UNIVERSITY OF CALICUT

(Abstract)

B.Sc programme in Geology under Choice Based Credit Semester System Scheme and Syllabus – implemented with effect from 2009 admission – approved – Orders issued.

GENERAL AND ACADEMIC BRANCH – I 'J' SECTION

No. GA I/J2/2492/07 Dated, Calicut University. P.O., 23.06.2009.

Read: 1. U.O.No.GAI/J2/3601/08 Vol.II dated 19.06.2009.

2. Item No.2 of the minutes of the meeting of the Board of Studies in Geology held on 16.12.2008.

3. Minutes of the meeting of the Board of Studies in Geology held on 02.05.2009.

4. Item No.II 2 of the minutes of the meeting of the Faculty of Science held on 05.05.2009.

5. Extract of the minutes of the meeting of the Academic Council held on 14.05.2009 (Item II.A2).

O R D E R

Choice Based Credit Semester System and Grading has been introduced for UG curriculum in the affiliated colleges of the University with effect from 2009 admission onwards and the Regulation for the same implemented vide paper cited 1 above.

Vide paper read as 2, the Board of Studies in Geology resolved to conduct 5-day workshop for restructuring UG curriculum and vide paper read as 3 above, the Board unanimously approved the draft regulation for Choice Based Credit Semester System (UG) 2009 of Calicut University. The Board of Studies in Geology also approved the syllabus prepared for UG programme in Geology under Choice Based Credit Semester System 2009.

The Faculty of Science vide paper read as 4 above resolved to approve the minutes of the meetings of the Board of Studies in Geology held on 16.12.2008 and 02.05.2009.

The Academic Council vide paper 5 above approved the minutes of the Faculty of Science.

Sanction has therefore been accorded for implementing the Scheme and Syllabus of B.Sc Geology programme under Choice Based Credit Semester System from 2009 admission onwards.

Orders are issued accordingly. Syllabus is appended.

Sd/-

DEPUTY REGISTRAR (G&A I)

For REGISTRAR.

To

The Principals of all affiliated Arts

and Science Colleges offering B.Sc Geology Programme.

Copy to: PS to VC/PA to PVC/PA to Registrar/

Convenor, CCSS (UG), C.E, Ex Sn, Enquiry, EGI,

System Administrator (with a request to upload in University website), Information Centres, G&A-I 'A', 'F', 'G' Sections.

Forwarded by Order

Section Officer

Restructured curriculum for B.Sc. Programme in Geology (core) with Chemistry and Physics/ Statistics/ Remote Sensing & GIS as Complementaries

Submitted to

UNIVERSITY OF CALICUT

Submitted by

Board of Studies in Geology (UG&PG)

University of Calicut

March 2009.

University of Calicut

Undergraduate Programme in Geology

Rules & Regulations and Syllabus

Rules and regulations

The Calicut University regulations for under-graduate curriculum 2009 (CCSSUG 2009) is applicable to undergraduate programme in GEOLOGY.

Admission

Registration and admission to the undergraduate programme in Geology will be as per the rules and regulations of the University. Minimum qualification for the admission is a pass in higher secondary (10+2 Science scheme) or qualifications announced by the University from time to time.

The applicants for B.Sc Geology Course will be ranked as follows: The total marks obtained for Part III Optionals at the Higher secondary or equivalent level plus highest marks scored for any one of the subsidiaries among Physics/Chemistry/Computer Science/Mathematics/Geology/Biology. A bonus mark of 20 should be given for those candidates who have taken Geology as an optional subject at higher secondary or equivalent examination. In the case of a tie, preference shall be given as per the following order:

(i) Candidates with Geology as optional subject

(ii) Marks for Geology

(iii) Marks for Chemistry

(iv) Marks for Physics

(v) Marks for Mathematics

(vi) Marks for Computer Science

(vii) Alphabetical Order of the applicants

(U.O No.GAI/JI/4440/99(2) Dated 13-05-2004)

Programme structure

Duration of the programme shall be six semesters distributed in a period of three years. Each semester consists of a minimum of 90 working days, including examination, distributed over 18 weeks each of 5 working days.

The Programme leading to B.Sc.Geology shall have the following courses from four types of courses viz. Common Course, Core Course, Complementary Course and Open Course.

Common Courses (10 theory) with 38 credits

Core courses (10 Theory, 8 Practicals, 1 Elective theory, and Project,) with 54 credits

Open Course (one from other department) with 4 credits and

Complementary courses **(4 Theory and 4 Practical Courses each from Chemistry and Physics/Statistics/Remote Sensing &GIS)** with 24 credits.

There shall be a total of 38 courses with total credit of 120.

Evaluation

There shall be examination at the end of each semester which is to be conducted by the University. All the University **Practicals are restricted to fourth and sixth semesters**. Both theory and practical examinations will be of three hour duration.

Internal Assessment:

Internal Assessment content shall be restricted to 25% of the total. The components of continuous internal assessment are

Theory:

Sl No	Components	% of the total	Weightage
1	Attendance	5	1
2	Test paper	10	2
3	Seminar	5	1
4	Assignment	5	1

Practical:

Sl No	Components	% of the total	Weightage
1	Attendance	5	1
2	Practical test	10	2
3	Record	5	1
4	Viva	5	1

Component :Theory / Practical test Conduct Minimum Two test papers and take the average grade					
Grades Awarded	**A**	**B**	**C**	**D**	**E**
Grade points	**4**	**3**	**2**	**1**	**0**

Component :Attendance					
Grades Awarded	A (95% & above)	B 85 to 95	C 80 to 85	D 75 to 80	E (< 75%)
Grade points	4	3	2	1	0

Components :Seminar / Assignment/ Record/Project /Viva					
Grades Awarded	A (Excellent)	B (Very Good)	C (Good)	D (Average)	E (Poor)
Grade points	4	3	2	1	0

Grade of Internal:

Sl No	Components	Grade	Weightage	WGP (Weighted Grade Points)
1	Attendance		1	
2	Theory/ Practical test		2	
3	Assignment/ Record		1	
4	Seminar/ viva		1	
	Total		5	

Grade = ∑ WGP/5

External Evaluation

Type of Questions	No of Questions	Grades Awarded / Grade Points	Weightage	WGP (Weighted Grade Points)
Objective (in bunches of **four**)	5	A (4), B(3), C(2), D(1), E(0)	1*5 =5	
Short Answer	7	A (4), B(3), C(2), D(1), E(0)	1*7 = 7	
Short Essay	5	A (4), B(3), C(2), D(1), E(0)	2*5=10	
Long Essay	2	A (4), B(3), C(2), D(1), E(0)	4*2=8	
			30	

Overall grade of the answer paper = Sum of Weighted Grade Points / Sum of the Weightage

Overall grade of the course:

Course	**Weightage**		**Grade**	**WGP**
Name of Course	**External**	**3**		
	Internal	**1**		

Grade of the Course = ∑ **WGP/4**

Semester I

No	Course Code	Course Title	Hrs/ week	Total Hrs.	Credits
1	**1 A 01**	**Communicative Skills in English**	**4**	**72**	**3**
2	**1 A 02**	**Critical Reasoning, Writing and Presentation**	**5**	**90**	**3**
3	**1 A 07**	**Communication Skills in Other Languages**	**4**	**72**	**4**
4	**GL1B01**	**Perspectives & Methods in Science And Earth Processes**	**2**	**36**	**2**
5	**GL1B02(P)**	**Field Geology**	**2**	**36**	**0**
6	**CH1C01**	**Chemistry course 1**	**2**	**36**	**2**
7	**CH1C02 (P)**	**Chemistry Practical 1**	**2**	**36**	**0**
8	**PH/ST/RS1C03**	**Physics/Statistics/Remote sensing & GIS course 1**	**2**	**36**	**2**
9	**PH/ST/RS1C04(P)**	**Physics/Statistics/Remote sensing & GIS Practical 1**	**2**	**36**	**0**
		Total	**25**	**450**	**16**

Semester II

No	Course Code	Course Title	Hrs/ week	Total Hrs.	Credits
1	**2 A 03**	**Reading Literature in English**	**4**	**72**	**4**
2	**2 A 04**	**Readings on Indian Constitution, Secularism and Sustainable Environment**	**5**	**90**	**4**
3	**2 A 08**	**Translation and Communication in Other Languages**	**4**	**72**	**4**
4	**GL2B03**	**Dynamic Geology and Geoinformatics**	**2**	**36**	**2**
5	**GL2B04(P)**	**Geoinformatics**	**2**	**36**	**0**
6	**CH2C05**	**Chemistry course 2**	**2**	**36**	**2**
7	**CH2C06 (P)**	**Chemistry Practical 2**	**2**	**36**	**0**
8	**PH/ST/RS2C07**	**Physics/Statistics/Remote sensing & GIS course 2**	**2**	**36**	**2**
9	**PH/ST/RS2C08(P)**	**Physics/Statistics/Remote sensing & GIS Practical 2**	**2**	**36**	**0**
		Total	**25**	**450**	**18**

Semester III

No	Course Code	Course Title	Hrs/ week	Total Hrs.	Credits
1	**3 A 05**	**Literature and Contemporary Issues**	**5**	**90**	**4**
2	**3 A 09**	**Literature in Other Languages**	**5**	**90**	**4**
3	**GL3B05**	**Crystallography**	**3**	**54**	**3**
4	**GL3B06(P)**	**Crystallography**	**2**	**36**	**0**
5	**CH3C09**	**Chemistry course 3**	**3**	**54**	**2**
6	**CH3C10 (P)**	**Chemistry Practical 3**	**2**	**36**	**0**
7	**PH/ST/RS3C11**	**Physics/Statistics/Remote sensing & GIS course 3**	**3**	**54**	**2**
8	**PH/ST/RS3C12(P)**	**Physics/Statistics/Remote sensing & GIS Practical 3**	**2**	**36**	**0**
		Total	**25**	**450**	**15**

Semester IV

No	Course Code	Course Title	Hrs/ week	Total Hrs.	Credits
1	**4 A 06**	**History and Philosophy of Science**	**5**	**90**	**4**
2	**4 A 10**	**Culture and Civilization**	**5**	**90**	**4**
3	**GL4B07**	**Mineralogy**	**3**	**54**	**3**
4	**GL4B08(P)**	**Crystallography & Mineralogy**	**2**	**36**	**4**
5	**CH4C13**	**Chemistry course 4**	**3**	**54**	**2**
6	**CH4C14 (P)**	**Chemistry Practical 4**	**2**	**36**	**4**
7	**PH/ST/RS4C15**	**Physics/Statistics/Remote sensing & GIS course 4**	**3**	**54**	**2**
8	**PH/ST/RS4C16(P)**	**Physics/Statistics/Remote sensing & GIS Practical 4**	**2**	**36**	**4**
		Total	**25**	**450**	**27**

Semester V

No	Course Code	Course Title	Hrs/ week	Total Hrs.	Credits
1	**GL5B09**	**Stratigraphy & Indian Geology**	**4**	**72**	**3**
2	**GL5B10**	**Palaeontology**	**3**	**54**	**3**
3	**GL5B11**	**Structural Geology& Geotectonics**	**3**	**72**	**3**
4	**GL5B12(P)**	**Palaeontology**	**5**	**90**	**0**
5	**GL5B13(P)**	**Structural Geology**	**5**	**90**	**0**
6	**Open course 1 (for other stream)**				
	GL5D01	**Gemmology**	**3**	**54**	**4**
	GL5D02	**Ground water Exploration & management**			
	GL5D03	**Under standing the Earth**			
	GL5D04	**Nanotechnology**			
7	**GL5B14(Pr)**	**Project work/Study Tour**	**2**	**36**	**0**
		Total	**25**	**450**	**13**

Semester VI

No	Course Code	Course Title	Hrs/ week	Total Hrs.	Credits
1	**GL6B15**	**Economic Geology**	**4**	**72**	**3**
2	**GL6B16**	**Igneous Petrology**	**3**	**54**	**3**
3	**GL6B17**	**Sedimentary & Metamorphic Petrology**	**3**	**54**	**3**
4	**GL6B18(P)**	**Petrology & Palaeontology**	**5**	**90**	**8**
5	**GL6B19(P)**	**Economic Geology & Structural Geology**	**5**	**90**	**8**
6	**Core Course Elective**				
	GL6B20(E01)	**Disaster management**	**3**	**54**	**2**
	GL6B20(E02)	**Geo exploration**			
	GL6B20(E03)	**Geo technical Engineering**			
	GL6B20(E04)	**Environmental Geology**			
7	**GL6B21(Pr)**	**Project work/Study Tour**	**2**	**36**	**4**
		Total	**25**	**450**	**31**

CORE COURSE: GEOLOGY- THEORY

Sl.No	Semester	Course Code	Course Name	Hours	Credits
1	I	GL1B01	Perspectives & Methods in Science And Earth Processes	36	2
2	II	GL2B03	Dynamic Geology And Geoinformatics	36	2
3	III	GL3B05	Crystallography	54	3
4	IV	GL4B07	Mineralogy	54	3
5	V	GL5B09	Stratigraphy& Indian Geology	72	3
6		GL5B010	Palaeontology	54	3
7		GL5B11	Structural Geology &Geotectonics	54	3
8	VI	GL6B15	Economic Geology	72	3
9		GL6B16	Igneous Petrology	54	3
10		GL6B17	Sedimentary & Metamorphic Petrology	54	3

CORE COURSE: GEOLOGY- PRACTICAL

No	Semester	Course Code	Course Title	Hours	Credits
1	I	GL1B2(P)	Field Geology	36	0
2	II	GL2B4(P)	Geoinformatics	36	0
3	III	GL3B6(P)	Crystallography	36	0
4	IV	GL4B8(P)	Crystallography & Mineralogy	36	4
5	V	GL5B12(P)	Palaeontology	90	0
6		GL5B13(P)	Structural Geology	90	0
7	VI	GL6B18(P)	Petrology & Palaeontology	90	8
8		GL6B19(P)	Economic Geology & Structural Geology	90	8

CORE COURSE: GEOLOGY- *PROJECT / STUDY TOUR

No	Semester	Course Code	Course Name	Hours	Credits
1	V	GL5B14(Pr)	Project work/Study Tour	36	0
2	VI	GL6B21(Pr)	Project work/Study Tour	36	4

- **The Project work/Study Tour is a compulsory part of the programme. External evaluation may be done during the VIth semester practical examination**

Complementary Course – (for Other stream)

Semester	Sl.no	Course code	Course Name	Hr/Week	Total Hours	Credits
I	1	GL1CO1	Geology paper-I	2	36	2
	2	GL1CO2(P)	Geology practical-I	2	36	0
II	3	GL2CO3	Geology paper-II	2	36	2
	4	GL2CO4(P)	Geology practical-II	2	36	0
III	5	GL3CO5	Geology paper-III	3	54	2
	6	GL3CO6(P)	Geology practical-III	2	36	0
IV	7	GL4CO7	Geology paper-IV	3	54	2
	8	GL4CO8(P)	Geology practical-IV	2	36	4

Complementary course (for Geology stream)

Semester	Sl.no	Course code	Course Name	Hour/ Week	Total Hours	credits
I	1	RS1C03	Remote Sensing & GIS Course-1	2	36	2
	2	RS1C04(P)	Remote Sensing & GIS Practical-1	2	36	0
II	3	RS2C07	Remote Sensing & GIS Course-2	2	36	2
	4	RS2C08(P)	Remote Sensing & GIS practical-2	2	36	0
III	1	RS3C11	Remote Sensing & GIS Course-3	3	54	2
	2	RS3C12(P)	Remote Sensing & GIS practical-3	2	36	0
IV	1	RS4C15	Remote Sensing & GIS Course-4	3	54	2
	2	RS4C16(P)	Remote Sensing & GIS practical-4	2	36	4

Open courses (for other stream)

Semester	Sl.no	Course code	Course Name	Hour/Week	Total Hours	Credits
	1	GL5D01	Gemmology	3	54	4
	2	GL5D02	Ground water Exploration & management	3	54	4
	3	GL5D03	Under standing the Earth	3	54	4
	4	GL5D04	Nanotechnology	3	54	4

Core Course Elective

Semester	Sl.no	Course code	Course Name	Hour/Week	Total Hours	Credits
	1	GL6B20(E01)	Disaster management	3	54	2
	2	GL6B20(E02)	Geo exploration	3	54	2
	3	GL6B20(E03)	Geo technical Engineering	3	54	2
	4	GL6B20(E04)	Environmental Geology	3	54	2

CORE COURSE: GEOLOGY-THEORY SYLLABUS

PERSPECTIVES & METHODS IN SCIENCE AND EARTH PROCESSES

GL1B01
Credits: 2
Hours: 36

Section A- Perspectives and Methods in Science

Unit-I Science and science studies. Types of knowledge: Practical, theoretical and scientific knowledge. Information. Science, laws of science and basis for laws and factual truths. Revolutions in Science. Science and Technology. Scientific knowledge about Solar system- Meteorites, comets, Asteroids.

Unit II Methods and tools of science. Hypotheses, theories and laws in science. Observations, evidences and proof. Big bang theory. Theories of Origin of Earth, Nebular hypothesis, Planetesimal hypothesis, Gaseous tidal hypothesis and Gas dust cloud hypothesis. Determination of Earth's age, radioactive methods; Non-radioactive methods.

Unit III Experimentation in science. Observation, data collection, interpretation and deduction. Earthquake as a natural experiment: Earthquakes-magnitude and intensity, properties of seismic waves. Direct and indirect observations. Human and machine observations. Origin, distribution and prediction of earthquakes. Major earthquakes in India & world. Connection between measurements and underlying theory: Constitution of Earth's interior from earthquake records.

Section B – Earth Processes

Unit-IV Earth processes: Weathering physical, chemical and biological weathering. Mass movements-landslides-causes, effects and remedial measures. Volcanoes; Types-distribution -products-causes-effects and prediction.

Unit V Orogeny and epeirogeny**,** Mountains: origin, types and significance of mountains. Concept of Isostasy. Geosynclines: Types, characters, distribution and their importance.

References

1. T.F Gieryn., Cultural Boundaries of Science., Univ.Chicago Press, 1999.
2. H.Collins and T.Pinch., The Golem: What Everyone Should Know About Science., Cambridge Univ.Press, 1993.
3. Arthur Holmes-Principles of Physical Geology
4. Arthur N. Strahler- The Earth Sciences
5. Lennis Barlin (!980) , Earthquakes and urban Environment , Vol.1, 2 & 3.
6. Davis etal (1976) Environmental Geoscience Niley Eastern .
7. Weller, Stratigraphic principles and practice,Harper and Raw ,1959
8. Donald R coates, 1981, Environmental geology, John wiley and sons
9. Plumer, Mc Geary Carlson- Physical Geology
10. Parbin singh- Engineering and general Geology

DYNAMIC GEOLOGY AND GEOINFORMATICS

GL2B03
Credits:2
Hours:36

Unit I Methodology specific to Geologic sciences: Importance of field observation in geology. Earth's history as a detective story – 'present is key to the past' – concept of rock cycle – use of fossils – Geologic Time Scale. Brief Introduction to the use of Toposheets, Brunton Compass and Clinometer Compass.

Unit II Running water as a geological agent: Development of a typical stream-Drainage system-consequent and subsequent streams - Drainage basin- Drainage pattern-Geological work of stream, erosional and depositional fluvial landforms, Concept of base level, Peneplanation, Monadnocks, Stream terrace , Rejuvenation, knick Point, Entrenched meanders.

Underground water: occurrence, zone of aeration & saturation, Water table, Perched water table, porosity, permeability, Aquifers- confined and unconfined, aquicludes, aquitard and aquifuge. Artesian wells, Geyser and springs. Erosional and depositional landscapes produced by action of ground water. Origin of limestone caverns-Stalactite and stalagmites. karst topography.

