Approved in BOS meeting in the Subject of Geology held on

Annexure-I of BOS Meeting

GEOLOGY DEPARTMENT

HIMACHAL PRADESH UNIVERSITY

OUT LINES OF SYLLABI AND COURSES OF READING

IN THE SUBJECT OF GEOLOGY FOR B. Sc. WITH MAJOR IN GEOLOGY AND MINOR ELECTIVE IN GEOLOGY (2013-2014 onwards)

(A) Structure Outline of Major in GEOLOGY (Minimum Credits to be Earned=56)

Semester	Course Code	Course Type	Course Name	Credit(s)	Cumulated Credits Category-wise
I (O dd)		Compulsory Course I	To be Selected from the list of Compulsory Courses	3	Compulsory – 6 Core – 8 Elective – 8 GI & H – 1 Total – 23
		Compulsory Course II (Skill Based)	To be Selected from the list of Compulsory Courses (Skill Based)	3	
	BSCGEOL0101	Major Core Course I	Physical & General Geology	3 *	
	BSCGEOL0102	Major Core Course II	Environmental Geology	3*	
		Minor Elective Course I (a)	To be Selected from the list for Minor Elective Subject other than GEOLOGY	3	
		Minor Elective Course I (b)	To be Selected from the list for Minor Elective Subject other than GEOLOGY	3	
	BSCGEOL0101(P)	Major Core LabCourse I	GEOLOGY Lab 1 (Physical & General Geology)	1*	
	BSCGEOL0102(P)	Major Core Lab Course II	GEOLOGY Lab 1 (Environmental Geology)	1*	

Semester	Course Code	Course Type	Course Name	Credit(s)	Cumulated Credits Category-wise
		Minor Elective Lab Course I (a)	To be Selected from the list for Minor Elective Subject other than GEOLOGY	1	
		Minor Elective Lab Course I (b)	To be Selected from the list for Minor Elective Subject other than GEOLOGY	1	
		GI and H Course I	To be Selected from the list GI and Hobby Courses	1	
II (Even)		Compulsory Course III	To be Selected from the list of Compulsory Courses	3	Compulsory – 6 (12) Core – 8 (16) Elective – 8 (16) GI & H – 1 (2) Total 23 (46)
		Compulsory Course IV(Skill Based)	To be Selected from the list of Compulsory Courses (Skill Based)	3	
	BSCGEOL0203	Major Core Course III	Geomorphology	3*	
	BSCGEOL0204	Major Core Course IV	Mineralogy	3*	
		Minor Elective Course II (a)	To be Selected from the list for Minor Elective Subject other than GEOLOGY	3	
		Minor Elective Course II (b)	To be Selected from the list for Minor Elective Subject other than GEOLOGY	3	
	BSCGEOL0203(P)	Major Core Lab Course III	GEOLOGY Lab II (Geomorphology)	1*	
	BSCGEOL0204(P)	Major Core Lab Course IV	GEOLOGY Lab III (Mineralogy)	1*	
		Minor Elective Lab Course II (a)	To be Selected from the list for Minor Elective Subject other than GEOLOGY	1	

Semester	Course Code	Course Type	Course Name	Credit(s)	Cumulated Credits Category-wise
		Minor Elective Lab Course II ()	To be Selected from the list for Minor Elective Subject other than GEOLOGY	1	
		GI and H Course II	To be Selected from the list GI and Hobby Courses	1	
III (Odd)		Compulsory Course V	To be Selected from the list of Compulsory Courses	3	Compulsory – 6 (18) (Complete) Core – 8 (24) Elective – 8 (24) GI & H – 1 (3) (Complete) Total 23 (69)
		Compulsory Course VI	To be Selected from the list of Compulsory Courses (Skill Based)	3	
	BSCGEOL0305	Major Core Course V	Structural Geology	3*	
	BSCGEOL0306	Major Core Course VI	Stratigraphy	3*	
		Minor Elective Course III (a)	To be Selected from the list for Minor Elective Subject other than GEOLOGY	3	
		Minor Elective Course III(b)	To be Selected from the list for Minor Elective Subject other than GEOLOGY	3	
	BSCGEOL0305(P)	Major Core Lab Course V	GEOLOGY Lab IV (Structural Geology)	1*	
	BSCGEOL0306(P)	Major Core Lab Course VI	GEOLOGY Lab IV (Mineralogy)	1*	
		Minor Elective Lab Course III(a)	To be Selected from the list for Minor Elective Subject other than GEOLOGY	1	
		Minor Elective Lab Course III(b)	To be Selected from the list for Minor Elective Subject other than GEOLOGY	1	
		GI and H Course III	To be Selected from the list GI and Hobby Courses	1	

Semester	Course Code	Course Type	Course Name	Credit(s)	Cumulated Credits Category-wise
IV (Even)	BSCGEOL0407	Major Core Course VII	Igneous Petrology	3*	Core – 12 (36) Elective – 8 ((32) Core / Elective (additional) - 4 Total 24 (93)
	BSCGEOL0408	Major Core Course VIII	Sedimentary	3*	
	BSCGEOL0409	Major Core Course IX	Metamorphic Petrology	4*	
		Minor Elective Course IV (a)	To be Selected from the list for Minor Elective Subject other than GEOLOGY	4	
		Minor Elective Course IV (b)	To be Selected from the list for Minor Elective Subject other than GEOLOGY	4	
	BSCGEOL0407(P)	Major Core LabCourse VII	GEOLOGY Lab V (Igneous Petrology)	1*	
	BSCGEOL0408,0409(P)	Major Core Lab Course VIII	GEOLOGY Lab VI (Sedimentary & Metamorphic Petrology)	1*	
		Minor Elective Lab Course IV (a)	To be Selected from the list for Minor Elective Subject other than GEOLOGY	1	
		Minor Elective Lab Course IV(b)	To be Selected from the list for Minor Elective Subject other than GEOLOGY	1	
		Core / Elective Course (Additional)*		4	
V (O dd)	BSCGEOL0510	Major Core Course X	Invertebrate	3*	Core – 12 (48) Elective – 8 (40) (Complete) Core / Elective (additional) - 4 Total 24 (117)
	BSCGEOL0511	Major Core Course XI	vertebrate	4*	
	BSCGEOL0512	Major Core Course XII	Himalayan Geology	3*	
		Minor Elective Course V(a)	To be Selected from the list for Minor Elective Subject other than GEOLOGY	3	

Semester	Course Code	Course Type	Course Name	Credit(s)	Cumulated Credits Category-wise
		Minor Elective Course V(b)	To be Selected from the list for Minor Elective Subject other than GEOLOGY	3	
	BSCGEOL0510(P)	Major Core LabCourse X	GEOLOGY Lab VII (Invertebrate)	1*	
	BSCGEOL0511,0512(P)	Major Core Lab Course XI	GEOLOGY Lab VIII (Vertebrate & Himalayan Geology)	1*	
		Minor Elective Lab Course V (a)	To be Selected from the list for Minor Elective Subject other than GEOLOGY	1	
		Minor Elective Lab Course V (b)	To be Selected from the list for Minor Elective Subject other than GEOLOGY	1	
		Core / Elective Course (Additional)*	Any one of the Additional or open elective courses	4	
VI (Even)	BSCGEOL0513	Major Core Course XIII	Economic Geology	3*	Core – 8 (56) Core / Elective (additional) – 20* Total 28 (145)
	BSCGEOL0514	Major Core Course XIV	Applied Geology	4*	
	BSCGEOL0513,0514(P)	Major Core lab Course XIII	GEOLOGY Lab IX (Economic Geology & Applied Geology)	1*	
	BSC(Or Other than Science) PHY(or other than GEOLOGY) 06**	Core / Elective Course (Additional)*	Any one of the Additional or open elective courses	4	
	BSC(Or Other than Science) PHY(or other than GEOLOGY) 06**	Core / Elective Course (Additional)*	Any one of the Additional or open elective courses	4	
	BSC(Or Other than Science) PHY(or other than GEOLOGY) 06**	Core / Elective Course (Additional)*	Any one of the Additional or open elective courses	4	
	BSC(Or Other than Science) PHY(or other than GEOLOGY) 06**	Core / Elective Course (Additional)*	Any one of the Additional or open elective courses	4	

Semester	Course Code	Course Type	Course Name	Credit(s)	Cumulated Credits Category-wise
	BSC(Or Other than Science) PHY(or other than GEOLOGY) 06**	Core / Elective Course (Additional)*	Any one of the Additional or open elective courses	4	

** I f the course has a lab the 4 credits will be L3+T0+P1

*Additional Elective Courses offered by GEOLOGY Department

Semester	Course Code	Course Type	Course Name	Credit(s)	Cumulated Credits Category-wise
V/VI	BSCGEOL05/0615	Core / Elective Course (Additional)*	Hydro Geology	4*	
V/VI	BSCGEOL05/0616	Core / Elective Course (Additional)*	Oceanography	4*	
V/VI	BSCGEOL05/0617	Core / Elective Course (Additional)*	Geology of Himalaya	4*	
V/VI	BSCGEOL05/0618	Core / Elective Course (Additional)*	Geophysical Prospecting	4*	
V/VI	BSCGEOL05/0619	Core / Elective Course (Additional)*	Mining Geology	4*	
V/VI	BSCGEOL05/0620	Core / Elective Course (Additional)*	Coal and Petroleum Geology	4*	
V/VI	BSCGEOL05/0621	Core / Elective Course (Additional)*	Mineral Economics	4*	

V/VI	BSCGEOL05/0622	Core / Elective Course (Additional)*	Earth Processes	4*	

*Open Elective Courses offered by GEOLOGY Department

Semester	Course Code	Course Type	Course Name	Credit(s)	Cumulated Credits Category-wise
V/VI	BSCGEOL05/0623	Open /Core Elective Course (Additional)*	Historical Geology	4*	
V/VI	BSCGEOL05/0624	Core / Elective Course (Additional)*	Field Geology	4*	

