- Jenson and A. M. Bateman (Willey and Sons)
2. India's Mineral resources- S. Krishnaswami. (Oxford and IBH Publication)
3. Ore deposits of India- K. V. G. K. Gokhale and R. T. C Rao.
   (Thomson Press (India) Ltd.)
4. An introduction to Mineral Economics - K. K.Chatterjee (Willey Eastern Ltd.)
5. Mineral Economics - R.K. Sinha and N.L. Sharma. (Oxford and IBH Publication)
6. Mining geology – H. E. Mckinstry (Prentice-Hall inc.)
7. Geophysical Prospecting – M. B. Dobrin (McGraw Hill Publication)
8. Geochemistry in Mineral Exploration – H. E. Hawkes and J. S. Webb.
   (Harper International Student Reprint)
9. Field Geology - F. H. Lahee (CBS Publishers and Distributors)
10. Geology of Petroleum - A. I. Lavorsen (CBS Publishers and Distributors)
11. Coal Geology

Paper VIII –

Environmental Geology , Geomorphology, Hydrogeology and RemoteSensing

Section I- Environmental Geology and Geomorphology

Unit I - Meaning of Environment ; Environmental Geology - definition , scope, fundamental concepts in environmental geology ; Hazardous Earth Phenomena - River flooding , Earthquakes ,Mass movements (Fall , Slide , Flow , Creep)

(10 Periods)

Unit **II** - Volcanic activity and Coastal hazards
Geological aspects of environmental health hazards related to Mining, Surface water and Groundwater.

(10 Periods)

Unit III - Geomorphology - Introduction , ten concepts of geomorphology; Relationship between landforms and underlying rocks ; Slope- geometric properties and classification; Soil - definition, Soil texture, structure and composition; Soil profiles and horizons; soil formation- processes and factors

(10 Periods)

Unit IV - Cycle of Erosion - Cyclic concept, Geomorphic erosion cycle of W.M. Devis, Pencks and C.L. King ; Rejuvenation due to eustatic and landscape evolution ;Topographic evidences of rejuvenation ; Morphometric parameters.

(10 Periods)

Section II - Hydrogeology and Remote Sensing

Unit I - Hydrogeology - Objectives of surface and groundwater management; National Water Policy

(10 Periods)

Unit II - Water Harvesting techniques - Traditional and Modern with emphasis on rainwater harvesting ;

(10 Periods)

Unit III - Remote Sensing - Definition, Concept of remote sensing – Source of Electromagnetic energy, Electromagnetic spectrum; Indian Scenario; Sensors- Camera, film, Linear and multi spectral scanner.

(10 Periods)

Unit IV - Imagery – IRS products (Main). MSS Bands- blue, green, red and near I.R. – FCC.
Importance in Geology - Lineaments, fractures, faults, folds, dykes, Unconformities; Igneous, sedimentary and metamorphic terrain identification.

(10 Periods)

Reference books:
1. Principles of Physical Geology- A. Holmes. (ELBS)

2. Environmental Geology - K. S. Valdiya
3. Environmental Geography - Savinder Singh (Prayag Pustak Bhawan , Allahabad)
4. Groundwater Hydrology- D. K. Todd (John Wiley and Sons)
5. Geomorphology – Savinder Singh (Prayag Pustak Bhawan , Allahabad)
6. Principles of Geomorphology – W. D.Thornbury (John Wiley and Sons)
7. Geomorphology – A. L. Bloom
8. Environmental Geology – E. A. Keller (CBS Publishers and Distributors)
9. Remote Sensing and Image Interpretatiion - T.M. Lillesand and R.W. Kiefer (John Wiley and Sons)
10. Remote Sensing - Principles and Image Interpretation - F.F. Sabins (W.H. Freeman and Company)
11. Principles of Remote Sensing - P.J. Curran (ELBS)
12. Textbook of Remote Sensing and Geographical Information Systems 3rd Editioin - M. Anji Reddy (B.S. Publications)