Unit III Geological work of wind. Erosional and depositional landforms. . Loess, types of dunes , Pediplanation, playas and inselbergs. Formation of deserts.

Glaciers- Formation of glaciers- Types- Movements-Erosional and depositional landforms, Glacier landforms, glacial ages.

Unit IV Oceans and Seas: Waves, tides and currents. Geological work of oceans. Classification of shore line, Shore line types, description of continental margins, Continental shelf-Continental slope-submarine canyons- sea mount-Guyots, midoceanic ridges, trenches. Coral reefs – types and origin.

Unit V Geoinformatics – integration of information and communication technology with geological sciences. Maps and their uses. Significance of maps in spatial data representation. Spatial and non-spatial data. Raster and vector types of data. Components of Geographic Information System (GIS) – hardware, software, data and users. Basic uses of GIS software for digitization, georeferencing / geocoding, transformation and projection.Thematic maps.Layer concept in a GIS. Applications in e-governance, utility management, forestry, urban planning, policing, defense, agriculture,groundwater studies and natural disaster management.

References:

1. Ahamed,E. Coastal geomorphology of India. Orient long man, New Delhi, 1972
2. Thornbury .W.D Principles of geomorphology, Wiley 1968
3. Plumer, Carlson, Mc Geary(2003), Physical geology, published by Mc Graw –Hill
4. Yasso.W.E. Oceanography,
5. Weisberg J., and Parish,H., Introductory Oceanography. McGraw Hill,1974.
6. Arthur Holmes-Principles of Physical Geology
7. Arthur N. Strahler- The Earth Sciences
8. Bloom A- Geomorphology
9. Vishwas S. Kale. Geomorphology
10. Sparks B.W- Geomorphology
11. Burrough & Mc Donnel - Introduction to Geographic Information System.
12. Anji Reddy- Remote Sensing and Geographic Information system.
13. C.P. Lo and A.K.W Yeung – Concepts and Techniques of Geographic Information Systems, Prentice Hall of India, 2005.

CRYSTALLOGRAPHY

GL3B05
Credits:3
Hours:54

UNIT I: Definition of crystal – morphological characters of crystal – faces –forms – edges solid angles Interfacial angle. Contact Goniameter and its use. Symmetry elements – crystallographic axes – crystal notation – parameter system of Weiss and Miller indices – axial ratio – laws of crystallography – the law of constancy of symmetry , the law of constancy of interfacial angles and the law of rational indices. Classification of crystals into systems and classes - Holohedral , Hemihedral, Hemimorphic and Enantiomorphic forms in crystals.

UNIT II Elementary knowledge of spherical and stereographic projections. study of the symmetry elements, and forms of the Normal, pyritohedral , tetrahedral and plagiohedral classes of cubic system with special reference to well developed crystals of Galena, Spinel, Garnet, Flourite, Diamond, Pyrite, Tetrahedrite, Boracite and cuprite.

UNIT III: Study of symmetry elements and forms of Normal, Hemimorphic, Tripyramidal, Pyramidal Hemimorphic, Sphenoidal and Trapezphedral classes of Tetragonal system with special reference to well developed crystals of zircon, Rutile, Cassiterite, Vesuvianite, Apophyllite, Sheelite, Meionite, Wulfenite and Chalcopyrite.

UNIT IV Study of the symmetry elements and forms of Normal, Hemimorphic, Tripyramidal, Pyramidal hemimorphic, Trapezohedral, Rhombohedral, Rhombohedral Hemimorphic, Trirhombohedral and Trapezohedral classes of Hexagonal system with special reference to well developed crystals of Beryl , Zincite, Apatite, Calcite, Corundum, Tourmaline, Phenacite and Quartz. Study of the symmetry elements and forms of the Normal , Hemimorphic and Sphenoidal classes of Orthorhombic system with special reference to well developed crystals of Barite, olivine topaz, staurolite, Sulphur, Calamine, Struvite and Epsomite.

UNIT V: Study of the symmetry elements and forms of the Normal classes of the Monoclinic and Triclinic systems with special reference to well developed crystals of Gypsum, Orthoclase, Albite, Augite, Axinite and Kyanite.

Twin crystals – Definitions – Effects of Twinning – laws of twinning – composition plane, twinning plane and twinning axis, indices of twins – simple and repeated (polysynthetic twins), contact and penetration twins: secondary twins. Study of twin laws pertaining to the following crystals – Flourite

(spinel law), Pyrite (iron cross twin). Rutile (geniculate), Calcite, Quartz (Brazil laws), Aragonite (mimetic twin), Staurolite (cruciform), Gypsum, Augite and Feldspars (Carlsbad, Baveno , Manebach, Albite and Pericline).

References:

1. Dana, E.S. 1955 – A text book of mineralogy – Asia publishing House, Wiley.
2. Phillips .P.C (1956) - An Introduction to crystallography-Longmans Green and Co.
3. Hurbut, C.S., Dana's manual of Mineralogy.

MINERALOGY

GL4B07
Credits:3
Hours:54

Unit I: Definition of Mineral and Mineraloid – Scope and aim of Mineralogy. Chemical elements and periodic Table - Bonding of atoms – Metallic, Covalent, Ionic and Vander Walls Bonding in Minerals. Structure and classification of silicates. Compositional variation and coupled ionic substitution, Isomorphism, Polymorphism, Pseudomorphism, solid solution and ex-solution in minerals.

Physical properties of minerals depending upon cohesion and elasticity, specific gravity, light, heat, electricity, magnetism and the senses. Determination of specific gravity of minerals- Joly's spring balance and walker's steelyard methods.

Unit II: Nature of light – Ordinary and polarized light – Refraction and reflection. Refractive index, Critical angle and Total internal reflection. Double refraction - Plane polarization by Reflection, Plane polarization by Refraction, Nicol Prism - Plane polarization by absorption, Polaroid. Petrological microscope and its parts – Optical accessories, their construction and uses – Quartz wedge (Determination of order of Interference Colour), – Gypsum plate and Mica plate (Determination of Fast and Slow vibration directions)

Unit III: Optical classification of minerals. Optical properties of isotropic and anisotropic minerals observed under parallel and crossed Nicols. Differences between Isotropic and anisotropic minerals. Definition of extinction, Types of extinction, Extinction angles and their determination, and uses – Characters of Uniaxial and biaxial minerals – Optics axis and optic axial angle – Acute and Obtuse Bisectrix – Optic sign of Uniaxial and Biaxial minerals – Uniaxial and Biaxial Indicatrix - Sign of elongation - Optical anomalies.

Unit IV: Mineralogy, Structure, Chemistry, Optical and Physical properties, Modes of occurrence and uses of the following groups of minerals: Olivine, Garnet, Epidote, Aluminium silicates, Pyroxene, Amphiboles, Mica, Chlorite, Feldspars, Feldspathoids and Zeolites.

Unit V: Mineralogy, Structure, Chemistry, Optical and Physical properties, Modes of occurrences and industrial uses of the following minerals: Polymorph and varieties of Quartz, Scapolite, Cordierite, Talc, Serpentine, Steatite, Calcite, Dolomite, Topaz, Staurolite, Beryl, Tourmaline, Fluorite, Apatite, Zircon, Rutile, Sphene and Corundum.

References:

1. Dana, F.S. 1955 – A text book of mineralogy – Asia publishing House, Wiley.
2. Read, H.H- 1974, - Rutley's elements of mineralogy – Thomas murby & co.
3. Mason B and Berry, L.G- Elements of Mineralogy – W.H. Freeman & Co.
4. Deer. W.A.,Howie. R.A and Zussman, J. -1966 .An introduction of the Rock forming minerals. Longmans.
5. Berry, Mason, Dietrich,2000 - Mineralogy, CBS Publication
6. Cornelis Klen and Cornelius S. Hurlbut , 1985 – Manual of Minerology, John wiley & Sons
7. Chakrapani-
8. Naidu, P.R.J, Optical Mineralogy.
9. Philips,W.R Mineral Optics-Principles and techniques.
10. Kerr.P.F- Optical Mineralogy.
11. Winchell. A.N-Elements of Optical Mineralogy.
12. Battey, M.H., Mineralogy for students.

STRATIGRAPHY & INDIAN GEOLOGY

GL5B09
Credits:3
Hours:72

Unit I Laws of Stratigraphy; concept of uniformitarianism, law of order of super position, law of faunal succession, law of original horizontality, law of cross cutting relationship, physical and biological criteria of correlation and homotaxis. Facies and facial changes-litho and bio facies.

Unit II Time scale; standard stratigraphic time scale-Indian geological time scale, imperfections in geological records- breaks in stratigraphic records: unconformity, non-sequences, diastems. Stratigraphic classification: Biostratigraphy, lithostratigraphy, chronostratigraphy.

Unit III Physiographic divisions of India-major Stratigraphic divisions of India, Early Precambrian Stratigraphy: Sargur supra crustals, Granulite succession of south India, Dharwar Supergroup- Aravalli Supergroup.

Late Precambrian Stratigraphy: Delhi Supergroup, Cudappah Supergroup, Vindhyan Super group. Brief study of Singhbhum craton, Sausar and Sakoli group

Unit IV Paleozoic Stratigraphy**:** Distribution of Paleozoic rocks in India, Cambrian of Salt Range, Age of Saline Series, Upper Carboniferous and Permian rocks of Salt Range, Paleozoic rocks of Kashmir Valley, Paleozoic rocks of Spiti Valley, Paleozoic rocks of Peninsular India,

Mesozoic Stratigraphy: The Depositional Environment-distribution-life-classification and economic importance of Gondwana formations of India, Coastal Gondwana of India, Gondwana formations of Tamilnadu, Triassic of Spiti – The Lilang System, Jurassic of Kutch, Cretaceous of Tiruchirapalli – Pondicherry – Bagh Beds, Deccan traps : distribution , structure , Lameta beds – infratrapean and intertrappean beds, age of the Deccan traps.

Unit V Cenozoic Stratigraphy: Comprehensive account of the geological events took place during Cenozoic Era in India, rise of Himalayas, stratigraphy of Siwalik system, fauna and flora of Siwaliks, Tertiary rocks of Assam, Karewa formation, Tertiary rocks of Tamilnadu, Tertiary rocks of Kerala, Pleistocene Glaciation – Cenozoic oil bearing formations of India.

References:

1. Krishnan M.S. (2003) - Geology of India and Burma, 6th Edition, CBS.
2. Wadia D.N. (1953) – Geology of India, TATA McGraw – Hill.
3. Ravindrakumar K.R. - Stratigraphy of India.
4. Lemon R.Y (1990) - Principles of Stratigraphy, Merrill Publishing Co.
5. Pascoe, E.H.(1968) - A manual of the Geology India and Burma, Govt of India Publications.
6. Gregory , J.W. and Barret B.H- General Stratigraphy.
7. Dunbar.C.O & Rogers.J 1961 Principles of Stratigraphy. Willey.
8. Krumbein.W.C. &Sloss.L.D 1963 Stratigraphy & Sedimentation.Freeman
9. GSI publications, Bangalore. Geology of India Vol 1 &2, 2008

PALAEONTOLOGY

GL5B10
Credits:3
Hours:54

Unit I: Definition of Palaeontology – organic world- Animal Kingdom – classification of animals – Habitates and Habits of animals. Definition of fossils – nature and modes of preservation of fossils : Unaltered hard parts : Altered hard parts : Petrifaction, permineralisation, carbonisation, recrystallisation, silicification , mould, casts, tracks , trails, borings, uses of fossils – stratigraphic indicators – climatic indicators- indicators of palaeogeography – indicators of evolution and migration of life forms – indicators of new deposits of coal and petroleum – life through ages.

Unit II: Phylum protozoa – Order: Foraminifera: General morphology – chitinous test – septa, arrangement of chambers, suture, aperture , dimorphism – classification , geological history and stratigraphic importance. An outline of the uses and applications of Micro palaeontology.

Phylum coelenterata – class Anthozoa – zoological features – General morphology: corallum, corallite , theca , chambers, septa, fossula, columella, septal developments, classification – tabulate corals – Rugose corals evolution geological distribution – stratigraphic importance.

Sub phylum Hemichordata – class Graptozoa: order Dendroidea and Graptoloidea – general morphology , rhabdosome, stipe , theca , common canal , nema , virgula , sicula , angle of divergence, central disc, uniserial, biserial, classification, geological distribution and stratigraphic importance.

Unit III: Phylum mollusca: Class Pelecypoda:- General characters – umbo, Hinge line – ligament – lunule and escutcheon – adductor impressions, pallial line, pallial sinus, dental patterns, ornamentation, classification, geological history.

Class Gasteropoda:- General morphology, shell forms, whorl, spire, spiral angle, suture, aperture, columella, umbilicus , peristome , aperture , (Holostomatus and siphonostomatus) – types of coiling – Dextral and sinistral – ornamentation , classification and geological history.

Class Cephalopoda:- General morphology , siphuncle, septa, septal necks, connecting ringes, chambers, suture lines, (Nautilitic , Goniotitic , Ceratitic and Ammonitic) – shell forms – ornamentation – classification evolution, geological history- morphology of a Belemnite shell.

Unit IV: Phylum Brachiopoda:- General morphology, umbo, hinge line , pedicle opening, delthyrium, deltidium pseudo deltidium – Brachial skeleton – morphometric details, ornamentation , classification , geological history.

Phylum Echonodermata: - Class Echinoidea:- General morphology, periproct, apical system (Anus, ocular plates, Genetal plates, madriporic plates), corona (Ambulacra , inter ambulacra) – peristome – Regular and irregular echinoids – classification – geologicial history. Class crinoidea:- General morphology , calyx , dorsal cup, (Radicals , basals, intrabasals), arms, stem, classification, geological history. Class Blastoidea: - General morphology – calyx, dorsal cup (Basals, radials, deltoids, ambulacra). Brachioles, cicatrix, geological history.

Unit V: Phylum Arthropoda:- Class – Trilobita- General morphology : Cephalon: glabella, facial suture, free cheek, fixed cheek, genal angle , genal spine , cranadium; thorax – pygidium – classification – geological history.

A brief outline of the classification of vertebrates. A short account of Devonian fishes, Mesozoic Reptiles, Siwalik mammals.

General classification of plant kingdom – plant fossils from India – A brief account of the following plant fossils :- Glossopteris , Gangamopteris , Ptilophyllum , Calamites , Lepididendron and Sigillaria.

References:

1. Henry woods : Invertebrate palaeontolgy – Cambridge.
2. Romer , A.S.: Vertebrate palaeontology, Chicago press.
3. Arnold, C.A., An introduction to Palaeobotany., MC-Graw Hill.
4. B.U. Haq and A. Boersma (1978) Introduction to marine Micropalaeontology. Elsevier, Netherlands
5. Raup, D.M. and Stanely, M.S.: Principles of Palaeontology, CBS Publishers.
6. Moore , R.C., Laliker , C.G.& Fishcher, A.G.: Invertebrate Fossils , Harper brothers
7. Shrock. R.R. and Twenhofel , W.H – 1953 : Principles of invertebrate Palaeontology, Amold publication

STRUCTURAL GEOLOGY & GEO TECTONICS

GL5B11
Credits:3
Hours:54

Unit I Introduction to Structural Geology. Methods for representing relief features; contours, topographic and geologic maps- their preparation and uses, geological surface and their attitudes-Dip and strike- trend of outcrops- rules of V – relation between true dip and apparent dip-width of outcrops; true thickness and vertical thickness and their mutual relation. Uses of clinometers and Brunton compass.

Rock deformation-uniform pressure- differential pressure- stress and strain, types of stress-type of strain -stress strain diagram. Stages of deformation, mechanism of elastic, plastic and brittle deformation.

Unit II Folds: Geometry and elements of folded surface-classification- descriptive study of different types of folds- recognition in the field and on the maps.

Fault: Definition, terminology, classification, description and recognition in the field and on the map.

Unit III Joints: Definition, classification, descriptive study and geological significance of joints. Foliation and lineation- primary and secondary and their types.

Unconformities: Definition, and types, significance and recognition in the field and on the maps. overlaps-overlaps and offlaps, outlier and inlier.

Unit IV Plate tectonics: Basic concepts and definition . Types of plate margins. Important character of plate margins- divergent , convergent and transform plate margins. Triple junctions, Benioff zones, plate tectonic models for the origin of mountain belts. Island arcs, rift valleys, mid oceanic ridges, oceanic trenches, transitional faults and shield areas.

Unit V A review of various tectonic hypotheses: Continental drift, Sea floor spreading, polar wandering, paleomagnetism, mantle plumes, hot spots.

Tectonics of Indian subcontinent: Major structural trends in the peninsular India, Indogangetic and extra peninsula.

References:

1. Billings M.P. structural geology, 11 edition,prentice hall,1974
2. Hills,E.S. elements of structural geology
3. Hobbs .B.E., means,W.D and William P.F an out line of structural geology, John wiley,1976
4. John L. Robbers, introduction to geological maps and the structures, Pergamon press
5. Ken MeClay the mapping of geological structures, geological society of London, John wiley and Sons.

ECONOMIC GEOLOGY

GL6B15
Credits:3
Hours:72

Unit I Historical development of economic Geology. Geochemical distribution of elements. Materials of mineral deposits – ore minerals, gangue minerals, tenor and grade of ores, ore shoots and bonanzas. Classification of mineral deposits. Outline of Lindgren's and Bateman's classification-Syngenetic and epigenetic deposits. Controls of ore localization – structural, stratigraphic, physical and chemical. Brief study of metallogenic epochs and provinces – geologic thermometers.

Unit II Magmatic processes. – mode of formation – Early magmatic processes and deposits, disseminations, segregations and injections – Late magmatic processes and deposits – Residual liquid segregation and injection – immiscible liquid segregation and injection – sublimation. Contact Metasomatic processes – the process and effects – resulting mineral deposits. Hydrothermal processes – principles – Factors affecting deposition – wall rock alteration – minerals sequence – cavity filling deposits Fissure veins, shear – zone, stock-work, saddle reef, ladder vein, fold cracks, breccia filling, solution cavities, pore space and vesicular filling – replacement deposits- process and deposits – criteria of replacement.

Unit III: Sedimentary processes and cycles – principles involved in sedimentation – cycles of Iron and manganese, weathering processes – principles- Residual concentration process and deposits – mechanical concentration principles – eluvial, alluvial, beach and eolian placers. Oxidation and supergene sulphide enrichment – solution and deposition in the zone of oxidation – secondary sulphide enrichments – Gossans and capping.

Metamorphic processes – Formation of Graphite, Asbestos, Talc, Soapstone and Sillimanite group of minerals.

Unit IV Diagnostic physical properties, chemical composition, uses, modes of occurrence and distribution in India of the following:

1) Economic Minerals- Gold, Silver, Copper, Lead, Zinc, Iron, Manganese, Chromium, Tin, Aluminium
2) Radioactive metals - Thorium, Uranium, Titanium.
3) Industrial Minerals- Asbestos, Barite, Graphite, Gypsum and Mica.

4) Abrasives- Diamond, Corundum, Emery garnet, Abrasive sand, Tripoli, Pumice, Sand feldspar, Limestone, Clay, Talc etc.
5) Refractories- fireclay, graphite, Dolomite and sillimanite group of minerals, diaspore, pyrophillite, zircon etc
6) Ceramic minerals- Clay, Feldspar, Wollastonite,
7) Gemstones.

UNIT V Fossil fuels – coal and lignite – uses, classification, constitution, origin and distribution in India. Petroleum- composition, uses, theories of origin, oil traps, and important oil fields of India. A brief account of mineral deposits in Kerala. Significance of minerals in National Economy. Strategic, critical and essential minerals.