General Interest Courses Offered by GEOLOGY Department

Semester	Course Code	Course Type	Course Name	Credit(s)	Cumulated Credits Category-wise
I/II/III	BSCGEOL01/02/0325	GI/H	History of Science	1*	
I/II/III	BSCGEOL01/02/0326	GI/H	Science, Technology and Society	1*	

(B) Structure Outline of Minor Elective in GEOLOGY for other than Major GEOLOGY Students (Minimum Credits to be Earned=20)

Semester	Course Code	Course Name	Course Name	Credit(s)	Cumulated Credits Category-wise
I (Odd)		Compulsory Course I		3	Compulsory – 6 Core – 8 Minor Elective 1(a) – 4(4) Minor Elective 1(b)=4 Total Minor Electives – 8 (8) GI & H – 1 Total – 23
		Compulsory Course II (Skill Based)		3	
		Major Core Course I		3	
		Major Core Course II		3	
	BSCGEOL0101	Minor Elective Course I (a)	Physical & General Geology	3	
		Minor Elective Course I (b)		1	
		Major Core LabCourse I		1	
		Major Core Lab Course II		1	
	BSCGEOL0101(P)	Minor Elective Lab Course I (a)	GEOLOGY Lab 1 (Physical & General Geology)	1	
		Minor Elective Lab Course I (b)		1	
		GI and H Course I		1	
II (Even)		Compulsory Course III		3	Compulsory – 6 (12) Core – 8 (16) Minor Elective 1I(a) – 4 (8) Minor Elective 1I(b) – 4 (8) Total Minor Electives – 8 (16) GI & H – 1 (2)
		Compulsory Course IV(Skill Based)		3	
		Major Core Course III		3	
		Major Core Course IV Optics		3	
	BSCGEOL0203	Minor Elective Course II (a)	Geomorphology	3	
		Minor Elective Course II (b)		3	
		Major Core LabCourse III		1	

Semester	Course Code	Course Name	Course Name	Credit(s)	Cumulated Credits Category-wise
		Major Core Lab Course IV		1	Total 23 (46)
	BSCGEOL0203(P)	Minor Elective Lab Course II (a)	GEOLOGY Lab II (Geomorphology)	1	
		Minor Elective Lab Course II ()		1	
		GI and H Course II		1	
III (Odd)		Compulsory Course V		3	Compulsory – 6 (18) (Complete) Core – 8 (24) Minor Elective III(a) – 4 (12) Minor Elective III(b) – 4 (12) Elective – 8 (24) GI & H – 1 (3) (Complete) Total 23 (69)
		Compulsory Course VI		3	
		Major Core Course V		3	
		Major Core Course VI	------	3	
	BSCGEOL0305	Minor Elective Course III (a)	Structural Geology	3	
		Minor Elective Course III(b)	------	3	
		Major Core Lab Course V	------	1	
		Major Core Lab Course VI	------	1	
	BSCGEOL0305(P)	Minor Elective Lab Course III(a)	GEOLOGY Lab IV (Structural Geology)	1	
		Minor Elective Lab Course III(b)	------	1	
		GI and H Course III	------	1	
IV (Even)		Major Core Course VII	------	4	Core – 12 (36) Minor Elective IV(a) – 4 (16) Minor Elective IV(b) – 4 (16) Total Minor Electives – 8 (32) Core / Elective
		Major Core Course VIII Nuclear GEOLOGY	------	4	
		Major Core Course IX Particle GEOLOGY	------	4	
	BSCGEOL0407	Minor Elective Course IV (a)	Igneous, Sedimentary and metamorphic Petrology	4	
		Minor Elective Course IV (b)	------	4	

Semester	Course Code	Course Name	Course Name	Credit(s)	Cumulated Credits Category-wise
		Major Core LabCourse VII	------	1	(additional) - 4 Total 24 (93)
		Major Core Lab Course VIII	------	1	
	BSCGEOL0407(P)	Minor Elective Lab Course IV (a)	GEOLOGY Lab V (Igneous, Sedimentary and metamorphic Petrology)	1	
		Minor Elective Lab Course IV(b)	------	1	
		Core / Elective Course (Additional)*	------	4	
V (O dd)		Major Core Course X	------	3	Core – 12 (48) Minor Elective V(a) – 4 (20) Minor Elective V(b) – 4 (20) Total Minor Electives – 8 (40) (Complete) Core / Elective (additional) - 4 Total 24 (117)
		Major Core Course XI	------	3	
		Major Core Course XII	------	3	
	BSCGEOL0510	Minor Elective Course V(a)	Invertebrate Paleontology	3	
		Minor Elective Course V(b)	------	3	
		Major Core LabCourse X	------	1	
		Major Core Lab Course XI	------	1	
		Major Core Lab Course XII *	------	1	
	BSCGEOL0510(P)	Minor Elective Lab Course V(a)	GEOLOGY Lab VII (Invertebrate Paleontology)	1	
		Minor Elective Lab Course V (b)	------	1	
		Core / Elective Course (Additional)*	------	4	
VI (Even)		Major Core Course XIII	------	4	Core – 8 (56) Core / Elective (additional) –
		Major Core Course XIV	------	4	

Semester	Course Code	Course Name	Course Name	Credit(s)	Cumulated Credits Category-wise
		Core / Elective Course (Additional)*	------	4	20* Total 28 (145)
		Core / Elective Course (Additional)*	------	4	
		Core / Elective Course (Additional)*	------	4	
		Core / Elective Course (Additional)*	------	4	
		Core / Elective Course (Additional)*	------	4	

B.Sc Geology Course

Semester :1

Course Code	BSCGEOL0101		
Credits=3	L=2 , T=1 , P=0		
Name of the course	Physical & General Geology		
Type of the course	Major Core Course I and Minor Elective Course 1(a)		
Number of hrs required for this course	45 hrs.		
Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.
2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Course of Study

Unit I (12 hrs.) Geology its definition, subdivisions, scope and relation with other sciences.

- Earth's relations with solar system. Earth's shape, structure and surface relief. Origin and age of the earth. Interior of the earth.

Unit II (12 hrs.) Basic idea of diastrophism.

- Mountain building, orogenic and epirogenic movements.

Unit III (11 hrs.) Weathering and Mass wasting

- Erosional, depositional features and geological works of running water, ground

  water and glaciers.

Unit IV (10 hrs.) Erosional, depositional features and geological works of winds, oceans and lakes.

Books Suggested:

1. Principles of Physical geology by Strahler .
2. Physical Geology of Arther Holmes.
3. Physical Geology by A.K Dutta.
4. Physical Geology By P.K Mahapatra.
5. Dynamics of Earth by Spencer.

Course Code	BSCGEOL0102		
Credits=3	L=2 , T=1 , P=0		
Name of the course	Environmental Geology		
Type of the course	Major Core Course II		
Number of hrs required for this course	45 hrs.		
Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.
2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Course of Study

Unit I (12 hrs.) Fundamental principles of environmental geology, its definition and scope.

- Geologic hazards,
- landslides, its causes and remedial measures, prevention and identification.

Unit II (12 hrs.) Earthquakes hazard, its causes and remedies.

- Predications of Earthquakes.
- Construction in earthquakes prone area.
- Volcanic hazards, its causes and remedies.

Unit III (11 hrs.) - Atmosphere, its pollution, causes and remedies.
Deforestation and causes and effects
Basic idea about global warming and its future projections

Unit IV (10 hrs.) Water pollution, pollutants and remedies. Elementary idea of water quality and destructive effects of water pollution.

Waste disposal and its management

Books Suggested:

1. Environmental geology by K.S Valdiya.
2. Geology and Environment by Coats.
3. Understanding The Earth by Gunter Gass .
4. Environmental geology by Flawn.
5. Geology in Environmental Planning by Howarde and Remson

BSCGEOL101 (P) Major Core Lab. I : pertaining to major course I

Course Code	BSCGEOL0101		
Credits=1	L=0 , T=0 , P=1		
Name of the course	Physical & General Geology		
Type of the course	(Major Core Lab Course I/ Minor Elective Lab Course 1(b))		
Number of hrs required for this course	30hrs.		
Total Max Marks	50		
Semester Term End Examination	50 % of total marks		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on performance in the laboratory, lab record, lab seminar and Attendance. Marks Attendance: 5% marks to be given as per the regulations			Max Marks: 50% of the total marks

Instructions for Paper Setters and candidates: Laboratory examination will consist of two parts: (i) Performing a practical exercise assigned by the examiner from Unit II and Unit III (50% of the total marks) (ii) Viva Voce Examination (50 % of the total marks) Viva Voce Examination will be related to the practical performed, seminar assignment done by the candidate related to the paper and lab skills (Unit I) learnt during the course of the semester.

Course of Study

1. Identification of Landforms formed by fluvial and Glacial agencies.
    - Determination of Drainage parameters, Slope analysis.
    - Identification of Features formed by mechanical and chemical weathering.
    - Field study of some important river valley systems.

BSCGEOL0102(P)Major Core Lab. II : pertaining to major course II

Course Code	BSCGEOL0102		
Credits=1	L=0 , T=0 , P=1		
Name of the course	Environmental Geology		
Type of the course	(Major Core Lab Course I/ Minor Elective Lab Course 1(b))		
Number of hrs required for this course	30hrs.		
Total Max Marks	50		
Semester Term End Examination	50 % of total marks		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on performance in the laboratory, lab record, lab seminar and Attendance. Marks Attendance: 5% marks to be given as per the regulations			Max Marks: 50% of the total marks

Instructions for Paper Setters and candidates: Laboratory examination will consist of two parts: (i) Performing a practical exercise assigned by the examiner from Unit II and Unit III (50% of the total marks) (ii) Viva Voce Examination (50 % of the total marks) Viva Voce Examination will be related to the practical performed, seminar assignment done by the candidate related to the paper and lab skills (Unit I) learnt during the course of the semester.

