

KANNUR UNIVERSITY
(Abstract)

BSc Geology programme - Revised Scheme, Syllabus & Model Question Papers of Core, Complementary and Open Courses under Choice Based Credit Semester System for Under Graduate Programme-implemented with effect from *2014 admission-Orders Issued.*

ACADEMIC BRANCH

No. Acad/C2/6489/2014

Dated, Civil Station P.O, 20- 06-2014

Read: 1.U.O No. Acad/C2/2232/2014 dated 14-03-2014

2. Minutes of the meeting of the Board of Studies in Geology (Cd) held on 26.09.2013

3. Minutes of the meeting of the Faculty of Science held 25-03-2014

4. Letter dated 24.05.2014 from the Chairperson, BOS in Geology Cd)

ORDER

1. The Revised Regulations for UG Programme under Choice based Credit Semester System were implemented in this University with effect from 2014 admission as per paper read (1) above.

2. As per paper read (2) above the Board of Studies in Geology (Cd) finalized the Scheme, Syllabus & model Question Papers for Core, Complementary & open courses of BSc Geology programme to be implemented with effect from 2014 admission..

3. As per read (3) above the Faculty of Science held on 25-03-2014 approved Scheme, syllabus & model question papers for core/complementary & open courses of BSc Geology programme to be implemented with effect from 2014 admission.

4. The Chairperson, Board of Studies in Geology (Cd) vide paper read (4) above has submitted the finalized copy of Scheme, syllabus & Model question papers for core/complementary and open courses of BSc Geology programme for implementation with effect from 2014 admission.

5. The Vice Chancellor, after examining the matter in detail, and in exercise of the powers of the Academic Council as per section 11(1) of Kannur University Act 1996 and all other enabling provisions read together with, has accorded sanction to implement the revised scheme, syllabus& model question papers of BSc Geology Programme with effect from 2014 admission.

6. Orders, are therefore issued implementing the revised scheme, syllabus & model question papers for core, complementary& open courses of BSc Geology programme under CBCSS with effect from 2014 admission subject to report to Academic Council

7. Implemented revised Syllabus is appended.

SD/-

REGISTRAR

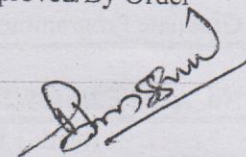
To:

1. The Principals of Affiliated Colleges offering B.Sc Geology Programme
2. The Examination Branch (through PA to CE)

Copy To:

1. The Chairperson, BOS Geology (Cd)
2. PS to VC/PA to PVC/PA to Registrar
3. DR/AR I Academic
4. Central Library
5. SF/DF/FC.

Approved/By Order



Section Officer

Regd



❖ For more details log on to www.kannur.university.ac.in

KANNUR UNIVERSITY
CHOICE BASED CREDIT AND SEMESTER SYSTEM

2014 Admission onwards



SYLLABUS

B.Sc. GEOLOGY

Prepared by

BOARD OF STUDIES IN GEOLOGY (COMBINED)

2014

UNDER THE GUIDELINES OF Prof.HRUDAYAKUMARI COMMITTEE REPORT

And financial support of

KERALA STATE HIGHER EDUCATION COUNCIL

About the Course

Geology is the study of the Earth. It includes the study of organisms that have inhabited our planet. It includes study of rocks, minerals, Groundwater resources, Interior of the earth etc. An important part of geology is the study of how Earth's materials, structures, processes and organisms have changed over time.

Undergraduate Course in Geology is the foundation for the advanced studies in Geology. Students can orient themselves to become a geologist. Geologists work to understand the history of our planet. The better they can understand Earth's history the better they can foresee how events and processes of the past might influence the future. Many processes such as landslides, earthquakes, floods and volcanic eruptions can be hazardous to people. Geologists work to understand these processes well enough to avoid casualties and damages. For example, If geologists can prepare maps of areas that have flooded in the past they can prepare maps of areas that might be flooded in the future. These maps can be used to guide the development of communities and determine where flood protection or flood insurance is needed.

Today we are concerned about climate change. Many geologists are working to learn about the past climates of earth and how they have changed across time. This information is valuable to understand how our current climate is changing and what the results might be.

Geology as a Career:

Geology gives a very interesting and rewarding career. The minimum training required is a three year college degree in geology. Pre-college students who are interested in becoming geologists should take a full curriculum of college preparatory courses, especially those in mathematics and science. Courses related to computers, geography and communication are also valuable.

Geologists work in a variety of settings. These include: natural resource companies, environmental consulting companies, government agencies, non-profit organizations, and universities. Many geologists do field work at least part of the time. Others spend their time in laboratories, classrooms or offices. All geologists prepare reports, do calculations and use computers. Although a bachelor's degree is required for entry level employment, many geologists earn masters and/or doctorate degrees. The advanced degrees provide a higher level of training, often in a geology specialty area. In most cases postgraduate degree is essential. Advanced degrees will often qualify the geologist for supervisory positions, research assignments or teaching positions at the university level. These are some of the most sought after jobs in the field of geology. Employment opportunities for geologists are very good. Most geology post graduates with a strong academic background and good grades have no trouble finding employment if they

are willing to move to a location where work is available. Employment opportunities are there all over the world. Hundreds of class I posts available in Geological Survey of India, Oil and Natural Gas Commission , Indian Space Research Organization , Centre for Earth Science Studies , Central Ground Water Board ,Various Universities and Colleges as faculty members, Centre for Water Resources Development and Management , Science and Technology , National Institute of Hydrology , Remote Sensing Utilisation Centres , Land Management Departments , Mud Logging companies ,Marine Survey Dept. , Groundwater Departments and Mining and Geology Department . Very good opportunities are there in countries like USA , UK, Gulf countries , Vietnam , Australia and Singapore. Open courses in Geology will be benefited to the general public. The environmental degradation created as a result of the implementation of unscientific developmental activities can be understood if one has a knowledge in the subject.. The extension work in connection with the Peoples Planning programme at Panchayat level can be properly implemented if one has a knowledge about the natural resource. Various awareness programmes can also be undertaken. The people may become aware about the need to protect the environment, to stop soil erosion and landslide. The need for sustainable development is given due importance in the subject.

Programme outcome The graduates in Geology are employable as Geological Assistant, Technical Assistant in various Geological Organisations like Mining & Geology and Ground Water Department. With B.Ed they are able to teach courses at school level in Earth and Environment related subjects in Geography and Science. They can also proceed to Postgraduate courses and Research. The subject also has a multidisciplinary nature where it can be associated with Botany, Zoology, Physics, Chemistry, Mathematics, Geography and Computer Science. Mining and Civil Engineering also show interlink with the subject. For better opportunities postgraduation in geology will help.

The graduate of this programme should be able to 1. Megascopically identify common rocks, minerals and fossils from outcrops, exploration pit, core samples and slurries. 2. Read and interpret geological maps with particular reference to structure and lithology 3. To assist design and develop geological map, geological cross section and panel diagrams to understand subsurface geology 4. Identify landforms, soil types and their interrelationships. 5. Identify and assess the impact on environment caused by exploitations of natural resources. 6. Assist in site selections for light civil constructions. 7. Read, interpret and report on topographical maps. 8. To plan and execute geological field work. 9. Communicate

geological knowledge so as to evolve sustainable living practices. 10. To explain and document causes and effect of common natural hazard impacting the society.

ADMISSION CRITERIA

Should have passed qualifying examination with Science combination. If a student who has studied Geology as one of the subject in the qualifying examination with other combinations and is ready to improve and understand mathematics, physics and chemistry during their graduation can also be admitted to BSc.Geology.

KANNUR UNIVERSITY

**BSc. GEOLOGY DEGREE PROGRAMME UNDER CHOICE BASED CREDIT AND
SEMESTER SYSTEM (CBCSS-UG)**

PROGRAMME STRUCTURE AND SCHEME OF EXAMINATION**Scheme Geology (Core) w.e.f 2014 admission**

Sem.	Course code	Name of the course	Hours / week	Total Hours	Credits	Marks		
						Internal	External	Total
I	1B01 GEO	Introduction to Earth Science	4	72	3	10	40	50
II	2B02 GEO	Geoinformatics	3	54	3	10	40	50
		Geoinformatics Practical	1	18	0	0	0	0
III	3B03 GEO	Crystallography	3	54	3	10	40	50
		Crystallography Practical	2	36	0	0	0	0
IV	4B04 GEO	Mineralogy	3	54	3	10	40	50
		Practical I (Geoinformatics, Crystallography & Mineralogy)	2	36	4	10	40	50
V	5B06 GEO	Igneous petrology	3	54	3	10	40	50
	5B07GEO	Metamorphic Petrology	3	54	3	10	40	50
	5B08GEO	Stratigraphy & Sedimentary Petrology	4	72	3	10	40	50
	5B09GEO	Geology of India	4	72	3	10	40	50
	5B10GEO	Structural Geology & Geotectonics	5	90	4	10	40	50
		Petrology Practical	2	36	0	0	0	0
		Structural Geology Practical	2	36	0	0	0	0
	Open Course	2	36	2	5	20	25	
VI	6B11GEO	Environmental Geology	3	54	3	10	40	50
	6B12GEO	Economic Geology	3	54	3	10	40	50
	6B13GEO	Palaeontology	4	72	3	10	40	50
	6B14GEO	Disaster Management	3	54	3	10	40	50
	6B15GEO	Field work/Study Tour*	2	36	2	10	40	50
	6B16GEO	Practical II: Petrology and Economic Geology	4	72	4	10	40	50
	6B17GEO	Practical III: Structural Geology & Palaeontology	4	72	4	10	40	50
	6B18GEO	Project	2	36	2	5	20	25
					58	180	720	900

*Students will be on deputation for fieldwork/study tour continuously for 35 hours (ie in 7 working days) during VI Semester

Prof.K.Sreemathikutty
Chairman Board of Studies in Geology

Scheme Open course in GEOLOGY w.e.f 2014 admission

Sem.	Course code	Course title	Hours / week	Hour s/se mester	Cred it	Exa m durat ion	Marks		
							Inte rnal	Extern al	Total
V	5D01GEO	Water Resource Development & Management	2	36	2	2Hrs	5	20	25

Scheme Complementary Course in GEOLOGY w.e.f 2014 admission

Sem.	Course code	Name of the course	Hours / week	Total Hours	Credits	Marks		
						Inter nal	Extern al	Total
I	1C 01 GEO	Geology I	2	36	2	8	32	40
		Geology I Practical	2	36	0	0	0	0
II	2C 02 GEO	Geology II	2	36	2	8	32	40
		Geology II Practical	2	36	0	0	0	0
III	3C 03 GEO	GeologyIII	3	54	2	8	32	40
		Geology III Practical	2	36	0	0	0	0
IV	4C 04 GEO 4C 05GEO(P)	Geology IV	3	54	2	8	32	40
		Geology Practical*	2	36	4	8	32	40
Total					12	40	160	200

*End semester Examination includes practical done in all the 4 semesters.

Prof.K.Sreemathikutty
Chairman Board of Studies in Geology

B.Sc Geology Programme - Credit distribution

Sem	Common Course Credits			Core course Geology Credits							Complementary Courses Credits		OpenCou.Cr	Total Credits			
	English		Addl. Lang.								Physics	Chem.					
I	4	3	4	3							2	2		18			
II	4	3	4	3							2	2		18			
III	4		4	3							2	2		15			
IV	4		4	3			4*				2	4*	2	4*		27	
V				3		3		3		3		4				2	18
VI				3	3	3	3	2	4*	*4	2**					24	
Total	22		16	56							12	12	2	120			

Bsc.Geology Programme – Mark Distribution

Common	English	6 X 50	300	500
Additional	Mal/Hindi.....	4 x 50	200	
Core	Geology	17 x 50	850	875
Project			25	
Open			25	25
Complementary	Physics(T)	4 x 40	160	400
	Physics (P)	1x40	40	
	Chemistry(T)	4 x 40	160	
	Chem.(P)	1 x 40	40	
Total				1800

Scheme of evaluation in B.Sc Geology Programme under Choice based Credit and Semester System w.e.f. 2014 admissions

The scheme of Evaluation in BSc Geology programme under choice based Credit & Semester System shall contain 2 parts,

1) Internal Assessment (IA)

2) External Evaluation or End-Semester Evaluation (ESE)

Both IA & ESE will be carried out under mark system. For each course in the semester letter grade, grade point and % of marks are introduced in 7-point indirect grading system. For each course 20 % of the total mark shall be given to the internal evaluation and 80% marks shall be for external evaluation.

Components of Internal Assessment for Theory course

The IA for Theory course shall be based on pre-determined transparent system involving Attendance, Assignment/seminar/viva and written test. Each theory course carries an IA of 10 marks. The following Table shows the different components of IA of theory courses and corresponding percentage of marks.

IA Theory course components and percentage of marks.

Component	% of marks
Attendance	25 %
Assignment/seminar/viva	25 %
Test Paper	50 %

1. Attendance of each course will be evaluated as follows

Above 90 % attendance	100 % marks allotted for attendance
85-89 %	80 %
80-84 %	60 %
76-79 %	40 %
75 %	20 %

2. Assignment/seminar/viva: Second component for IA is any one from Assignment/ seminar / Viva.

Assignment shall be assessed on the basis of their quality in terms of structure, content and presentation. Seminar shall be based on the topics in the course and shall be graded in terms of structure, content, presentation, interaction etc. Viva Voce for each course will be conducted by the concerned teachers.