References:

1. Gokhale and Rao – Ore deposits of India.
2. Jensen and Bateman A.M. – Economic Mineral Deposits.
3. Krishnaswamy, S. – Indian Mineral Resources.
4. Krauskopf – Introduction to Geochemistry.
5. Park and Macdiarmid -Ore deposits.
6. Umeshwer Prasad- Economic geology

IGNEOUS PETROLOGY

GL6B16
Credits:3
Hours:54

Unit I: Definition of Petrology – Earth zones. Composition and constitution of magmas – Primary and Parental Magmas. Forms of Intrusive igneous rocks: Concordant forms - Sill, Laccolith, Lopolith and Phacolith, Discordant forms - Dykes, Cone Sheets, Volcanic neck, Ring dyke, Batholiths, Stocks, Bosses and bysmaliths. Forms of Extrusive igneous rocks: Lava flows, Pyroclastic deposits - Agglomerate, Lapilli, volcanic ash and volcanic froth.

Unit II: Structures vesicular and Amygdaloidal structures – block lava – Ropy lava – pillow structure – flow structure – sheet joints- mural jointing – columnar jointing – rift and grain. Textures: Definition and description - crystallinity: crystallites and microlites – Devitrification – Granularity – shapes of crystals , mutual relations – Equigranular textures: allotriomorphic hypidimorphic, Panidiomorphic. inequigranular Textures: porphyritic and Intergrowth texture – Trachytic texture – Intergrowth texture strctures orbicular structure Spherulitic structure – Perlitic fracture. , Directive textures, Overgrowth textures, Reaction textures - Micro Structures

Unit III: Classification: bases of classification – Genetic classification – classification based on colour index – based on the proportion of Alkali to plagioclase feldspars-based on silica saturation – based on alumina saturation – A short account of CIPW classification , Normative minerals, salic and femic groups –Merits and defects of CIPW classification – Tyrrel's tabular classification- IUGS classification

Unit IV: Crystallization of Unicomponent magma – Crystallization and petrogenetic significance of Binary magmas: Diopside – Anorthite Eutectic system, Albite – Anorthite Solid-Solution system, Forsterite – Silica incongruent melting system and Ternary system (Ab–An– Di). Reaction principle and Bowen's reaction series - Causes for the diversity of Igneous rocks – Magmatic Differentiation: Fractional Crystallization, Liquid immiscibility, Assimilation - Short notes on: Consanguinity, Variation diagrams and petrographic provinces.

Unit V Study of Texture, Mineralogy, Classification, and Modes of occurrence of Granite, Granodiorite, Syenite, Diorite, Gabbro with their hypabyssal and volcanic equivalents. Petrographic characters and origin of Pegmatites, Lamprophyres, Alkaline rocks, Dunite, Peridotite and Anorthosites.

References:

1. Tyrrell, G.W. 1978 -Principles of petrology – Chapman and Hall Ltd., London.
2. Bowen, N.L.-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.-Petrology of Igneous Rocks, Thomas Murby & Wells, M.K. – 1949
7. Johannesen, A – 1962-Descriptive petrography of Igneous Rocks, Vols. I to IV - Allied Pacific.

SEDIMENTARY & METAMORPHIC PETROLOGY

GL6B17
Credits:3
Hours:54

Unit I: Sedimentary process: disintegration & decomposition of rocks – transportation – deposition – diagenesis. A broad classification of sedimentary rocks into residual, mechanical, chemical and organic Groups. Structures of sedimentary rocks-mechanical, chemical and organic structures. Textures of sedimentary rocks – clastic and non – clastic textures. Residual deposits – terra rossa , clay, laterite and bauxite and soils.

Unit II: Mechanical deposits – rudaceous, arenaceous and argillaceous groups. Heavy minerals in sand and sandstones. A descriptive study of Conglomerate, Breccia, Sandstones and Shales. Chemical deposits – siliceous , carbonaceous, ferruginous and salt deposits. organic deposits – calcareous, siliceous, phosphatic, ferruginous and carbonaceous deposts. A brief study of Flint, Chert, Siderite, Gypsum, Rock Salt, Caliche. Guano and Kiesellgher. Descriptive study of different types of calcareous and carbonaceous deposits.

Unit III Definition of metamorphism –Agents and kinds of metamorphism – facies, zones and grades of metamorphism – metamorphic structures and textures. cataclastic metamorphism and its products. Retrograde metamorphism.

Unit IV Thermal metamorphism of pelitic sediments, pure and impure calcareous rocks. A brief study of Breccia, Flaser, Mylonite, Hornfels, Marble, Ophicalcite.

Unit V: Dynamothermal metamorphism of pelitic sediments. plutonic metamorphism petrography and origin of charnockites – metamorphic differentiation – pneumatolitic and injection metamorphism – anatexis and palingenesis. Brief study of Slate, Phyllite, Quartzite, Schist. Gneiss, Granulite, Leptynite, Charnockite, Ecologite, Amphibolite, Schorl, Adinole, Lit- Par- Lit – gneiss and Migmatite.

References:

1. Tyrrel, G.W - Principles of petrology, Asia Publishing House.
2. Huang, W.T. -Petrology, MC Graw Hill
3. Pettijhon, F.J. -Sedimentary Rocks, Harper & Bros.
4. Harker, A. -Petrology for Students, Cambridge,
5. Turner,F,J &Verhogen,J-Igneous and Metamorphic Petrology, MC Graw Hill.
6. Williams, H, Turner, F.j. & Gillibert, C.M. - Petrography, Freeman.
7. Winkler, A. G.F. - Petrogenesis of Metamorphic Rocks, Mc Graw Hill.
8. Folk. -Petrology of Sedimentary rock

CORE COURSE: GEOLOGY-PRACTICAL SYLLABUS

FIELD GEOLOGY

GL1B02 (P)
Credits:0
Hours:36

Description of features in Survey of India toposheet.

Study of marginal information.

Interpretation of intramarginal and extramarginal information.

Study of geological conventional signs, symbols, physical and socio-cultural features.

Visual observation of features in satellite imagery.

Stereoscopic visualization of aerial photos.

Instructional training on uses of Clinometer, Brunton compass and GPS.

Field trip to understand the geomorphology and topography of an adjacent locality.

Report preparation on field trip.

GEOINFORMATICS

GL2B04(P)
Credits:0
Hours:36

Practical understanding of hardware & software component of a GIS

Computer Peripherals – Scanning and digitising the map of an area of interest.

Methods of Data Transfer using CD ROM, Flash/Thumb Drives.

Thematic maps preparation – manual & digital

Internet & Academic Search Techniques – Wikipedia, creating educational Blogs.

Downloading and installation of free GIS software.

Hands on experience with Vector and Raster data.

Practical Applications of Geological Software: Surfer, G-Stat, Rockworks, Aquachem.

Preparation of digital record of the practical done.

CRYSTALLOGRAPHY

GL3B06(P)
Credits:0
Hours:36

Study of axial disposition, axial relationship and axial analysis of crystal systems.

Classification of normal classes of all systems by studying the symmetry elements.

Identification and description of the following crystal models in normal classes only.

Isometric system: Galena, garnet, Fluorite, Magnetite.

Tetragonal System: Zircon, Cassiterite, Rutile, Octahedrite, Apophyllite.

Hexagonal: Beryl, Calcite.

Orthorhombic: Olivine, Topaz, Barite.

Monoclinic: Gypsum, Orthoclase, Augite, Amphibole.

Triclinic: Axinite, Albite, Kyanite.

Study of simple twin models.

Galena-Flourite-Pyrite-rutile-calcite-quartz-staurolite-Gypsum-augite-orthoclase-albite-Calamine

Record preparation.

CRYSTALLOGRAPHY & MINERALOGY*

GL4B08(P)
Credits:4
Hours:36

MEGASCOPIC MINERALOGY:

Megascopic identification and description of the following: Quartz, smoky quartz, milky Quartz, Rosy quartz, Amethyst, Chalcedony, Agate, Flint, Jasper, Chert, Opal, Orthoclase, Microcline, Albite, Oligoclase, Labradorite, Nepheline, Leucite, Sodalite, Enstatite, Bronzite, Hypersthene, Diopside, Augite, Spodumene, Acmite, Rhodonite, Wollastonite, Anthophyllite, Tremolite, Actinolite, Hornblende, Olivine, Serpentine, Muscovite, Biotite, Vermiculite, Phlogpite, Chlorite, Epidote, Garnet, Natrolite, Stilbite, Apophyllite, Talc, Steatite, Andalusite, Kyanite, Sillimanite, Staurolite, Cordierite, Apatite, Beryl, Topaz, Calcite, Dolomite, Tourmaline, Zircon, Fluorite.

MICROSCOPIC MINERALOGY:-

Microscopic identification and Description of the following:-Quartz, Orthoclase, Microcline, Albite, Oligoclase, Labradorite, Nepheline, Leucite, Enstatite, Hypersthene, Augite , Biotite, Muscovite, Olivine, Epidote, Garnet, Apatite, Zircon, Sphene, Tourmaline, Calcite, Andalusite, Kyanite, Sillimanite, Staurolite, Cordierite, Diopside, hornblende, Tremolite, Actinoloite and chlorite.

Record preparation.

*This course will include the practical component of the course GL3B06(P) – Crystallography.

PALAEONTOLOGY

GL5B12(P)
Credits:0
Hours:90

Megascopic identification and description of the following fossisls with neat diagrams :-

Anthozoa: Calceola, Zaphrentis, Lithostrotion, Favosites, Halysites, Montlivaltia, Isastrea, Thecosmilia;

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

Echinoderma: Cidaris, Hemicidaris, Micraster, Holaster, Hemiaster, Pentremites,

Mollusca-Lamellibranchia: Arca, Cardium, Cardita, Pecten, Trigonia, Megaladon, Spondylus, Gryphaea, Exogyra, Ostrea, Inoceramus, Alectryonia, Hippurities, Venus

Mollusca-Gastropoda: Natica, Turbo, Trochus, Turritella, Cerithium, Conus, Murex, Fusus, Physa, Bellerophon,

Mollusca-Cepalopoda: Nautilus, Goniatites, Ceratites, Acanthoceras, Phylloceras, Scaphites, Baculites, Turrilites and Belemnites,

Trilobites: Paradoxides, Calymene, Phacops, Olenus, Olenellus.

Graptolites: Phyllograptus, Tetragraptus, Didymograptus, Diplograptus, Monograptus,

Plant fossils: Glossopteris, Gangamopteris, Ptillophylum, Lepidodendron, Sigillaria, Calamites, Elatocladus, Vertibraria.

Record preparation.

STRUCTURAL GEOLOGY

GL5B13(P)
Credits:0
Hours:90

Illustration with the help of neat diagrams of the following:

Attitude of beds, true and apparent dip, strike and dip symbols, rules of 'V', types of Folds, Faults, Joints and Unconformities. Maps with suitable sections and geological descriptions

- Simple horizontal beds – two maps.
- Study of effect of relief on 'V' of outcrops – four maps.
- Simple dipping beds – three maps.
- Simple dipping beds with intrusions – three maps.
- Tracing the outcrops –with three point problems- Three maps.
- Problems involving bore hole data, thickness, dip and apparent dip –three maps.
- Simple dipping beds with unconformity – five maps.
- Folded beds – five maps.
- Maps with different types of faults –five numbers.
- Combination of intrusions, unconformity, folds and faults –six maps.

Problems:

Problems involving true and apparent dip, true vertical thickness and width of outcrops. Three point problems.

Record preparation.

PETROLOGY & PALAEONTOLOGY*

GL6B18(P)
Credits:8
Hours:90

Megascopic identification of the following rocks:

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

Conglomerate, Breccia, Sandstone, Arkose, Shale, Limestone, Laterite, Chert, Grit, Lignite.

Slate, Phyllite, Schists, Gneisses, Quartzite, Marble, Amphibolite, Eclogite, Leptynite, Charnockite, Khondalite, Schorl rock, Banded Magnetite Quartzite

Microscopic identification and description of the following rocks:-

Mica Granite, Hornblende Granite, Graphic Granite, Syenite, Nepheline Syenite, Diorite, Gabbro, Dunite, Peridotite, Granite porphyry, Diorite, Dolerite, Anorthosite, Basalt.

Conglomerate, Breccia, Sandstone, Arkose, Shell limestone.

Slate, Chlorite schist, Mica schist, Kyanite schist, Garnetiferous schist, Charnockite, Eclogite Amphibolite, Leptynite, Khondalite, Augen Gneiss, Garnet sillimanite gneiss.

Record Preparation.

*This will include the practical component of the course GL5B12(P) Palaeontology also.

*ECONOMIC GEOLOGY & STRUCTURAL GEOLOGY

GL6B19(P)
Credits:8
Hours:90

Megascopic identification and description of Indian occurrences & uses of the following ore and industrial Minerals: -

Sulphides: Realgar, Orpiment, Stibnite, Molybdenite, Galena, Sphalerite, Chalcophyrite, Pyrite, Arsenopyrite, Marcasite.

Sulphates: Barite, Celestite, Gypsum,

Oxides: Cuprite, Corundum, Hematite, Ilmenite, Magnetite, Chromite, Cassiterite, Rutile, Pyrolusite, Psilomelane, Goethite, Limonite, Bauxite,

Carbonates: Calcite, Dolomite, Magnesite, Siderite, Aragonite, Witherite, Strontianite, Cerussite, Azurite, Malachite.

Industrial Minerals: Halite, Fluorite, Phosphatic Nodule, Monazite, Graphite, Coal and its varities, Asbestos.

Record preparation.

*This will include the practical component of the course GL5B13(P) Structural Geology also.

COMPLEMENTARY COURSE GEOLOGY (for other stream)

COMPLEMENTARY COURSE GEOLOGY PAPER I

GL1CO1
Credits: 2
Hours: 36

UNIT-I Introduction to Earth Science- Earth in the solar system- size, shape and dimension of the earth. Lithosphere- Hydrosphere- Atmosphere- Biosphere- Geological significance of major interfaces. Geological processes: - Types of rocks- Rock cycle- Weathering –Physical and chemical.

UNIT II Mass movement- definition, causes, types-Landslides- Soil – types. Ground water- source- types, Hydrologic cycle. Water bearing rock formation- Types of wells- Geological work of ground water. Ground water flow.

UNIT III Streams- Types- Drainage pattern and drainage basin. Geological work of streams . Land forms developed by streams. Wind- Geological work of wind. Types of Aeolian land forms. Deserts of the world.

UNIT IV Glaciers- Types, distribution, geological work of glaciers, glacial land forms- Ice ages. Oceans- composition of sea water- eustatic change of sea level and their causes. Marine sediments and environment, submarine topography. Coral reefs, coral landforms. Mineral deposits of ocean floor.

UNIT V Earthquake- causes, types, seismic waves, epicenter, focus, isoseismal lines, intensity and magnitude. Seismograph- seismic belt- Interior of the earth.

Volcanoes- classification and distribution Volcanic landforms. Volcanic products.

References

1. Arthur Holmes-Principles of Physical Geology
2. Arthur N. Strahler- The Earth Sciences
3. Lennis Barlin (!980) , Earthquakes and urban Environment , Vol.1, 2 & 3.
4. Davis etal (1976) Environmental Geoscience Niley Eastern .
5. Weller, Stratigraphic principles and practice,Harper and Raw ,1959
6. Donald R coates, 1981, Environmental geology, John wiley and sons
7. Plumer, Mc Geary Carlson- Physical Geology
8. Parbin singh- Engineering and general Geology

COMPLEMENTARY COURSE GEOLOGY PAPER II

GL2CO3
Credits: 2
Hours: 36

UNIT-I Crystalline and noncrystalline susbstances- Amorphous material. Minerals. Crystals, crystal systems and their symmetry. Significance of the study of crystals as an aid to mineral identification. Physical properties of minerals (colour, Streak, luster, fracture, cleavage, hardness, transparency, specific gravity)

UNIT-II Chemical composition and diagnostic properties of the following minerals:
Quartz, Feldspar, Mica, Amphiboles, Pyroxenes, Magnetite, Haematite, Gypsum, Garnet, Kyanite, Sillimanite, Calcite, Barite, Apatite, Corundum, Chromite, Ilmenite, Pyrite, Sphalerite, Graphite, Diamoand, Gold, Silver, Chalcopyrite, Talc, Galena, Fluorite, Magnesite, Beryl, Psilomelane, Pyrolusite, Dolomite.

UNIT-III Magma- Lava- Types- Origin- physical properties and chemical composition . Textures and Structures of igneous rocks. Mode of occurrence- Dyke, sill, lacolith, lopolith, stock, batholiths, Traps. Classification of igneous rocks- Megascopic study of the following rocks.
Granite, Pegmatite, Rhyolite, Basalt, Gabbro, Dolerite, Dunte, Syenite, Pumice, Diorite.

UNIT-IV Brief study of origin of Sediments and Sedimentary rocks- Texture and structures of sedimentary rocks. Field classification of Sedimentary rocks.
Megascopic study of Conglomerate, Breccia, Sandstone, Shale, Limestone, Laterite and lignite.

UNIT-V Metamorphism and Metamorphic rocks . Processes. Textures and Structures of metamorphic rocks. Megascopic study of the following metamorphic rocks. Slate, Phyllite, Schist, Amphibolite, Gneiss, Granulite, Marble, Charnockite, Khondalite.

References

1. Dana, F.S. 1955 – A text book of mineralogy – Asia publishing House, Wiley.
2. Read, H.H- 1974, - Rutley's elements of mineralogy – Thomas murby & co.
3. Mason B and Berry, L.G- Elements of Mineralogy – W.H. Freeman & Co.
4. Deer. W.A.,Howie. R.A and Zussman, J. -1966 .An introduction of the Rock forming minerals. Longmans.
5. Berry, Mason, Dietrich,2000 - Mineralogy, CBS Publication
6. Cornelis Klen and Cornelius S. Hurlbut , 1985 – Manual of Minerology, John wiley & Sons
7. Chakrapani-
8. Naidu, P.R.J, Optical Mineralogy.
9. Philips,W.R Mineral Optics-Principles and techniques.
10. Kerr.P.F- Optical Mineralogy.
11. Winchell. A.N-Elements of Optical Mineralogy.
12. Battey, M.H., Mineralogy for students.
13. Tyrrell, G.W. 1978 -Principles of petrology – Chapman and Hall Ltd., London.
14. Bowen, N.L.-The Evolution of the Igneous Rocks – Dover publication, Inc, New York.
15. Barth, FW. 1962-Theoretical petrology - Wiley.
16. Walstrom, E.E. 1961- Theoretical Igneous petrology, Wiley.
17. Turner.F.J and Verhoogen.J –1960.- Igneous and Metamorphic petrology – McGraw Hill.
18. Hatch, F.H. Wells, A.K.-Petrology of Igneous Rocks, Thomas Murby & Wells, M.K. – 1949
19. Johannesen, A – 1962-Descriptive petrography of Igneous Rocks, Vols. I to IV - Allied Pacific.

COMPLEMENTARY COURSE GEOLOGY PAPER III

GL3CO5
Credits: 2
Hours: 54

UNIT I Rock Out crops- Attitude of beds- Primary and secondary structures. Measurement of attitude of planar and linear structures- unconformities and their geological significance.

Folds- geometrical elements- Geometric classification. Antiform, synform, anticline, syncline, anticlinorium, synclinorium, geanticline, gesyncline , isoclinal folds, recumbent fold, overturned fold, Nappe.