Course of Study

1. Identification and classification of Landslides
2. Generation of seismic maps and Iso-seismal maps and their interpretation.
3. Generation of land degradation maps with special emphasis on hilly terrain using satellite imageries.
4. Measurement of Water pollution levels using water quality kit.
5. Field study of Geo- environmentally sensitive zone.

2nd semester: Major Core Course III.

Course Code	BSCGEOL0203		
Credits=3	L=2 , T=1 , P=0		
Name of the course	Geomorphology		
Type of the course	Major Core Course III and Minor Elective Course 2(a)		
Number of hrs required for this course	45 hrs.		
Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course
2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Course of Study

Unit I (12 hrs.) : Geomorphological study including detailed study of geological processes involved in the building of land forms

Unit II(12 hrs.) : Concept of land form evolution and agents responsible for their evolution

- Soils, their development and types.

Unit III(11 hrs.) : Classification of movements.

- Drainage pattern: Its development, analysis of stream activity and its relation to the structures.
- Processes and features of karst geomorphic cycle with reference to Himachal Pradesh lime stone deposits.

Unit IV(10 hrs.) : Glaciology: Land form of alpine glaciations, continental glaciations with reference to erosion and deposition study of Indian glaciers.

Books Suggested:

1.Principals of Geomorphology by Thornbury

2. Text book of geomorphology by woreester.

3. The Earth by Doun

4. Principles of Geomorphology by Easter Brook

5. Study of land form by R.J Small

Major Core Course IV

Course Code	BSCGEOL0204		
Credits=3	L=2 , T=1 , P=0		
Name of the course	Mineralogy		
Type of the course	Major Core Course IV		
Number of hrs required for this course	45 hrs.		
Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course
2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Course of Study

Unit I (12 hrs.) : Definition and scope of Mineralogy

- Physical character of minerals depending upon specifiy gravity,light and, heat, electricity magnetism and odour.
- Classification of minerals.
- Isomorphism, polymorphism, Pseudomorphism.

Unit II(12hrs.) : Study of Physical and chemical properties, classification, alteration, occurenences and uses of the following groups of minerals and their species.

- Silica family
- Felspar family,
- Felspathoids
-
-

Unit III(11 hrs.) : Study of Physical and chemical properties, classification, alteration, occurenences and uses of the following groups of minerals and their species.

- Olivine
- Pyroxene
- Amphibole
  Mica
-

Unit IV(10 hrs.) : General Principles of optics.

- Elements of optics .
- Isotropism and Anisotropism.
- General idea about refractive index.double refraction,extinction,pleocroism and interference colours.

-Study of optical Properties of the minerals given in the unit II and III of the course

Books Suggested:

1. Routleys Elements of Minerology by H.H. Read
2. Text book of Mineralogy by E.S Dana.
3. Mineralogy by Berry and Mason.
4. Textbook of Mineralogy by A.N Winchell.
5. Optical Mineralogy by P.F Kerr

BSCGEOL0203 (P) Major Core Lab. III : pertaining to major course III

Course Code	BSCGEOL0203		
Credits=1	L=0 , T=0 , P=1		
Name of the course	Geomorphology		
Type of the course	(Major Core Lab Course I/ Minor Elective Lab Course 1(b))		
Number of hrs required for this course	30hrs.		
Total Max Marks	50		
Semester Term End Examination	50 % of total marks		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on performance in the laboratory, lab record, lab seminar and Attendance. Marks Attendance: 5% marks to be given as per the regulations			Max Marks: 50% of the total marks

Instructions for Paper Setters and candidates: Laboratory examination will consist of two parts: (i) Performing a practical exercise assigned by the examiner from Unit II and Unit III (50% of the total marks) (ii) Viva Voce Examination (50 % of the total marks) Viva Voce Examination will be related to the practical performed, seminar assignment done by the candidate related to the paper and lab skills (Unit I) learnt during the course of the semester.

Course of Study

1. Formation of various Landforms Contour Maps
2. Identifiactions of various physical features on toposheets
3. Calculations of area on Toposheets
4. Prepration of Profile from Structural Maps
5. Study of some important landforms in the field.

BSCGEOL0204 (P) Major Core Lab. IV: pertaining to major course IV

Course Code	BSCGEOL0204		
Credits=1	L=0 , T=0 , P=1		
Name of the course	Mineralogy		
Type of the course	Major Core Lab Course		
Number of hrs required for this course	30hrs.		
Total Max Marks	50		
Semester Term End Examination	50 % of total marks		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on performance in the laboratory, lab record, lab seminar and Attendance. Marks Attendance: 5% marks to be given as per the regulations			Max Marks: 50% of the total marks

Instructions for Paper Setters and candidates: Laboratory examination will consist of two parts: (i) Performing a practical exercise assigned by the examiner from Unit II and Unit III (50% of the total marks) (ii) Viva Voce Examination (50 % of the total marks) Viva Voce Examination will be related to the practical performed, seminar assignment done by the candidate related to the paper and lab skills (Unit I) learnt during the course of the semester.

Course of Study

1. Study of physical properties and determination of hardness and specific gravity and optical phenomenon of minerals in hardspecimen
2. Megascopic study and spot identification of minerals and their diagonestic character
   Microscopic study and identification of the following
   Minerals:
   Quartz.orthoclase,Microline,
   Plagioclase,olivine,Augite,hypersthenen,hornblende,actinolite,biotite,Moscuvite,calcite,tourmaline,Zreon,carnet,Chlorite,Sphene

3rd semester: Major Core Course V.

Course Code	BSCGEOL0305		
Credits=3	L=2 , T=1 , P=0		
Name of the course	Structural Geology		
Type of the course	Major Core Course V and Minor Elective Course 3(a)		
Number of hrs required for this course	45 hrs.		
Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.
2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Course of Study

BSCGEOL0105 Structural Geology

Unit-I (12 hrs.) : Elementary concept of structural geology

- Mechnical principles of deformation.

- Definition of force,stress and strain, Mechanics of plastic deformation.
- Elementary idea of dip, strike, thickness and width of out corp. Idea of width out crop and thickness of rocks.

Unit- II (12 hrs.) : Terminology and description of folds, its type and classification. Effects of folds on the out crops and their recognition criteria for determination of top and bottom of the beds. Plunge and rake of the folds, drag fold and elementary idea about uses of the folds.

- Joint sets system and classification and distinction from faults.

Unit- III (11 hrs.) Faults,its terminology,types and classification of faults .Effects of faults on the out crop and topography.

- Reverse faults and thrusts, norml faults.Definition of window,klippe and nappe.Horst and graben.

Unit-IV (10 hrs.) : Unconformity, its types their recognition.

- Distinction between unconformity and faults.
- Inlier- outlier and their significances.
- Clinometers compass- brunton compass and measurements of dip and strike
- Elementary idea of topographic features.

Books Suggested:

1. Structural geology by M.P Willings.
2. Principles of structural geology by G.M Nevin .
3. Structural Geology by Desitter.
4. Structural problems by Badgley.
5. Structural Geology by Davis.

Major Core Course VI

Course Code	BSCGEOL0306
Credits=3	L=2 , T=1 , P=0
Name of the course	Stratigraphy
Type of the course	Major Core Course VI
Number of hrs required for this course	45 hrs.

Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.
2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Course of Study

BSCGEOL0106 Stratigraphy

Unit-I(12 hrs.) : Introduction to stratigrafic nomenclature.

Brief account of Archiozoic rocks.

- Dharwar Super Group of Karnataka.
- Stratigraphy of the Cuddapah super Group and vindhiyan Super Group in their type area.

Unti –II(12hrs.) : Distribution of Palaeozoic rocks in India.

- Palaeozoic of Kashmir -

Gondwana Super Group (lower Gondwana sequence,upper Gondwana).

- Sequence and classification and their marker fossils). Umaria marine beds.

Unit-III(11 hrs.) : Distribution of Mesozoic rocks in India.

- Triassic of spiti
- Jurassic of kutch.
- Cretaceous rocks of Trichinopoly and Pondicherry.
- Bagh beds and lameta formation.

Unit-IV(10 hrs.) : Deccan traps-intertrappean.

- Shiwaliks Super group,classification and significant vertebrate faunas.
- Subathu,Dharamshala,Dagshai and Kasauli Groups.
- Karewa beds of Kashmir.

Books Suggested:

1. Geology of India and Burma by M.S Krishnan
2. Geology Of India by D.N Wadia
3. Historical Geology and Stratigraphy by Ravindra Kumar
4. Stratigraphy by D.T Donovan
5. Stratigraphic principles and practice by A. waller

BSCGEOL0305 (P) Major Core Lab: pertaining to major course V

Course Code	BSCGEOL0305		
Credits=1	L=0 , T=0 , P=1		
Name of the course	Structural Geology		
Type of the course	(Major Core Lab Course I/ Minor Elective Lab Course 3(a))		
Number of hrs required for this course	30hrs.		
Total Max Marks	50		
Semester Term End Examination	50 % of total marks		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on performance in the laboratory, lab record, lab seminar and Attendance. Marks Attendance: 5% marks to be given as per the regulations			Max Marks: 50% of the total marks

Instructions for Paper Setters and candidates: Laboratory examination will consist of two parts: (i) Performing a practical exercise assigned by the examiner from Unit II and Unit III (50% of the total marks) (ii) Viva Voce Examination (50 % of the total marks) Viva Voce Examination will be related to the practical performed, seminar assignment done by the candidate related to the paper and lab skills (Unit I) learnt during the course of the semester.