The following Table illustrates how marks are consolidated for IA theory course.

	Attendance Max.marks :2.5	Assignment/seminar/viva Max. marks: 2.5	Test paper Max.marks: 5	Total Max. marks: 10
Reg. No.				

Components of Internal Assessment : Practical course

The IA for practical course I, II, and III will be based on Attendance, Lab involvement & Records and test paper.

The following table shows the different components of Internal Assessment and the corresponding percentage of marks for Practical course.

Components	% of marks
Attendance	25 %
Lab involvement and Records	50 %
Test paper	25 %

Lab involvement & Records: Lab involvement is to be assessed during the practical classes by the teacher in charge. Quality of Lab Records is to be assessed by the teacher concerned on the basis of quality of observation books and lab records. Records must be properly certified by the teacher(s) and Head of the Dept.

Practical Test papers: shall be conducted by teachers-in-charge and marks shall be given based on the student's performance.

Table: Consolidation of marks for IA practical course I/II/III.

	Attendance Max. marks :2.5	Lab involvement and record Max. marks :5	Practical Test Paper Max. marks:2.5	Total Max. marks :10
Reg. No.				

Components of IA for Field work/Study Tour

Field work/Study Tour is an integral part of BSc. programme in Geology. Study tour must be conducted under the supervision of teachers for understanding rocks/minerals/fossils/structures in the field. During this, the students must visit at least one mine or quarry and the studies conducted must be documented in a comprehensive Tour Report under the supervision and guidance of the teacher in charge. Necessary sketches, maps, photographs etc. have to be incorporated in the report.

Samples of rocks/minerals/fossils etc. have to be collected during the fieldwork. They have to be properly labeled and displayed. The concerned teacher shall give marks for IA. The following table illustrates how marks are consolidated for IA of fieldwork/study tour.

Reg.No	Involvement in Study tour/field work Max. marks :4	Involvement in writing Report Max. marks :3	Sample Collection Max. marks :3	Total Max. marks :10

Internal assessment of Project

IA of project shall be done under mark system. Supervising teachers will assess the project and award internal marks. Internal Assessment of different components may be taken as below.

Components	% of Internal marks
Punctuality	20
Use of Data	20
Scheme/organization of Report	30
viva voce	30

Consolidation of marks for IA of Project is as follows

	Punctuality Max. mark:1	Use of Data Max. marks :1	Scheme/Organization Max. marks :1.5	viva voce Max. marks :1.5	Total Max. Marks: 5
Reg. No.					

End semester evaluation-Theory course

The ESE in theory course is to be conducted with Question Papers set by external experts. External evaluation carries 80 % of the total marks. The evaluation of the answer scripts shall be done by examiner based on a well-defined scheme of valuation and answer keys. The duration of theory examination shall be 3 hours with a total mark of 40. (See model Question Paper).

End semester evaluation - Practical Course I, II & III

The ESE in practical course I shall be conducted at the end of fourth semester and that of practical course II and III shall be conducted at the end of sixth semester. The evaluation should be conducted jointly by 2 examiners appointed by the University- one external and the other internal. The duration of each practical exam shall be three hours. The candidate shall be permitted to attend the practical exam only if he/she submits certified bonafide Laboratory records of Practical work done. The answer scripts will be valued using mark system.

The mark distribution for different components of practical examination for each course such as procedure, formula, accuracy of recorded values, properties of crystal models/rocks/minerals/fossils/thinsections/tabulation/calculation/graphs/maps/sections/diagrams/problems/presentation of results etc. will be divided by Board of examiners. The total mark for ESE of each practical course is 40.

End semester evaluation -fieldwork/study tour

Field work /Study tour Report must be submitted before the external examiners for evaluation. A display of samples collected by each student should be arranged so that the external examiners can view and examine the samples displayed and award marks. Viva-voce will be conducted by a board consisting of at least 2 examiners appointed by the University. The board will ask questions to the candidates related to field work/study tour they have conducted and assess the students.

The following table illustrates how marks are consolidated for ESE of fieldwork/study tour.

	Display of sample Max. marks : 10	Field Report Max. marks : 10	Viva-voce Max. marks : 20	Total Max. marks : 40
Reg No.				

End semester evaluation- Project

ESE of project shall be by the external examiner appointed by the University. The assessment of different components may be taken as below.

	Component	% of external marks
1	Relevance of topic, statement of objectives, methodology (Reference/Bibliography)	20
2	Presentation, Quality of Analysis/Use of statistical tools, Findings and recommendations	30
3	Viva-voce	50

Distributions of marks for these components for ESE are as follows

	Components			Total Max.marks :20
	1 Max. marks :4	2 Max.marks :6	3 Max.marks :10	
Reg. No.				

Scheme of evaluation in Geology complementary Programme under Choice based Credit and Semester System w.e.f. 2014 admissions

Scheme of examination

I semester: 1C01GEO Theory paper I

II semester: 2C02GEO Theory Paper II

III semester: 3C03GEO Theory Paper III

IV semester: 4C04GEO Theory Paper IV

IV semester: 4C05GEO Practical paper

The scheme of Evaluation in BSc Geology complementary course under choice based credit and semester system 2014 shall contain two parts

- 1) Internal Assessment (IA)
- 2) End Semester Evaluation (ESE)

Both IA and ESE will be carried out under mark and indirect grading system. 20 % of marks of the total shall be given for IA and the remaining 80 % shall be given for ESE, i.e. the ratio of IA: ESE = 1:4.

Components of Internal Assessment (IA): Theory course

The continuous Evaluation of Theory course shall be based on pre-determined transparent system involving Attendance, Assignment/seminar/viva and written test. The following table shows the different components IA Theory courses and the corresponding % of marks.

Components	Marks
Attendance	25 %
Assignment/seminar/viva	25 %
Test papers	50 %

Attendance: Attendance of each course will be evaluated as follows:

Above 90 % attendance	100 % marks allotted for attendance
85-89 %	80 %
80 -84 %	60 %
76-79 %	40 %
75 %	20 %

Assignment/seminar/viva: Second component of IA theory is either Assignment or seminar or viva. Assignment shall be assessed on the basis of their quality. The teacher shall define

the expected quality of an assignment in terms of structure, content, presentation etc. and inform the same to the students. Due weight may be given for punctuality in submission.

Or for each theory course student's performance shall be assessed by conducting seminar presentations. Seminar shall be based on the topics in that course.

Or Viva-voce can be conducted by the concerned teacher who is teaching the course.

Test paper: Each test paper may have duration of minimum one hour. For each paper there shall be a minimum of 2 test papers and the best of two is to be taken.

Total internal marks for each theory paper are '8' and it is divided as follows.

	Attendance Max. mark = 2	Assignment/seminar/viva Max. mark = 2	Test paper Max. mark = 4	Total Max. mark = 8
Reg. No.				

Components of Internal Assessment (IA) Practical course :

Total Internal marks for practical course is '8'.

The IA for practical course will be based on Attendance, Lab involvement and Record and test paper.

The following table shows the different components of IA and the corresponding % of marks for practical course.

Components	% of marks
Attendance	25 %
Lab involvement and Records	50 %
Test paper	25 %

Lab involvement and Records: Lab involvement is to be assessed during the practical classes by the teacher in charge.

Quality of Lab records: marks should be awarded on the basis of quality of observation books and lab records by the teacher concerned. These observation books and records must be properly certified by the teachers and Head of the Department.

Practical Test papers: must be conducted by teachers-in-charge and marks may be awarded based on student's performance.

The following table illustrates the distribution of marks for Internal Assessment (IA) practical course.

	Attendance Max. mark = 2	Lab involvement & Records Max. mark = 4	Test paper Max. mark = 2	Total Max. mark = 8
Reg. No.				

End Semester Evaluation (ESE): Theory course

The End Semester Evaluation in Theory course is to be conducted with Questions Papers set by external examiners. To evaluate the performance of candidates, marks are used on the basis of a well-defined scheme of valuation. The duration of theory examination shall be three hours and total marks 32 (See model Question Paper).

End Semester Evaluation (ESE): Practical course

The ESE in practical course shall be conducted at the end of 4th semester. There shall be one practical with Credit '4' at the end of 4th Semester, comprising the content of practical courses taught throughout the first 4 semesters. i.e, semester I, II, III and IV. The evaluation should be conducted jointly by 2 examiners appointed by the University. The duration of practical course shall be 3 hours and total mark 32. The candidate shall be permitted to attend the Practical course only if he/she submits certified bona fide Laboratory Records of practical work done. The marks for different components of Practical Course such as procedure, formula, accuracy of recorded values and properties of crystal models/ rocks/ minerals/ tabulation/ calculation/ graphs/maps/sections/diagrams/presentation of results etc. will be decided by the Examination Board. The subject content of the Practical course suggested is as given below.

Sl. no.	Content	Duration	Marks
1	Solving simple geological map	60 minutes	10
2	Identification of features, calculations in Toposheet	30 minutes	5
3	Identification and description of rock samples	30 minutes	6
4	Identification and description of mineral samples	30 minutes	6
5	Identification and description based on models/charts/figures	30 minutes	5
Total		180 minutes	32

Distribution of Marks & pattern of questions for Core (Geology), Complementary (Geology) & Open (Geology) courses

Pattern of questions & Marks for External Examination - **Core** Geology

	Total Questions	No. Of Questions to be answered	Mark for each Marks for each Question	Total Marks
Objective	4	4	1	4
Short answer	10	7	2	14
Short essay/Problems	6	4	3	12
Essay	4	2	5	10
	24	17		40

Marks for internal assessment: 10

Total marks for each core course: 40+ 10 =**50**

Pattern of Questions & Marks for External Examination- **Complementary** Geology

	Total Questions	No. Of Questions to be answered	Mark for each Question	Total Marks
Objective	5	5	1	5
Short answer	6	4	2	8
Short essay/Problems	5	3	3	9
Essay	4	2	5	10
	20	14		32

Marks for internal assessment: 8

Total marks for each complimentary course: 32+ 8 =**40**

Pattern of Questions & Marks for External Examination - **Open course** Geology

	Total Questions	No. Of Questions to be answered	Mark for each Marks for each Question	Total Marks
Objective	5	5	1	5
Short answer	5	3	2	6
Short essay/Problems	5	3	3	9
Total	15	11		20

Marks for internal assessment: 5

Total marks for open course: 20+5= **25**

CORE PAPERS
SYLLABUS
BSc GEOLOGY

Marks: External: 40
Internal: 10

Hours/week: 4; Total hours: 72
Credits: 3

1B01GEO – INTRODUCTION TO EARTH SCIENCES

MODULE I Earth Sciences- Definitions, brief introduction to the various branches of earth sciences; relationship of geology with other branches of science. Solar system with special emphasis on terrestrial planets and meteorites. Earth in solar system: size, shape, volume, mass, rotational and revolutional parameters. Modern theories of origin of earth, age of the earth. Internal structure of the earth (10 hours)

MODULE II Geospheres: Atmosphere, hydrosphere and lithosphere. Exogenic and endogenic processes and agents. The concept of rock cycle. Weathering: agents, types and products of weathering. Influence of climate and lithology on weathering. Soils: Geological classification of soil, Mass wasting: Types, causes and controls. (14 hours)

MODULE III Volcanoes: mechanism and causes of volcanic eruption, types, products, effects and prediction. Global distribution of volcanoes. Earthquakes: types and causes, propagation of seismic waves, focus and epicenter, Elastic Rebound Theory, seismograph and seismogram. Intensity and magnitude of earthquakes, seismic belts of the world. (16hours)

MODULE IV Streams: Drainage basins and streams, geological activity of stream, erosion, transportation and deposition; erosional and depositional landforms. Geomorphic cycle and concept of peneplain. Oceans and Seas: Ocean water: extent, composition, waves, currents, tides; Marine erosion, transportation and deposition. Coastal landforms and ocean floor topography, oceanic sediments. Coral reefs: origin, types and distribution. (16 hours)

MODULE V Glaciers: Formation and morphology, types, erosion and transportation by glaciers, Glacial landforms, Ice age and its causes. Lakes: Origin, classification and geological importance, Backwaters of Kerala. Wind: Geological action of wind, landforms of aeolian origin. Ground water: Source, nature, storage, porosity, permeability, aquifer, aquiclude, aquitard, water table, seepage and springs, geysers, wells, artesian wells, Geological action of groundwater and Karst topography. (16 hours)

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13. King, C.A.M. (1972) Beaches and Coasts. Arnold, London.
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2B02GEO – GEOINFORMATICS

MODULE I Geoinformatics: definition; Scope, development and importance of Geoinformatics. Geoinformatic Technologies and application in Geographical Studies - Geoinformatics and other Information Sciences. (6 hours)

MODULE II Basics of computer: parts and types of computers, personal computers, memory structure and data storage. Hardware: external devices, storage devices- primary (RAM and ROM) and secondary storage devices (Hard disk, CD, DVD and pen drives); Internal devices- CPU and clock speed, microprocessor, mother board, graphics card, expansion slots and network card. Softwares: Different operating systems- Windows: Vista, 7 and 8; Linux: Ubuntu, and Fedora. Application softwares- word processor, spread sheets and DBMS. Basics of Computer languages, Internet browsers, Multimedia (15 hours)

MODULE III GIS: definition; Components of GIS; History and development of GIS. Data types: Raster and vector; GIS layer, georeferencing and topology. Data entry into GIS, basic digital map generation: Scanning and digitization of maps; editing of layers, creating attribute data. Data extraction from GIS by simple query. Introduction to GIS packages: Free GIS: GRASS and QGIS; Commercial GIS: ArcGIS. (15 hours)

MODULE IV Introduction to Satellite based navigation system. Basic idea of GPS, GPS satellites, space segment, ground and control segment, GPS receivers; uses of GPS, worldwide digital network of GPS. (10 hours)

MODULE V Sources of data in GIS: Introduction, analog map, topographical map, thematic map and geologic maps, aerial photos, satellite imageries, ground survey with GPS, reports and publications, socioeconomic data and census data. (8 hours)

LIST OF REFERENCES

1. Godchild M.F. and Kemp K. (1990) Developing a curriculum in GIS: The NCGIA Core curriculum project, University of California, Santa, Barbara.
2. Ian Haywood, Sarah Cornelius and Steve Carver (2000). An introduction to Geographical Information System, Addison Wesley Longman Ltd., New York
3. Misra H.C. (1995) A Handbook on GIS. GIS India, Hyderabad.
4. Smith T.R. and Piquet (1985) GIS. London Press, London.
5. Taylor D.R.F. (1991) GIS: The Microcomputer and Modern Cartography. Pergamon Press, Oxford.
6. Heywood I, et al., (1998) An Introduction to Geographical Information System. Longman, New Delhi.
7. Lo C.P. and Young A.K.W. (2003) Concepts & Techniques of Geographical Information System. Prentice Hall of India, New Delhi.