Practical Course
Geology

Unit- I: Mineralogy (Microscopic) and Industrial and ore minerals (Megascopic)

i) Mineralogy (Microscopic) - Olivine, Hypersthene, Enstatite, Augite, Diopside, Actinolite, Tremolite, Hornblende, Muscovite, Biotite, Orthoclase, Microcline, Sanidine, Plagioclase, Leucite, Nepheline, Quartz, Tourmaline, Calcite, Staurolite, Garnet, Kyanite, Sillimanite, Andalusite, Sphene, Epidote, Chlorite.

ii) Ores and Industrial minerals (Megascopic)
Ores: Pyrolusite, Psilomelane, Rhodocrosite, Hematite, Magnetite, Pyrite, Limonite, Goethite, Chalcopyrite, Native-copper, Braunite, Malachite, Azurite, Galena, Sphalerite, Chromite, Illemanite, Cinnabar, Realgar, Orpiment, Wolframite, Bauxite, Stibnite.
Industrial minerals: Quartz, Beryl, Barite, Asbestos, Mica, Calcite, Gypsum, Magnesite, Kaolin, Corundum, Zeolite, Kyanite, Sillimanite, Andalusite, Garnet, Graphite, Zircon, Feldspar, Talc, Sulphur, Fluorite, Dolomite, Olivine.

Unit – II: **Optics, Mineral calculations and Paleontology**

i) Optics:
1. Types and determination of extinction for Hornblende and Augite, Diopside, Tremolite.
2. Determination of sign of elongation of Sillimanite, Actinolite, Staurolite, Biotite and Tourmaline.
3. Study of interference figure of uniaxial minerals and their optic sign- Quartz, and Calcite.

ii) Mineral calculations:
i) Determination of type of pyroxene with the help of Hess method and diagram from a given chemical data.
ii) Determination of type of plagioclase feldspar from a given chemical data.

iii) Palaeontology
Identification and description of the following Invertebrate fossils:

1. Phylum – Coelentrata – Favosite, Tubipora.
2. Phylum – Mollusca,
Class- Lamellibranchia – Graphea, Pecten, Cardium, Trigonia, Inoceramus and Cardita.
Class – Gastropoda - Voluta, Conus, Physa, Turritella, Trochus, Turbo, Cyprea.
Class – Cephalopoda – Nautilus, Goniatites, Acanthoceras, Belemnites.
3. Phylum – Brachiopoda – Productus, Lingula, Terebratula, Rhynconella, Spirifer.
4. Phylum – Echinodermata – Echinus, Holaster, Hemiaster, Micraster.
5. Phylum – Arthropoda – Trilobites, Paradoxide, Trinucleus and Ogygia.
6. Identification and description of the following plant fossils – Calamites, Lepidomelane, Siggilaria, Vertibraria, Lepidomelane, Glossopteris, Gangamopteris, Neuropteris, Nissonia and Ptilophyllum.