UNIT II Faults- Basic terminology, Types of faults. Mechanics of faulting- Normal fault, Reverse fault, strike slip fault, dip slip fault,oblique slip fault, horst, graben, rift valley. Joints- Types of joints and their geological significance. Planar and linear structures- Foliation, lineation

UNIT III Geotectonics- Plate tectonics- Continental movement, Plate margins- Palaeomagnetism, Ocean floor spreading.

Mountains- Orogenic and epirogenic movements, Types of mountains.

Structural maps, topographic maps, geological maps- Map study and interpretation- Preparation of maps, Conventional symbols.

UNIT IV Palaeontology- Fossilization and fossils- Uses of fossils, Types of fossilization , Index fossils. General morphology of typical Trilobites, Brachiopods, Lamellibranchs, Gastropods, and Cephalopods.

UNIT V Stratigraphy- Laws of Stratigraphy; concept of Uniformitarianism, law of order of super position, law of faunal succession, law of original horizontality, law of cross cutting relationship, physical and biological criteria of correlation.

Geologic Time scale and its units - Eon, Era, Period, Epoch.

References:

1. Billings M.P. structural geology, 11 edition,prentice hall,1974
2. Hills,E.S. elements of structural geology
3. Hobbs .B.E., means,W.D and William P.F an out line of structural geology, John wiley,1976
4. John L. Robbers, introduction to geological maps and the structures, Pergamon press
5. Ken MeClay the mapping of geological structures, geological society of London, John wiley and Sons.
6. Henry woods : Invertebrate palaeontolgy – Cambridge.
7. Romer , A.S.: Vertebrate palaeontology, Chicago press.
8. Arnold, C.A., An introduction to Palaeobotany., MC-Graw Hill.
9. B.U. Haq and A. Boersma (1978) Introduction to marine Micropalaeontology. Elsevier, Netherlands
10. Raup, D.M. and Stanely, M.S.: Principles of Palaeontology, CBS Publishers.
11. Moore , R.C., Laliker , C.G.& Fishcher, A.G.: Invertebrate Fossils , Harper brothers
12. Shrock. R.R. and Twenhofel , W.H – 1953 : Principles of invertebrate Palaeontology, Amold publication
13. Ravindrakumar K.R. - Stratigraphy of India.
14. Lemon R.Y (1990) - Principles of Stratigraphy, Merrill Publishing Co.
15. Gregory , J.W. and Barret B.H- General Stratigraphy.
16. Dunbar.C.O & Rogers.J 1961 Principles of Stratigraphy. Willey.
17. Krumbein.W.C. &Sloss.L.D 1963 Stratigraphy & Sedimentation.Freeman

COMPLEMENTARY COURSE GEOLOGY PAPER IV

GL4CO7
Credits: 2
Hours: 54

UNIT-I Major Geological divisions of India – Precambrian, Cuddapah Super Group, Vindhyan Super Group, Deccan Traps, Jurassic of Kutch, Cretaceous of Trichinopoly, Tertiary formation, Quarternary, Indo Gangetic Alluvium,. Brief study of the Stratigraphy of Kerala - Precambrian, Tertiary and Quaternary.

UNIT-II Economic Geology- Ore and gangue minerals. Industrial minerals.

Bauxite, Copper deposits, Lead and Zinc deposits, Iron deposits, Radioactive minerals, Manganese deposits, Chromite deposits, Gold deposits, Beach sands.

UNIT-III Types of ore formation- Brief study.

Magmatic process, Hydrothermal process, Residual formation, Mechanical concentration.

Selected mineral deposits in India: Kundremukh Iron ore, lead and zinc deposit of Zawar, Kolar and Wayanad gold fields, Nellur mica deposits, Manganese deposits of Karnataka, Khetri copper deposits, Bauxites of Kerala, Neyvelli Lignite, Petroleum deposits of Bombay High, Cauvery and North East. Coal deposits of Bihar.

UNIT-IV Environmental Geology: Human impact on environment. Waste management. Ecology and environment. Air pollution, Water pollution, Impact of chemical residues on human health. Change of life style- Water conservation. Salt water intrusion. Sustainable development.

UNIT-V Geoscience and Disaster Management. Disasters - Natural and human made. Role of geologists in disaster management. Effect of earthquake, landslides, flooding and Tsunami on human being- Mitigation measures. Warning system for natural disasters.

References:

1. Krishnan M.S. (2003) - Geology of India and Burma, 6th Edition, CBS.
2. Wadia D.N. (1953) – Geology of India, TATA McGraw – Hill.
3. Ravindrakumar K.R - Stratigraphy of India.
4. Pascoe, E.H.(1968) - A manual of the Geology India and Burma, Govt of India Publications.
5. GSI publications, Bangalore. Geology of India Vol 1 &2, 2008
6. Gokhale and Rao – Ore deposits of India.

7. Jensen and Bateman A.M. – Economic Mineral Deposits.
8. Krishnaswamy, S. – Indian Mineral Resources.
9. Krauskopf – Introduction to Geochemistry.
10. Park and Macdiarmid -Ore deposits.
11. Umeshwer Prasad- Economic geology
12. Abbott .P.C (2002); Natural Disasters, Mcraw- Hill Publications-New Delhi
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15. Howard .A.D and Irwin Remson (1978); Geology in Environmental Planning, M.C Graw-hill publications
16. Keller. E.A (1976); Environmental Geology. Charles E.Merril Publishers, New Jerseys
17. Lundgren. L. (1986) Environmental Geology. Prentice-Hall publishers, New Jerseys
18. Strahler. N. and Strahler. A.H (1973); Environmental Geoscience; Willey eastern
19. Donald R coates, Ed 1973 Environmental geomorohology and Environmental geo science. Willey international
20. Donald R coates, 1981, Environmental geology, John wiley and sons
21. Peter T Elawan ,1970. Environmental geology,Harper & Raw

COMPLEMENTARY COURSE

GEOLOGY PRACTICAL

COMPLEMENTARY COURSE GEOLOGY PRACTICAL-I

GL1CO2(P)
Credits: 0
Hours: 36

I Preparation of neat diagrams/charts/maps/models of the following:

1. Solar system.
2. Seismic Belt of the World.
3. Rock types- Igneous, sedimentary, metamorphic.
4. Soil profile.
5. Hydrologic cycle.
6. Drainage pattern.
7. Confined aquifer- artesian wells.
8. Seismic waves.
9. Seismograph.
10. Seismogram.
11. Seismic zones of India.

II. Preparation of neat Block diagrams/Models of the following:

1. Dyke.
2. Sill.
3. Laccolith.
4. Lopolith.
5. Batholiths.
6. Volcanoes.
7. Earth quake with focus and epicenter. Movement of waves.
8. River terraces.
9. Slumping.
10. Landslide.

III. Exercise in identification of salient topographic and drainage features using toposheets. (1:50000 or 1: 25000) of Survey of India- 3 exercises. Covering 100 Sq.Km

IV. Collecting different types of soil/mineral/rock- put it in polythene cover pack it on a display board with neat labeling. Brief description of its physical properties.

Preparation of record.

COMPLEMENTARY COURSE GEOLOGY PRACTICAL-II

GL2C04(P)
Credits: 0
Hours: 36

I. Neat drawing of 6 crystal systems.

Crystallographic axes.

Plane of symmetry.

Axis of symmetry.

Typical models-

Cube- Isometric.

Prism + Base- Tetragonal.

Prism+ Base- Hexagonal.

Pinacoids- Orthorhombic.

Pinacoids- Monoclinic.

Pinacoids- Triclinic.

II. **Megascopic identification of the following minerals**

Quartz, orthoclase, plagioclase, microcline, biotite, muscovite, hornblende, chlorite, tremolite, actinolite, hypersthene, augite, diopside, magnetite, hematite, gypsum, garnet, kyanite, sillimanite, apatite, chromite, ilmenite, pyrite, sphalerite, graphite, chalcopyrite, beryl, talc, fluorite, magnesite, psilomelane, pyrolusite, dolomite, calcite.

III. Megascopic identification of the following igneous rocks: Granite, pegmatite, rhyolite, basalt, gabbro, dolerite, syenite, pumice, diorite, tuff.

Megascopic identification of the following sedimentary rocks Conglomerate, breccia, sandstone, shale, limestone, laterite, coal, lignite.

IV. Megascopic identification of the following metamorphic rocks:Slate, phyllite, mica schist, amphibolites, hornblende gneiss,, biotite gneiss, khondalite, marble, charnockite, chlorite schist, tremolite- actinolite schist.

Preparation of record.

COMPLEMENTARY COURSE GEOLOGY PRACTICAL-III

GL3C06(P)
Credits: 0
Hours: 36

1. Measurement of slope and distance using toposheets. (3 Exercises)
2. Completion of outcrops in contour maps (3 Exercises)
3. Determination of attitude of beds from maps. (3 Exercises)
4. Interpretation of geological maps with simple structures. (fold, fault, unconformity, intrusion [5 maps]).
5. Diagrams/ chart/ block diagrams showing different kinds of folds, faults, unconformities, joints, foliation, lineation. (3 Exercises)
6. Neat sketches of typical representation of the following fossil groups.
   Brachiopoda, trilobites, lamellibranch, gastropoda, cephalopoda.
7. Geological time scale.

COMPLEMENTARY COURSE GEOLOGY PRACTICAL-IV

GL4CO8(P)
Credits: 4
Hours: 36

1. Chart showing symbols of rocks and igneous, sedimentary, and metamorphic structures.
2. Megascopic identification or important ore and industrial minerals.
3. Geological map of Kerala showing major stratigraphic units.
4. In an India map mark the important places where ore minerals/ industrial minerals are found.
5. Preparation of mineral map of Kerala.
6. Revision of Practical-I
7. Revision of Practical-II
8. Revision of Practical-III
9. Revision of Practical-IV

COMPLEMENTARY COURSE REMOTE SENSING AND GIS (For Geology stream)

COMPLEMENTARY COURSE REMOTE SENSING AND GIS -I

GL1C09
Credits: 2
Hours: 36

Section-A Remote Sensing

UNIT I Concept of Remote Sensing. Basic principles of remote sensing-stages in of remote sensing process. Wavelength regions of electromagnetic radiation. Characteristic of electromagnetic radiation –wave nature and particle nature. Interactions between matter and electromagnetic radiation. Types of remote sensing with respect to wavelength regions- Visible Remote sensing, Infrared Remote sensing, Thermal infrared remote sensing, Microwave remote sensing

UNIT II Definition of Radiometry. Blackbody radiation- Kirchoff's Law, Stefan Boltzmann Law, Wein's displacement Law. Reflectance- Specular and Diffuse. Spectral reflectance of land covers- Soil, Clear water, Turbid water, vegetation-Healthy and diseased. Spectral characteristics of solar radiation, Transmittance of the atmosphere- Atmospheric window. Radiative transfer equation- Multiplitive and Additive

UNIT III Platform: Types of platform. Atmospheric condition and altitude. Attitude of platform- a. Rotation angles around the three axes **;** roll, pitch and yaw b. Jitter ; random and unsystematic vibration. Attitude sensors- Attitude control of a satellite (spin control and three axis control**).** Types of Attitude sensors- Angular sensor, magnetic sensor**,** angular moment sensor, angular displacement sensor. Orbital elements of satellite- six elements of Keplerian orbit. Orbit of satellite- Geosynchronous orbit, Sun synchronous orbit, Semi-recurrent orbit. Satellite positioning system. Remote sensing Satellites

Section B –GIS

UNIT IV Definition of GIS, Components of GIS-Hardware, Software, Brainware, Infrastructure. List of some important GIS software producers and their products. why is a GIS needed. Required functions for GIS. Required hardware and software for GIS. Required functions of GIS. Required functions of GIS software

UNIT-V Map: Overview, Geographic data-Spatial and Non spatial data, Elements of a map-Scale, Datum, Coordinate system, Projection. Types of coordinate system, Map projection-Types of Map Projection (Azhimuthal, Conial, Cylindrical). Types of Map-Topographical map, Large scale map, Thematic map. Methods of Map making

COMPLEMENTARY COURSE REMOTE SENSING AND GIS –II

GL2C11
Credits: 2
Hours: 36

Section- A Remote Sensing

UNIT I Sensors- Types of Sensors, Sensor Parameters-Spatial Resolution, Spectral Resolution, Radiometric Resolution, Temporal Resolution. Characteristics of Optical sensors, Resolving power, Dispersing element, Spectroscopic filter, Spectrometer, Characteristic of optical detectors, Camera for remote sensing, films for remote sensing, Optical mechanical scanner, Push broom scanner, Imaging spectrometer, Atmospheric sensor, Sonar, Laser radar.

UNIT II Aerial Photography: Basic information and Specification of aerial photography; Planning and execution of photographic flight lines, Crab, Cloud, Dead ground; Completion of Photographic task. Interpretation of aerial photographic elements-Tone, Texture, Shape, Association, Pattern etc. Photogrammetric Instruments

Section- B - GIS

UNIT III PC based GIS for education, Image display, Color hard copy machine, Pen computer.**GIS** as a multidisciplinary science- Geography Statistics Cartography Operations Research Remote Sensing Computer Science Photogrammetry Mathematics Surveying Civil Engineering Geodesy Urban Planning etc. Areas of **GIS a**pplications- Facilities Management, Environment and Natural Resources Management, Street Network, Planning and Engineering, Land Information System. **GIS** as an Information Infrastructure-Social infrastructure, Environmental infrastructure, Urban infrastructure, Economic infrastructure**,** Educational infrastructure. **GIS** for decision support.

UNIT IV 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 ,census data.

UNIT V Data model: Spatial data model-Raster data model and vector data model, Advantage and Disadvantages of Raster and vector data model; Non spatial data model- Hierarchical model ,Relational model, Network model, Relational model; Hybrid data model – Quad tree and vector topology.

COMPLEMENTARY COURSE REMOTE SENSING AND GIS –III

GL3C13
Credits: 2
Hours: 54

Section- A Remote Sensing

UNIT I Optical Remote Sensing- Panchromatic, Multispectral , Hyperspectral, superspectral. Microwave Remote Sensing- Introduction, attenuation of microwave, microwave radiation, surface scattering, volume scattering, types of antenna. Thermal remote sensing.

UNIT II Introduction to satellite Remote sensing, Earth resource satellite, Landsat series, Orbital characteristics of different satellite series, SPOT, NOAA, Geostationary meteorological satellites .Introduction to satellite data Interpretation.

UNIT III Indian Space Program-Introduction. Aryabhatta, Bhaskara, Rohini, Apple satellite. IRS satellite system, INSAT satellite system, Launch vehicles, Launch Infrastructure, International Cooperation, Antrix, Indian Space centres.

Section- B - GIS

UNIT IV Data input –Introduction, Entering the data -Analogue, Digital data. Methods of entering data -Manual digitizing -Headsup digitising, and Heads down digitizing; Automatic digitizing-Scanning and Electronic line following; Electronic data transfer, Keyboard entry.

Data management in GIS-Database approach, Database management system, Designing a Database, GIS database applications.

UNIT V Data editing - Detecting and correcting errors- Dangles, Psuedonode, Duplicate lines, Silver polygon.

-Reprojection, Transformation, Reduction and Generalization.

- Edge-matching and Rubber sheeting.

Querying Data-Queries, Types of Queries- Spatial and Non Spatial, Combining Queries-Boolean Operators AND, OR and NOT

COMPLEMENTARY COURSE REMOTE SENSING AND GIS –IV

GL4C15
Credits: 2
Hours: 54

Section- A Remote Sensing

UNIT I Application of Remote Sensing- Land cover classification, Land cover change detection, Global vegetation map, water quality monitoring, measurement of sea surface temperature, snow survey, monitoring of atmospheric constituents, lineament extraction, geological interpretation, Height measurement (DEM) generation. Integration Remote Sensing with GIS.

UNIT II Digital Image Processing: Flow of Digital Image Processing, Radiometric Correction, Geometric Correction, Image Enhancement, Spatial Filtering, Feature Extraction, Classification Methods, Maximum Likelihood Classifier.

Section- B - GIS

UNIT III Topology: Definition of Topology. Topology and Spatial Relationships- Adjacency, Containment, Connectivity. Topological Data structure-Nodes, Arcs, Polygons. Advantages of the Topological Data Structure. Building a Topology in GIS. Layering Concept in GIS

UNIT IV Sources of error in GIS- Obvious sources of errors, Error resulting from natural variation or from original measurement, Error arising through processing. Data Analysis: Spatial Analysis Surface Analysis, Network Analysis. Output in GIS: Cartographic Output and Non cartographic Output.

UNIT V Installation of GIS: Plan for GIS installation, Consideration for Installation of GIS, Key for successful GIS, Reasons for unsuccessful GIS, Required Human Resources for GIS, Cost analysis of GIS project.

REFERENCES

1. Elements of Cartography, 6th edition.- Robinson, Arthur H., Morrison
2. Geographical Information Systems and Computer Cartography- Jones, Christopher. 1997
3. Remote sensing and image interpretation (5th ed.)- Lillesand, T.M.; R.W. Kiefer, and J.W. Chipman
4. Remote Sensing of the Environment- Jensen, John R
5. Introductory Digital Image Processing- Jensen, John R., 2005
6. Remote Sensing and Geographical Information system (sec ed)-M.Anji Reddy
7. Principles of Geographical Information Systems for Land Resources Assessment- Burrough P.A and Frank A V
8. Geographical Information Systems for Natural Resources Assessment- Burrough P.A
9. Remote sensing digital image analysis: an introduction (4th ed.).
10. Principles and Applications of Photogeology -SHIV N.PANDEY
11. GIS Fundamentals, A First Text on Geographic Information Systems- Bolstad, Paul. 2005
12. Introduction to GIS –Dr M A Siddiqui
13. Basics of Remote sensing and GIS-Dr S Kumar
14. A guide to Image Interpretation-Dr Gary Prost
15. GIS: A Visual Approach- Davis, Bruce E. 2001
16. GIS and AutoCAD Map-NIIT
17. Physical Principles of Remote Sensing- W. G. Rees
18. An Introduction to Ocean Remote Sensing- Seelye Martin
19. Spatial Databases- Shekhar, Shashi, and Sanjay Chawla.
20. GIS Work Book Fundamental course Shunji Murai
21. GIS Work Book Technicalcourse Shunji Murai
22. Remote Sensing Notes- Japan Association of Remote Sensing
23. Remote Sensing of Landscapes with Spectral Images- John B. Adams, Alan R. Gillespie

COMPLEMENTARY COURSE REMOTE SENSING AND GIS PRACTICALS

COMPLEMENTARY COURSE REMOTE SENSING AND GIS PRACTICAL-I

GL1C10(P)
Credits: 0
Hours: 36

1. Draw Spectral reflectance signature curve for different land covers
2. Cartography(Manual)- Choropleth map, Dot map, Isarithmic map, Proportional symbol map
3. Digitization

COMPLEMENTARY COURSE REMOTE SENSING AND GIS PRACTICAL –II

GL2C12(P)
Credits: 0
Hours: 36

1. From the aerial photographs supplied to you, identify the cultural/ geomorphological features and mark them on the corresponding toposheet.
2. Photogrammetry exercises (without the aid of instruments)
    a. Calculation of Photoscale
    b. B Calculation of Relief displacement
    c. C Calculate the number of aerial photographs for the given area
3. Viewing Photographs Stereoscopically
4. Stereoscopic depth perception
5. On screen digitization -Georeferencing

COMPLEMENTARY COURSE REMOTE SENSING AND GIS PRACTICAL-III

GL3C14(P)

Credits: 0
Hours: 36

1. Preparation of aerial mosaic.
2. Prepare a base map-Drainage, Road network, contour from the given grid of toposheet/satellite imagery by using Light table
3. Interpretation aerial photographs.
4. Aerial photographs stereoscopic vision-Measurement of height,Parallax measurement
5. On screen digitization- Georeferencing- attribute data entry

COMPLEMENTARY COURSE REMOTE SENSING AND GIS PRACTICAL-IV

GL4C16(P)
Credits: 4
Hours: 36

1. Satellite image interpretation.-Panchromatic image,Multispectral,True colour,False colr composite
2. Digital image processing.
3. On screen digitization- Georeferencing -attribute data entry- Linking of Spatial data and Non spatial data -Spatial analysis-Query-model-GIS Output in the form of Map/Graph/Chart
4. Preparation of different thematic layers from satellite imageries / Toposheet by using GIS

Open courses (for other stream)

GEMMOLOGY

Paper Code: GL5D01
Total Credits-4
Hours-54

Unit-I Gems and Jewelry. Navarathnas. Evolution of science of gemology. History of Gem industry In India- ancient and recent. Diamond cutting industry. Coloured stone industry. Gems in ayurvedha. Geological distribution.