8. Craig D Knuckles (2000) Introduction to Interactive Programming on the Internet. John Wiley & Sons Inc.
9. Zhong-Ren Peng and Ming-Hsiang Tsou (2003) Internet GIS: Distributed Geographic Information Services for the Internet and Wireless Networks.
10. Korte, G. B., (2001) The GIS book: 5th Edition, Onward press, Australia.
11. Kang-Stung-Chang (2002) Introduction to Geographical Information Systems. Tata McGraw Hill Publishing Co.
12. Stephen Wise (2002) GIS Basics. CRC Press.
13. Ahmed El-Rabbany (2002) Introduction to GPS: The Global Positioning System. Artech House, Boston.
14. Hofmann W. (2001) GPS Theory and Practice. H. Lichtenegger & J. Collins, Springer-Wien, New York.

Marks: External: 40
Internal: 10

Hours/week: 3; Total hours: 54
Credits: 3

3B03GEO – CRYSTALLOGRAPHY

MODULE I Elements of crystallography: crystalline state and crystals; Morphology of crystals, faces, edges, vertex, forms and zones. Crystal angles: plane angles, interfacial angles and solid angles. Contact Goniometer, law of constancy of interfacial angles. External symmetry. (6 hours)

MODULE II Crystallographic axes: choice of axes, labelling and orientation, classification of crystals into Systems and Classes, nomenclature of crystal faces, intercepts, parameters, unit face, Weiss notation, Miller indices, law of crystal indices, axial ratio. Brief study of the following: holohedral, hemihedral, hemimorphic, enantiomorphic and tetartohedral forms. (8 hours)

MODULE III Systematic crystallography: The study of symmetry, simple forms and combinations of the following crystal classes: Isometric system - normal, tetrahedral, pyritohedral and plagiohedral. Tetragonal system - Normal, tripyramidal, pyramidal hemimorphic and sphenoidal. (15 hours)

MODULE IV Hexagonal system: Hexagonal Division - Normal class, tripyramidal, trapezohedral. Rhombohedral Division - Rhombohedral, trirhomboidal, pyramidal hemimorphic, trapezohedral. Orthorhombic system - Normal class. Monoclinic system - Normal class. Triclinic system - Normal class. (15 hours)

MODULE V Twin crystals: elements of twinning, twin axis, twin plane and compositional plane; important types and examples of twinning. Brief study of morphological imperfections in crystals. Stereographic projection - basic concept and projection of isometric system normal class (form and symmetry). (10 hours)

LIST OF REFERENCES

1. Dana, E.S. (1962) A text book of Mineralogy (Revised by Ford). Asia Publishing House, Wiley.
2. Philips F.C. (1956) An Introduction to Crystallography. Longmans Green 20
3. Read, H.H. (1984) Rutley's Elements of mineralogy. CBS Publishers, Delhi.

4B04GEO – MINERALOGY

MODULE I Mineral: Definition of Mineral and Mineraloid; Scope and aim of Mineralogy. Physical mineralogy: Physical properties of minerals-form, habit, cleavage, fracture, colour, luster, streak, hardness, specific gravity, piezoelectricity and pyroelectricity. (8 hours)

MODULE II Chemical mineralogy: Chemical elements and periodic Table - Bonding of atoms: Metallic, covalent, ionic and Van der Waals bonding in minerals, solid solution, exsolution, isomorphism, polymorphism and pseudomorphism in minerals. (5 hours)

MODULE III Optical mineralogy: Ordinary and polarized light, polarization of light, refractive index, critical angle and total internal reflection. Polarization by reflection, absorption, refraction, double refraction. Construction of Nicol prisms. Petrological microscope: parts and functions. Optical accessories: Mica plate, gypsum plate and quartz wedge. Optical properties of minerals: Colour, Pleochroism, pleochroic haloes, relief, birefringence, interference colour, extinction, twinning, alteration and zoning. Isotropic and anisotropic substances, uniaxial and biaxial minerals, sign of elongation. (13 hours)

MODULE IV Descriptive Mineralogy: a) classification of minerals. b) systematic study of the important non-silicate minerals: Diamond, Graphite, Sulphur, Gold, Silver, Copper, Realgar, Orpiment, Stibnite, Molybdenite, Cinnabar, Sphalerite, Galena, Chalcocite, Bornite, Chalcopyrite, Pyrite, Magnetite, Hematite, Marcasite, Barite, Gypsum, Halite, Fluorite, Corundum, Cryolite, Cuprite, Spinel, Chromite, Rutile, Cassiterite, Ilmenite, Monazite, Psilomelane, Pyrolusite, Goethite, Limonite, Bauxite, Calcite, Dolomite, Aragonite, Magnesite, Siderite, Malachite, Azurite. (13 hours)

MODULE V Structure and classification of silicate minerals with detailed physical, chemical and optical properties of the following: Olivine family, Garnet family, Alumino silicate family, Epidote family, Pyroxene family, Amphibole family, Mica family, Feldspars, Feldspathoids, Quartz, Zeolite group, Clay minerals; Beryl, Cordierite and Tourmaline. (15 hours)

LIST OF REFERENCES

1. Dana, E.S. (1955). A text book of mineralogy – Asia publishing House, Wiley.
2. Read, H.H. (1984) Rutley's elements of Mineralogy. CBS Publishers, Delhi.
3. Mason, B. and Berry, L.G- Elements of Mineralogy – W.H. Freeman & Co.
4. Deer. W.A., Howie. R.A and Zuessman, J. (1966) An introduction of the Rock forming minerals. Longman.
5. Berry, Mason, Dietrich, (2000) Mineralogy, CBS Publication.
6. Cornelis Klein and Cornelius S. Hurlbut (1985) Manual of Mineralogy, John Wiley & Sons.
7. Nesse Williams, D. (2008) Introduction to Mineralogy. Oxford University Press.
8. Nesse Williams, D. (2003) Introduction to Optical Mineralogy. Oxford University Press.
9. Perkins Dexter (2006) Mineralogy. Pearson Prentice Hall.
10. Kerr P.F. (1977) Optical Mineralogy. Mcgraw-Hill
11. Perkins Dexter and Henke Kevin, R. (2007) Minerals in thin section. Pearson Education.

Marks: External: 40
Internal: 10

Credits: 4

4B05GEO PRACTICAL–I- GEOINFORMATICS, CRYSTALLOGRAPHY AND MINERALOGY

Practicals in Geoinformatics : (Hours per week:1,Total hour:18;Sem II)

Introduction to the parts of a computer

Internet basics

Visit to a GIS lab

Basic operations of the GPS.

Demonstration of any GIS package

Entering data into a GIS

Generating a simple map with the GIS

Practicals in Crystallography (Hours per week:2,Total hour:36;Sem III)

Drawing of symmetry elements of Normal classes of all systems.

Identification and description of the following crystal models.

Isometric system: Galena, Garnet, Spinel, Magnetite, Fluorite, Sphalerite, Tetrahedrite, Pyrite and Cuprite.

Tetragonal system: Zircon, Cassiterite, Rutile, Apophyllite, Wulfenite, Chalcocopyrite.

Hexagonal system: Beryl, Beta Quartz, Calcite, Tourmaline, Alpha Quartz.

Orthorhombic System: Barite, Olivine, Topaz, Sulphur, Staurolite.

Monoclinic system: Gypsum, Orthoclase, Augite, Hornblende.

Triclinic: Axinite, Albite, Kyanite.

Twin crystals: Spinel, Fluorite, Rutile, Calcite, Quartz, Staurolite, Aragonite, Gypsum, Augite, Orthoclase, Albite.

Practicals in Mineralogy (Hours per week:2,Total hour:36; Sem IV)

Megascopic study and identification of the following minerals:

Quartz, Smoky Quartz, Milky Quartz, Rosy Quartz, Amethyst, Chalcedony, Agate, Flint, Jasper, Chert, Opal, Orthoclase, Microcline, Plagioclase, Perthite, Nephelene, Leucite, Sodalite, Enstatite, Bronzite, Hypersthene, Diopside, Augite, Spodumene, Acmite, Rhodonite, Wollastonite, Anthophyllite, Tremolite, Actinolite, Hornblende, Olivine, Serpentine, Muscovite, Biotite, Vermiculite, Phlogopite, Chlorite, Epidote, Garnet, Natrolite, Stilbite, Apophyllite, Talc, Steatite, Andalusite, Kyanite, Sillimanite, Staurolite, Cordierite, Apatite, Beryl, Topaz, Calcite, Dolomite, Tourmaline, Zircon, Fluorite.

Microscopic study of the following minerals:

Quartz, Microcline, Orthoclase, Albite, Oligoclase, Labradorite, Nephelene, Leucite, Enstatite, Hypersthene, Augite, Diopside, Hornblende, Tremolite, Actinolite, Anthophyllite, Biotite, Muscovite, Olivine, Epidote, Garnet, Chlorite, Cordierite, Andalusite, Sillimanite, Kyanite, Staourolite, Calcite, Sphene, Apatite, Zircon.

5B06GEO – IGNEOUS PETROLOGY

MODULE I Rock: definition, types; Rock cycle; Plutonic, hypabyssal and volcanic igneous rocks. Forms of igneous rocks: lava flows, pyroclastic deposits, volcanic ash, sill, laccolith, lopolith, phacolith, dyke, cone sheets, batholiths, stocks, bosses, bysmalith, ring dykes and dyke swarms. Structures of igneous rocks: Definition, vesicular, amygdaloidal, blocky lava, ropy lava, pillow structure, flow structure, sheeted joints, mural jointing, columnar jointing, rift and grain. (10 hours)

MODULE II Textures of igneous rocks: definition, crystal and glass, crystallites and microlites. Granularity and shapes of crystals; Equigranular textures- allotriomorphic, hypidiomorphic and panidiomorphic; Inequigranular textures- porphyritic and poikilitic, intergrowth textures, directive textures, devitrification, perilitic fractures, spherulitic structures, reaction structure. (10 hours)

MODULE III Cooling history of igneous rocks, melting and crystallization. Bowen's Reaction Series. Study of the following Binary systems: Diopside-Anorthite (Eutectic), Albite-anorthite (solid solution), Forsterite-silica (Incongruent). Partial melting and formation of magma, magma generation. Petrotectonic settings; mid oceanic ridges and subduction zones. (12 hours)

MODULE IV Diversity of igneous rocks: magmatic differentiation, fractional crystallisation, liquid immiscibility, assimilation. Classification and nomenclature of igneous rocks based on depth of occurrence, silica percentage and colour index. Tyrrel's tabular classification, CIPW norm, IUGS- QAPF classification of plutonic and volcanic rocks. (10 hours)

MODULE V Petrography, petrogenesis and association of the following rocks/classes: Granite, pegmatite, aplite, syenite, diorite, gabbro, basalt, dolerite, dunite and peridotite. (12 hours)

LIST OF REFERENCES

1. Tyrrell, G.W. (1978) The principles of petrology – Chapman and Hall Ltd. London.
2. Bowen, N.L.M The Evolution of the Igneous Rocks – Dover publication, Inc, New York
3. Barth, FW. (1962) Theoretical Petrology -Wiley.
4. Walstrom, E.E. (1961) Theoretical Igneous Petrology, Wiley.
5. Turner.F.J and Verhoogen.J (1960) Igneous and Metamorphic Petrology – McGraw Hill.
6. Hatch, F.H. Wells, A.K. (1949) Petrology of Igneous Rocks, Thomas Murby & Wells,
7. Johannesen, A – (1962) Descriptive petrography of Igneous Rocks, Vols. I to IV – Allied Pacific.
8. Mackenzie, W.S., Donaldson, C.H. and Guilford, C. (1988) Atlas of Igneous rocks and their textures, ELBS/Longman. 23
9. Winter J.D. (2001) An introduction to Igneous and Metamorphic Petrology. Prentice Hall, New Jersey.
10. Middlemost E.A.K. (1985) Magmas and Magmatic rocks. Longman, New York.
11. Ehler G.E. and Blatt H. (1999) Petrology- Igneous, Sedimentary and Metamorphic. CBS Publishers and Distributors, New Delhi.
12. Hyndman, D.W. (1972) Petrology of igneous and Metamorphic Rocks. Mc-Graw Hill.