Course of Study

1. Reading to paper to geographical maps of survey of India in different scales.
2. Locating own position on Map.
3. Measuring dip, strike, discetion, bearing and back bearing with clinometers compass and Burnton compass
   - Completion of outcrops on contoured maps
   - Study and interpretation of simple geological maps
   - Prepration of geologiacla cross section of simple geological maps
   - Prepration of geological section of Simple maps
   - Simple problems on width of outcrops and thickness of state.
   - Determination of true dip and direction from two apparent dips and apparent dip direction from true dip direction.
   - Measurement of dip and strike in the field

BSCGEOL0306 (P) Major Core Lab. VI: pertaining to major course VI

Course Code	BSCGEOL0306		
Credits=1	L=0 , T=0 , P=1		
Name of the course	Stratigraphy		
Type of the course	Major Core Lab Course		
Number of hrs required for this course	30hrs.		
Total Max Marks	50		
Semester Term End Examination	50 % of total marks		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on performance in the laboratory, lab record, lab seminar and Attendance. Marks Attendance: 5% marks to be given as per the regulations			Max Marks: 50% of the total marks

Instructions for Paper Setters and candidates: Laboratory examination will consist of two parts: (i) Performing a practical exercise assigned by the examiner from Unit II and Unit III (50% of the total marks) (ii) Viva Voce Examination (50 % of the total marks) Viva Voce Examination will be related to the practical performed, seminar assignment done by the candidate related to the paper and lab skills (Unit I) learnt during the course of the semester.

Course of study

1. Recognition of stratigraphic rocks their mineral contents ,textures, structures and rock type area.
2. Preparation of stratigraphic columns according to ascending order of rocks of Precambrian.
3. Preparation of stratigraphic columns according to ascending order of rocks of Paleozoic.
4. Preparation of stratigraphic columns according to ascending order of rocks of Mesozoic.
5. Preparation of stratigraphic columns according to ascending order of rocks of Tertiary .
6. Preparation of stratigraphic columns according to ascending order of rocks of Extra peninsular India.
7. Study of some type areas in the field.

4th semester: Major Core Course VII

Course Code	BSCGEOL0407		
Credits=3	L=2 , T=1 , P=0		
Name of the course	Igneous Petrology:		
Type of the course	Major Core Course VII and Minor Elective Course 4(a)		
Number of hrs required for this course	45 hrs.		
Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.
2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Course of Study

Unit –I(12 hrs.) : Igneous rocks and their constituents.

- Nature, composition and origin of Magma.
- Forms, structure sand textures of igneous rocks- Extrusive and Intrusive rocks.
- Bases of Classification of igneous rocks .
- Tabular and Streckiensen classification.

Unit-II(12 hrs.) : Crystallization of Unicomponent system.

- Binary System.
- Crystallization of Quartz- Albite and Albite-Anorthite system.
- Bowen's reaction series.

Unit-III(10 hrs.) :

Megascopic and microscopic description and elementary idea of petrogensis of the following rocks.

- Granite, Rhyolite, Charnockite,Syenite and Nepheline Syenite ,Gabbro,Peridotie, Basalt and Dolerite.

Unit IV(11 hrs.) :

Elementary idea of magmatic differentiation and assimilation.

Magma Types and Magma Series.

Primary magma partial and derivative magmas.

Books Suggested:

1. Principles of Petrology by G.W Tyrrell
2. Petrology of Igneous and Metamorphic rocks by D.W. Hyindman.
3. Igneous and Metamorphic petrology by turner and Verhoogan.
4. Textbook of petrology by Hatch ,Wells
5. Petrology of Igneous and Metamorphic rocks of India by S.C chatterjee.

Major Core Course VIII

Course Code	BSCGEOL0408		
Credits=3	L=2 , T=1 , P=0		
Name of the course	Sedimentary Petrology		
Type of the course	Major Core Course VIII		
Number of hrs required for this course	45 hrs.		
Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.

2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Course of Study

BSCGEOL0108 Sedimentary Petrology

Unit I(12 hrs.) : Sedimentary cycles and processes of sedimentation.

- Lateral variations in rocks
- Facies concept in sedimentary Petrology.
- Transportation and deposition of sediments in marine basin

Unit II(12 hrs.) : Diagensis and Lithification.

- Composition of sedimentary rocks.
- Textures and structures of sedimentary rocks and their formations.
- Classification of sedimentary rocks.

Unit III(10 hrs.) : Environments of deposition. Classification of environments and their characteristics

- Sedimentary basins, troughs and rifts, plate tectonics and sedimentations .

Unit IV(11 hrs.) : Definition importance and fundamental classification of sedimentary rocks.

- Megascopic and microscopic study of the following rocks types; Conglomerate, Bracia,Arkose,Sandstone,Grewacke,Shale,Limestone,Marl,Dolomite,peat and Lignite.

Books Suggested:

1. Principles of Petrology by G.W Tyrrell
2. Sedimentary Rocks by F.J Pettijohn
3. Stratigraphy and Sedimentaion by Krunbein and Sloss.
4. Introduction of Sediment logy by R.C Shelley .
5. Manual of sedimentary Petrography by Krunbein and Pettijon.

Major Core Course IX

Course Code	BSCGEOL0409		
Credits=3	L=2 , T=1 , P=0		
Name of the course	Metamorphic Petrology		
Type of the course	Major Core Course IX		
Number of hrs required for this course	45 hrs.		
Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.
2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Course of Study

BSCGEOLOGY0109 Metamorphic Petrology:

Unit I(12 hrs.) : Metamorphism, definition and Processes.

- Textures and structures of metamorphic rocks.
- Agents and types of Metamorphism.
- Classification and nomenclature.
- Elementary idea of depth zones in metamorphism.

Unit II(12 hrs.) : Introduction to Metasomatism , Metamorphic facies,types and products.

- Petrographic study of the following types of Metaphorpic rocks and their identification.
- Slate, Phyllite , Schist, Gneiss,Quartzite & Marble.

Unit III(10 hrs.) : Dynamic metamorphism and its products

- Dynamothermal and contact metamorphism.

- Contact metamorphism of pelite and carbonate rocks

Unit IV(11 hrs.) : Concept of facies.

- Regional metamorphism of politic and carbonate rocks.
- Microscopic Study of the following Metamorphic rocks and their identification.
- Slate, Phyllite , Schist, Gneiss,Quartzite & Marble.
-

BSCGEOL0407 (P) Major Core Lab. VII: pertaining to major course VII

VI: pertaining to major course VI

Course Code	BSCGEOL0407
Credits=1	L=0 , T=0 , P=1

Name of the course	Igneous Petrology		
Type of the course	(Major Core Lab Course I/ Minor Elective Lab Course 4(b))		
Number of hrs required for this course	30hrs.		
Total Max Marks	50		
Semester Term End Examination	50 % of total marks		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on performance in the laboratory, lab record, lab seminar and Attendance. Marks Attendance: 5% marks to be given as per the regulations			Max Marks: 50% of the total marks

Instructions for Paper Setters and candidates: Laboratory examination will consist of two parts: (i) Performing a practical exercise assigned by the examiner from Unit II and Unit III (50% of the total marks) (ii) Viva Voce Examination (50 % of the total marks) Viva Voce Examination will be related to the practical performed, seminar assignment done by the candidate related to the paper and lab skills (Unit I) learnt during the course of the semester.

Course of study

1. Megascopic study and description of following rocks and their classification and identification.
   - Granite
   - Pegmatite
   - Charnockite
   - Seynite and nephelene syneite
   - Gabbro
   - Dolerite
   - Basalt
   - Phonalite
   - Dacite
   - Microgranite
2. Microscopic study, description, Classification and identification of following rocks.
   - Granite
   - Charnockite
   - Seynite

- Nephelene syneite
- Basalt
- Dolerite

3. Study of Igneous rocks in field.

BSCGEOL0408 (P) Major Core Lab. VIII: pertaining to major course VIII

Course Code	BSCGEOL0408		
Credits=1	L=0 , T=0 , P=1		
Name of the course	Sedimentary Petrology		
Type of the course	Major Core Lab Course		
Number of hrs required for this course	30hrs.		
Total Max Marks	50		
Semester Term End Examination	50 % of total marks		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on performance in the laboratory, lab record, lab seminar and Attendance. Marks Attendance: 5% marks to be given as per the regulations			Max Marks: 50% of the total marks

Instructions for Paper Setters and candidates: Laboratory examination will consist of two parts: (i) Performing a practical exercise assigned by the examiner from Unit II and Unit III (50% of the total marks) (ii) Viva Voce Examination (50 % of the total marks) Viva Voce Examination will be related to the practical performed, seminar assignment done by the candidate related to the paper and lab skills (Unit I) learnt during the course of the semester.

Course of study

1. Megascopic and Microscopic study of the following clastic sediments:
   - Conglomerate
   - Brccia
   - Arkose
   - Sandstone
   - Greywackes
2. Textue and structure of Clastic rock.
3. Megascopic and Microscopic study of following Non Clastic sediments
   - Limestone

- Dolomite
- Lignite
- Peat

-Marl

4. Study of sedimentary rocks in the field

BSCGEOL0109 (P) Major Core Lab. IX: pertaining to major course IX

Course Code	BSCGEOL0409		
Credits=1	L=0 , T=0 , P=1		
Name of the course	Metamorphic Petrology		
Type of the course	Major Core Lab Course		
Number of hrs required for this course	30hrs.		
Total Max Marks	50		
Semester Term End Examination	50 % of total marks		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on performance in the laboratory, lab record, lab seminar and Attendance. Marks Attendance: 5% marks to be given as per the regulations			Max Marks: 50% of the total marks

Instructions for Paper Setters and candidates: Laboratory examination will consist of two parts: (i) Performing a practical exercise assigned by the examiner from Unit II and Unit III (50% of the total marks) (ii) Viva Voce Examination (50 % of the total marks) Viva Voce Examination will be related to the practical performed, seminar assignment done by the candidate related to the paper and lab skills (Unit I) learnt during the course of the semester.

Course Study:

4. Megascopic study and description of following rocks and their classification and identification.
   - Phyllite
   - Slate
   - Schist
   - Gniess

- Marble
- Quartzite
- Granulite
- Amphibolite
- Pyroxinite
- Charnockite

5. Microscopic study, description, Classification and identification of following rocks.

- Phyllite
- Slate
- Schist
- Gniess
- Marble
- Quartzite
- Granulite
- Amphibolite
- Pyroxinite
- Charnockite

Study of Metamorphic rocks in the Field

Books Suggested:

1. Principles of Petrology by G.W Tyrrell
2. Metamorphic Petrology by A. Harker.
3. Metamorphic Petrology by F.J Turner.
4. Petrogenesis of Metamorphic Rocks by H.G.F. Winkler.
5. Petrography by William et.al.