Unit- III Study of rocks.
Megascopic Identification:
1. Igneous rocks: Granites and its varieties, Pegmatite, Obsidian, Pumice, Rhyolite, Granodiorite, Diorite, Andesite, Pitchstone, Syenite porphyry, Trachyte, Gabbro, Dolerite, Basalts and its varieties, Dunite, Lamprophyre, Felsite, Norite, Peridotite, Anorthosite.
2. Secondary and sedimentary rocks: Laterite, bauxite, Breccia, Conglomerate, Grit, Arkose, Siliceous sandstone, Ferruginous sandstone, Flagstone, Shale, Mudstone, Limestone, Oolitic limestone, Shelly limestone.
3. Metamorphic rocks: Slate, Phyllite, Sericite schist, Chlorite schist, Mica schist, Mica garnet schist, Kyanite schist, Graphite schist, Hornblende schist, Actinolite schist, Tremolite schist, Amphibolite, Fuschite quartzite, Hematite quartzite, Marble, Schorl, Granite gneiss, Garnetiferous gneiss, Augen gneiss, Hornblende gneiss, Charnockite.
Microscopic Identification
1. Igneous rocks: Granite, Dolerite, Gabbro, Basalt, Dunite, Anorthosite, Peridotite, Lamprophyre, Syenite, Trachyte, Diorite, Andesite, and Norite.
2. Sedimentary rocks: Sandstone, Ferruginous sandstone, Arkose, Limestone, Shelly limestone, Oolitic Limestone.
3. Metamorphic rocks: Chlorite schist, Mica schist, Mica garnet schist, Sillimanite schist, Kyanite schist, Charnockite, Quartzite, Amphibolite, Hornblende gneiss, Granite gneiss, Augen gneiss.
II) Origin and description of the following structures and textures
Megascopic Identification (Textures and Structures)
1. Igneous rocks: Granitic, Porphyritic, Glassy, Vesicular, Amygdaloidal, Flow, Ropy, Graphic, Columnar.
2. Sedimentary rocks: Clastic, Lamination, Graded bedding, cross bedding, Ripple marks, Mudcracks, Pisolitic, Oolitic.
3. Metamorphic rocks: Slaty cleavage, Schistose, Granulose, Gneissose, Augen and Cataclasite.
Microscopic Identification (Textures)
1. Igneous rocks: Granitic, Porphyritic, Ophitic, Subophitic, Graphic, Intergranular, Intersertal, Flow, Reaction rim, and corona.
2. Sedimentary rocks: Clastic, Oolitic.
3. Metamorphic rocks: Slaty cleavage, Schistose, Granulose, Gneissose, and Augen.

Unit IV: Petrochemical calculations and computer applications.
A) Petrochemical calculations – from given chemical analysis of rocks.
1. Determination of CIPW Norms (Over saturated rocks) and classification.
2. Determination of Niggli values up to quartz values and classification.
3. Determination of ACF and plotting on triangular diagrams for metamorphic rocks.
4. Plotting of sedimentological size analysis data on histogram and frequency curves, mode and mean, Folk and Ward's (1957) graphic measures- mean, size and standard deviation. Significance of this analysis to be compared with std. Table given by Krumbein and Sloss.
B) Computer applications:
1. Introduction to fundamental statistical applications to geology – Viz- Mean, Mode, Median and standard deviation and variance.
2. Computer fundamentals- Information technology, Hardware concepts, Classification of computers and computer soft wares, Introduction to DOS (Disc operating system) and DOS commands.
Introduction to problem solving, flow chart, branching and looping.
3. Windows (Software programme)- Introduction to windows Operating system, working with windows excel, solving petrochemical calculations and geomorphic analysis, Preparation of histograms, Line, Bar, Pie charts.

Unit V: Geomorphology, Toposheet reading, Drainage analysis and remote sensing techniques. Reading of Toposheet

1. Identification of features from Toposheets: Mesa, Butte, Ridge, Cuesta, Meander, Incised meander, Point bar.
2. Drainage patterns, drainage density and its significance.
i) Drainage basin analysis- stream order, (Strahler's method), Stream number, Stream length, Basin area, Basin area ratio, Drainage density and Bifurcation ratio and their significance.
3. Terrain features identifications:
a) Drainage – Drainage pattern, density and its significance.
b) Landforms – Mesa, Butte, Ridge and Questa.
c) Lineaments – Stream (Tonal contrast and Topographic contrast).
d) Structures – Tectonic features.

Unit VI: Structural maps and problems:

1) Completion of Outcrops (Single inclined series) and one fault and intrusion.
2) Drawing of geological sections and geological history of the given maps.
3) Solving borehole problems by graphical methods and also on contour maps.

Fieldwork: Geological fieldwork in selected areas as specified in paper VII- Indian Stratigraphy, for about 15days under guidance is compulsory. Submission of fieldwork report along with specimens collected is also compulsory.
Field project: Related to geology like Well inventory, Resistivity survey in the area or any other work related to geology.

- **During each practical writing of laboratory journal is compulsory and it is to be checked by teacher in-charge and certified by the Head of the Department.**

Nature of theory question paper and practical examination and scheme of marking.