Marks: External: 40
Internal: 10

Hours/week: 3; Total hours: 54
Credits: 3

5B07GEO – METAMORPHIC PETROLOGY

MODULE I Metamorphism: definition, factors of metamorphism, types of metamorphism, P-T limits of metamorphism. Prograde and retrograde metamorphism; metasomatism, metamorphic differentiation. (12 hours)

MODULE II Concept of depth zones in metamorphism. Barrowian zone of metamorphism. Concept of mineral paragenesis in metamorphism. Facies concept: Greenschist facies, Amphibolite facies, Granulite facies, Eclogite facies, Blueschist facies, Contact metamorphic facies; Metamorphic Grade. (14 hours)

MODULE III Metamorphism in relation to Plate tectonics. Paired metamorphic belts. Metamorphic textures and structures. (8 hours)

MODULE IV Effects of metamorphism on different types of rocks: metamorphism on argillaceous rocks, metamorphism on calcareous rocks, metamorphism on arenaceous rock and metamorphism on basic igneous rocks. (10 hours)

MODULE V Petrography, origin and occurrence of the following rock types: Slate, phyllite, schist, gneiss, amphibolite, marble, granulite (charnockite and khondalite), mylonite, and BMQ/BHQ. (10 hours)

LIST OF REFERENCES

1. Bayly, B. (1968) Introduction to Petrology. Prentice Hall.
2. Huang, W.T. (1962) Petrology. Mc-Graw Hill.
3. Harker, A. (1952) Metamorphism. Mc-Graw Hill Co.
4. Hyndman, D.W. (1972) Petrology of igneous and Metamorphic Rocks. Mc-Graw Hill.
5. Moorehouse, W.W. (1959) The study of rocks in thin sections. Harper and Row, New York.
6. Rao, B.B. (1986) Metamorphic Petrology. Oxford-IBH Publ. Co.
7. Tyrrel, G.W. (1963) Principles of Petrology. Asia Publication.
8. Williams, H., Turner, J.F. and Gilbert, C.M. (1985) Petrography-An Introduction to the study rocks in thin sections. Second Edn. CBS Publishers, Delhi.
9. Winter, J.D. (2001) An introduction to Igneous and Metamorphic Petrology. Prentice Hall, New Jersey.

Marks: External: 40
Internal: 10

Hours/week: 4; Total hours: 72
Credits: 3

5B08GEO – STRATIGRAPHY AND SEDIMENTARY PETROLOGY

MODULE-I Definition and scope. Concept of stratum and delineation of strata. A brief study of the guiding principles of Stratigraphy (Principle of Uniformitarianism; principle of order of superposition; principle of cross-cutting relationships, principle of truncation; principle of original horizontality, principle of included fragments and principle of faunal succession). Concept of facies, Local and regional successions. Type area and Type Sections. Breaks in stratigraphic successions: Unconformities and Diastems, Overlap and Offlap.

(12 hours)

MODULE II Concept of geological column and Geological Time Scale. Elements of lithostratigraphic, chronostratigraphic and biostratigraphic classifications and their units. Dating of strata (relative and absolute dating). Stratigraphic concepts of correlation, criteria and methods.

(15 hours)

MODULE III Origin of Sedimentary rocks – disintegration & decomposition of rocks-transportation – deposition –diagenesis. Sedimentary textures and structures (clastic and non-clastic).

(15 hours)

MODULE IV A broad classification of sedimentary rocks into residual, mechanical, chemical and organic Groups. Residual deposits – terra rossa, clay, laterite and bauxite and soils. Mechanical deposits – rudaceous, arenaceous and argillaceous groups. A descriptive study of Conglomerate, Breccia, Sandstones, Limestone and Shales. Heavy minerals in sand and sandstones.

(15 hours)

MODULE V Chemical deposits: siliceous, carbonaceous, ferruginous and saline deposits. Organic deposits: calcareous, siliceous, phosphatic, ferruginous and carbonaceous deposits. A brief study of Flint, Chert, Gypsum, Rock Salt, Caliche. Guano and Kiesellghur. Descriptive study of different types of calcareous and carbonaceous deposits.

(15 hours)

LIST OF REFERENCES

1. Dunbar, C.O and Rogers, J. (1961) Principles of Stratigraphy. Wiley Publications.
2. Krumbein W.C. and Sloss, L.D. (1963) Stratigraphy and Sedimentation. Freeman
3. Tyrrel, G.W. (2013) Principles of Petrology, Asia Publishing House.
4. Huang, W.T. (1962) Petrology. Mc-Graw Hill.
5. Pettijohn, F.J. (1983) Sedimentary Rocks. Harper & Bros.
6. Harker, A. (1964) Petrology for Students, Cambridge Press.

Marks: External: 40
Internal: 10

Hours/week: 4; Total hours: 72
Credits: 3

5B09GEO – GEOLOGY OF INDIA

MODULE I Brief study of the physiographic divisions of India. Major geological divisions of India. Geological time scale and its representative in Indian stratigraphy. General study of Early Precambrian terrains of India and the concept of cratons and mobile belts. (10 hours)

MODULE II Archaean succession of India. Sargur Supergroup: distribution, lithology, structure, associated intrusives and economic resources. Proterozoic succession of India: General distribution and major lithounits. Geographic distribution, lithological features, classification, structural features, associated magmatism, organic remains, age and economic importance of the following lithostratigraphic units:

- | | | |
|------------------------|------------------------|-----------------------|
| a. Dharwar Supergroup | b. Aravalli Supergroup | c. Delhi Supergroup |
| d. Cuddapah Supergroup | e. Vindhyan Supergroup | f. Kurnool Supergroup |

Brief study of Precambrian Geology of Kerala. (20 hours)

MODULE III Palaeozoic stratigraphic succession and associated fossils of Spiti region and its Precambrian foundation in India. Distribution of marine Mesozoic succession in India and detailed study of the following:

- | | |
|--------------------------------------------------------|--------------------------------------------|
| a. Triassic succession of Spiti. | b. Jurassic succession of Spiti and Kutch. |
| c. Cretaceous succession of Trichy and Narmada Valley. | d. Bagh Beds. (15 hours) |

MODULE IV Gondwana Supergroup: geographic distribution, nature of Gondwana basins, environment of deposition, lithology, organic remains, age and economic resources. Deccan traps: extent, distribution, classification, lithology, inter trappeans and infra trappeans. Age of Deccan Traps. (12 hours)

MODULE V Cenozoic succession of India: A brief study of Palaeogene and Neogene lithounits and their distribution in India. Detailed study of the following:

- | | |
|----------------------------------|--------------------------------------|
| a. Cenozoic succession of Assam. | b. Siwalik Supergroup. |
| c. Cuddalore sandstone | d. Quilon and Warkalli formations. |
| e. Karewa Group. | f. Indo-Gangetic Alluvium (15 hours) |

LIST OF REFERENCES

1. Krishnan, M.S. (1982) Geology of India and Burma, 6th edition.
2. Ravindra Kumar (1985) Fundamentals of Historical Geology and Stratigraphy of India.
3. Wadia D. N. (1944) Geology of India. MacMillan and Co. Limited.
4. Vaidyanadhan, R. and M. Ramakrishnan (2008) Geology of India (Volume I and II). Geological Society of India, Bangalore.

5B10GEO – STRUCTURAL GEOLOGY AND GEOTECTONICS

MODULE I Introduction to Structural Geology. Stratification, horizontal and inclined beds; dip and strike, relation between true dip and apparent dip; Trend of outcrops: pattern and width of outcrops; outlier and inlier. Rule of V's, true thickness, vertical thickness and their mutual relations. Uses of clinometer and Brunton compass. Methods for representing relief features: contours, topographic and geologic maps; map symbols and rock symbols; interpretation of geological maps. Basic concept of spherical and stereographic projections in Structural Geology. Stages of rock deformation - stress and strain, factors controlling rock deformation. (20 hours)

MODULE II Folds: Geometry and elements of folded surface. Terminology, geometric and genetic classification of folds, criteria for recognition in the field and on the maps. Fault: Definition, terminology, classification, mechanism of faulting, criteria for recognition in the field and on the map. (25 hours)

MODULE III Foliation and lineation: introduction and types. Joints: nature, origin, classification and geological significance. Unconformities: types and their recognition in the field and on the map. (15 hours)

MODULE IV Continental drift hypothesis, Sea floor spreading, polar wandering, paleomagnetism. Concept of plate tectonics: Types of plate margins- divergent, convergent and transform plate margins. Important characteristics of plate margins: Triple junctions, Benioff zones, mid oceanic ridges, island arcs and rift valleys, oceanic trenches, transform and transcurrent faults; Passive and active continental margins. Causes of plate movements: mantle convection, mantle plumes and hotspots. Wilson cycle. (20 hours)

MODULE V Mountains: origin and classification; Concept of isostasy and various hypotheses. Orogeny in relation to plate tectonics. Origin of Himalayas. (10 hours)

LIST OF REFERENCES

1. Billings M.P. (1972) Structural Geology. Third Edition. Prentice Hall, New Delhi.
2. De Sitter (1964) Structural Geology. Second Edition, McGraw Hill Co.
3. Hill, S. (1961) Elements of Structural Geology, Asia Publishing House.
4. Lahee (1987) Field Geology. Sixth Edition, McGraw Hill Co.
5. Ben A. Van Der Pluijm, Marshak, S. (2004) Earth Structure- An introduction to Structural Geology and Tectonics. 2nd Edition.
6. Davis, H.D. and Reynolds, S.J. (1984) Structural Geology of rocks and regions. John Wiley and Sons, Inc.
7. Thompson, G. R. and Turk, J. (1997) Introduction to Physical Geology. 2nd Edn., Thompson Brooks Publishers.
8. Carlson, D. and Plummer, C. (2010) Physical Geomorphology: Earth Revealed. 9th Edn., Mc-Graw Hill Co.

6 B 11 GEO - ENVIRONMENTAL GEOLOGY

MODULE I Environmental Geoscience: Environment--concept, definition, scope and importance; Ecosystem--the physical environment, atmosphere, hydrosphere and lithosphere; Anthropogenic environment. (10 hours)

MODULE II Natural Resources: Renewable and Non-renewable resources and its conservation. Natural resource utilization and environment. Concept of sustainable development. Impact of mining on the environment. (10 hours)

MODULE III Environmental Pollution: Water pollution--causes, effects, prevention and control. Water quality parameters. Domestic, industrial and urban pollution. Heavy metal pollution. Solid waste disposal, Nuclear wastes.

Air pollution--causes, effects, preservation and control. Air pollution and climate. Greenhouse Effect and Ozone Depletion. (14 hours)

MODULE IV Environmental Planning and Management. Environmental Impact Assessment. Environmental Impact of urbanization. Geology and urban planning. Role of Geologist in conservation of environment, environmental awareness and environmental laws. (10 hours)

MODULE V Natural hazards: Earthquakes, Storms, Floods, Tsunamis, Volcanic activity and Landslides—Environmental consequences of natural hazards. Soil erosion and its impact on environment. (10 hours)

List of References:

1. Valdiya, K.S. (1987) Environmental Geology—Indian Context, Tata McGraw Hills.
2. Strahler, A.N. and Strahler, A.H. (1973) Environmental Geosciences, Wiley Eastern.
3. Donald. R. Coates (1981) Environmental Geology, John Wiley & Sons.
4. Peter. T. Elawan (1970) Environmental Geology, Harper & Row.
5. Keller, E.A. (1978) Environmental Geology, Bell & Howell, USA.
6. Bryante (1985) Natural Hazards, Cambridge University Press.
7. Das, R.C. and Behera, D.K. (2008) Environment Science Principles and Practice, Prentice Hall of India.
8. Davis, et. al., (1976), Environmental Geoscience, Wiley Eastern.
9. Howard, A.D. and Irwin Remson (1978). Geology in Environmental Planning, McGraw Hill Publishers.
10. Coates, D.R. (1985) Geology and Society, Chapman and Hall Publishers, New Delhi.

6B12GEO – ECONOMIC GEOLOGY

MODULE I Definition, scope and historical development of Economic Geology. Ore minerals and gangue minerals, tenor and grade of ores. Primary and secondary classification of mineral deposits. Outline of Lindgren's and Bateman's classification. Controls of ore localization: structural controls, stratigraphic controls, physical controls and chemical controls. Brief study of metallogenetic epochs and provinces. (8 hours)

MODULE II Processes of formation of mineral deposits and related deposits. Magmatic deposits, contact metasomatic deposits, hydrothermal deposits, pegmatitic mineral deposits, volcanic exhalative deposits, gossans. (13 hours)

MODULE III Evaporites, sedimentary deposits, oxidation and supergene sulphide enrichment deposits, residual and mechanical concentration deposits, placer deposits, metamorphic deposits. (12 hours)

MODULE IV Mode of occurrence, distribution in India and important economic uses of the following: Ores of Aluminium, chromium, copper, lead, zinc, gold, manganese, iron, Thorium, uranium, magnesium, tin and titanium. Minerals used as abrasives, refractories, fertilizers, ceramics and gemstones, coal and petroleum. Mineral deposits of Kerala. (12 hours)

MODULE V Brief outline of the types of exploration of mineral deposits, geological, geophysical, geochemical and geobotanical exploration methods. (9 hours)

LIST OF REFERENCES

1. Gokhale and Rao (1978) Ore deposits of India. Thomson Press (India)
2. Jensen, m and Bateman, A.M. (1981) Economic Mineral Deposits. John Wiley & Sons Inc
3. Krishnaswamy, S. (1988) Indian Mineral Resources. 3rd Edition. South Asia Books
4. Krauskopf (1994) Introduction to Geochemistry. 3rd Edition. McGraw-Hill Publications.
5. Park, C.F. and Mac Diarmid, R.A. (1964) Ore deposits. W. H. Freeman Publications.
6. Roy Chacko P.T. (ed.), (2005) Mineral resources of Kerala. Department of Mining and Geology.
7. Sinha, R.K (1982) Industrial minerals. Oxford and IBH Publishing Co.
8. Umeshwar Prasad (2000) Economic Geology- Economic Mineral Deposits. 2nd Edition. CBS Publishers and Distributors.