5th semester: Major Core Course X

Course Code	BSCGEOL0510		
Credits=3	L=2 , T=1 , P=0		
Name of the course	Invertebrate Paleontology		
Type of the course	Major Core Course X and Minor Elective Course 5(a)		
Number of hrs required for this course	45 hrs.		
Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.
2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Course of Study

BSCGEOL00510 Invertebrate

Unit I(12 hrs.) : Broad Classification of organism.

- Introduction, definition and importance of Paleontology and its branches.
- Geological time Scale.
- Fossil, its definition requisites and preservation.
- Applied aspects and uses of fossils in various fields of the earth sciences.

Unit II (12 hrs.) : Study, classification, morophology , distribution and Geological history of the classes.

- Phyllum Mollusca: Pelecypoda,Gastropoda and Cephalopoda.

Unit III(10hrs.) : Phyllum Brachiopoda,Arthropoda(class trilobite) its Morphology classification and Geological History

Unit IV(11 hrs.) : Phyllum Echinodermata,Phyllum Protochodata (Graptoloidea) their morphology Geological history and distribution.

Books Suggested:

1. Invertebrate paleontology by Woods.
2. Principles of Invertebrate paleontology by R.R Shrock and W.H Trinhofil.
3. Textbook of paleontology by K.A Zittel.
4. An introduction to paleontology by A. Moreley Davis and C.J Stubblefied.
5. Elements of paleontology by R.M Black

Major Core Course XI

Course Code	BSCGEOL0511		
Credits=3	L=2 , T=1 , P=0		
Name of the course	Vertebrate Paleontology and Palaeo- botany		
Type of the course	Major Core Course XI		
Number of hrs required for this course	45 hrs.		
Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.
2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Course of Study

BSCGEOL01511 Vertebrate paleontology and palaeo- botany:

Unit I(12 hrs.) : Vertebrate Paleontology: Systematic and historical back ground of vertebrate paleontology . A brief account of the vertebrate sequence through the geological times

Unit II(12 hrs.) : Introduction to reptiles and their classification, distribution , their appearance and extinction Mesozoic reptiles with special reference to India.

Unit III(10 hrs.) : Evloutionary trends of following :

- Man
- Horse
- Elephant

Unit IV(11 hrs.) : Introduction of plant kingdom- Classification

- Description, morphology of the following plant fossils.
- Glossopteris,Gangmopteris,vertebraia,Ptilophyllum,lepidodendron,Williamsonia and Schizoneura.

- Books Suggested:
  1. Vertebrate Paleontology by A.S Romer
  2. Evolution of Vertebrate by E.H Colbert.
  3. Vertebrate Paleontology by E.C Oslon.
  4. Evolution of Vertebrate by P.C Jain.
  5. Essential of Paleobotany by Shukla.
  6. Geology of India by D.N Walia

Major core course XII

Course Code	BSCGEOL0512		
Credits=3	L=2 , T=1 , P=0		
Name of the course	Himalayan Geology and Geotectonics		
Type of the course	Major Core Course XII		
Number of hrs required for this course	45 hrs.		
Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.
2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Course of Study

BSCGEOL01512 Himalayan Geology and Geotectonics

Unit I(12 hrs.) : Formation of Tethyes Geosyncline. Phases of upheaval of Himalayas.

Geological and Geographical sub-divisions of Himalayas

Stratigraphical and lithological units of Himalayas and their correlation.

-

Unit II (12 hrs.) Structures of the Himalayas

Sedimentation, Igneous activity and metamorphism in Himalayas.

Mineral wealth of Himalayas

Detailed study of important rocks type of Himalayas both in hand specimen and under microscope.

Unit III(10hrs.) Geosynclines, their evolution and classification

Plate tectonics, theories and plate movement

Sea-floor spreading theories and evidences

Unit IV(11 hrs.) Concepts of Isostacy

Horst-Grabens and Rift valleys

Neo-tectonic movements and its indicators.

BSCGEOL0510 (P) Major Core Lab. X: pertaining to major course X

Course Code 3	BSCGEOL0510		
Credits=1	L=0 , T=0 , P=1		
Name of the course	Invertebrate		
Type of the course	(Major Core Lab Course I/ Minor Elective Lab Course 5(a))		
Number of hrs required for this course	30hrs.		
Total Max Marks	50		
Semester Term End Examination	50 % of total marks		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on performance in the laboratory, lab record, lab seminar and Attendance. Marks Attendance: 5% marks to be given as per the regulations			Max Marks: 50% of the total marks

Instructions for Paper Setters and candidates: Laboratory examination will consist of two parts: (i) Performing a practical exercise assigned by the examiner from Unit II and Unit III (50% of the total marks) (ii) Viva Voce Examination (50 % of the total marks) Viva Voce Examination will be related to the practical performed, seminar assignment done by the candidate related to the paper and lab skills (Unit I) learnt during the course of the semester.

Course of Study

1. Description and identification of flowing:
   - Moluscia
   - Brachiopoda
   - Echinodermata
   - Graptolite
   - Trilobite
2. Study of Invertebrate fossils in the filed.

BSCGEOL0511 (P) Major Core Lab. XI: pertaining to major course XI

Course Code 3	BSCGEOL0511		
Credits=1	L=0 , T=0 , P=1		
Name of the course	Vertebrate Paleontology & Paleo botany		
Type of the course	(Major Core Lab Course I/ Minor Elective Lab Course 1(b))		
Number of hrs required for this course	30hrs.		
Total Max Marks	50		
Semester Term End Examination	50 % of total marks		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on performance in the laboratory, lab record, lab seminar and Attendance. Marks Attendance: 5% marks to be given as per the regulations			Max Marks: 50% of the total marks

Instructions for Paper Setters and candidates: Laboratory examination will consist of two parts: (i) Performing a practical exercise assigned by the examiner from Unit II and Unit III (50% of the total marks) (ii) Viva Voce Examination (50 % of the total marks) Viva Voce Examination will be related to the practical performed, seminar assignment done by the candidate related to the paper and lab skills (Unit I) learnt during the course of the semester.

Course of Study

1. Study of the models/ fossils of the reptiles of different ages.
2. Study of the Models/Fossils of the man, horse and elephant.
3. Megascopic study of the following plant
   - Glossopteris
   - Gangmopteris
   - Vertebraia
   - Ptilophyllum
   - Lepidodendron

- Williamsonia
- Schizoneura

4. Study of some important vertebrate fossils of Shivaliks.

Books Suggested:

1. Dynamic Himalayas by K.S Valdiya .
2. Himalayas (Geological Aspects) by P.S Saklani .
3. Geology of Himalayas by Ganssar.
4. Tectonic aspects of Himalayas by K.S Valdia.
5. Understanding of the Earth by Gunter Gass .
6. Dynamics of earth by Spincer

BSCGEOL0512 (P) Major Core Lab. XII: pertaining to major course XII

Course Code 3	BSCGEOL0512		
Credits=1	L=0 , T=0 , P=1		
Name of the course	Himalayan Geology and Geotectonics		
Type of the course	(Major Core Lab Course I/ Minor Elective Lab Course 1(b))		
Number of hrs required for this course	30hrs.		
Total Max Marks	50		
Semester Term End Examination	50 % of total marks		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on performance in the laboratory, lab record, lab seminar and Attendance. Marks Attendance: 5% marks to be given as per the regulations			Max Marks: 50% of the total marks

Instructions for Paper Setters and candidates: Laboratory examination will consist of two parts: (i) Performing a practical exercise assigned by the examiner from Unit II and Unit III (50% of the total marks) (ii) Viva Voce Examination (50 % of the total marks) Viva Voce Examination will be related to the practical performed, seminar assignment done by the candidate related to the paper and lab skills (Unit I) learnt during the course of the semester.

Course of Study

1. Identification of important rocks belonging to lower Himalayas , Middle Himalayas and higher Himalayas .
2. Use of fossils in assigning relative ages to the important rocks system of Himalayas .
3. Mapping of important tectonic units of Himalayas .
4. Use of Remote Sensing in the mapping of various recourses of Himalayas.
5. Field study of some important geological section of Himalayas .

Semister VI

Course Code	BSCGEOL0613		
Credits=3	L=2 , T=1 , P=0		
Name of the course	Economic geology:		
Type of the course	Major Core Course XIII		
Number of hrs required for this course	45 hrs.		
Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.
2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Course of Study

Major core course XIII

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.
2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Course of Study

Economic geology:

UNIT I(12 hrs.) : Economic Geology its definition, scope and terminology.

Syngenetic - Epigenetic minerals deposits

Classification of mineral deposits

Unit II(12 hrs.) : Fundamentals of Ore genesis.

- Control of ore mineralization
- Magmatic and hydrothermal processes
-

Unit III(10hrs.) : Oxidation and Supergene enrichment.

- Mechanical and residual concentration.

Unit IV(11 hrs.) : Physical properties, chemical composition, mode of occurrence, Geographical and Geological distribution and use of the following Ore deposits of INDIA.

- Iron, Manganese and Copper.
- Lead, Zinc and Aluminum.
- Mica
- Magnesite
- Gypsum

Book Suggested :

1. Economic Mineral Deposits by A.M Batman.
2. Principles of Economic Geology by Emmons.
3. Mineral deposits by W. Lindgren.
4. Economic minerals of India by P.C Pandey.
5. Ore Deposits by C.S Park and Mac Diarmid.

Major core course XIV

Course Code	BSCGEOL0614		
Credits=3	L=2 , T=1 , P=0		
Name of the course	Applied Geology		
Type of the course	Major Core Course XIV		
Number of hrs required for this course	45 hrs.		
Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Applied Geology

Unit 1(12hrs.)

Elements of magnatic, electo-magnatic, radiometric and seismic methods of mineral exploration.