Unit-II Minerals and rocks. The formation of gemstones in the earth crust. Essential qualities of gem materials, organic and inorganic gems, gem testing. The major gem occurrences of the world.

Unit-III Chemical composition of gemstones. The relationship between chemical composition and durability. Important Physical and optical properties of gemstones. Groups, species and varieties of gemstones with special reference to Ruby, Sapphire, Aquamarine, Alexandrite, Emerald, Opal, Topaz, Tourmaline and Diamonds.

UNIT IV Factors influencing the choice of a precious stone, definition of synthetic gem. Cutting and polishing of gemstones. Cutting with reference to diamonds, artificial colouring of synthetic gems, distinction between natural and synthetic gemstones.

Unit V Gemstone occurrences in India. Marketing values of gemstones,

Reference

1. R.V. Karanth. Gems and Gem industry in India(2000)
2. Peter G.Read gemmology
3. Phlips.W.R. (1986); Optical Minerology-Giffen
4. Dana.F.S.(1955); A text book of Minerology Asia publishing House Willey

GROUND WATER EXPLORATION AND MANAGEMENT

GL5D02
Credits-4
Hours-36

Unit-I Origin- meteoritic, juvenile and connate waters. Hydrological cycle, occurrence; ground water occurrences in igneous, sedimentary and metamorphic rocks- vertical distribution of ground water, movement; classification and types of aquifers, definition of porosity, permeability, specific yield, specific retention, storage and transmissibility.

Unit-II Groundwater detection; surface methods-geomorphological, structural and biological evidences. Surface geophysical methods; principles, field procedures, electrode arrangements, instruments and interpretations involved in electrical resistivity method of ground water exploration. Brief account of role of remote sensing in ground water targeting.

Unit-III Well design and well development; brief introduction about dug wells, tube wells, jetted wells, infiltration galleries and collector wells, well screening and artificial packing. Well development through surging and acidizing. Methodology and need for pump test.

Unit IV Water quality; Quality of water in various rock types, water quality parameters and their standards proposed by WHO and BIS. Physical parameters of water quality. Chemical parameters and determining methods. Diseases and virological aspects of ground water and remedial measures.

Unit V Ground water management; meaning of water shed and river basins. Ground water provinces of india. Ground water potentiality in Kerala. Seawater intrusions and remedies. Cloud seeding, artificial recharge and ground water harvesting techniques.

References

1. Davis S.N and Dewiest(1966)-Hydrogeology, John wiley and sons.
2. Bouwer . H. Ground water hydrology,1978
3. Todd,D,K. ground water hydrology,John wiley and sons 1980
4. Tolman C. F, Ground water,Mc Graw Hill
5. Walton,W.C., Ground water resource evaluation, Mc Graw Hill,1970

UNDERSTANDING THE EARTH

GL5D03
Credits-4
Hours-54

Unit I Physiographic features of India-Mountains, oceans, rivers and lakes in India. Evolutionary history of Himalayas. A brief note on copmpsition and constitution of western ghats. Comparison between western ghats and easternghats.

Unit II Climate; atmosphere-layersand composition. Rain, Formation of meteoritic precipitation-sleet –hail. Physical and chemical properties of water-Global distribution of water and fresh water. Surface and subsurface storitivity of water. Uses of water.

Unit III Concepts; explanation of; Concepts of uniformitarinism, plate tectonics, isostacy, geomorphology (structure-processes-time), continental drift, rock cycle, water cycle, weathering cycle and soil formation.

Unit IV Stratigraphy of Kerala- Geomorphology of Kerala-Mineral wealth of Kerala, Rivers of Kerala- Rock types in Kerala, Soil types of Kerala, Paleotectonic and neotectonic zones in Kerala. Natural disasters in Kerala, Ground water potentiality in kerala.

Unit V Role of Geology in the civilization of man, Major Geological organization in India-GSI, ONGC, MECL, AMD. Research and developmental activities in geological studies. Job opportunities in geological domains.

References:

6. Plumer, Carlson, Mc Geary(2003), Physical geology, published by Mc Graw -Hill
7. Bloom,A, geomorphology,CBS, New Delhi
8. Ahamed,E. coastal geomorphology of india. Orient long man, New Delhi, 1972
9. Weller, Stratigraphic principles and practice,Harper and Raw ,1959
10. Thornbury .W.D principles of geomorphology, Wiley 1968

NANOTECHNOLOGY

GL5D04
Credits-4
Hours-54

Unit 1 Introduction.Concept and definition,. Nanotechnology as an integrating science Different domains - nano materials, nano geology, nano physics, nano chemistry, nano robots, etc. The concept of 'nano level' and 'nano size' particles.Emergence of nano technology – the 'bottom up' and 'top down' approaches, the scope and challenges.

Unit II Various sectors of industry, where the impact of the technology will be maximum –
A) Automobile b) chemical c) engineering d) electronics e) Manufacturing f) medicine g) textiles h) energy i) cosmetics to food J) House hold equipments k) sports/outdoors.Role of scanning electron microscope in nano sciences

Unit III Carbon nanotubes: structure and applications. Nano complex millipede chips. Nano solar cells and fuel cells as an alternative energy source. Nano television. 'Smart bombs' and 'dendrimers'. Nano sensors.

Unit IV Noval applications of nano materials. Next generation computer chips. Better insulation materials, Phosphors for high-definition tv.Low cost flat panel displays.High energy density batteries, Automobile with greater fuel efficiency. Ductile, machinable ceramics.Longer lasting satellites, Application in the field of environmental science.Water quality – bacteria, virus & chemical free water maintenance using nano technology.Elimination of pollutants using nano crystalline materials

Unit V Application in the field of medicine- Nano diagnosis.Nano probes. Nano particles and its application in cancer treatment. Nano toxicology.Application of biochips in health and allied fields, Longer lasting medical implants.

Reference

1. **Nanotechnology: Basic Science and Emerging Technologies** by Mick Wilson
2. **Nanotechnology (AIP-Press)** by Gregory L. Timp
3. **principles of nanotechnologymolecular-based study of condensed matter in Small Systems**by **G Ali Mansoori** *(University of Illinois at Chicago, USA)*
4. Introduction to Nanoscale Science and Technology Di Ventra, Massimiliano; Evoy, Stephane; Heflin, James R. (Eds.) 2004, 632 p. With CD-ROM., HardcoverISBN: 978-1-4020-7720-3

Core Course Elective

DISASTER MANAGEMENT

GL6B20(E01)
Credits-2
Hours-54

Unit I Introduction- Hazard and Disaster: Definition and terminologies - Classification. Concept of Disaster Management- Comprehensive Disaster Management Plan. Elements of Disaster Management Plan. Disaster Management Act, 2005. Institutional frame work - Policy and Administrative frame work for Disaster Management.

Unit II Natural Disasters - Earth quake, Land Slide, Avalanches, Volcanic eruptions - Their Case Studies. Heat and Cold waves. Coastal Disasters. Coastal Regulation Zone. Cyclone - Case Studies. Flood - Case Studies. Drought - Case Studies. Tsunami - Case studies.

Unit III Man-made Disasters. Rail, Road, Air and Sea accidents. Dams and Dam bursts. Environmental Planning and Design of Dams. Environmental Impact of Dam. Dam safety, failure and mitigation measures Nuclear Disasters, Chemical Disasters. Biological Disaster .Building fire, Coal fire/Forest fire and Oil fire. Air pollution, Water pollution, Industrial pollution: Types of Pollutants - Heavy metals Pesticides, Petroleum Hydro Carbons. Abatement, Mitigation and Management of Environmental pollution Hazards. De-forestation. Climate change: Global warming, sea level rise, Ozone Depletion- Causes and Effects.

Unit IV Risk Assessment and Vulnerability Analysis- concepts and elements, Hazard, Risk and Vulnerability, Understanding risk, Risk Reduction. Vulnerability: Social and Economic Factors. Strategies for Survival. Vulnerability and Development.

Unit V Disaster Management. Prevention, Preparedness and Mitigation; Disaster Preparedness Plan. Application of Information Technology in Disaster Preparedness. Applications of GIS in disaster management. Trauma and Stress Management. First Aid, and Emergency procedures, Warning Systems.

References:

1. Abbott .P.C (2002); Natural Disasters, Mcraw- Hill Publications-New Delhi
2. Coates D.R (1985) ; Geology and society chapman and hall publishers- New Delhi
3. Davis etal (1976) Environmental Geoscience Niley Eastern
4. Howard .A.D and Irwin Remson (1978); Geology in Environmental Planning, M.C Graw-hill publications
5. Keller. E.A (1976); Environmental Geology. Charles E.Merril Publishers, New Jerseys
6. Lundgren. L. (1986) Environmental Geology. Prentice-Hall publishers, New Jerseys Strahler. N. and Strahler. A.H (1973); Environmental Geoscience; Willey eastern

GEO EXPLORATION

GL6B20(E02)
Credits-2
Hours-54

Unit I Geological exploration; marginal information of toposheets and working principles with Brunton compass. Principle of making pits and trenches. An introductory knowledge of different types of drilling. Stratigraphic, structural, mineralogical and geomorphological guides in ore search.

Unit II Geophysical exploration; scope and limitations of geophysical techniques. Principles involved in geoelectrical survey. A brief introduction about self potential and resistivity surveys. Basic principles of well logging surveys.

Unit III Geodectic aspects of earth. Newtons law of gravitation- gravity corrections- gravimeters- applications of gravity in exploration. Geomagnetic field of earth. Principles of magnetism, Hysterisis loop- magnetometers-interpretation magnetic data- application magnetic survey.

Unit IV Elastic constants, properties of seismic waves-geophones-refraction path of seismic waves in simple, horizontal two layer case. Basic principles of seismic reflection, application of seismic survey. Principles of radioactivity and its utility in geo exploration

Unit V Geochemical exploration; abundance and types of elements in earth crust, mobility of elements, the electronic structure of atoms and the periodic table, chemical bonds, Geochemical exploration for copper and gold, principles of bio geo exploration-indicator plants, interrelation between geo exploration techniques.

References

1. Dohr.G.(1984) Applied geophysics- English Book Department
2. Dobrin.M.B (1981) Introduction to geophysical prospecting- McGraw Hill
3. Kearney .P and Brooks M(1984) An introduction to geo physical exploration- ELBS
4. Mckinstry.H.E (1960) mining geology. Asia publisher house
5. Mason.B.(1966) principles of geo chemistry-Willey Toppan
6. Ramachandra Rao.M.B (1975) out lines of geo physical prospecting- a manual for geologist university of mysore
7. Hawkes.H.E and Webh.V.S. (1962) geo chemistry in mineral exploration.

GEOTECHNICAL ENGINEERING

GL6B20(E03)
Credits-2
Hours-54

Unit I Geo-technical engineering as a field science related to construction. Scope of geo-technical engineering. Ground investigations – Introduction, Types of ground investigation, Geological mapping for ground investigation.

Unit II Field investigations - Introduction, Excavations and boreholes - Shallow trial pits, Deep trial pits and shafts, Headings (adits), Hand auger boring, Light cable percussion drilling, Mechanical augers, Wash boring and other methods, Backfilling excavations and boreholes.

Unit III Sampling. Frequency of sampling. Sampling the ground - General principles, Sample quality. Disturbed samples from boring tools or from excavating equipments, Types of samplers - Open-tube samples and samplers, Stationary piston sampler, Continuous soil sampling, Sand samplers, Rotary core samplers, Window sampler, Block samples. Handling and labelling of samples

Unit III Field and lab tests

Field tests – Introduction, Tests in boreholes - Standard penetration test (SPT). Permeability test and Packer test. Pressuremeter test. Pumping tests. Geophysical surveying (Electrical resistivity, Gravity, Magnetic, Seismic methods.

Laboratory tests on samples - Tests on soil - Classification tests - Moisture content/ water content determination, Liquid and plastic limits (Atterberg Limits), Particle size distribution (grading) by sieving. Soil strength tests - Triaxial compression test and Unconfined compression test. Compaction-related tests - Dry density (dry unit weight)

UNIT IV Tests on rock

Rock classification tests - Saturation moisture content (alteration index), Bulk density, Moisture content, Petrographic analysis, Hardness and abrasiveness, Carbonate test, Swelling test. Rock strength tests - Point load test, Uniaxial Compression, Direct tension test, Indirect tensile strength test (Brazil test).

Unit V Logging - Description of soils and rocks

Description of soils - Mass characteristics of soils. Material characteristics of soils – Colour, Particle shape, grading and composition.

Description and classification of rocks - General description - Strength of rock material, Structure, Colour, Texture, Grain size, State of weathering, Rock name.

Total core recovery (TCR), solid core recovery (SCR), Rock Quality Designation (RQD

Suggested Texts:

Canadian Geotechnical Society, Canadian Foundation Engineering Manual. 3rd Ed.
Canadian Geotechnical Society, Technical Committee on Foundations, BiTech Publishers Ltd., Richmond, British Columbia, 1992.

Nielsen, David M., (ed.). Practical Handbook Of Ground-Water Monitoring. Lewis Publishers Inc., Chelsea, Michigan, 1991.

Coduto, D.P., Component: Geotechnical Engineering: Principles and Practices. Prentice Hall, NJ, 1999.

Lambe, T.W., Soil Testing for Engineers. BiTech Publishers, Vancouver, 1991.

Hoek, Evert and John Bray, Rock Slope Engineering. London: Institution of Mining and Metallurgy, 1981.

Hoek, Evert and Edwin T. Brown, Underground Excavations in Rock. London: Institution of Mining and Metallurgy, 1982.

ENVIRONMENTAL GEOLOGY

GL6B20(E04)
Credits-2
Hours-54

Unit I Our place in the environment-humans as agents of geologic change-fundamental concepts of environmental geology. Man as a geologic agent- de forestation-human population explosion-urbanization.

Unit II Man and geologic hazards-mass wasting and its human impacts-factors that influence slope stability- earth quakes hazards and risks- prediction and control of earth quakes

Unit III Man and hydrosphere- pollution of surface water-pollution of ground water-saline water intrusion- pollution in the marine environment

Unit IV Man and atmosphere- atmospheric change as a natural process-anthropogenic impacts on the atmosphere- depletion of ozone-global warming- green house effect.

Unit V The global energy scenario- energy from fossil fuels- energy alternatives- environmental impacts of mining-waste management

References

1. Donald R coates, Ed 1973 Environmental geomorohology and Environmental geo science. Willey international
2. Donald R coates, 1981, Environmental geology, John wiley and sons
3. Peter T Elawan ,1970. Environmental geology,Harper & Raw

MODEL QUESTION PAPERS

CORE COURSE: GEOLOGY- THEORY
MODEL QUESTION PAPERS

UNIVERSITY OF CALICUT

MODEL QUESTION PAPER

PERSPECTIVES & METHODS IN SCIENCE AND EARTH PROCESSES

Course Code: GL1B01 **Weightage: 30** **Time : 3hours**

SECTION A

(Weightage 1 for a bunch of 4 questions)

I choose the correct answer

1. The big-bang theory was proposed by
   a) Kant b) Abbe georges Lemaitre c) Laplace d) Buffen
2. P waves passes through
   a) Solids and liquids b) solids, liquids and gases c) liquids and gases d) gases and solids
3. Lapilli are the pyroclastic materials having the size range
   a)less than 0.25mm b) 0.25-4mm c) 4-32mm d) more than 32mm
4. According to Airy's theory of isotasy

a) The density of the crust and the subtraction is uniformly same through out

b) The thickness of the crust and the subtraction` is uniformly same through out

c) The crust & the subtraction each have uniform but different densities

d) The crust has a constant thickness at the top where as the subtraction has a constant thickness of the bottom

II Name the following

5. Branch of geology that deals with the origin, occurrence, structure and history of rocks
6. Earthquakes whose depth of focus ranges between 300-700 km are known as
7. Movements of uplift & subsidence that have produced boarder feature of continent & ocean
8. Type of volcanic eruption characterized by jetting of fountains of fluid basic lava from a central crater

III Fill in the blanks

9. ----------is one of the many small celestial bodies in the orbit around the sun.
10. ---------- is an instrument that records seismic waves.
11. The process by which concentric scales or shells of the rocks from less than a centimeter to several meter in thickness are successively pealed off from barren surface of large masses of rock is called --------.
12. The condition of equilibrium, comparable of floating of the units of the lithosphere above the Asthenosphere is called ----------

IV. True or False

13. The concept of Uniformitarianism was proposed by James Hutton.
14. The spacing of planets is best explained by Planetesimal hypothesis.
15. Discontinuity between sial & sima of the earth crust is Mohorovicic discontinuity.
16. Radioactive method used in dating recent materials is Potassium-Argon method.

V. Match the following

17. A crater of very large size	Jeans and Jeffreys
18. Nebular hypothesis	Weichert Guttenberg
19. Tidal hypothesis	Caldera
20. Mantle and core	Kant & Laplace
	Cinder Cones

SECTION B

VI. Write short Notes on any 7 of the following (Each question with weightage 1)

21. Planetesimal Hypothesis
22. Different types of seismic waves
23. Volcanoes & their products
24. Geosynclines & their importance
25. Uniformitarianism
26. Discontinuities in the earth's interior
27. Asthenosphere
28. Carbon dating
29. Frost wedging

SECTION C

VII. Write short essay any five of the following (Each question with weightage 2)

30. Physical, Chemical & Biological weathering
31. Concept of Isostasy
32. Scope of Geology
33. Origin of earthquake
34. Big-bang theory
35. Mid-oceanic ridge
36. Types of seismographs

SECTION D

VIII. Long Essay (Each question with weightage 4)

37. What are Land slides? Add a note on the classification and preventive measures.

Or

What are the different methods to determine the age of the Earth?

38. What are the different hypotheses for the origin of the earth?

Or

Describe the interior of the earth with reference to the seismic waves.

UNIVERSITY OF CALICUT
MODEL QUESTION PAPER
DYNAMIC GEOLOGY AND GEOINFORMATICS

Course Code: GL2B03 **Weightage:30** **Time : 3hours**

SECTION-A
(Weightage 1 for a bunch of 4 questions)

I. Name the following

1. An isolated table-land area with steep sides.
2. Feature produced by wind erosion down to water table in a desert.
3. Floating ice hill on the sea water.
4. The upper surface of the saturated zone.