6B13GEO – PALAEOLOGY

MODULE I Palaeontology: introduction, sub division and scope. Methods of preservation of fossils - requisites of fossilisation. Types of fossils: Body fossils, trace fossils, index and zone fossils, transported fossils, leaked fossils and pseudo fossils. Type specimen: Holotype, genotype, paratype, syntype. Scientific value and uses of fossils. (10 hours)

MODULE II Phylum Protozoa: morphology, classification, geological history and stratigraphic importance. An outline of Micropalaeontology, its classification based on shell composition; uses of micro fossils. Kinds of marine environments: Benthonic and planktonic. Phylum Coelentrata: morphology, classification and stratigraphic range of Anthozoan corals. Phylum Brachiopoda: general morphology, classification and geological history. (20 hours)

MODULE III Phylum Mollusca: detailed morphology and classification. Stratigraphic range of Pelecypoda, Gastropoda and Cephalopoda. Suture patterns of Cephalopods. (20 hours)

MODULE IV Phylum Echinodermata: morphology, classification and stratigraphic range of the classes Echinoidea, Crinodea and Blastoidea. Phylum Arthropoda: morphology, classification, stratigraphic distribution and geological history of trilobites. Vertebrate Paleontology: A brief account of the evolution of fishes, reptiles and mammals. A short account of Siwalik mammals. (15 hours)

MODULE V Palaeobotany: A short account of the following fossil flora from India: Glossopteris, Gangamopteris, Ptilophyllum, Calamites, Lepidodendron, Vertebraria and Sigillaria. Paleoecology of plant fossils. (7 hours)

LIST OF REFERENCES

1. Woods, H. (1961) Invertebrate Palaeontology. Cambridge University Press.
2. Romer, A.S. (1966) Vertebrate Palaeontology, 3rd edition. Chicago Univ. Press.
3. Arnold Ca. (1947) An introduction to Palaeobotany. Mc-Graw Hill.
4. Haq, B. U. and Boersma, A. (1978) Introduction to Marine Micropalaeontology. Elsevier, Netherlands.
5. Raup, D.M. and Stanley, M.S. (1978) Principles of Palaeontology. CBS Publishers.
6. Moore, R.C., Lalicker, C.G., and Fischer, A.G. (1952) Invertebrate Fossils. Mc-Graw Hill.
7. Shrock, R.R. AND Twenhofel, W.H. (1953). Principles of Invertebrate Palaeontology, 2nd edition. Mc-Graw Hill.

Marks: External: 40
Internal: 10

Hours/week: 3; Total hours: 54
Credits: 3

6B14GEO – DISASTER MANAGEMENT

MODULE I Disaster: concepts; definition. Classification: natural and man-made disasters; water and climate related disaster. Geologically related disasters. Chemical and nuclear disasters. Biologically related disasters. (10 hours)

MODULE II Approaches to disaster risk reduction; disaster cycle, its analysis. Prevention, mitigation and preparedness for community based disaster risk reduction; structural and non-structural measures. Roles and responsibilities of community, panchayath raj institutions, urban local bodies, states, centres and other stake holders. (12 hours)

MODULE III Inter relationship between disasters and development. Factors affecting vulnerabilities, differential impacts. Impacts of development projects such as dams, embankments, changes in land use. Relevance of indigenous knowledge. (10 hours)

MODULE IV Disaster Risk Management; Hazards and vulnerability profiles of India. Components of disaster relief, water, food, sanitation, shelter, health and waste management. Institutional arrangement: mitigation, response, preparedness, disaster management act and policy. (12 hours)

MODULE V Disaster Management Plan for Kerala: types of disasters in Kerala – flood, drought, coastal erosion, landslides, pesticide contamination. Accident related disaster, prevention and mitigation. (10 hours)

LIST OF REFERENCES

1. David, A. (2000) Introduction in confronting catastrophe. Oxford Univ. Press.
2. Cuny, F. (1983) Development and disasters. Oxford University Press.
3. Govt. of India (2005) Disaster Management Act, New Delhi.
4. Govt. of India (2009) National Disaster Management Policy.
5. Gupta, A.K. and Nair, S.S. (2011) Environmental Knowledge for disaster Risk Management, NIDM, New Delhi.
6. Murthy, R.K. (2012) Disaster Management, Wisdom Press, New Delhi.
7. Tearfund (2006) Reducing risk of disaster in our communities, Disaster theory.
8. Vasudevan, V., Krishnan, K.R.S., Baba, M. and Kumar, P (eds.) Natural Hazards and management strategies. XVIII Kerala Science Congress – 2006, KSCSTE.
9. Websites: [www.http://nidm.gov.in](http://nidm.gov.in), [www.http://cwc.gov.in](http://cwc.gov.in), [www.http://ekdrm.net](http://ekdrm.net)

Marks: External: 40
Internal: 10

Hours/week: 2; Total hours: 36
Credits: 2

6B 15 GEO: FIELD WORK/ STUDY TOUR

Since Geology is a field science study tour and field work forms an integral part of the course. The geological formations have to be studied on a vast dimension. The field exposure of rocks is sparsely distributed. The study cannot be restricted to a small area. For better understanding of the subject they should be taken to Ghat sections , Underground mines , Open cast mines , beaches , oceans , rivers , valleys plains ,plateaus, deserts, glaciers , mountains , lakes , backwaters and so on. Resource mapping is very important. They have to visit institutions where geological investigations and research works are undertaken. Specimen collection and report writing is part of the work. As far as possible this can be done in all the three years. Without this work the course will not be complete. The study tour to area of geological importance is compulsory during VI Semester.

6 B 16 GEO – PRACTICAL II –PETROLOGY AND ECONOMIC GEOLOGY

Megascopic and microscopic identification of the following rocks:

Granite, Graphic granite, Pegmatite, Aplite, Granite Porphyry, Syenite, Syenite porphyry, Diorite, Gabbro, Anorthosite, Dunite, Pyroxenite, Dolerite, Basalt, Vesicular Basalt, amygdaloidal basalt, Rhyolite, felsites, Obsidian, Pumice, lamprophyre.

Conglomerate, Breccia, Sandstone, Arkose, Shale, Limestone, Laterite, Chert, Grit, Lignite. Sandstone, fossiliferous lime stone, kankar lime stone.

Slate, Phyllite, Schists, Gneisses, Quartzite, Marble, Amphibolite, Eclogite, Charnockite, Khondalite, Banded Magnetite quartzite, mafic granulite, marble and khondalite

ECONOMIC GEOLOGY

Megascopic identification of important ore minerals:

Ore minerals of Iron (Hematite, Magnetite, Siderite, BHQ and BMQ)

Manganese (Pyrolusite, Psilomelane, Wad)

Aluminium (Bauxite)

Lead and Zinc (Galena, Sphalerite)

Copper (Chalcopyrite, Malachite, Azurite, Bornite and native copper)

Chromium minerals (Chromite)

Industrial minerals:

Micas (Muscovite and Biotite), Talc

Refractories (Graphite, Kyanite, Sillimanite, Barite)

Asbestos minerals (Chrysotile and Serpentine)

Sulphur minerals (Sulphur, pyrites, Orpiment, Realgar)

Abrasives (Quartz, Corundum, Garnet)

Gemstones (Tourmaline, Garnet, Topaz and Beryl)

Fertilizer minerals (Gypsum, Anhydrite, calcite, dolomite)

Coal (Peat, Lignite, Bituminous coal, Anthracite)

Petroleum (Crude oil)

Radioactive minerals (Monazite, Ilmenite, Rutile)

Clay minerals (Kaolinite, Ball clay)

Marks: External: 40
Internal: 10

Hours/week: 4; Total hours: 72
Credits: 4

6B 17 GEO- PRACTICAL III-STRUCTURAL GEOLOGY AND PALAEOLOGY

Illustration with the help of neat diagrams of the following: Attitude of beds, apparent dip, strike and dip symbols, types of folds, faults and unconformities.

Simple problems in structural geology. Problems involving true and apparent dip, thickness and width of outcrops, three point problems.

Interpretation of geological maps and preparation of sections.

- Simple horizontal beds (2 maps)
- Study of effect of relief on 'V' of outcrops (4 maps)
- Simple dipping beds (2 maps)
- Simple dipping beds with intrusions (2 Maps)
- Tracing the out crops (3 maps)
- Folded beds (5 maps)
- Maps with different types of faults (5 maps)
- Simple dipping beds with unconformity (5 maps)
- Combination of intrusions, unconformity, folds and faults (10 maps)

36 hours

PALAEOLOGY

Morphological studies of the following fossils

Protozoa: Lagenas, Nodosaria, Textularia, Nummulites, Globigerina.

Coelentrata: Calceola, Zaphrentis, Halysites, Favosites, Montlivaltia.

Brachiopoda: Spirifer, Productus, Terebratula, Rhynchonella, Athyris, Orthis, Lingula

Mollusca: Gasteropoda (Natica, Turbo, Trochus, Turritella, Cerethium, Conus, Murex, cypraea, Physa)

Cephalopodes (Nautilus, Goniatites, Orthoceras, Phylloceras, Baculites, Schloenbachia Ceratites, Acanthoceras,)

Pelecypoda (Arca, Trigonia, Nucula, Spondylus, Pecten, Inoceramus, Ostrea, Gryphaea, Alectryonia.

Echinodermata: Pentacrinus, Cidaris, Hemicidaris, Echinus ,Micraster, Holaster, Encrinus, Apiuocrinus

Plant fossils: Glossopteris, Gangamopteris, Ptilophyllum, Lepidodendron, Sigillaria, Calamites, Elatocladus.

36 hours

**OPEN COURSES IN GEOLOGY
(FOR OTHER STREAMS)
SYLLABUS**

Marks:External:20

Internal: 5

Hours/week: 2; Total hours: 36

Credit: 2

5D01GEO –WATER RESOURCES DEVELOPMENT AND MANAGEMENT

MODULE I Water Resources: Ground water and surface water; Hydrologic cycle; occurrence of ground water; hydrogeological properties of water bearing rocks: porosity and permeability; types of aquifer; geologic work of groundwater. (6 hours)

MODULE II Surface water: rivers - drainage pattern; river basins; geologic work of rivers. Land forms developed by rivers. (7 hours)

MODULE III Water quality standards proposed by WHO and BIS. Physical and chemical parameters of water; water pollution; remedial measures. Diseases and bio-contamination of groundwater and surface water: remedies. (8 hours)

MODULE IV Water resource development and management. Water conservation practices; well design and well development; dug wells, tube wells and bore wells. Watershed management- rain water harvesting; artificial recharge; surangams; sea water intrusion. (8 hours)

MODULE V Groundwater exploration. Groundwater provinces of India. Groundwater development potential of Kerala. (7 hours)

LIST OF REFERENCES

1. REGHUNATH, H.M. (1987) Groundwater. New Age International Publishers, New Delhi.
2. DAVID KEITH TODD (1995) Groundwater Hydrology. 2nd Edn. John Wiley and Sons, Singapore.
3. KARANTH, K.R. (2006) Groundwater assessment, development and management. Tata Mc-Graw Hill, New Delhi.

QUESTION PAPERS IN BSc. GEOLOGY PROGRAMME- PATTERN OF QUESTIONS AND INSTRUCTIONS TO THE QUESTION PAPER SETTERS

1. A judicious mix of questions which assess (i) knowledge acquired (ii) standard application of knowledge and (iii) application of knowledge in new situations would be required. The question setter shall ensure that questions covering all skills are set. He/she shall also submit a detailed scheme of evaluation along with the question paper.
2. For **core course** Geology question paper shall be a judicious mix of objective type, short answer type, short essay type/problem solving type and essay type questions .Pattern of questions & Marks for External Examination core course Geology is as follows.