Principal methods of geological prospecting.

Unit II(12hrs.)

Introduction of mining methods

Open cast and underground mining.

Unit III(10hrs.)

Remote sensing techiniques and other visiual imageriers. Basic idea about remote sensing, satellite imageriers, spectral bands.
Brief idea about the application of remote sensing in ground water exploration and glaciology.

Unit IV(11hrs.)

Enginering properties of rocks and other structural materials.

Geological considerations telating to the design of Dams, Tunnels, Bridges, canals and Highways.

Book Suggested :

1. Course in mining geology by R.M, P Arogayaswami.
2. Elements of Mining technology by G.d Deshmukh .
3. Geology of engineers by Prabin Singh.
4. Handbook of Prospecting by R.M Perarl .
5. Remote Sensing Techniques by George Joseph.
6. Applied Geology by Nealson and Nealson

BSCGEOL01613 (P) Major Core Lab. XIII: pertaining to major course XIII

Course Code	BSCGEOL613		
Credits=1	L=0 , T=0 , P=1		
Name of the course	Geology Lab 1 (Economic geology)		
Type of the course	(Major Core Lab Course I/ Minor Elective Lab Course 1(b))		
Number of hrs required for this course	30hrs.		
Total Max Marks	50		
Semester Term End Examination	50 % of total marks		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on performance in the laboratory, lab record, lab seminar and Attendance. Marks Attendance: 5% marks to be given as per the regulations			Max Marks: 50% of the total marks

Instructions for Paper Setters and candidates: Laboratory examination will consist of two parts: (i) Performing a practical exercise assigned by the examiner from Unit II and Unit III (50% of the total marks) (ii) Viva Voce Examination (50 % of the total marks) Viva Voce Examination will be related to the practical performed, seminar assignment done by the candidate related to the paper and lab skills (Unit I) learnt during the course of the semester.

Course of Study

1. Megascopic study of physical chemical properties and identification of following ore minerals:-
   - Iron: Magnetic, hematite,Pyrite, Ilmenite.
   - Manganese: Pyrolucite, Psilomaline, Rhodonite,rhodocrosite.
   - Copper: Cuperite, Chalcopyrite,Chalcocite,Malachite.
   - Lead Zinc and Tin: Zincite,Spharlrite,Cassitirite,Galena,Cerussite
   - Aluminium:Crundum,Bauxite,Spinel.

Other Minerals:
Halite,Kainite,Calcite,Anhydrite,Gypsum,Apatite,Fluorite,Barytes,Beryl,Magnesite,Cinnabar,Graphite, Lignite,Ahthracite,Chromite,Lepidolite,Muscovite,Biotite,Talc,Stibnite,Realgar,Orpiment,Tapaz,Nativ ecopper,Molebdenite,Azurite,Graphite,Siderite.

BSCGEOL01614 (P) Major Core Lab. XIV: pertaining to major course XIV

Course Code	BSCGEOL614		
Credits=1	L=0 , T=0 , P=1		
Name of the course	Geology Lab 1 (Applied geology)		
Type of the course	(Major Core Lab Course I/ Minor Elective Lab Course 1(b))		
Number of hrs required for this course	30hrs.		
Total Max Marks	50		
Semester Term End Examination	50 % of total marks		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on performance in the laboratory, lab record, lab seminar and Attendance. Marks Attendance: 5% marks to be given as per the regulations			Max Marks: 50% of the total marks

Instructions for Paper Setters and candidates: Laboratory examination will consist of two parts: (i) Performing a practical exercise assigned by the examiner from Unit II and Unit III (50% of the total marks) (ii) Viva Voce Examination (50 % of the total marks) Viva Voce Examination will be related to the practical performed, seminar assignment done by the candidate related to the paper and lab skills (Unit I) learnt during the course of the semester

Course of Study

1. Familiarization about instruments used in Geological prospecting.
2. Study of models related to open-cast and underground mining .
3. Megascopic study of rocks used for construction purposes .
4. Interpretaion of satellite imageries for lithology, soil, surface water and Glaciers.
5. Geological field study of an area undergoing opencast/ underground mining.

*Additional Elective Courses offered by Geology department (can be chosen for earning credits over and above 56 Major subject credits, 40 Minor elective credits,18 compulsory course and 3 GI&H Course credits)

Semester VI

Course Code	BSCGEOL0615		
Credits=4	L=3 , T=1 , P=0		
Name of the course	Hydro Geology		
Type of the course	Additional Elective Course		
Number of hrs required for this course	60 hrs.		
Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.
2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Unit I : Hydrological Cycles- Distribution of water on earth crust

- Types of Ground Water, meteoric water, juvenile and magmatic waters. Characters of Zones of aeration, saturation and Water table

Unit II: classification of aquifer

- Unconfined, confined, leaky and bounded aquifers.
- Run off, Rainfall , evaporation and Transpiration .
- Hydro geological properties of rock and soil , permeability and porosity their relations to ground water motions . Its determination in lab and field
- Transmissbility ,storativity specific yield ,specific retention and diffusivity

Unit III: Surface investigations :

- Geophysical exploration, electric resistivity, seismic, gravity and magnetic methods
- Sub-surface investigations of ground water : electrical ,traditional and allied logging methods , test drilling
- Fluctuations of water level and its causes
- Quality of ground water – chemical analysis

Unti IV: Principles governing ground water movement

- Darcy ! law , its application range , validity , Reynold's number and its application
- Well hydraulics and water wells, methods of constructing shallow and deep wells.
- Various recharging methods with Indian examples.
- Spring wells, origins , classification, distribution and important hot water springs in India.

Book Suggested:

1. Hydrogeology by Davis and Wiest.
2. Applied Hydrogeology by C.W Felter.
3. Ground Water Hydrogeology by D.K Todd.
4. Ground Water by N.M Raghunath.
5. Ground Water Survey and investigation by Gautam Mahajan .

Semester VI Course Name

Semester VI

Course Code	BSCGEOL0616		
Credits=4	L=3 , T=1 , P=0		
Oceanography :	Oceanography :		
Type of the course	Additional Elective Course		
Number of hrs required for this course	60 hrs.		
Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.
2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Unit I : Introduction and historical aspects

- Methods of exploration of ocean floor
- Geological and Geophical methods and various techniques of sampling

- Sample collection
- Under water decding
- Underwater photography

Unit II: Geomorphology of the sea floor

- Continental Shelf
- Continental Slope
- Submarine canyons
- Ridges
- Plateau
- Fracture Zones
- Deep Sea Channels

Unit III: Estatic changes in sea level, causes and methods of Study

- Turbidity Currents
- Recent Idea of Sea floor Spreading
- Origin of Indian Ocean and cost line
- Coral reefs their origin and classification

Unit IV: Marine Sedimentation shore Lines

- Beach material and factors controlling the beach Characters
- Beach Stability, coastal erosion and wave study
- Marine Sediments, their Classification and their properties
- Formation manganese Nodules
- Biological Factors in forming the marine Sediments and deposits
- Indian in relation to mineral recourses of the sea

Book Suggested:

1. Oceanography by D.S Lal.
2. Essentials of Oceanography by Trujillo.
3. Oceanography: An Invitation to Marine Science by Tom Garrison.
4. Marine Geology by P.H Kuenen.

Semester VI Course Name

Course Code	BSCGEOLOGY0617		
Credits=4	L=3 , T=1 , P=0		
Name of the course	Geology of Himalayas		
Type of the course	Additional Elective Course		
Number of hrs required for this course	60 hrs.		
Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.
2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Unit I: Physiographyic and Geological Subdivisions of Himalayas. Birth and Evolution of Himalayas. Phases of upheaval of Himalayas. Drainage basins and characteristics.

Unit II Earthquake activity in the Himalayas.Structures of the Himalayas Sedimentation, Igneous activity and Metamorphism in Himalayas.

Unit III Collision and welding of India and Asia. Formation of landbridge and faunal migration. Development of lesser Himalayan domain and Main Boundary Thrust. Important rock types and fossils of Himalayas.

Unit IV Structural Evolution of Siwalik terraine. Pleistocene Glaciation. Neotectonics- Reactivation of faults. Uplift and Landforms Changes. Mineral wealth of Himalayas.

Detailed study of important rocks type of Himalayas both in hand specimen and under microscope.

Books Suggested:

1. Dynamic Himalayas by K.S Valdiya .
2. Himalayas (Geological Aspects) by P.S Saklani .
3. Geology of Himalayas by Ganssar.
4. Tectonic aspects of Himalayas by K.S Valdia.
5. Understanding of the Earth by Gunter Gass .
6. Dynamics of earth by Spincer

Course Code	BSCGEOL0618		
Credits=4	L=3 , T=1 , P=0		
Name of the course	Geophysical Prospecting		
Type of the course	Additional Elective Course		
Number of hrs required for this course	60 hrs.		
Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.
2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Unit I

Relationship between Exploration Geophysics and Basic Sciences. Methods of Geophysical Prospecting. Seismic wave propagation. Earths Internal and crustal structure as deduced from earthquake evidence.

Unit II

Seismic refraction method. Plotting and mapping of Reflection Data. Interpretation and Geologic coordination of reflection data. Correlation of Seismic data with surface and sub surface geology.

Unit III

Fundemental principals of the Gravity prospecting. Earths gravity and the concept of Isostacy. Instruments for measuring Gravity. Gravity field measurements and reductions. Interpretation of gravity data.

Unit IV

Fundemental Principal and Instruments of Magnetic Prospecting. Magnetism of the earth. Magnetic measurement on land and prospection with airborne data. Electrical Prospecting methods. Prospecting for radioactive minerals.

Book Suggested:

1. Handbook of Prospecting by R.M Perarl .
2. Remote Sensing Techniques by George Joseph.
3. Applied Geology by Nealson and Nealson
4. Geological prospecting and exploration by A. Guravich.
5. Introduction of Geophysical Prospecting by N.V Dobrin

Course Code	BSCGEOL0619		
Credits=4	L=3 , T=1 , P=0		
Name of the course	Mining Geology		
Type of the course	Additional Elective Course		
Number of hrs required for this course	60 hrs.		
Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.