Theory papers:

There will be 4 theory papers with total 400 marks, each paper for 100 marks and consisting of two sections, each section having 50 marks.
Nature of theory question paper (for each section).

1. Objective type question 10 marks.
2. Essay type/or Essay type question, two questions 10 marks each.
3. Short answer type question (four out of six) 20 marks.

Practical:

Practical examination will consist of total 200 marks and the examination will be conducted on 3 days, covering two units of practical each day as follows:

Practical examination of 3 days for total 200 marks as given below:-

Part I: Unit –I and Unit II (First day)

Section I

Mineralogy Microscopic	8 marks.
Megascopic	12 marks.

Section II

Optics	8 marks.
Paleontology	10 marks
Mineral calculation-	
Hess	6 marks
Plagioclase	6 marks.
	Total 50 marks

Part II: Unit III and IV (Second day)

Section I

Study of rocks Microscopic	6 marks.
Study of rocks Megascopic	9 marks.

Section II

Structure/Texture Microscopic	6 marks.
Megascopic	9 marks.
Section III	
Petrochemical calculations and Computer applications	
Norm	6 marks.
Niggli	4 marks.
ACF	4 marks.
Size	6 marks.
	Total 50 marks

Part III: Unit – V and VI (Third day)

Section I

Toposheet reading	4 marks.
Remote sensing	10 marks.
Drainage analysis	8 marks.

Section II

Outcrop	8 marks.
Map section	10 marks.
Graphical problem	5 marks.
Contour problem	5 marks.
	Total 50 marks

Section III

Journal	20 marks
Project report/Fieldwork report	20 marks
Viva voce	10 marks.
	Total 50 marks

C] **OTHER FEATURES :**

1. INTAKE CAPACITY / NUMBER OF STUDENTS:-
As per University Norms

2. TEACHERS QUALIFICATIONS:-

- **As prescribed by norms .**
- **Work load details should be as per Apex body/UGC/State Govt./University norms.**

(A) LIBRARY :

----- List of books has been mentioned paper wise in the syllabi.

(B) SPECIFIC EQUIPMENTS : Necessary to run the Course.

Rocks and minerals specimens, fossil specimens, petrological microscopes, field equipments, maps, charts, models, Aerial photographs, satellite imageries, stereoscopes, slide projector, OHP/LCD, Computers and necessary softwares and operating systems etc.

(C) LABORATORY SAFETY Measures:

General Safety Rules For Laboratory Work.

I. List Of Equipments Needed For Laboratory Safety

1. Fire extinguisher
2. First Aid Kit
3. Good earthling and insulated wirings for electrical supply
4. Standard operated procedure manuals for instrument, map, specimens etc.

II. Instructions For Safety In Laboratory

1. Any injury while handling rocks and mineral must be reported to teacher in charge of practically immediately.
2. In case of fire, switch off all electric connections.
3. Make your workplace clean before leaving the laboratory.
4. Know the place of fire extinguisher, first aid box.
5. Do not use cell phones in laboratory.

III. Do's

1. Always wear shoes in the laboratory.
2. Maintain separate record book for practical work.
3. Maintain silence, cleanliness and discipline in the laboratory.
4. Handle the laboratory equipment, rock, and mineral specimens carefully.
5. Follow the standard operation procedure of instrument.

IV. **DON'T**

1. Don't take apparatus out of laboratory.
2. Don't eat or drink any food in laboratory.
3. Don't enter or leave the laboratory without permission.

Guidelines for Field Work

1. During study tour, more emphasis be given to field relations of rocks, collection of specimens, their labeling and mapping.
2. students are advised to carry field equipments – viz. hammers, clinometers / brunton compass, magnifying lens, tape, maps / toposheets, field note books, writing and drawing material as well as haversack for collection of specimens.
3. field notes should be taken under the guidance of teacher in-charge incorporating photographs, sketches and measurement of different features.
4. Strict discipline and safety measures must be followed under the guidance of teacher in-charge.
5. Preparation of the study tour report and its presentation along with field collection at the time of practical examination is compulsory.