	Total Questions	No. Of Questions to be answered	Mark for each Question	Total Marks
Objective	4	4	1	4
Short answer	10	7	2	14
Short essay/Problems	6	4	3	12
Essay	4	2	5	10
	24	17		40

3. Care must be taken while framing the questions. In all the four types, questions should be evenly asked from all modules.
4. In the case of papers where there are two sections care must be taken to ask the essay questions in such a way that internal choice is from one section so that the student will have to attend both sections.
5. The question paper setters are requested to submit the question paper with correct spelling especially the scientific terms. Mistake can be minimized if the set question paper is type set.
6. Answer key and scheme of valuation should be prepared by the setter.
7. For **open course** the question paper shall be a judicious mix of objective type, short answer type and short essay type. Pattern of Questions & Marks for External Examination for Open course Geology is as follows

	Total Questions	No. Of Questions to be answered	Mark for each Marks for each Question	Total Marks
Objective	5	5	1	5
Short answer	5	3	2	6
Short essay/Problems	5	3	3	9
Total	15	11		20

8. Model question papers are given below.

**MODEL QUESTION PAPER IN BSc GEOLOGY (CORE COURSE)
CBCSS**

**KANNUR UNIVERSITY
I SEMESTER BSc PROGRAMME**

CORE SUBJECT: GEOLOGY

1B01GEO – INTRODUCTION TO EARTH SCIENCES

Time: 3 Hours

Max. marks: 40

I Answer in one word or one sentence.

1. Branch of earth science that deals with earthquakes.
2. Give an example for endogenic process.
3. Instrument that record the seismic waves.
4. What is MOR.

(4 X 1 = 4Marks)

II Write short answer to any seven of the following.

5. What is aquitard. Give an example.
6. Explain hogback.
7. Differentiate focus and epicenter of an earthquake.
8. Define mass wasting. Types of mass wasting.
9. Internal structure of earth.
10. Types of seismic waves.
11. Interior of earth.
12. Volcanoes.
13. Atolls.
14. Moraines.

(7 X 2 = 14Marks)

III write short essay on any four of the following.

15. Big bang theory.
16. Exogenic process and agents.
17. Global distribution of volcanoes.
18. Rock cycle.
19. Concept of peniplain.
20. Karst topography.

(4 X 3 = 12Marks)

IV Write essay on any two of the following.

21. Causes and control measures of landslides.
22. Landforms of aeolian origin.
23. Prediction of volcanoes.
24. Modern theories of origin of earth.

(2 X 5 = 10Marks)

KANNUR UNIVERSITY
II SEMESTER BSc PROGRAMME

CORE SUBJECT: GEOLOGY

2B02GEO – GEOINFORMATICS

Time: 3 Hours

Max. marks: 40

I Answer in one word or one sentence.

1. Name one geoinformatic technology.
2. The operating system owned by Red Hat.
3. Father of GIS.
4. Name the location of GPS master control station.

(4 X 1 = 4Marks)

II Write short answer to any seven of the following.

5. Define geoinformatics.
6. What is RAM? What are the types of RAM?
7. Components of GIS.
8. Space segment of GPS.
9. Data types in GIS.
10. What is thematic layer.
11. Open source GIS.
12. Topology.
13. Georeferencing.
14. GPS Receivers.

(7 X 2 = 14Marks)

III write short essay on any four of the following.

15. Explain remote sensing as a data source for GIS.
16. Principle of triangulation.
17. Types of GIS data query.
18. Secondary storage devices.
19. Geoinformatics technology.
20. Data conversion.

(4 X 3 = 12Marks)

IV Write essay on any two of the following.

21. Hardware of a computer system.
22. Data entry and layer generation in GIS.
23. Applications of GNSS.
24. Sources of data for geoinformatics.

(2 X 5 = 10Marks)

KANNUR UNIVERSITY
III SEMESTER BSc. PROGRAMME
STREAM: SCIENCE; CORE SUBJECT: GEOLOGY
3B03GEO – CRYSTALLOGRAPHY

Time: Three Hours

Maximum marks: 40

Answer all questions
Draw neat sketches wherever necessary

Answer in one word

1. The symmetry operation associated with center of symmetry.
 2. Type mineral of rhombohedral class.
 3. Type of twinning where 'c' is the twin axis.
 4. Plane of projection in stereographic projection
- (4x1=4 marks)**

Write short answer to any *seven* of the following.

5. Hemimorphism
 6. Form
 7. Law of constancy of interfacial angle.
 8. Symmetry of tetragonal sphenoid.
 9. Parameter
 10. Brachy pinacoid.
 11. Albite law of twinning
 12. Orthorhombic sphenoid.
 13. Goniometer.
 14. Crystallographic axes.
- (7x2=14 marks)**

Write short essay on any *four* of the following.

15. Axis of symmetry
 16. Miller indices
 17. Zone in crystallography
 18. Axial ratio
 19. Triclinic system.
 20. Orthorhombic prisms.
- (4x3=12marks)**

Write essay on any *two* the following.

21. Describe the symmetry and forms of normal class of tetragonal system.
 22. Write an essay on rhombohedral class of Hexagonal system
 23. Describe hemihedrism in crystals with example from cubic system
 24. What is twinning? Describe the various types of twinning with examples.
- (2 x 5=10 marks)**

KANNUR UNIVERSITY
IV SEMESTER BSc. PROGRAMME
STREAM: SCIENCE; CORE SUBJECT: GEOLOGY
4B04GEO – MINERALOGY

Time: Three Hours

Maximum marks: 40

Answer all questions
Draw neat sketches wherever necessary

Answer in one word

1. The most pure and transparent variety of quartz.
2. The type of bonding in diamond .
3. Chemical composition of zircon.
4. Difference in values of refractive index.

(4x1=4 marks)

Write short answer to any *seven* of the following.

- | | |
|--------------------|---------------------|
| 5. Optic axis | 6. Piezoelectricity |
| 7. Polarized light | 8. Nesosilicate |
| 9. Calcite | 10. Pleochroism |
| 11. Extinction | 12. Chalcedony |
| 13. Orthopyroxene | 14. Ionic bond |

(7x2=14 marks)

Write short essay on any *four* of the following.

15. Diamond and graphite
16. Isomorphism
17. Iron garnets
18. Optical accessories.
19. Biaxial minerals.
20. Zeolite group

(4x3=12marks)

Write essay on any *two* of the following.

21. Describe the feldspar group of minerals.
22. Describe parts and functions of petrological microscope.
23. Describe the optical classification of minerals.
24. Give an account of important physical properties of minerals.

(2x5=10 marks)

KANNUR UNIVERSITY
V SEMESTER BSc. PROGRAMME
STREAM: SCIENCE; CORE SUBJECT: GEOLOGY
5B 06 GEO – IGNEOUS PETROLOGY

Time: Three Hours

Maximum marks: 40

Answer all questions
Draw neat sketches wherever necessary

Answer in one word.

1. Which rock is the volcanic equivalent of gabbro?
2. An acidic igneous rock with very coarse grained texture
3. The scientist whose proposal is now known as IUGS classification
4. Conversion of glass to crystals is called as.

(4x1=4 marks)

Write short answers to any *seven* of the following.

- | | |
|-----------------------------|--------------------------|
| 5. Eutectic crystallisation | 10. Devitrification |
| 6. Mural Jointing | 11. Volcanic ash |
| 7. Ropy lava | 12. Granularity |
| 8. Phacolith | 13. Partial Melting |
| 9. Aplite | 14. Liquid Immiscibility |

(7x2=14 marks)

Write short essays on any *four* of the following.

15. Pillow structure
16. Fractional crystallisation
17. Granite family
18. Amygdaloidal structure
19. Bowens reaction series
20. Di-An System

(4x3=12 marks)

Write essays on any *two* of the following.

21. Write an essay on the different types of forms of igneous rocks
22. Give an account of the various classifications of igneous rocks with special reference to the QAPF classification.
23. Write an essay on the texture of igneous rocks
24. Describe the binary system Forsterite-Silica and bring out its importance in understanding petrogenesis.

(2x5=10 marks)

KANNUR UNIVERSITY
V SEMESTER B.Sc. PROGRAMME
STREAM: SCIENCE; CORE SUBJECT: GEOLOGY
5B 07 GEO – METAMORPHIC PETROLOGY

Time: Three Hours

Maximum marks: **40**

Answer all questions
Draw neat sketches wherever necessary

Answer in one word .

1. The splintery rock produced by contact metamorphism
2. The alumino silicate characteristic of high pressure
3. A metamorphic rock largely made up of CaCO₃.
4. The scientist who proposed facies concept.

(4x1=4 marks)

Write short answers to any *seven* of the following.

- | | |
|--------------------|-----------------------|
| 5. Isograd | 10. Porphyroblast |
| 6. Ptygmatic fold | 11. Hornfels |
| 7. Phyllite | 12. Augen structure |
| 8. Contact aureole | 13. Blueschist facies |
| 9. Foliation | 14. Marble |

(7x2=14 marks)

Write short essays on any *four* of the following.

15. Retrograde metamorphism
16. Greenschist facies
17. Paired metamorphic belts
18. Metasomatism
19. Barrowian zones of metamorphism
20. Mylonites

(4x3=12 marks)

Answer any *two* of the following essay type questions.

17. Describe various factors that cause metamorphism.
18. Give an account of the facies concept. Describe green schist and amphibolite facies in detail.
19. Describe the petrography and origin of granulites.
20. Write an essay on metamorphic rocks and textures

(2x5=10 marks)

KANNUR UNIVERSITY
V SEMESTER B.Sc. PROGRAMME
STREAM: SCIENCE; CORE SUBJECT: GEOLOGY
5B 08 GEO – STRATIGRAPHY AND SEDIMENTARY PETROLOGY

Time: Three Hours

Maximum marks: 40

Answer all questions
Draw neat sketches wherever necessary

Answer in one word.

1. The smallest rock stratigraphic unit.
2. An accumulation of valuable minerals by gravity separation during the sedimentary process.
3. A cryptocrystalline sedimentary rock composed of silicon dioxide.
4. A coarse grained sedimentary rocks composed mainly of angular fragments

(4 X 1=4 marks)

*Write short answers to any **seven** of the following.*

- | | |
|-------------------|---------------------|
| 5. Diastem | 10. Kiesellghur |
| 6. Litho facies | 11. Skarn |
| 7. Type section | 12. Oolitic texture |
| 8. Terra rosa | 13. Guano |
| 9. Graded bedding | 14. Cross bedding |

(7 X 2=14 marks)

*Write Short essays on any **seven** of the following.*

15. Overlap and offlap
16. Geological time scale
17. Conglomerate and breccia
18. Ferruginous deposits
19. Diagenesis
20. Sand stone

(4 X 3=12 marks)

Answer any **two** of the following essay type questions.

21. Write an essay on fundamental principles of stratigraphy
22. Write an essay on the texture and structures of sedimentary rocks
23. Write an essay on the classification of sedimentary rocks based on genesis.
24. What are sandstones? Add a note on its classification

(2 X 5=10 marks)

KANNUR UNIVERSITY
V SEMESTER BSc. PROGRAMME
STREAM: SCIENCE; CORE SUBJECT: GEOLOGY
5B 09 GEO – GEOLOGY OF INDIA

Time: Three Hours

Maximum marks: 40

Answer all questions
Draw neat sketches wherever necessary

Answer in one word.

1. The environment of deposition of Cretaceous rocks of Trichinopoly
2. What is the boundary age of Quaternary-Tertiary period
3. The person who gave the name Charnockite.
4. The super group of rocks in central India which bear diamonds.

(4x1=4 marks)

Write short answers to any *seven* of the following.

- | | |
|---------------------------|----------------------------------|
| 5. Craton | 10. Cumbum shale |
| 6. Eparchean unconformity | 11. Bagh beds |
| 7. Infra-trappeans | 12. Umaria marine intercalations |
| 8. Tipam Formation. | 13. Lower Gondwana plant fossils |
| 9. Extra-peninsular India | 14. Karewa formation |

(7x2=14marks)

Write short essays on any *four* of the following.

15. Warkalli formation
16. Indo-gangetic alluvium
17. Sargur Super group
18. Marine intercalation beds of Gondwana
19. Vindhyan rocks
20. Cuddalore sandstone

(4x3=12 marks)

Write essays on any *two* of the following.

21. Describe the Aravalli Super Group of rocks.
22. Give an account of the Cretaceous rocks of Trichinopoly region.
23. Write essay on Gondwana Super Group and its economic importance.
24. Write an essay on geology of Kerala.

(2x5=10 marks)

KANNUR UNIVERSITY
V SEMESTER BSc. PROGRAMME
STREAM: SCIENCE; CORE SUBJECT: GEOLOGY
5B 10 GEO – STRUCTURAL GEOLOGY AND GEOTECTONICS

Time: Three Hours

Maximum marks: 40

Answer all questions
Draw neat sketches wherever necessary

Answer in one word

1. Fold in which fold axis plunges 90° from the strike of the axial plane.
2. The surface expression of convection plumes.
3. The vertical component of dip separation.
4. The plate boundary in which plate is consumed.

(4x1=4 marks)

Write short answer to any *seven* of the following.

- | | |
|--------------------|-----------------------|
| 5. Subduction zone | 10. Triple junction |
| 6. Disconformity | 11. Mineral lineation |
| 7. Schistosity | 12. True dip |
| 8. Contour lines | 13. Mylonite |
| 9. Plunge | 14. Recumbent fold. |

(7x2=14 marks)

Write short essay on any *four* of the following.

15. Island arcs
16. Recognition of folds
17. Geological maps
18. Width of outcrop
19. Outlier and inlier
20. Transform faults

(4x3=12marks)

Answer *two* of the following Essay type questions

17. What are faults? Describe the geometric classification of faults

Or

18. Write an essay on joints and their geological significance

19. What is seafloor spreading? Add a note on paleomagnetism

Or

20. Discuss the plate tectonic theory in terms of global earthquake

(2 x 5 =10 marks)

KANNUR UNIVERSITY
VI SEMESTER BSc. PROGRAMME
STREAM: SCIENCE; CORE SUBJECT: GEOLOGY
6B11GEO – ENVIRONMENTAL GEOLOGY

Time: Three Hours

Maximum marks: 40

Answer all questions

Answer in one word.