2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Unit I

Mine, definition and terminology . Mining method, open cast mining and quarrying. Underground mining. Principal Geological factors involved in mining and associated problems and remedial methods.

Reserves and resourses, definition and classification.

Unit II

Estimation of reserves and ore bodies. Geochemical Prospecting for metallic mineral deposits. Pathfinder elements. Geochemical field techniques. Geochemical Analytical Methods. Techiniques used in geobotanical surveys. Geological prospecting practices, techniques and concept.

Unit III

Geophysical method introduction. Electrical method, electromagnetic, induced polarization, gravity, seismic and radioactive method. Electric well logging.

Unit IV

Drilling its types. Pre dressing (ore beneficiation). Indian examples of geochemical and geophysical exploration with respect to copper, gold, lead-zinc mining, mica, coal and manganese mining.

Book Suggested:

1. Curse in Mining Geology R.N.P Arogayaswa.
2. Elements of mining technology by J.D Deshmukh.
3. Mining Geology by M.C Muistry.
4. Mining by B.Bocky.

Course Code	BSCGEOL0620
Credits=4	L=3 , T=1 , P=0
Name of the course	Coal and Petroleum Geology
Type of the course	Additional Elective Course
Number of hrs required for this course	60 hrs.

Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.
2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Unit I

Physical, chemical properties of natural gas and oil. Mode of occurance. Petroleum and natural gas origin, migration and entrapment. Source and reservoir rock characteristics. Reservoirs , structural and stratigrapic traps. Classification and characteristics.

Unit II

Oil and gas pools. Petroleum prospecting. Surface indication of oil and gas, their investigation. Petroliferous basins of India and petroleum recourses of the world. Study of onshore and offshore oil fields of India.

Unit III

Geological setting, origin and classification and grading of coal. Distribution and geological occurances of coal in Indai and other parts of World. Coal petrography and petrology.

Unit III

Detailed study of important coal measures of India and their mineral economics. Beneficiation of coal and carbonization. Estimation, utilization and conservation of coal reserves. Coal mining methods in India.

Book Suggested:

1. Introduction to petroleum geology by Holson and Tiratsoo.
2. Petroleum geology by Loversen.
3. Elements of petroleum geology by R.C Selley.
4. Coal and organic Geology by MP Singh.
5. Coal mining economics by Sinclair.

Course Code	BSCGEOL0621		
Credits=4	L=3 , T=1 , P=0		
Name of the course	Mineral Economics		
Type of the course	Additional Elective Course		
Number of hrs required for this course	60 hrs.		
Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.
2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Unit I

Mineral Economics and its Concepts

Peculiarities inherent in Minerals industry

Worlds Recourses of Minerals

Future Sources of Minerals Supply .

Unit II

Mining Laws in various lands

Mines and Minerals Legislation of India

Minerals Taxation and Incentive Measures

Tenor Grade and Specification.

Unit III

Marketing

Methods of Estimation of reserves

Principles and Methods of Minerals Dressing

Strategic,Critical and Essential Minerals

Unit IV

Conservation and Substitution

National Mineral policy

Growth of Minerals Industry and the Economy.

Book Suggested:

1 .Indian Mineral Wealth by Brown and Day.

2. Economic minerals of India by P.C Pandey.

3. Indian Mineral resources by Krishna Swami.

4. Minerals of India by D.N Wadia.

5. Mineral Economics by R.K Sinha

Course Code	BSCGEOL0622		
Credits=4	L=3 , T=1 , P=0		
Name of the course	Earth Processes		
Type of the course	Additional Elective Course		
Number of hrs required for this course	60 hrs.		
Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.
2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Unit I

Introduction , Time Scales, Methods of Dating, Major features of the Earth- Mountains, plains, Isostacy and internal Structure of the Earth , Weathering and Soils. Types of weathering, Rates and significance of Weathering. Soils Profiles and Factors in Soil formation

Unit II

Global tectonics- continental drift, Sea floor Spreading and plate tectonics. Cratons, Geosynclines ,Orogens ,Fractures and folds, landforms control by faults and folds, Drainage patterns. Volcanic Landforms and Intrusions.

Unit III

Mass Wasting, Slope Deposits and forms, fluvial Processes, River valleys, Karst topography and Evolution , Eolian Processes and landforms. Coastal process and landforms.

Unit IV

Snow and frozen Ground, Processes and forms of the Peri Glacial Zones, Glaciated and Glaciated landforms. Ice Ages, Landforms of cold and temperate zones. Landforms of sub-tropics and Tropics .Methods of estimating local denudation rates .

Book Suggested:

1.Principles of Physical geology by Strahler .

2.Physical Geology of Arther Holmes.

3.Physical Geology by A.K Dutta.

4.Physical Geology By P.K Mahapatra.

5.Dynamics of Earth by Spencer.

6. Earths Changing Surface by Selby.

7. Glacial and Plestocene Geology by R.F flint

***Open Elective courses Offered by Geology Department**

Course Code	BSCGEOL0623
Credits=4	L=3 , T=1 , P=0
Name of the course	Historical Geology
Type of the course	Open Elective Course
Number of hrs required for this course	60 hrs.
Total Max Marks	100

Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

1. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.
2. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Unit I

Geological concept of time, History of geological time scale. Modern Time Scale. Measurement of Geological time Scale.

Unit II

The rock Record , Rock unit, Time Stratigraphic units, Correlation. Uniformitarianism and Finding Ancient lands.

Unit III

Origin of Earth. Origin and Development the hydrosphere and atmosphere. History of Precambrian. Origin of life. Learning to recognize fossils. Theories of evolution and trend of evolution.

Unit IV

Evolution of fishes and amphibians. History of reptiles and birds. Rise of mammals and mammals Characteristics .The primates and Anthropoidia.

Book Suggested :

1. Historical Geology by C. O. Dunbar
2. Historical Geology by W.J Miller
3. Basic Concept of Historical geology by E.H Spencer.

Field Geology

Course Code	BSCGEOL0624		
Credits=4	L=3 , T=1 , P=0		
Name of the course	Field Geology		
Type of the course	Open Elective Course		
Number of hrs required for this course	60 hrs.		
Total Max Marks	100		
Semester Term End Examination	Max Marks: 50		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on Minor Tests (2), class tests, Tutorials/ Assignments, Quiz, Seminar and Attendance. Marks Attendance: 5 marks to be given as per the regulations			Max Marks: 50

Instructions:

3. For Paper Setters and candidates: Question paper will consist of five sections: Sections A(Compulsory, Covering all the units), B(Unit-I), C (Unit-II), D (Unit-III) , E (Unit IV). Nine questions will be set in all. Section A will be Compulsory, consisting of a single question with 9 subparts of objective short answer/ multiple choice type, which will cover whole of the syllabus of the course and consist of the 36% of the maximum marks of the end term examination for the course. Sections B, C, D, and E will have two questions each from respective sub units and each question will carry 16% of maximum marks of the end term examination for the course.
4. For Candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections: B,C,D and E of the end term question paper and all the subparts in section A. Use of nonprogrammble calculator is allowed.

Unit I

Field Geology define . The study of Exposures. Primary and secondary Features define. Dip,strike and attitude if the beds. Lineation and its attitude . Gradational Changes in the rock bed . Cracks and fractures in the rock bed.

Unit II

Colors of Rock. Descriptions of rock colour. Relations of colour to the surface of exposure . Scratches, grooves , ribs , Character of the rock particles. Shape ,size , granularity and roundness. Original surface features of sediments. Ripples marks ,wave marks, suncraks , Rain prints ,animal tracks .

Unit III

Local unconformity. Contemporanious erosion, deformation. Cross bedding ,delta structure, Eolian cross bedding structure ,ripple marks, Depth of water for lake and marine Sediments, Direction of current and strength of current , tectonic correlation of sediments , Flow structures ,vesicular and amygdaloidal structures .

Unit IV

Significant features of Geological maps. Contour Maps, The compass and clinometers use of the clinometers , collecting and trimming of Specimen ,taking photographs in the fields, Degree in the field work. Tracing the outcrop . Scope of geological Field work . Cycle of river Erosion . Natural brides and caves. V shaped valleys , Glaciated Valleys .

Book Suggested:

1. Field geology by F.H Lahee.
2. Field Geology by Terry Maley
3. Manual of Field Geology by Robert R. Compton

General Interest Courses Offered by Geology Department

Semester	Course Code	Course Type	Course Name	Credit(s)	Cumulated Credits Category-wise
I/II/III	BSCPHY01/02/0325	GI/H	History of Science	1*	
I/II/III	BSCPHY01/02/0326	GI/H	Science, Technology and Society	1*	

B) Structure Outline of Minor Elective in Geology for other than Major Geology Students (Minimum Credits to be Earned = 20)

Minor Elective course 1(a) Semester 1

Course Code :BSCGEOL0101

Physical & General Geology

Unit I (12 hrs.) Geology its definition, subdivisions, scope and relation with other sciences.

- Earth's relations with solar system. Earth's shape, structure and surface relief. Origin and age of the earth. Interior of the earth.

Unit II (12 hrs.) Basic idea of diastrophism.

- Mountain building, orogenic and epirogenic movements.

Unit III (11 hrs.) Weathering and Mass wasting

- Erosional, depositional features and geological works of running water, ground water and glaciers.

Unit IV (10 hrs.) Erosional, depositional features and geological works of winds, oceans and lakes.