II. Fill in the blanks

1. A non stratified aeolian deposit composed of silt grade fragments are called----------
2. Flat- topped hills or small mountains formed by stream action are called----------
3. Island made by wave erosion is called----------
4. The dripstones hanging from the top of the limestone caves are called----------

III. Choose the correct answer

1. Cavity in a rock lined with quartz crystal projecting towards the centre (Stylolite, Geode, Sinter, Kankar).
2. Circular reefs enclosing a shallow body of water are called (Lagoons, Atolls, Fringing reefs, Barrier reefs).
3. The drainage pattern which shows lack of structural control to the stream-flow direction is described as (Parallel, Dendritic, Rectangular, Trellis).
4. Siefs are produced by the (Glaciers, Running streams, Wind, Wavy action in ocean).

IV. Match the following

1. Moraines	V-shaped valley
2. Gorges	Air chair like depression
3. Cirque	Cave deposits growing from the floor
4. Stalagmite	Glacial deposit
	A sharp pointed peak.

V. True or false.

1. The elongate ridge of sand or gravel that projects from land & ends in open water is known as spit.
2. Flat valleys are formed during the youth stage of a river.

3. Deflation is the most important aeolian process for the formation of yardangs.
4. The land counterpart of delta is an alluvial fan.

SECTION-B

VI. Short notes on any 7 of the following (Each question with weightage 1)

21. Trellis and dendritic drainage pattern.
22. Confined and unconfined aquifer.
23. Wind deposits.
24. Moraines.
25. Fringing and barrier reef.
26. U shaped and V shaped valleys
27. Pedestal rock
28. Perched water table
29. Continental slope and continental shelf

SECTION-C

VII. Short essay on any five of the following (Each question with weightage 2)

30. Give an account of shore line processes and associated landforms.
31. What is water table? Briefly explain the hydrological properties of rocks.
32. With neat sketches, differentiate the various types of drainage patterns.
33. Pleistocene glaciations
34. Explain work of geologic work of ocean.
35. What is rejuvenation? What are the important rejuvenated landforms?
36. Erosional features produced by stream action.

SECTION-D

VIII. Long essay (Each question with weightage 4)

37. Give a brief account of the geological work of streams.

Or

Describe the different landforms produced by glacial action.

38. Discuss wind as a geological agent.

Or

Give and account of the physiographical feature of the ocean floor.

UNIVERSITY OF CALICUT

MODEL QUESTION PAPER

CRYSTALLOGRAPHY

Course code: GL3B05 **Weightage:30** **Time : 3hours**

SECTION-A

(A bunch of 4 questions having Weightage 1)

I. Name the following

1. The crystal form having maximum number of faces.
2. A crystal class having only centre of symmetry.
3. Type mineral of normal class of isometric system
4. Instrument used for measuring inter facial angles of crystals

II. Fill in the blanks

5. The plane by which the reversed crystals are united is the---------
6. Miller indices corresponding to the Weiss symbol 2a, 1b,∞c is----------
7. Number of faces in rhombohedron ----------
8. Symmetry operation associated with centre of symmetry is ----------

III Choose the correct answer

9. Which of the following mineral group is identified by twinning
   (feldspathoids, epidote, feldspar, Aragonite)
10. The millers symbols for parameters ½ a :1 b : 1c will be
    {(201), (112), (012), (211)}
11. Type mineral of normal class of orthorhombic system.
    (zircon, barite, galena, axinite)
12. What is the crystallographic name of cube?
    (octahedron, hexoctahedron, hexahedron , tetrahedron)

IV. Match the following

13. Calcite	Cubic
14. Galena	Monoclinic
15. Gypsum	Triclinic
16. Axinite	Ortho rhombic
	Rhombohedral

V. True or False

17. Prisms are always parallel to the vertical axis in tetragonal system.
18. Magnetite is crystallizing in hexagonal system.
19. Tetartohedral form has one quarter of faces of holohedral form.
20. A crystal system with three unequal axes is tetragonal system

SECTION-B

VI. Short notes on any 7 of the following. (Each question with weightage 1)

21. Law of constancy of interfacial angle.
22. Enantiomorphous form.
23. Open and closed forms.
24. Forms in the normal class of the orthorhombic system.
25. Diploid.
26. Axial ratio.
27. Miller indices
28. Spherical projection
29. Pyramid of first order in the Tetragonal system

SECTION-C

VII. Short essay on any 5 of the following . (Each question with weightage 2)

30. Symmetry and forms present in normal class of Triclinic system.
31. Concept of symmetry in crystals.
32. Goniometer.
33. Stereographic projections.
34. Hemimorphism
35. Penetration twins
36. Laws of crystallography

SECTION-D

VIII. Long essay. (Each question with weightage 4)

37. Give an account of the different types of twining seen in crystals.

Or

Describe the symmetry elements and forms present in the Rhombohedral class.

38. Describe the symmetry elements and forms present in the Normal class of the orthorhombic system.

Or

Describe the symmetry elements and forms present in the Tetrahedral class of the cubic System.

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MODEL QUESTION PAPER

MINERALOGY

Course code GL4B07 **Weightage:30** **Time : 3hours**

SECTION-A

(A bunch of 4 questions having Weightage 1)

I. Name the following

1. Type of bond that has the strongest bond strength ?
2. Colourless, transparent variety of calcite ?
3. How many times an isotropic mineral extinguishes between crossed nicol during a complete 360 rotation of the stage?
4. Optic sign of a biaxial mineral if BXa is Z vibration direction.

II. Fill in the blanks

5. flaky habit is characteristic of ---------- silicate structure.
6. If the crystallographic axis direction is fast, uniaxial mineral become optically----
7. ----------represents a solid solution series between forsterite and fayalite.
8. Diamond shows ---------- luster.

III. choose the correct answer

9. Jollys spring balance is used to determine (luster, hardness,specific gravity, streak)
10. Al_2O_3 is the chemical composition of ----------(kyanite, bauxite, corundum, topaz)
11. Mineral which shows dichroism. (siderite, tourmaline, calcite ,garnet)
12. When a ray of light strikes the junction plane between two media at right angle, the angle of incidence is ----------(0^0, 45^0,90^0,180^0)

IV. Match the following

13. Calcite	Garlic smell
14. Sphalerite	Ceramic industry
15. Feldspar	Nicol prism
16. Arseno pyrite	Polysynthetic twining
	6 directional cleavage

V. True or False

17. Polymorphism is well exhibited by aluminium silicates.
18. Garnet is an anisotropic mineral
19. In the case of uniaxial –ve mineral, velocity of the E- ray is less than that of O-ray
20. Refractive index is directly proportional to critical angle.

SECTION-B

VI. Short notes on any 7 of the following (Each question with weightage 1)

21. Isomorphism.
22. Optical accessories
23. Extinction.
24. Uniaxial and biaxial minerals.
25. Types of luster
26. Specific gravity.
27. Quartz wedge
28. Polarizer and analyser
29. Sign of elongation.

SECTION-C

VII. Short essay on any 5 of the following (Each question with weightage 2)

30. Give the important differences between pyroxenes and amphiboles.
31. Petrological microscope and its parts.
32. Procedure for finding the order of interference colour.
33. Determination of hardness of a mineral using Moh's scale of hardness.
34. Uniaxial and biaxial indicatrix
35. Polymorphs of quartz
36. Double refraction

SECTION-D

VIII. Long essay(Each question with weightage 4)

37. Classify and describe silicate structures.

    Or

    Give an account of the chemical composition, classification, physical properties and optical properties of Olivine group. Add a note on their occurrence and association.

38. Describe the important optical properties exhibited by minerals in thin section.

    Or

    Describe the Mica group of minerals.

UNIVERSITY OF CALICUT

MODEL QUESTION PAPER

STRATIGRAPHY AND INDIAN GEOLOGY

Course code: GL5B09 **Weightage: 30** **Time : 3hours**

SECTION A

(A bunch of 4 questions having Weightage 1)

I. Choose the correct answer

1. According to the law of faunal succession
   a) The fossil content of each formation is non- diagnostic
   b) The fossil assemblage of each formation is the same as that of the overlying formations
   c) The fossil assemblage of each is very distinctive and characteristics of it
   d) The fossil in a formations are arranged successively according to their age
2. Geologic time divided at the beginning at the Cambrian period in to two
   a)Erathem b) Eons 3) Eras 4) Epochs
3. Type area of charnockite
   a) Pallawaram b) Trichi c) Trivandrum d) Angadippuram
4. The Cenomanian transgression occurred during
   a) Triassic period b) Jurassic period c) cretaceous period d) Miocene period

II. Name The Following

5. Cenozoic glacio- lacustrine formations of Kashmir
6. The term that indicates the particular environment of deposition of a sedimentary rock
7. Minor undetected breaks due to non deposition or slight erosion in a stratigraphic record
8. The youngest succession of rocks in the Kutch basin.

III. Fill in the blanks

9. In the Cudappah basin ----------shows the highest lateral extent
10. The Siwalik Group of rocks were deposited in the Himalayan foredeep during the ---------- stage of Himalayan orogeny.
11. ---------- is a fundamental rock unit
12. The time rock unit stage corresponds ------ -------- of the time units

IV. True or false

13. The lower & upper parts of Delhi Supergroup are separated from each other by Kushalgarh lime stone
14. The rock formations exposed in the Spiti valley range in age from Precambrian to Cretaceous
15. Giumal sandstone not belong to Miocene period
16. Graded bedding is a tectonic criterion for correlation

V. Match the following

17)	Group	Epoch	18)	Nallamalai group	Diamonds
	System	Age		Manusar formation	Pyrite
	Series	Era		Bijaigarh shale	Manganese
	Stage	period		Bijwar series	Lead

19)	Upper siwalik	Fluviatile environment	20)	Dharwar -	Palaeozoic
	Middle siwalik	Marshy environment		Cuddapah	Archean
	Lower siwalik	Lucustrine environment		Gondwana	Protrozoic
				Spiti	Mesozoic

SECTION-B

VI. Write short note on any 7 of the following (Each question with weightage 1)

21. Southern Granulite terrain
22. Breaks in stratigraphic records
23. Sausar & sakoli group
24. Intra trapean & inter trapean beds
25. Delhi super group
26. Laws of cross cutting relationship
27. Lower Vindhyan
28. Stratigraphic epoch
29. Pleistocene glaciation

VII. Write short essay on any 5 of the following (Each question with weightage 2)

30. Principles of stratigraphy
31. Physical and biological co- relation
32. Cretaceous of trichi
33. Teritiary rocks of kerala
34. Time scale
35. Salt range
36. Cenozoic oil bearing formations of India.

SECTION-D

VIII. Long essay (Each question with weightage 4)

37. Write an essay on the gondwana formation. Add notes on its palaeontological & economic importance

Or

Write an essay on siwalik system with reference gto their assemblages faunal & floral

38. Discuss the biostratigraphic and chronostrtigraphic classification

Or

Describe the Stratigraphy of Cuddapah super group & add a note on the economic importance of Cuddapah rocks.

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MODEL QUESTION PAPER

PALAEONTOLOGY

Course code:GL5B10 **Weightage:30** **Time : 3hours**

SECTION-A

(A bunch of 4 questions having Weightage 1)

I. Choose the correct answer

1. The relations of an organism to its environment
   a. Embryology
   b. Taxonomy
   c. Ecology
   d. Palaeontology
2. Largest taxonomic division of organisms
   a. Species
   b. Order
   c. Family
   d. Kingdom
3. Small exoskeleton with large first chamber secreted by asexual foraminifera
   a. Lagena
   b. Microspheric test
   c. Nodosaria
   d. Megalospheric test
4. Thread like extension of the apex of the sicula
   a. Stype
   b. Sicula
   c. Nema
   d. Calyx

II. Fill in the blanks

5. The entire skeleton of a solitary or colonial coral is known as ----------
6. A triangular fissure under the umbo for the passage of pedicle in brachiopod is known as ------
7. Physa exhibit ---------- type of coiling giving rise to left sided aperture
8. The portion of the septa produced to form the funnel shaped structure around the siphuncle is called --------

III. Match the pair

9. Olenellus – Trilobite; productus :----------
10. Micraster- cretaceous to present ; Cidaris: ----------
11. Glossopteris – lower gondwana; Gangamopteris: ----------
12. Regularia- Cidaris; Irregularia--------

IV. Name the following

13. Brachiopods with no teeth.
14. Suture line in phylloceras.
15. The cavity or impression left after the removal of a fossil by solution.
16. The central region of the cephalon comprising the glabella and fixed cheeks.

V. Match the following

17. Foraminifera	Middle Cambrian
18. Unigeminal pores	Dimorphism
19. Paradoxides	Graptolites
20. Stipe-	Ambulacra
	Graptolites

SECTION-B

VI. Short answer (Answer any seven. Each question with weightage 1)

21. What is trace fossil?
22. Type of pedicle opening in the brachiopods?
23. What is the application of micro fossil?
24. What do you mean by fossulae?
25. Distinguish between lepidodendron & sigillaria
26. Name the plates seen in pentremites
27. Amber
28. Petrificatioin
29. Corals

SECTION-C

VII. Short essay (Answer any five.Each question with weightage 2)

30. Glabella in trilobites
31. Dentition in lamellibranchs
32. Apical disc and peristome in echinoderma
33. Give a brief account on dinosaurs and their extinction
34. Preservation of fossils
35. Dimorphism in foraminifera
36. Evolutionary changes in Trilobites

SECTION-D

VIII. Long essay (Each question with weightage 4)

37. Describe the morphology of graptolites. Add a note on their evolutionary developments.

Or

Describe the morphological features and stratigraphic distribution of brachiopods.

38. Define fossil. Give a brief account on different nature and modes of fossil preservation

Or

Examine the morphology and stratigraphic significance of foraminifera.

UNIVERSITY OF CALICUT

MODEL QUESTION PAPER

STRUCTURAL GEOLOGY & GEOTECTONICS

Course Code:GL 5 B11 **Weightage:30** **Time : 3hours**

SECTION- A

(A bunch of 4 questions having Weightage 1)

I. Choose the correct answer.

1. The line joining points of equal elevation in the ground is called

   a) Contour line
   b) Strike line
   c) Isothermal line
   d) Hinge line.

2. Which of the following are the folds with parallel arrangement of limbs

   a) Isoclinal fold
   b) Reclined fold
   c) Inverted fold
   d) Symmetrical fold

3. Joints which are developed perpendicular to the fold axis are called

   a) Extension joints
   b) Release joints
   c) Tension joints
   d) Shear joints

4. Beneath the ocean the Moho lies at a depth of

   a) 79 km
   b) 10-12 km
   c) 14-16 km
   d) 20-25 km.

II. Fill in the blanks.

5. A fault in which rake of the net slip is zero is called----------

6. A tectonic mountain chain in Peninsular India is----------

7. ---------- is the super continent that existed prior to continental drift.

8. ---------- is the unconformity in which both the series of rocks are parallel to each other.

III. Name the following

9. The horizontal component of fault displacement

10. A stable part of the land mass.

11. The deformation of rocks caused by stress.

12. The type of plate margins coinciding with mid- oceanic ridge.

IV. Match the pair.

13. Columnar joints	Net slip is parallel to the strike, dip slip is zero.
14. Axial surface	Granite
15. Strike slip fault	Basalt.
16. Outlier.	Which contain all the hinges
	Older rocks surrounding the younger rock

V. True or false

17. Normal fault is a fault along which the hanging wall has relatively moved up.
18. Alfred G. Wegener is the proponent of the Continental drift hypothesis.
19. If the dip of the bed and valley slope are in opposite direction, dip of the 'V' will be pointing upstream.
20. Older rocks are found in mid-oceanic ridges.

SECTION-B

VI. Short Answers (Answer any seven.Each question with weightage 1)

21. Distinguish between Geological map and Topographic map
22. How will you recognize a fold in the field?
23. Benioff zone.
24. Outcrops.
25. What is palaeomagnetism?
26. What is the attitude of a bed?
27. What is throw and heave ?
28. Explain Outlier and Inlier?
29. What is Diastem?

SECTION-C

VII. Short essays (Answer any five.Each question with weightage 2)

30. Give the geometric classification of fold.
31. Explain different types of unconformities.
32. Describe various types of joints.
33. What is shield area? Give their characteristic features and tectonic elements.
34. Procedure for the measurement of Strike and Dip in the field.
35. Palaeomagnetism
36. Overlap and offlap.

SECTION-D

VIII. Long essays (Each question with weightage of 4)

37. Discuss mountains with special reference to their origin.

Or

What are faults? Explain how they are identified in the field and maps.

38. Discuss with neat sketches, the different types of plate boundaries.

Or

Give an account of the sea floor spreading in the light of modern Tectonic hypothesis.

UNIVERSITY OF CALICUT

MODEL QUESTION PAPER

ECONOMIC GEOLOGY

Course Code:GL6B15 **Weightage:30** **Time 3 hours**

SECTION-A

(A bunch of 4 questions having Weightage 1)

I. Choose the correct answer

1. The Indian Gold deposits are of----------
   a) Epithermal
   b) Mesothermal
   c) Hypothermal
   d) Xenothermal
2. The age of Neyveli Lignite deposit ---------
   a) Cretaceous
   b) Eocene
   c) Miocene
   d) Oligocene
3. A placer deposit formed at the site of the destruction of primary source rock--------
   a) Aeolian placer
   b) Alluvial placer
   c) Elluvial placer
   d) Colluvial placer
4. Hydrothermal replacement process controls----------
   a) Oxidation
   b) Metasomatism
   c) Supergene enrichment
   d) All of the above

II. Fill in the blanks

5. The optimum temperature range for the formation of hydrothermal deposit is -----
6. A vertical dyke showing transverse veins is known as ----------
7. If the colour of the gossan is black, it indicates the presence of ----------
8. Atacamite is an ore mineral of ----------

III. Name the following

9. Specific periods characterized by the formation of large number of mineral deposits
10. Father of Economic Geology
11. The world's largest producer of lignite
12. The metal content of an ore.

IV. Match the following

13. Gold	Antartica
14. Miocene coal	Galena
15. Ruby mica	Arsenic
16. Lead	Andhrapradesh
	Bihar

V. Write the suitable pair.

17. Segregation: Chromite; Dissemination: ----------
18. Cinnabar: HgS; Orpiment:----------
19. Solid Petroleum: Asphalt; Black lignite:----------
20. Chromium: anorthosite; Diamond:----------

SECTION-B

VI. Short notes (On any seven of the following.Each question with weightage 1)

21. Syngenetic and epigenetic deposits
22. Sublimation.
23. Fissure veins.
24. Mechanical concentration.
25. Abrasive minerals.
26. Strategic and critical minerals.
27. Magmatic segregation
28. Placer deposits
29. Gossan

SECTION-C

VII. Short essay (On any five of the following .Each question with weightage 2)

30. Describe the controls of ore localization.
31. Write an essay on Contact metasomatic processes.
32. Copper deposits of India.
33. Occurrence of gemstone in India.
34. Hydrothermal deposits
35. Tertiary lignite
36. Gold deposits of India

SECTION-D

VIII. Long essay.(Each question with weightage 4)

37. Describe the hydrothermal cavity filling ore deposits

Or

Write an essay on Supergene sulphide enrichment.

38. Give an account of mineral deposits of Kerala.

Or

Write an essay on the processes of formation of coal and describe any two major coal fields of India.