1. Example for one greenhouse gas
 2. The layer of atmosphere in which ozone is situated.
 3. A disease due to Cd pollution.
 4. The process of nutrient enrichment of water and consequent loss of species diversity.
- (4 x 1 = 4 marks)**

Give short answer to any *seven* of the following.

5. Renewable energy sources.
 6. Effect of volcanic eruption on global climate.
 7. What are water quality parameters?
 8. The methods to control soil erosion.
 9. How the ozone layer depletion occurs?
 10. What is sustainable development?
 11. What is silicosis?
 12. What is BOD?
 13. What is global warming?
 14. Define ecosystem
- (7 x 2 = 14 marks)**

Write short essays on any *four* of the following:

15. Impact of mining on environment?
 16. Environmental consequences of earthquakes.
 17. Heavy metal pollution.
 18. How the air pollution effect climate of an area?
 19. Role of geology in urban planning.
 20. Effect of flood.
- (4 x 3 = 12 marks)**

Write long essays on any *two* of the following.

21. Describe causes, effects and control of air pollution.
 22. Describe environmental consequences of landslides.
 23. Describe Environmental Impact Assessment. What is Environmental Impact of urbanization?
 24. What are environmental consequences of solid and nuclear wastes?
- (2 x 5 = 10 marks)**

KANNUR UNIVERSITY
VI SEMESTER BSc. PROGRAMME
STREAM: SCIENCE; CORE SUBJECT: GEOLOGY
6B12GEO – ECONOMIC GEOLOGY

Time: Three Hours

Maximum marks: 40

Answer all questions

Answer in one word or one sentence

1. Name a few important ores of manganese.
2. What is tenor of an ore?
3. An economic mineral which fluoresces under ultra violet radiation found in Kerala.
4. Aggregate of a mineral in an unusually high concentration. **(4 x 1 = 4 marks)**

Give short answer to any *seven* of the following.

5. What are Eluvial Placers?
6. What is Metallogenic Epoch?
7. What are geobotanical guides?
8. Principles of gravity survey.
9. Write notes on phosphatic nodules.
10. What are gossans?
11. Secondary enrichment.
12. gangue minerals.
13. Syngenitic ore deposits
14. Fertilizer minerals **(7 x 2 = 14 marks)**

Write short essays on any *four* of the following:

15. Gravity method of exploration.
16. Describe types of iron ores.
17. Contact metasomatic deposits.
18. Types of coal.
19. Industrial use of garnets.
20. Structural control of ore localization. **(4 x 3 = 12 marks)**

Write long essays on any *two* of the following.

17. Give an account of mineral deposits of Kerala.
18. Write an essay on ores of aluminium.
19. Explain oxidation and supergene sulphide enrichment processes.
20. Describe the mode of occurrence and distribution of the coal deposits of India. **(2 x 5 = 10 marks)**

KANNUR UNIVERSITY
VI SEMESTER BSc PROGRAMME
CORE SUBJECT: GEOLOGY
6B13GEO – PALAEOLOGY

Time: 3 Hours

Max. marks: 40

I. Answer in one word or one sentence.

1. The process by which the original calcite or aragonite shell replaced by dolomite.
2. Name a rock forming Protozoa.
3. Name the outer layer of the body of coelentrata.
4. The system of vessels in Echinoderms that directly communicate with sea water which function in respiration and locomotion. **(4 X 1 = 4Marks)**

II. Write short note on any *seven* of the following.

5. Pyrite disease.
6. Inhabitation of Protozoa.
7. Free living and fixed form of Echinoderms.
8. Morphology of nautilus.
9. Lepidodendron.
10. Index and zone fossils.
11. Microfossils.
12. Collumella.
13. Ceratitic suture pattern.
14. Adductor muscles. **(7 X 2 = 14Marks)**

III write short essay on any *four* of the following.

15. Petrification.
16. Benthonic and planktonic marine environment.
17. Morphology of ceolentrata.
18. Glossopteris.
19. Suture patterns of cephalopods.
20. Siwalik mammals. **(4 X 3 = 12Marks)**

IV Write essay on any *two* of the following.

21. Types of fossilization and kinds of preservations.
22. Scientific value and uses of foraminifera.
23. Evolution of fishes.
24. Paleoecology of plant fossils. **(2 X 5 = 10Marks)**

KANNUR UNIVERSITY
VI SEMESTER BSc. PROGRAMME
STREAM: SCIENCE; CORE SUBJECT: GEOLOGY
6B14GEO – DISASTER MANAGEMENT

Time: Three Hours

Maximum marks: 40

Answer all questions
Draw neat sketches wherever necessary.

Answer in one word .

1. The natural disaster for which rock bolts are used for prevention.
2. An example pesticide harmful to human health.
3. A structure used to minimize coastal erosion.
4. An example for chemical disaster in India.

(4 x 1 = 4 marks)

Give short answer to any *seven* of the following.

5. Man-made disasters.
6. Waste management methods.
7. What is disaster management act?
8. Flooding and its consequences.
9. Methods to prevent and mitigate droughts.
10. Differentiate hazard and disaster.
11. Coastal erosion and disaster management
12. Change in land use.
13. Disaster risk management
14. Response to disaster

(7 x 2 = 14 marks)

Write short essays on any *four* of the following:

15. Impact of dams on environment.
16. Nuclear disasters and preparedness.
17. Disaster relief camps.
18. What are climate related disasters?
19. Environmental Impact Assessment.
20. Hazards and vulnerability profile of India

(4 x 3 = 12 marks)

Write long essays on any *two* of the following.

17. Give an account of approaches to disaster risk reduction.
18. Describe pesticide contamination and its consequences.
19. Describe geologically related disasters and management plan for them.
20. Describe common type of disasters in Kerala and disaster management plan for them?

(2 x 5 = 10 marks)

MODEL QUESTION PAPER FOR U.G. OPEN COURSE (GEOLOGY) – THEORY

KANNUR UNIVERSITY
V SEMESTER UG PROGRAMME
OPEN COURSE IN GEOLOGY
5D 01 GEO : Water Resources Development and Management

Time: 2 hours

Total Marks: 20

Answers can be written only in English

Section A

Objective type questions. Answer **all 5** questions.

1. The interstitial water which was present in the rock right from the time of their deposition.
(a) Meteoric water (b) juvenile water (c) connate water (d) stream water
2. The rock which is neither porous nor permeable.
(a) aquifer (b) aquiclude (c) aquitard (d) aquifuge
3. Which of the following rock has highest primary porosity?
(a) Granite (b) sandstone (c) Gneiss (d) Dolerite
4. The composition of stalagmites.
(a) CaCO₃ (b) CaSO₄ (c) CuSO₄ (d) ZnSO₄
5. The alluvial deposits of roughly triangular shape that are deposited by major rivers at their mouths
(a) Alluvial fans (b) Deltas (c) Natural levees (d) Flood plains **(5x1 = 5 marks)**

Section B

Write short answers on any **three** of the following.

6. Drainage pattern
7. Hydrological cycle
8. Artificial recharge
9. Water quality standards by WHO
10. Borewells

(3x2=6 marks)

Section C

Write short essays on any **three** of the following.

11. Water resource development
12. Ground water provinces of India
13. Sea water intrusion
14. Ground water pollution
15. Geological work of rivers

(3x3=9 marks)

COMPLEMENTARY COURSE GEOLOGY

Scheme Complementary Course in GEOLOGY w.e.f 2014 admission

Sem.	Course code	Name of the course	Hours / week	Total Hours	Credits	Marks		
						Internal	External	Total
I	1C 01 GEO	Geology I	2	36	2	8	32	40
		Geology I Practical	2	36	0	0	0	0
II	2C 02 GEO	Geology II	2	36	2	8	32	40
		Geology II Practical	2	36	0	0	0	0
III	3C 03 GEO	Geology III	3	54	2	8	32	40
		Geology III Practical	2	36	0	0	0	0
IV	4C 04 GEO	Geology IV	3	54	2	8	32	40
	4C 05GEO(P)	Geology Practical*	2	36	4	8	32	40
Total					12	40	160	200

*End semester Examination includes practical done in all the 4 semesters.

1 C 01 GEO : GEOLOGY I

Module 1: Introduction to Earth Science . Earth and Solar System. Origin of the earth. Age of the earth . Relative age and absolute age . Size of the earth. Internal constitution of the earth –Crust , Mantle and Core. Interior of the earth .The rock cycle – Igneous , Sedimentary and Metamorphic Rocks. (8hrs)

Module 2: Internal and external processes. Rock weathering. Agents and causes of weathering Physical and chemical weathering. Soil -Types and Classification of soil . Soil profile. Soil erosion (6 hrs)

Module 3 : Mass wasting . Different types of mass wasting. Causes and effects of landslides. Concept of isostasy. Orogeny and epirogeny . Mountains and mountain building. (6 hrs)

Module 4: Groundwater. Sources. Hydrologic cycle. Occurrence of groundwater. Hydrologic properties of water bearing rocks – aquifers , aquicludes, aquitard aquifuge. Types of aquifers – confined, unconfined and artesian aquifers. Springs . Geological work of underground water. Conservation of groundwater. (8 hrs)

Module 5 : Continental drift . Plate tectonics . Seafloor spreading . Palaeomagnetism.

(8 hrs)

References.

1. Thompson, G. R. and Turk, J. (1997) Introduction to Physical Geology. 2nd Edn. Thompson Brooks Publishers.
2. Carlson, D. and Plummer, C. (2010) Physical Geomorphology: Earth Revealed. 9th Edn., Mc-Graw Hill Co.
3. Bloom, A.L. (1992) Geomorphology, Second Edition, Prentice Hall India Pvt. Ltd., New Delhi.
4. Holmes, A. (1981) Principles of Physical Geology. ELBS, Third Edition. Thomas Nelson.
5. Physical Geology: Exploring the Earth James Stewart Monroe, Reed Wicander 2005 Thomson Brooks/Cole 644 page
6. Cliffs Quick Review Physical Geology Mark J. Crawford 1998 Wiley 258 p
7. Earth: An Introduction to Physical Geology Edward J. Tarbuck, Frederick K. Lutgens, Dennis Tasa 2007 Pearson 720 p
8. Strahler, A.N. (1971) Earth Sciences. 2nd Edition, Harper and Row.
9. Thornbury, W.D. (1968) Principles of Geomorphology, Wiley.
10. Laboratory Manual for Physical Geology James H Zumberge, Robert H. Rutherford, James L Carter 2006 McGraw-Hill Higher Education 289 p
11. How Does Earth Work?: Physical Geology and the Process of Science Gary Allen Smith, Aurora Pun 2006 Pearson Prentice Hall 641 p

Hours per week : 2
External Marks 32 Internal marks 08

Total Hours : 36
Credits : 2

2 C 02 GEO : GEOLOGY II

Module 1: Streams – overland flow, channel flow. Types of streams. Drainage basins, patterns. Geological work of streams – erosion, transportation, deposition – types of loads – long profile of stream – graded stream. Concept of base level – fluvial aggradational and degradational landforms. (8 hrs)

Module 2: Glaciers – types, distribution, geological work – glacial landforms, moraines. Wind – geological action of wind – aeolian landforms. Oceans and seas – geological activity of ocean and sea waves. Sea level changes and their causes. Submarine topography, coral reefs, coastal landforms – marine sediments. (8 hrs)

Module 3 : Volcanoes – mechanism, types, products. Distribution of volcanoes, volcanic landforms. Earthquakes – causes, types, seismic waves, epicentre, focus, isoseismal lines, intensity and magnitude, Seismic belts. (8 hrs)

Module 4: Minerals and crystals – study of crystals and its significance in mineral identification. Physical properties of minerals – colour, streak, lustre, transparency, fracture, cleavage, hardness, specific gravity, magnetism (4 hrs)

Module 5 : Chemical composition and diagnostic properties of the following minerals:-Quartz, feldspar, biotite, muscovite, hornblende, calcite, garnet, hematite, gypsum, kyanite, sillimanite, magnetite, chromite, pyrite, chalcopyrite, apatite, actinolite, beryl, magnesite, fluorite, talc, pyrolusite, galena, dolomite, corundum, graphite, sphalerite, diamond, coal, asbestos, monazite, bauxite. (8 hrs)

References.

1. Thompson, G. R. and Turk, J. (1997) Introduction to Physical Geology. 2nd Edn. Thompson Brooks Publishers.
2. Carlson, D. and Plummer, C. (2010) Physical Geomorphology: Earth Revealed. 9th Edn., Mc-Graw Hill Co.
3. Bloom, A.L. (1992) Geomorphology, Second Edition, Prentice Hall India Pvt. Ltd., New Delhi.
4. Holmes, A. (1981) Principles of Physical Geology. ELBS, Third Edition. Thomas Nelson.
5. Mcalister, A.L. and Hay, E.A. (1975) Physical Geology, Principles and Perspectives. Prentice Hall Inc. London.
6. Strahler, A.N. (1971) Earth Sciences. 2nd Edition, Harper and Row.
7. Thornbury, W.D. (1968) Principles of Geomorphology, Wiley.
8. Dana, E.S. (1962) A text book of Mineralogy (Revised by Ford). Asia Publishing House, Wiley.
9. Philips F.C. (1956) An Introduction to Crystallography. Longmans Green 20
10. Read, H.H. (1984) Rutley's Elements of mineralogy. CBS Publishers, Delhi.