- Books Suggested :

*As Mentioned in Major Course

BSCGEOL0101 (P) Minor Elective Lab course 1(a) Semester 1

Course Code	BSCGEOL0101		
Credits=1	L=0 , T=0 , P=1		
Name of the course	Physical & General Geology		
Type of the course	(Major Core Lab Course I/ Minor Elective Lab Course 1(b))		
Number of hrs required for this course	30hrs.		
Total Max Marks	50		
Semester Term End Examination	50 % of total marks		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on performance in the laboratory, lab record, lab seminar and Attendance. Marks Attendance: 5% marks to be given as per the regulations			Max Marks: 50% of the total marks

Instructions for Paper Setters and candidates: Laboratory examination will consist of two parts: (i) Performing a practical exercise assigned by the examiner from Unit II and Unit III (50% of the total marks) (ii) Viva Voce Examination (50 % of the total marks) Viva Voce Examination will be related to the practical performed, seminar assignment done by the candidate related to the paper and lab skills (Unit I) learnt during the course of the semester.

Course of Study

1. Identification of Landforms formed by fluvial and Glacial agencies.
   - Determination of Drainage parameters, Slope analysis.
   - Identification of Features formed by mechanical and chemical weathering .
- Field study of some important river valley systems.

Minor Elective course 2(a) Semester 2

BSCGEOL0203 Geomorphology

Unit I (12 hrs.) : Geomorphological study including detailed study of geological processes involved in the building of land forms

Unit II(12 hrs.) : Concept of land form evolution and agents responsible for their evolution

- Soils, their development and types.

Unit III(11 hrs.) : Classification of movements.

- Drainage pattern: Its development, analysis of stream activity and its relation to the structures.

- Processes and features of karst geomorphic cycle with reference to Himachal Pradesh lime stone deposits.

Unit IV(10 hrs.) : Glaciology: Land form of alpine glaciations, continental glaciations with reference to erosion and deposition study of Indian glaciers.

- Books Suggested :

*As Mentioned in Major Course

BSCGEOL0203(P) Minor Elective Lab course 2(a) Semester 2

Course Code	BSCGEOL0203		
Credits=1	L=0 , T=0 , P=1		
Name of the course	Geomorphology		
Type of the course	(Major Core Lab Course I/ Minor Elective Lab Course 1(b))		
Number of hrs required for this course	30hrs.		
Total Max Marks	50		
Semester Term End Examination	50 % of total marks		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on performance in the laboratory, lab record, lab seminar and Attendance. Marks Attendance: 5% marks to be given as per the regulations			Max Marks: 50% of the total marks

Instructions for Paper Setters and candidates: Laboratory examination will consist of two parts: (i) Performing a practical exercise assigned by the examiner from Unit II and Unit III (50% of the total marks) (ii) Viva Voce Examination (50 % of the total marks) Viva Voce Examination will be related to the practical performed, seminar assignment done by the candidate related to the paper and lab skills (Unit I) learnt during the course of the semester.

Course of Study

1. Formation of various Landforms Contour Maps
2. Identifiactions of various physical features on toposheets
3. Calculations of area on Toposheets
4. Prepration of Profile from Structural Maps
5. Study of some important landforms in the field.

Minor Elective course 3(a) Semester 3

BSCGEOL0305 Structural Geology

Unit-I (12 hrs.) : Elementary concept of structural geology

- Mechnical principles of deformation.
- Definition of force,stress and strain, Mechanics of plastic deformation.
- Elementary idea of dip, strike, thickness and width of out corp. Idea of width out crop and thickness of rocks.

Unit- II (12 hrs.) : Terminology and description of folds, its type and classification. Effects of folds on the out crops and their recognition criteria for determination of top and bottom of the beds. Plunge and rake of the folds, drag fold and elementary idea about uses of the folds.

- Joint sets system and classification and distinction from faults.

Unit- III (11 hrs.) Faults,its terminology,types and classification of faults .Effects of faults on the out crop and topography.

- Reverse faults and thrusts, norml faults.Definition of window,klippe and nappe.Horst and graben.

Unit-IV (10 hrs.) : Unconformity, its types their recognition.

- Distinction between unconformity and faults.
- Inlier- outlier and their significances.
- Clinometers compass- brunton compass and measurements of dip and strike
- Elementary idea of topographic features.

Book Suggested:

*As Mentioned in Major Course

BSCGEOL0305 (P) Minor Elective Lab course 3(a) Semester 3

Course Code	BSCGEOL0305		
Credits=1	L=0 , T=0 , P=1		
Name of the course	Structural Geology		
Type of the course	(Major Core Lab Course I/ Minor Elective Lab Course 1(b))		
Number of hrs required for this course	30hrs.		
Total Max Marks	50		
Semester Term End Examination	50 % of total marks		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on performance in the laboratory, lab record, lab seminar and Attendance. Marks Attendance: 5% marks to be given as per the regulations			Max Marks: 50% of the total marks

Instructions for Paper Setters and candidates: Laboratory examination will consist of two parts: (i) Performing a practical exercise assigned by the examiner from Unit II and Unit III (50% of the total marks) (ii) Viva Voce Examination (50 % of the total marks) Viva Voce Examination will be related to the practical performed, seminar assignment done by the candidate related to the paper and lab skills (Unit I) learnt during the course of the semester.

Course of Study

4. Reading to paper to geographical maps of survey of India in different scales.
5. Locating own postion on Map.
6. Measuring dip, strike, discetion, bearing and back bearing with clinometers compass and Burnton compass
    - Completion of outcrops on contoured maps
    - Study and interpretation of simple geological maps
    - Prepration of geologiacla cross section of simple geological maps
    - Prepration of geological section of Simple maps
    - Simple problems on width of outcrops and thickness of state.
    - Determination of true dip and direction from two apparent dips and apparent dip direction from true dip direction.
    - Measurement of dip and strike in the field

Minor Elective course 4(a) Semester 4

BSCGEOL0407 Igneous, Metamorphic and Sedimentary petrology.

Unit –I (12 hrs.) : Igneous rocks and their constituents.

- Nature, composition and origin of Magma.
- Forms, structure sand textures of igneous rocks- Extrusive and Intrusive rocks.
- Classification of igneous rocks.

Unit-II (12 hrs.) : Metamorphism , Definition and processes

- Texture and Structure of Metamorphic rocks
- Classification of Metamorphic rocks

Unit-III(10 hrs.) : Sedimentary cycles and processes of sedimentation

- Composition ,Texture and structure of sedimentary rocks.
- Classification of sedimentary rocks.
-

Unit IV(11 hrs.) : Petrological description of important igneous ,sedimentary and Metamorphic rocks .

Books Suggested:

*As Mentioned in Major Course

BSCGEOL01407 (P) Minor Elective Lab course 4(a) Semester 4

VI: pertaining to major course VI

Course Code	BSCGEOL0407
Credits=1	L=0 , T=0 , P=1
Name of the course	Igneous , metamorphic and sedimentary Petrology
Type of the course	(Major Core Lab Course I/ Minor Elective Lab Course 1(b))
Number of hrs required for this course	30hrs.

Total Max Marks	50		
Semester Term End Examination	50 % of total marks		Maximum Time: 3 hrs.
Continous Comprehensive Assesment: Based on performance in the laboratory, lab record, lab seminar and Attendance. Marks Attendance: 5% marks to be given as per the regulations			Max Marks: 50% of the total marks

Instructions for Paper Setters and candidates: Laboratory examination will consist of two parts: (i) Performing a practical exercise assigned by the examiner from Unit II and Unit III (50% of the total marks) (ii) Viva Voce Examination (50 % of the total marks) Viva Voce Examination will be related to the practical performed, seminar assignment done by the candidate related to the paper and lab skills (Unit I) learnt during the course of the semester.

Course of study

1. Megascopic and Microscopic study and description of following rocks Granite
   - Gabbro
   - Basalt
   - Rhyolite
2. Schist
   - Gneiss
   - Slate
   - Phyilite
3. Sandstone
   - Shale
   - Conglomerate
   - Arkose

Minor Elective course 5(a) Semester 5

BSCGEOL0510 Invertebrate Paleontology

Unit I(12 hrs.) : Broad Classification of organism.

- Introduction, definition and importance of Palaeontology and its branches.
- Geological time Scale.
- Fossil, its definition requisites and preservation.
- Applied aspects and uses of fossils in various fields of the earth sciences.

Unit II (12 hrs.) : Study,classification,morophology,distribution and Geological history of the classes.

- Phyllum Mollusca: Pelecypoda,Gastropoda and Cephalopoda.

Unit III(10hrs.) : Phyllum Brachiopoda,Arthropoda(class trilobite) its Morphology classification and Geological History

Unit IV(11 hrs.) : Phyllum Echinodermata,Phyllum Protochodata (Graptoloidea) their morphology Geological history and distribution.

Books Suggested:

6. Invertebrate paleontology by Woods.
7. Principles of Invertebrate paleontology by R.R Shrock and W.H Trinhofil.
8. Textbook of paleontology by K.A Zittel.
9. An introduction to paleontology by A. Moreley Davis and C.J Stubblefied.
10. Elements of paleontology by R.M Black

Books Suggest:

*As Mentioned in Major Course

BSCGEOLOGY01510 (P) Minor Elective Lab course 5(a)

Course Code	BSCGEOL0510		
Credits=1	L=0 , T=0 , P=1		
Name of the course	Invertebrate		
Type of the course	(Major Core Lab Course I/ Minor Elective Lab Course 1(b))		
Number of hrs required for this course	30hrs.		
Total Max Marks	50		
Semester Term End Examination	50 % of total marks		Maximum Time: 3 hrs.

Continous Comprehensive Assesment: Based on performance in the laboratory, lab record, lab seminar and Attendance. Marks Attendance: 5% marks to be given as per the regulations	Max Marks: 50% of the total marks

Instructions for Paper Setters and candidates: Laboratory examination will consist of two parts: (i) Performing a practical exercise assigned by the examiner from Unit II and Unit III (50% of the total marks) (ii) Viva Voce Examination (50 % of the total marks) Viva Voce Examination will be related to the practical performed, seminar assignment done by the candidate related to the paper and lab skills (Unit I) learnt during the course of the semester.

Course of Study

3. Description and identification of flowing:
    - Moluscia
    - Brachiopoda
    - Echinodermata
    - Graptolite
    - Trilobite
4. Study of Invertebrate fossils in the filed.