UNIVERSITY OF CALICUT
MODEL QUESTION PAPER
IGNEOUS PETROLOGY

Course Code: GL 6B 16 **Weightage:30** **Time 3 hours**

SECTION-A
(A bunch of 4 questions having weightage4)

I. Choose the correct Answer

1. Rhyolite is the volcanic equivalent of----------
   a) Ijolite
   b) Meltigite
   c) Nepheline syenite
   d) Granite
2. Which of the following is an example of a concordant igneous form.
   a) Sill
   b) Essexite
   c) Dyke
   d) Cone sheet.
3. Porphyritic texture is frequently found in ----------
   a) Plutonic rocks
   b) Volcanic rocks
   c) Hypabyssal and plutonic rocks
   d) Volcanic and hypabyssal rocks
4. A minor pluton that is either curved or lensoid injected along and concordant with the arches and troughs of folded strata
   a) Laccolith
   b) Lopolith
   c) Phacolith
   d) Bysmalith

II. Fill in the blanks

5. The condition in which different parts of a liquid magma chamber exhibit different temperature values is described as ----------
6. Lavas in which the gas cavities are very numerous and irregular in shape are called----------
7. The most abundant plutonic igneous rock is----------
8. The process by which a broadly homogenous parent magma breaks up into contrasted fractions which ultimately form rocks of different composition is ----------

III. Name the following

9. The structure by which felsites formed by devitrification process is disintegrated from that of direct crystallization.
10. The rock which produce ringing sound which it is hitted.

11. A type of lava having a festooned, ropy surface structure.
12. A mineral found as a consequence of an earlier phase failing to react with the liquid.

IV. Match the following.

13. Myrmekitic	Corundum
14. Anhedral	Basalt
15. Peraluminian	Panidiomorphic
16. Gabbro	Granite.
	Allotrimorphic

V. Write the suitable pair.

17. Pyroxene: Pyroxenite; Olivine:----------
18. Perthite: Alkali Feldspar & Plagioclase Feldspar; Graphic Texture:----------
19. Quartz: Leucite; Saturated: ----------
20. Shand: Colour Index; Streikeinson:----------

SECTION-B

VI. Write short notes on any 7 of the following (Each questions with weightage1)

21. Batholiths
22. Devitrification
23. Trachytic texture.
24. Salic and femic group of minerals.
25. Assimilation.
26. Origin of pegmatite.
27. Amygdalloidal basalts
28. Eutectic crystallization
29. Norm

SECTION-C

VII. Write short essay on any 5 of the following. (Each questions with weightage 2)

30. Forms of intrusive igneous rocks.
31. Magmatic differentiation.
32. Tyrrels tabular classification.
33. Bowen's reaction series.
34. Albite-Anorthite system
35. Textures of igneous rocks
36. Fractional crystallization
37. Merits and demerits of CIPW classification

SECTION-D

VIII. Long essays. (Each questions with weightage 4)

38. Write an essay on mineralogy, texture, classification and mode of occurrence of granite.

Or

Describe the course of crystallization of Albite-Anorthite system. Add a note on its significance.

39. Describe the different structures in igneous rocks

Or

Give an account of the classification of igneous rocks.

UNIVERSITY OF CALICUT
MODEL QUESTION PAPER
SEDIMENTOLOGY & METAMORPHIC PETROLOGY

Course code: GL6B17 **Total weightage:30** **Time 3 hours**

SECTION-A

(A bunch of 4 questions having Weightage 1)

I. Choose the correct answer.

1. The smallest megascopic layer in a sedimentary sequence.
   a) Bed
   b) Stratum
   c) Lamina
   d) All of the above
2. Texture in which the fragmental characteristics are not visible.
   a) Epiclastic.
   b) Clastic.
   c) Non clastic.
   d) Pyroclastic.
3. Metamorphism involving the combined effect of uniform pressure and heat is described as
   a) Plutonic metamorphism
   b) Dynamothermal metamorphism.
   c) Cataclastic metamorphism.
   d) Contact metamorphism.
4. Which of the following rocks are completely unfoliated
   a) Slates
   b) Schist
   c) Phyllite
   d) Hornfelses

II. Fill in the blanks

5. According to Wentworth scale particles having a diameter between 64 mm to 4mm are described as----------
6. The size concept in metamorphism was proposed by----------
7. Marble is the metamorphic equivalent of----------
8. Relicts of original materials and textures found in metamorphic rocks are described as---------- textures.

III. Name the following

9. The process results by the combined effect of water, boron and fluorine.
10. The evaporate is that typical of marine basin.
11. The diagnostic mineral in the blue schist facies.
12. The pyroxene which is characteristic of eclogite.

IV. Match the following

13. Charnockite	Shallow water
14. Arkose	Hypersthene granulite
15. Ripple marks	Feldspar
16. Hornfels	Marble
	Contact metamorphism

V. Write the suitable pair.

17. Arenites: Arenaceous;	Lutite: ----------
18. Shale :Slate;	Sandstone:----------
19. Contact metamorphism:temperature;	cataclastic metamorphism:----------
20. Pebble : 64-4mm;	silt:----------

SECTION-B

VI. Write short notes on any 7 of the following.(Each question with weightage 1)

21. Clastic and nonclastic texture.
22. Siliceous deposits
23. Zone of metamorphism
24. Breccias
25. Anatexis
26. Retrograde metamorphism
27. Marl
28. Diagenesis
29. Metamorphic zone

SECTION-C

VII. Write short essay on any 5 of the following (Each question with weightage 2)

30. Limestone
31. Cataclastic metamorphism & its product.
32. Eclogite
33. Sedimentary processes.
34. Grade scale
35. Soils and its geologic significances
36. Grade of metamorphism

SECTION-D

VIII. Long essay (Each question with weightage 4)

37. Write an essay on structures of sedimentary rocks.

Or

Describe the composition , petrogenesis, and classification of sandstone.

38. Describe the structures and textures of metamorphic rocks.

Or

Give an account of metamorphism of calcareous rocks and its products.

CORE COURSE: GEOLOGY- PRACTICALS
MODEL QUESTION PAPERS

UNIVERSITY OF CALICUT

MODEL QUESTION PAPER (PRACTICALS)

CRYSTALLOGRAPHY & MINERALOGY

Course Code: GL4B08(P) **Total Weightage:30** **Time: 3 hours**

1. Identify the given crystal models numbered **1** to **8** giving their system, class, symmetry, faces and their miller indices. Give the name of the mineral crystallising after each model.

   Weightage : 8

2. Identify the mineral specimens numbered **9** to **18** giving their crystallising system, composition and other megascopic characters.

   Weightage : 10

3. Identify the thin sections of the minerals under the petrological microscope, numbered **17** to **22** giving their characters under parallel and crossed nicols.

   Weightage : 12

UNIVERSITY OF CALICUT

MODEL QUESTION PAPER (PRACTICALS)

PETROLOGY & PALAEONTOLOGY

Course Code: GL6B15(P) **Total Weightage:30** **Time: 3 hours**

1. Identify the rock specimens numbered **1** to **10** giving structure, texture if any, mineral composition, mode of origin and occurrence.

Weightage : 10

2. Identify the rock sections numbered **11** to **16** under the Petrological; microscope, giving their texture, structure, mineral composition and their origin.

Weightage : 12

3. Identify the fossil specimens numbered **17** to **24** giving their taxonomic position, morphological characters, and stratigraphic range.

Weightage : 8

UNIVERSITY OF CALICUT

MODEL QUESTION PAPER (PRACTICALS)

ECONOMIC GEOLOGY & STRUCTURAL GEOLOGY

Course Code: GL6B16(P) **Total Weightage:30** **Time: 3 hours**

1. Identify the ore minerals numbered 1 to **6** giving their composition, Crystallising system and other megascopic characters. Give their Indian occurrences and uses.

   Weightage : 12

2. Geological Map.

   i).Work out the given Geological Map. Draw strike lines and label with elevation values.

   ii) Mark all the structures in the map.

   iii) Bring out the structures in a section along the given direction.

   iv) Add a note on geology of the area represented by the Map.

   Weightage : 12

3. Two Structural Problems.

   Weightage : 6

Open courses (for other stream)
MODEL QUESTION PAPERS

UNIVERSITY OF CALICUT

MODEL QUESTION PAPER

GEMMOLOGY

Course code: GL5D01 **Total Weightage: 30** **Time 3 hours**

SECTION A

(A bunch of 4 questions having Weightage 1)

I. Choose the correct answer

1. Luster in diamond

a)Vitreous

b) Pearly

c) Silky

d) Adamantine

2. Cats' eye

a)Chrysoberyl b) Urarovite c) Pyrope d) Grossularite

3. Which is the anisotropic gem

a) Lapis lazuli b) Chrysoberyl c) Pyrope d)Diamond

4. Fossil recene used as gem stone

a) Amber b) Glossopteris c) Coprolute d) Quano

II. Name The Following

5. The devise that used for polarize the light

6. Mineral exhibit play of colour

7. Precious variety of garnet

8. the most primitive style of cutting

III. Fill in the blanks

9. Wajrakarur is famous for ----------

10. Red colour corrundum is ----------

11.The Science and study of gemstones is called----------

12.A mineral with Adamantine luster shows the brilliant appearance because of-------

IV.Match the following

13. Diamond	cubic
14. Zircon	Tetragonal
15. Chrysoberyl	Orthorhombic
16. Malachite	Monoclinic
	Triclinic

V True or false

17. Gemstones are measured in terms of metric carat

18. Pleochroism is best observed in non polarized light

19. Spinel is also called 'Naram Manek', if means Soft ruby

20. Beryl is a polymorph of alumino silicate

SECTION-B

VI. Write short note on any 7 of the following. each question having the Weightage 1

21. Isomorphism and Polymorphism
22. Blow pipe test and Etch test
23..Natural and Synthetic gemstone
24.. Ruby and Sapphire
25.. Role of gemstone in astrology
26.. Cutting of diamond
27. Bonding of atoms in silicate structure
28. Hardness of mineral
29. Kimberlite

VII. Write short essay on any 5 of the following. each question having the Weightage 2

30. Techniques of preparation of thin section
31.Factors in influencing the choice of precious stones
32. Physical properties of minerals
33.Distribution of diamonds in india
34.Medicinal value of gemstones
35.Artificial colouring of synthetic gem
36. Properties of minerals under polarizer and Analyzer

VII Write essay on the following, each question having the Weightage 4

37.Describe origin and economic aspects of diamond ? Distribution of diamonds in india

Or

Occurrence of gemstone in kerala ?Add a note on the industries of kerala

38.Explaine different parts and the functions of petrological microscope

Or

Give the important physical and optical properties of gemstones with the special reference to' Navarathnas'

UNIVERSITY OF CALICUT
MODEL QUESTION PAPER
GROUNDWATER EXPLORATION AND MANAGEMENT

Course code: GL5D02 **Total weightage:30** **Time 3 hours**

SECTION-A

(A bunch of 4 questions having Weightage 1)

I. Choose the correct answer.

1. The water that occurs within the zone of aeration
   a) Plutonic water b) Meteoric water c) Vadose water d) Connate water

2. A pulviometer is an instrument that is used to measure-----

   a) amount of precipitation b) permeability of rocks

   c) porosity of rocks d) safe yield of underground water

3. Which of the following materials has highest porosity?

   a) Clay b) Silt c) Gravel d) Sandstone

4. Excavation is very easy in the rock belonging to the ---

   a) Arenaceous b) Precambrian c) Palaeozoic d) Holocene.

II. Fill in the blanks

5. Darcy's law is applicable for --------flow
6. Presence of water in the rocks tends to --------- the velocity of seismic waves.
7. When sodium adsorption ratio is more than 26, the water class will be --------.
8. Well diameter and mud content of the walls of a well can be measured by ---------- logging.

III Name the following

9. An impermeable formation that neither hold nor transmit water
10. A variation of the hydraulic rotary method is known as
11. A stream which receives groundwater discharge
12. A dense mass of water drops on smoke or dust particles in the lower atmospheric layer

IV. Match the following

13. Hill method	Clay
14. Permeability	Piezometer
15. Darcy	Safe yield
16. Aquiclude	Permeameter
	18.2 ks

V Write the suitable pair.

17. Junenile water : magmatic origin; Connate water:----------
18. Zone of aeration : Vadose water ; Zone of saturation ----------
19. Sandstone :Aquifer ; Clay----------
20. Electrical resistivity method: Surface investigation of ground water; Caliper Logging: ----------

SECTION-B

VI Write short notes on any 7 of the following.(Each question with weightage 1)

21 Cone of depression
22 Wenner electrode arrangement
23 Tube well
24 WHO standards for drinking water
25 Artesian Aquifer
26 Roof top harvesting
27 Juvenile water and connate water
28 Water table
29 Seismic refraction method

SECTION-C

VII Write short essay on any 5 of the following (Each question with weightage 2)

30. Artificial recharge
31. Hydrologic cycle
32. Classification and types of aquifer
33. Electrical resistivity method
34. Pumping test
35. Water quality parameters
36. Watershed management

SECTION-D

VIII Long essay (Each question with Weightage 4)

37. Describe saltwater intrusion. Briefly explain the methods to prevent saline water intrusion

Or

Explain the important geophysical methods for groundwater exploration

38. Briefly explain the application of remote sensing in groundwater targeting.

Or

Describe the physical, chemical and biological parameters of groundwater quality.

UNIVERSITY OF CALICUT
MODEL QUESTION PAPER
UNDERSTANDING THE EARTH

Course code: GL5D03 **Total weightage:30** **Time 3 hours**

SECTION-A
(A bunch of 4 questions having Weightage 1)

I. Choose the correct answer.

1. Part of the ocean between 0-200m depth is called
   a) Continental shelf b) Continental slope
   c) Continental rise c) Oceanic trough

2. What is the name given to the single largr ocean which exited before the beginning of the continental drift
   a) Pangea b) Panthalasa
   c) Thethys d) Antartic ocean

3. Deltas are an examples of
   a) Exogeosyncline b) Auto geosyncline
   c) Mio geosyncline d) Taphro geosyncline

4. East flowing river of Kerala
   a) Bhavani b) Ganga
   c) Chandragiri d) Chaliyar

II. Name the Following

5. Isolated residual hillock surrounded by peneplain
6. Soil in which sand, clay, and humus are found more or less in equal amounts
7. The smallest rock stratigraphic unit
8. The continent mostly covered by ice

III. Fill in the Blanks

9. Average density of the earth is----------
10. Black soil is suitable for ----------
11. Water containing dissolved carbon dioxide can dissolve ----------
12. Flat topped sea mounts are called ----------

IV. Match the following

13. Canyon	a) Alteration product
14. Cirque	b)Erosional ridge
15. Bird's foot	c) Matured river valley
16. Cuesta	d) Matured delta
	e) Bowl shaped depression

V Write the suitable pair.

17.Mort lakes : formed in meanders of river ; Tarns:----------
18. Himalaya: Folded mountains ; Mount Fujiyama:----------
19. Sea level changes: Eustatic ; Land level changes:----------
20.Group: Era ; System:----------

SECTION-B

VI Write short notes on any 7 of the following.(Each question with weightage 1)

21.Western Ghat
22.Orogeny
23.Hail
24.Chemical properties of water
25.Uniformitarianism
26.Isostacy
27.Formation of soil
28.Rivers of Kerala
29..GSI

SECTION-C

VII Write short essay on any 5 of the following (Each question with weightage 2)

30.Evolution of Himalaya
31.Plate tectonics Research and developmental activities in Geology
32.Atmospheric composition
33.Economic minerals of Kerala
34.Major Geological Organizations in India
35.Weathering of rocks
36.Ocean basin topography

SECTION-D

VIII Long essay (Each question with weightage 4)

37. Phyiographic features of India

Or

Stratigraphy of Kerala

38.Plate tectonics

Or

Natural hazards of kerala

Core Course Elective
MODEL QUESTION PAPERS

UNIVERSITY OF CALICUT

DISASTER MANGEMENT

MODEL QUESTION PAPER

Course code: GL6B20(E01) **Total Weightage 30** **Time 3 hours**

Section A

I.A bunch of 4 questions having Weightage 1. Answer all questions

Choose the correct answer

1) The first stage of the disaster management cycle when a disaster has occurred
   a) Preparedness b) Rehabilitation
   c) Response d) Reconstruction

2) The technical concept used by specialist to arrive at an estimation of losses in the event of a disaster
   a) Risk b) hazard
   c) Vulnerability d) none of these

3) A dangerous condition or event that could cause injury, loss of life or damage to the property, lively hood or environment
   a) Disaster b) Hazard
   c) Geohazard d) Risk

4) Vulnerability depends on
   a) Gender b) Population growth
   c) Social and economic backwardness
   d) All these factors

5) One of the following is not a Geo hazard
   a) Cyclone b) Landslide
   c) Earthquake d) Volcano

6) Drought is classified under
   a) Geo hazard b) Weather related hazard
   c) Industrial disaster d) Chemical disaster

7) A disaster which can be beneficial to human kind
   a) Earth quake b) Avalanches
   c) Cyclone d) Volcanoes

8) Chernobyl disaster is associated with
   a) Nuclear power plant b) Thermal power plant
   c) Dam d) Sea

9) Which condition favor out break of Plague

a) Inadequate garbage disposal arrangements
b) Congestion in Town
c) Lack of over all preparedness on behalf of civic bodies
d) All the above

10) Mine fire give rise to emission of gases such as

a) CH_4 b) CO_2

c) NO_2 d) O_2

11) Chemical (pollutant) in the atmosphere before its destruction by chemical reaction or change in its form

a) Residence time b) Cooling time

c) Elapse time d) None of these

12) To prevent forest fire spread, vegetation is removed along a strip at same interval

a) Fire line b) Fire storm

c) Ground furrow d) Spread line

13) Which part of India was subjected to severe earth quake in 1993

a) Lattur b) Kutch

c) Jabalpur d) Kangra

14) The National Institute of Disaster Management is situated in

a) New Delhi b) Pune

c) Kolkata d) Dehradun

15) Factors triggering land slide

a) Seismicity b) Rainfall

c) Quarrying d) All the above

16) Orissa super cyclone occurred in

a) 1999 b) 2002

c) 2004 d) 1984

Fill in the blanks

17) Kerala is categorised under the seismic zone ----------

18) The occurrence of an illness or other heath related events that is unusually large or unexpected is called ----------

19) ---------- is the primary international agreement providing for control on the production and consumption of ozone depletion substances.

20) ---------- is the convention on climate change held in June 1992 at the Rio.

Section B

II Write short notes.(Answer any 7 questions. Each question having Weightage 1)

21.Planning for hazard reduction

22.Structural measures of flood mitigation

23.Application of information technology in disaster preparedness

24.Which are the natural disasters that can occur in Kerala

25.Describe the specific factors which aggravate the vulnerability of biological disaster.

26.Which are the indicators of Desertification

27.Warning system of tsunami

28.Suggest safety measures while on rail travel

29.Hazard zonation Map

Section C

III. Write short essay. Answer any 5 Questions. Each question having Weightage 2

30. First aid in Disaster response

31. Typical effects of chemical and industrial accidents

32. Strategies for combating land slides

33. Stress management strategies in disaster situation

34. Role of community in disaster preparedness

35. Coastal erosion

36. Green house effect

Section D

IV. Long essay (Each question with weightage 4)

37. Discuss the various elements of Disaster management plan. Add a note on Institutional frame work for Disaster management in India.