3 C 03 GEO : GEOLOGY III

Module 1: Magma – physical and chemical properties, lava and its types. Igneous rocks – texture, mode of occurrence – dykes, sills, laccolith, lopolith, stock, batholith, phacolith. Classification of igneous rocks – megascopic study of igneous rock types – granite, pegmatite, rhyolite, dunite, dolerite, pumice, syenite, gabbro, diorite, basalt. (10 hours)

Module 2: Brief study of sediments and sedimentary rocks. Structural and textural features – field classification. Megascopic study of the following sedimentary rocks – sandstone, shale, limestone, conglomerate, breccia, laterite. (10 hours)

Module 3 : Metamorphism – types and factors. Textures of metamorphic rocks. Megascopic study of the following metamorphic rocks – phyllite, slate, schist, gneiss, quartzite, marble, granulite, charnockite, khondalite. (10 hours)

Module 4: Topographical maps and geological maps – their preparation, conventional symbols. Structural features controlling landform development. Outcrops, strike and dip of surfaces, primary and secondary structures, unconformities and their geological significance. Folds, geometrical elements – geometrical classification, brief study of the following – antiform, synform, anticline, syncline, isoclinal fold, recumbent fold, overturned fold, geanticline, geosyncline, anti and synclinoriums. (12 hours)

Module 5 : Faults – terminologies, types, study of the following – normal, reverse, strike slip and dip slip faults, horst, graben, rift valley. Joints – types and geological significance. Foliation and lineation. (12 hours)

References.

1. Tyrrell, G.W. (1978) The principles of petrology – Chapman and Hall Ltd. London.
2. Bowen, N.L.M The Evolution of the Igneous Rocks – Dover publication, Inc, New York
3. Barth, FW. (1962) Theoretical Petrology -Wiley.
4. Turner.F.J and Verhoogen.J (1960) Igneous and Metamorphic Petrology – McGraw Hill.
5. Johannesen, A – (1962) Descriptive petrography of Igneous Rocks, Vols. I to IV – Allied Pacific.
6. Hyndman, D.W. (1972) Petrology of igneous and Metamorphic Rocks. Mc-Graw Hill.
7. Billings M.P. (1972) Structural Geology.Third Edition. Prentice Hall, New Delhi.
8. De Sitter (1964) Structural Geology. Second Edition, McGraw Hill Co.
9. Lahee (1987) Field Geology. Sixth Edition, McGraw Hill Co.

Hours per week : 3

Total Hours : 54

External Marks: 32, Internal marks: 8

Credits : 2

4 C 04 GEO : GEOLOGY IV

Module 1: Stratigraphy – its content, basic principles, uniformitarianism, order of superposition, lateral continuity, original horizontality, faunal succession, faunal assemblages. Geological time scale and basic time units – eon, era, period, epoch. (8 hours)

Module 2 : Major geological divisions of India – brief study of the stratigraphy of Kerala – Precambrian, Tertiary and Quaternary formations. (11 hours)

Module 3 : Palaeontology – its branches, fossils, types of fossilization, and uses of fossils. General morphological features of typical brachiopod, pelecypod, gastropod and arthropod.) (11 hours)

Module 4: Economic geology – ore, gangue and industrial minerals. Brief study of important processes of ore mineral formation. Magmatism, hydrothermal process, volcanism, contact metasomatism, metamorphism, evaporites, residual and mechanical concentration, supergene sulphide enrichment. (12 hours)

Module 5 : Mode of occurrence, geographic location in India, and geology of the following mineral deposits. Iron – Kudremukh, Karnataka Lead and Zinc – Zawar, Rajasthan Gold – Kolar, Karnataka Mica – Nellore, Andhra Pradesh Manganese – Chindwara, Madhya Pradesh Copper – Khetri, Rajasthan Aluminium – Koraput, Orissa Lignite – Neyveli, Tamil Nadu Coal – Bokaro, Bihar Petroleum – Naharkotiya, Assam and Bombay High (12 hours)

References.

1. Krishnan, M.S. (1982) Geology of India and Burma, 6th edition.
2. Ravindra Kumar (1985) Fundamentals of Historical Geology and Stratigraphy of India.
3. Wadia D. N. (1944) Geology of India. MacMillan and Co. Limited.
4. Dunbar, C.O and Rogers, J. (1961) Principles of Stratigraphy. Wiley Publications.
5. Gokhale and Rao (1978) Ore deposits of India. Thomson Press (India)
6. Jensen, m and Bateman, A.M. (1981) Economic Mineral Deposits. John Wiley & Sons Inc
- 7.. Krishnaswamy, S. (1988) Indian Mineral Resources. 3rd Edition. South Asia Books
8. Sinha, R.K (1982) Industrial minerals. Oxford and IBH Publishing Co.
9. Woods, H. (1961) Invertebrate Palaeontology. Cambridge University Press.

Marks, external: 32
internal: 08

Credit:4

4 C 05 GEO- GEOLOGY PRACTICAL

GEOLOGY PRACTICAL I (hours per week: 2; total hours: 36; I Sem)

1. Preparation of diagrams of the following – rock cycle, hydrological cycle, subsurface groundwater occurrence, confined, unconfined and artesian aquifers.
2. Preparation of diagram of typical soil profile.

GEOLOGY PRACTICAL II (hours per week: 2; total hours: 36; II Sem)

1. Exercises in identification of salient topographic and drainage features using topographic maps. 1 : 50,000 or 1 : 25,000 Survey of India of toposheets.
2. Megascopic identification of rock forming minerals and ore minerals listed in the theory part of the syllabus.

Also revision of practicals done during I Semester .

GEOLOGY PRACTICAL III(hours per week :2; total hours : 36; III Sem)

1. Preparation of chart showing classification of igneous, metamorphic and sedimentary rocks.
2. Block diagrams of the following: fold - anticline, syncline, recumbent fold, isoclinal fold. Fault – normal, reverse, dipslip, strike slip, graben, horst. Unconformity – angular, disconformity, non-conformity. Joints, dykes, sills, laccolith, lopolith, batholith, phaccolith.
3. Measurement of slope and distance in topographic maps. Completion of outcrops in contour maps. Determination of strike and dip of formations from maps. Interpretation of geological maps with simple structures (fold, fault, unconformity).

GEOLOGY PRACTICAL IV(hours per week :2; total hours : 36; IVSem)

1. Preparation of chart of geological time scale, mineral map of Kerala, map of India showing locations of important mineral deposits mentioned in the theory syllabus.
2. Geological map of Kerala showing distribution of major stratigraphic units. 3. Diagram of a shell of a typical brachiopod, pelecypod, gastropod (ammonite) and trilobite.

Pattern of Questions & Marks for External Examination- Complementary Geology

	Total Questions	No. Of Questions to be answered	Mark for each Question	Total Marks
Objective	5	5	1	5
Short answer	6	4	2	8
Short essay/Problems	5	3	3	9
Essay	4	2	5	10
	20	14		32

KANNUR UNIVERSITY
II SEMESTER BSc. PROGRAMME
STREAM: SCIENCE , CORE SUBJECT: GEOGRAPHY
COMPLEMENTARY SUBJECT : GEOLOGY
1C01 -GEO- GEOLOGY

Time: Three Hours

Maximum marks: 32

Answer all questions
Write only in English
Draw neat sketches wherever necessary.

Objective type –each carries 1 mark-answer all 5 questions

1. The equatorial dimension of the earth
- 2.. Age of the earth
3. The layer of the earth between the crust and the mantle.
4. The agent of weathering involved in arid regions
5. Who proposed the concept of Continental Drift ?

(5x1 = 5 marks)

Short Answer Type –each carries 2 marks – Answer any 4 questions

6. What are hotspots ?
7. What is crust?
8. Explain Talus
9. Orogeny
10. Hydrologic cycle
11. Landslides

(4x2 = 8 marks)

Short Essay type- Each carries 3 marks- Answer any 3

12. Palaeomagnetism
13. Rock Cycle
14. Artesian wells
15. Groundwater recharge
16. Lithosphere.

(3x3 = 9 marks)

Long Essay type – each carries 5 mark- Answer 2 questions.

17. Give an account on the geological work of groundwater..
18. Describe the processes of weathering. Add a note on soil profile.
19. What are plate tectonics? Elaborate your answer on continental movements.
20. Describe the various methods followed in determining the age of the earth.

(2x5 = 10 marks)

KANNUR UNIVERSITY
I SEMESTER BSc. PROGRAMME
STREAM: SCIENCE , CORE SUBJECT: GEOGRAPHY
COMPLEMENTARY SUBJECT : GEOLOGY
2C02GEO- GEOLOGY

Time: Three Hours

Maximum marks: 32

Answer all questions
Write only in English
Draw neat sketches wherever necessary.

Objective type –each carries 1 mark-answer all 5 questions

1. Which type of volcano is found in Hawaiian island?
 2. Name the coral reef enclosing a lagoon between land and sea?
 3. Name of the mineral having composition Al_2SiO_5 .
 4. Streak of hematite.
 5. Sea level changes of global dimension
- (5x1 = 5 marks)**

Short Answer Type –each carries 2 marks – Answer any 4 questions

6. What is a Meander ?
 7. Flat topped sub marine mountains
 8. Physical properties of feldspar
 9. Cleavage in minerals
 10. P Waves
 11. Graded stream
- (4x2 = 8 marks)**

Short Essay type- Each carries 3 marks- Answer any 3

12. Drainage pattern
 13. Seismic Belts of India.
 14. Chemical composition and diagnostic properties of diamond
 15. Aeolian land forms
 16. Hardness in minerals.
- (3x3 = 9 marks)**

Long Essay type – each carries 5 mark- Answer 2 questions.

17. Give an account on the development and evolution of fluvial land forms.
 18. Describe the processes of glacial erosion, transportation and deposition. Add a note on the different types of glaciers and glacial land forms
 19. What are the physical properties of minerals? Add a note on different physical properties and how it helps to identify minerals
 20. Give an account on the causes and types of earthquakes. Add a note on the environmental consequences due to earthquake.
- (2x5 = 10 marks)**

KANNUR UNIVERSITY
I SEMESTER BSc. PROGRAMME
STREAM: SCIENCE , CORE SUBJECT: GEOGRAPHY
COMPLEMENTARY SUBJECT : GEOLOGY
3C03- GEO- GEOLOGY

Time: Three Hours

Maximum marks: 32

Answer all questions
Write only in English
Draw neat sketches wherever necessary.

Objective type –each carries 1 mark-answer all 5 questions

1. Name a monomineralic igneous rock.
2. Name the texture shown by a metamorphic rock with alternating bands of light and dark Minerals.
3. Lines joining points of equal elevation.
4. Fold in which axial plane is horizontal.
5. A fault in which normal fault moves down with respect to foot wall. **(5x1 = 5 marks)**

Short Answer Type –each carries 2 marks – Answer any 4 questions

6. What are grabens ?
7. Explain Batholith
8. What are map symbols?
9. Slaty cleavage
10. Unconformity
11. Ripplemarks **(4x2 = 8 marks)**

Short Essay type- Each carries 3 marks- Answer any 3

12. Give a brief account on sandstones.
13. Describe classification of igneous rocks.
14. Megascopic features of Khondalite.
15. Give an account on Joints.
16. Geological maps **(3x3 = 9 marks)**

Long Essay type – each carries 5 mark- Answer 2 questions.

17. What are faults? Add a note on different types of faults..
18. How foliation and lineations are formed? Describe different types.
19. What are textures and structures? Briefly describe the sedimentary structures.
20. Describe the physical and chemical properties of magma. Add a note on the types of lavas. **(2x5 = 10 marks)**

KANNUR UNIVERSITY
I SEMESTER BSc. PROGRAMME
STREAM: SCIENCE , CORE SUBJECT: GEOGRAPHY
COMPLEMENTARY SUBJECT : GEOLOGY
4C04GEO- GEOLOGY

Time: Three Hours

Maximum marks: 32

Answer all questions
Write only in English
Draw neat sketches wherever necessary.

Objective type –each carries 1 mark-answer all 5 questions

1. Who formulated the theory of uniformitarianism?
- 2.. The youngest Period of Palaeozoic Era.
3. Name the term used to denote the study of spores and pollens .
4. Example of an evaporate
5. Name the sinistrally coiled gastropod. **(5x1=5 marks)**

Short Answer Type –each carries 2 marks – Answer any 4 questions

6. What is meant by faunal succession? ?
7. What is meant by order of superposition?
8. Explain the dentition in lamellibranchs.
9. Basic time units of the geologic timescale
10. Lead Zinc deposits of Zawar
11. What is petrification? **(4x2 = 8 marks)**

Short Essay type- Each carries 3 marks- Answer any 3

12. Major geologic divisions of India
13. Morphological features of brachiopod.
14. Supergene sulphide enrichment
15. Neyveli Lignite
16. Types of fossilization . **(3x3 =9 marks)**

Long Essay type – each carries 5 mark- Answer 2 questions.

17. Give an account on the mode of occurrence, geographic location and geology of iron ores of India
18. What are trilobites? Add a note on the morphological features with a neat diagram.
19. Give a brief account on the important processes of ore mineral formation with special reference to hydrothermal processes.
20. Briefly describe the stratigraphy of Kerala. **(2x5 = 10 marks)**