Or

Briefly explain the relevance Disaster Management Policy in Kerala

38. Describe various types of hazard and impact associated with earth quake and highlight the lessons learnt.

Or

The occurrence of cyclone in India. Suggest the best method of cyclone warning and forecasting with special reference to disaster prone state in India. General characteristic of the tropical cyclone

UNIVERSITY OF CALICUT

MODEL QUESTION PAPER

GEO EXPLORATION

Course code: GL6B20(E02) **Total Weightage: 30** **Time 3 hours**

SECTION A

(A bunch of 4 questions having Weightage 1)

I. Choose the correct answer

1. Which of the following is common method used for sampling of placer deposits

a) Churn drilling

b) Auger drilling

c) Jet drilling

d) Rotary drilling

2. A natural gamma- ray log exhibits a high response from

a)Shale b) Limestone c) Coal d) Dolomite

3. Which of the following is commonly used as a drilling mud in the exploration of Oil & gas

a) Heavy spar b) Satinspar c) Flourspar d)Jasper

4. Detailed survey of oil & gas is done by

a) Seismic reflection b) Seismic refraction c) Geo magnetic method d) Gravity method

II. Name The Following

5. Instrument used for detecting seismic signals during seismic survey

6. Element having strong affinity for oxygen concentrated in the silicate minerals

7. In gravity survey, the data collected are corrected for elevation of the terrain

8.The shape of the Hodograph of reflected wave

III. Fill in the blanks

9. The old Bisanathrm mine is engaged in the mining of ----------

10. Comminution is the processes of ---------

11. Sorting of grains is carried out by the instrument called --------

12. The outcrop manganese deposits exhibits ----------colour

IV. Match the following

13.Plan indicator	Deposits
14.Alfalfa	Ground water
15.Salicornea	Borate rich saline deposits
16.Calamine violet	Zinc

V. True or false

17. Schlumberger configuration is used in electrical profiling
18. Rotary drilling is a common method used for sampling of placer deposits
19. Bore hole diameter is determined by caliper logging
20. Induction logging is mainly used to determine the conductivity of rock

SECTION-B

VI. Write short notes (Answer any 7 questions. Each question having Weightage 1)

21. Diamond drilling
22. SP method
23. Application of magnetic survey
24. Geophones
25. Indicator plants
26. Stratigraphic guides in ore research
27. Torsion balance
28. gamma-gamma logging
29. Magneto meter

SECTION-C

VII Short essay (Answer any 5 questions. Each question having Weightage 2)

30. Methods of sampling
31. Bouger anomaly
32. Merits and limitations of schlumberger survey
33. GM counter
34. Path finder elements
35. Seismic reflection method
36. Ore reserve estimation

SECTION-D

VIII. Long essay(Each question having Weightage 4)

37. Principles and procedure of geo chemical exploration

Or

What is radio activity? How the radiometric used to interpret mineral reserves

38. Desribe geophysical in oil exploration

Or

What are gravity anomalies ? How gravity methods used to interpret mineral reserves?

UNIVERSITY OF CALICUT

MODEL QUESTION PAPER

ENVIROMENTAL GEOLOGY

Course code: GL6B20 (E04) **Total Weightage: 30** **Time 3 hours**

SECTION A

(A bunch of 4 questions having Weightage 1)

I. Choose the correct answer

1. Gas responsible for Green house effect

a)CH4

b) CO
c) H2S
d) CO2

2. Ozone layer is in

a)stratosphere b) mesosphere 3) troposphere 4) ionosphere

3. Salt water intrusion is best explained on the basis of

a) Ghyben- Herzberg relation b) Darcys' Law c) Theis' d) Hooks' law

4. Eutrophication is the type of

a) Water pollution b) Air pollution c) Soil pollution d) None of the above

5. Most abundant gas in atmosphere

a) N b) CO2 c) O2 d) H2

II. Name The Following

5. Worldwide changes of sea level
6. Very slow downward movement of landmass
7. Point just vertically above the focus
8. Instrument used for recording earth quake wave

III. Fill in the blanks

9. The change in shape of water table due to the excessive pumping of ground water is -------- cone of depression
10. Down slope movement of material due to gravity is known as --------
11. Composition of Ozone is---------
12. Meenamatha disease is caused by----- metal

IV True or False

13. Hail is a type of precipitation that consists of hard pellets of ice
14. Slow down slope movement of saturated rock debris, which is not confined to definite channel is described as mudflow
15. 'Mauna Lao' is the biggest volcanic cone in the world

16. Volcanic fissures or vent through which carbon dioxide vapours are emitted are called solfat aras

V. Match the following

17. Mogofes	Alluvial
18. monadnocks	Aeolian
19. Insel bergs	Glacial
20. Roches mountonees	Karst

\SECTION-B

VI. Write short notes. (Answer any seven of the following. Each question having Weightage 1)

21. Focus of earth quake
22. Vadose water
23. Ozone layer
24. Renewable energy
25. Deforestation
26. Earth system
27. Urbanization
28. Safety factor
29. Leachate migration

SECTION-C

VII. Write short essay (on any five of the following. Each question having Weightage 2)

30. Human population Explosion
31. Slump and Slide
32. Eutrophication
33. Green house effect
34. Impacts of mining
35. earth quake hazards and risk
36. Waste disposal technique

SECTION-D

VIII. Long essay (Each question with weightage 4)

37. Write an essay on the fundamental concepts of environmental geology

or

Discuss the impacts of geologic hazards on environment. Add a note on the prediction of earth quake .

38. How the human activities are contributing to atmospheric pollution . Discuss Global warming impacts on earth

or

. Discuss the global energy scenario and add an note on the impact on the earth systems of different fossil fuel use

COMPLEMENTARY COURSE GEOLOGY (for other stream) MODEL QUESTION PAPERS

UNIVERSITY OF CALICUT

MODEL QUESTION PAPER

COMPLEMENTARY COURSE GEOLOGY PAPER I

Course code: GL1CO1 **Total Weight age 30** **Time 3 hours**

Answer all questions

Students will be graded based on their answers.

Answer the following

1-4 will have a weightage of 1

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 driving force of all energy – matter interactions in the Earth

5-8 will have a weightage of 1

5. The agent of weathering involved in arid regions
6. The end stage of sedimentary processes
7. Who proposed the concept of Continental Drift ?
8. Will sediments be oldest near the mid-oceanic ridge or away from it?

9-12will have a weightage of 1

9. The temperature below which a mineral acquires its magnetism
10. Regolith deposits that have been transported primarily by gravity and mass wasting processes
11. Grains with size between 4 mm – 16 mm
12. Aravalli mountains represent what type of mounatin?

13-16 will have a weightage of 1

13. Chemical and physical processes that alter regolith into soil
14. The driving force of mass wasting, erosion and transportation
15. Very slow, imperceptible, movement of slope materials downslope
16. Percentage of world's water found underground

17-20 will have a weightage of 1

17. The Discontinuity between core and mantle
18. A rock formation which will not allow the movement of water through it
19. The science which deals with the age of the earth
20. The level above which perpetual snow is seen

Answer any seven of the following in not less than a paragraph .Each question will have a weightage of 1

21. Crust
22. Hotspots
23. Talus
24. Orogeny
25. Solifluction
26. Aquifer
27. Landslides
28. Age of the earth
29. Morain

Explain any five of the following in not more than a page . Each question will have a weightage 2

30. Hydrological cycle
31. Soil profile
32. Volcanic rocks
33. Polar wandering
34. Tides
35. Lithosphere
36. Tsunamis

Answer long answer type question from the following. Each question will have a weightage of 4

37. Give an account on the development and evolution of fluvial land forms.

Or

Describe the processes of glacial erosion, transportation and deposition. Add a note on the different types of glaciers and glacial land forms

38.Describe the important geomorphic features of the ocean floor.

Or

. Describe the various methods followed in determining the age of the earth.

COMPLEMENTARY COURSE
REMOTE SENSING AND GIS
(For the Geology stream)
MODEL QUESTION PAPERS

UNIVERSITY OF CALICUT

MODEL QUESTION PAPER

COMPLEMENTARY COURSE REMOTE SENSING AND GIS -I

Course Code: RS1C03 **Total Weightage: 30** **Time 3hours**

SECTION A (Weightage 1 for a bunch of 4 questions)

I Name the following

1. The region of electromagnetic spectrum with wavelength between 0.4 and 0.7micrometer

2. Radiant flux intercepted by a plane surface per unit area of the earth's surface

3……. Law describes the shift of the radiant power peak to shorter wavelengths as temperature increases

4 The agency in India which sells imageries of Indian satellites

II Choose the correct answer

5 A hypothetical, ideal radiator that totally absorbs and reemits all energy incidents upon it

1. White body 2.Blackbody 3. Grey body 4. None

6. An example of map feature which does not exist in the real world

1.Lake 2.contour 3.House 4.Road

7 The acronym GPS stands for _____

1.Geographical positioning system 2.Global positioning system

3.Geological position system 4.Global positioning software

8 Ultra violet energy adjoins the……end of the visible portion of the spectrum

1.Blue 2.Red 3.Green 4.Infra red

III Fill in the blanks

9. Property maps are known as _____--

10. Father of Canadian GIS is_____

11. Reflectance of electromagnetic energy at specified wavelength intervals is ……

12. The physical tangible unit of computer is_____

IV Match the following

13

A	B
1. Topographical map	Geological features.
2. Geologic map	Natural and Man made feature

3. Thematic map	Property map
4. Cadastral map	Particular theme

14.	A	B
1.Geomedia		ESRI
2.ArcInfo		ITT VIS
3.Spans		Intergraph corporation
4.ENVI		Tydac

15	A	B
1.Toplogy		GIS
2.Map overlay		Azhimuthal
3.Datum		Mathematical discipline
4.Map projection		Geodesy

16	A	B
1. Aryabhatta		First artificial satellite
2. Sputnik-		First Indian satellite
3. Omid		First Iranian Satellite
4. Alouette		Canada's first satellite

IV Mention the following True or False

17. The science which deals with the study of preparation of maps is

known as Cartogram

18. The only true geographic coordinates Latitude and longitude

19. The real world feature represented in a map is called as Phenomenon

20. An object that has a position in space but no length represented as 0-D

SECTION B

VI. Write short notes on any 7 of the following (each questions carries weightage 1)

21 Electromagnetic radiation
22 Orbit of satellite
23 Reflectance
24 GIS
25 Wein's Displacement Law
26 Map Projection
27 Layer concept
28 Georeferencing
29 Digitizer

SECTIONC

VII. Write short essay on any 5 of the following (each questions carries weightage 2)

30 Various thematic maps
31 Functions of GIS software
32 Spectral Reflectance of different land cover
33 Radiative transfer equation
34 Componance of GIS

35 Micro wave remote sensing platforms
36 Types of platforms

SECTION D

VIII. Write an essay on following(each questions carries weightage 4)

37.What is GIS? Write an essay on required hardware and software for GIS.

Or

Briefly explain the different types of maps and map projections commonly used in GIS.

38. Describe the electromagnetic radiation as applied in remote sensing. Add a note on the interaction of electromagnetic radiation with atmospheric constituents.

Or

Explain the various types of sensors used in remote sensing

UNIVERSITY OF CALICUT

MODEL QUESTION PAPER

COMPLEMENTARY COURSE REMOTE SENSING AND GIS -II

Course Code: RS2C07 **Total Weightage: 30** **Time 3 hours**

SECTION A (Weightage 1 for a bunch of 4 questions)

I. Name the following

1. The resolution of sensors in TM is

2. The computer program used to control the storage, retrieval and modification of data is

3. The point vertically below the perspective centre (camera lens) on the ground is

4. A scanner which measures more than one spectral band or wavelength region

II Choose the correct answer

5 The condition in which a flight deviate from its path is known as

1. drift 2. Crab 3. Tilt 4 Run

6. The GIS data format which uses point, lines and polygon

1.Vector 2. Raster 3. DEM 4. None

7. Across track scanner is known as_____

1 Optical mechnical Scanner 2.Pushbroom scanner

3. Multispectral Scanner 4.RADAR

8. Along track scanner is known as_____

1 Optical mechanical Scanner 2.Pushbroom scanner

3.Multispectral Scanner 4.RADAR

III Fill in the blanks

9. The computer programs that drive the hardware components of data processing system _____

10. An active form of remote sensing that operates in the microwave and radio wavelength regions_____

11. _____is a spatial data

12._____ is satellite based navigational aid

IV Match the following

13.

A	B
Spatial resolution	Height measurement
Drift	Aerial photography
Parallax bar	Sensor parameters
Stereoscope	3D View

14

A	B
Optical mechanical scanner	Prism
Push broom scanner	Along track scanner
Dispersing element	Across track scanner
Tone	Image interpretation

15

A	B
UNIX	Hardware
CPU	Workstation
MapInfo	PC
Pen computer	Software

16

A	B
RADAR	GIS
PAN	Camera lense
Resolving power	Single band
DBMS	Active

V Mention the following True or False

17. Aerial mosaic is an assembly of photographs cut and adjusted to match along the edges to ensure continuity of features on a plotted grid or projection

18.Data is organized as records, and stored in different levels that are connected with each other is known as Heirarchical database model

19.Vector topology is a Raster data structure in which the geographical space is partitioned into successive cells of the same size

20. Rakesh Sharma is the person who made the first aerial photography from a plane

SECTION B

VI. Write short note on any seven of the following(each questions carries weightage 1)

21 CCD

22 Dispersing Element

23 Tone

24 Vector data model

25 Satellite imageries

26 Pen Computer

27 Push broom scanner

28 IRS series of satellites

29 GPS

SECTION C

VII Write short essay on any five of the following(each questions carries weightage 2)

30. PC based GIS for education

31. Non spatial data model

32. Camera for remote sensing

33. Interpretation of aerial photographic elements

34. Errors in flying

35. GIS in natural resources management.

36. Resolution and their types

SECTION D

VIII Write an essay on following(each questions carries weightage 4)

37. Briefly Describe Data model in GIS

Or

Compare and contrast raster and vector data formats. Add a note on their advantages and disadvantages.

38. What is Sensor in remote sensing. Give an account of different sensor used in Remote Sensing Satellite

Or

Explain the different elements of aerial photo interpretation

UNIVERSITY OF CALICUT

MODEL QUESTION PAPER

COMPLEMENTARY COURSE REMOTE SENSING AND GIS -III

Course Code: RS3C11 **Total Weightage: 30** **Time 3 hours**

SECTION A (Weightage 1 for a bunch of 4 questions)

I Name the following

1.What is the resolution of LISS 1 in IRS-1A Satellite

2. The best band for surface waterbody delineation is

3…….satellite provides the advantages of space imaging in adverse weather conditions

4.The commercial front of the Department of space ,markets PSLV launch series on behalf of ISRO IS

II Choose the correct answer

5.The three sensors present in IRS 1D are

1. LISS 1 ,WIFS and PAN 2.LISS 11,TM and PAN 3.LISS 111,WIFS and PAN

4 WIFS,OCM, PAN

6.The organization which launched the seasat was

1. NASDA 2.ISRO 3.NASA 4.NRSA

7. Initial name of Landsat series

1 .Landsat 2.ERS 3.ERTS 4.EOS

8……is uses single band to take photographs

1.Hyperspectral 2.Superspectral 3.Multispectral 4.Panchromatic

III Fill in the blanks

9. Wavelength region of Radar radiation is_____

10. The process of stretching of a map in various directions to fit known control points is known as _____

11.In vector data entry, the data entry is done by …… coordinates

12…….Tool used to retrieve specific information from a database or a structured source data

IV Match the following

13

A	B
NRSA	Bangalore
SAC	Ahmedabad
ISRO	Trivandrum
VSSC	Hyderabad

14

A	**B**
Father of Indian Space Science	Talbert "TED" Abrams
Father of Aerial photography	Dr. Vikram Sarabhai
Father of Computer	Laussedat
Father of Photogrammetry	Charles Babbage

15

A	B
Radar altimeter	Wind speed
Microwave radiometer	Navigational aid
Wind scatterometer	Altitude above the terrain
GPS	Atmospheric and terrestrial radiation

16

A	B
Panchromatic imaging system	IKONOS MS
Multispectral imaging system	IKONOS PAN
Superspectral Imaging Systems	Hyperion on EO1 satellite
Hyperspectral Imaging Systems	MODIS

V Mention the following True or False

17.Example for Superspectral imaging system is IKONOS PAN

18.The wavelength region of thermal infrared is 3.5-20 micrometer

19.The term used by ESRI for non topological vector data is Coverage

20The term used by ESRI for vector based digital map with topology is Shape file

SECTION B

VII. Write short notes on any 7 of the following (each questions carries weightage 1)

21 Antenna

22 Launch vehicles

23 Digital data.

24 Psuedonode

25 Query

26 SPOT

27 FCC

28 ISRO

29 Rubber sheeting

SECTION C

VII. Write short essay on any 5 of the following (each questions carries weightage 2)

30 Advantages of Microwave Remote Sensing

31Geostationary meteorological satellites

32 anual digitizing

33 Querying Data

34 Satellite data interpretation

35 Advantages of satellite data interpretation

36 Data management in GIS

SECTION D

VIII. Write an essay on the following

37 Briefly explain Optical and Microwave Remote sensing.

Or

What is meant by thermal remote sensing? Give its important applications

38 Briefly Describe Data Input methods in GIS.

Or

Briefly explain the various data editing methods in GIS.

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MODEL QUESTION PAPER

COMPLEMENTARY COURSE REMOTE SENSING AND GIS –IV

Course Code: RS4C15 **Total Weightage: 30** **Time : 3 hours**

SECTION A (Weightage 1 for a bunch of 4 questions)

I Name the following

1.Acronym DEM stands for

2. Filters are used to enhance linear features that trend in a specific direction

3.The best band for mapping coastal submarine springs-both hot and cold in regions of basalt or limestone is

4.The primary causes of haze in imagery is

II Choose the correct answer

5.Radiometrically,the thematic mapper performs its onboard analog to digital signal conversion over a quantization range of

1.256 digital numbers 2.123 digital number 3.64 digital number 4.512 digital number

6.NNRMS situated at

1.Dehradun 2.Portblair 3.Aluva 4.Hyderabad

7.NDVI is related to……..

1.Water 2.Vegitation 3.Soil 4. Atmosphere constituent

8. In visible remote sensing ……..is very important

1.Emission 2.Refraction 3.Reflection 4. Absorption

III Fill in the blanks

9.IKONOS satellite launched by_____

10. The minimum number of satellite required for a GPS system is _____

11. ……is the process by which two or more different thematic map layers of the same area and overlay them on the top of the other to form a composite new layer

12. . In vector data entry, the data entry is done by …… coordinates

IV Match the following

13

A	B
Supervised classification	Data Input
Digitizing	GPS
Database Manager	Digital Image Processing
Ground truth data	Design of GIS Database

14

A	B
GIS OUTPUT	LISS
Pixel	Monitor
VDU	Map
CCD	Picture element

15

A	B
NDVI	Boolean operator
Query	Data model
Edge matching	Vegetation
Vector	Data editing

16

A	B
Keyboard entry	Training
Data Processing	Overlay
Spatial Analysis	Map Mozaicing
Support for Users	Data input

V Mention the following True or False

17. Lineament is a geometric feature

18 .Normalised Difference Vegetation Index(NDVI) is often used for vegetation classification is

$$NDVI=\frac{\text{Infra red+Red}}{\text{Infra red - Red}}$$

19. In Digital Image Processing, the classification with the use of ground truth data in the form of sample set is known as Maximum likehood classifier

20 .Lines of latitude on the geographic grid for the N-S direction is Meridian

SECTION B

VI. Write short notes on any 7 of the following (each questions carries weightage 1)

21 VDU

22 Topology

23 Cartographic Output

24 Image Enhancement

25 NDVI

26 DEM

27 Global Vegetation Map

28 Radiometric correction

29 Layering concept in GIS

SECTION C

VII. Write short essay on any 5 of the following(each questions carries weightage 2)

30 water quality monitoring and measurement of sea surface temperature

31 Geometric Correction in Digital Image Processing

32 Topological Data structure in GIS

33 Data Analysis in GIS

34 Image enhancement

35 DEM

36 Cost analysis of a GIS project

SECTION D

VIII. Write an essay on the following (each questions carries weightage 4)

37. Application of Remote Sensing

OR

Briefly explain the various methods of digital image processing

38 Briefly Describe Sources of error in GIS

OR

Give an account of the applications of GIS in various fields.

COMPLEMENTARY COURSE REMOTE SENSING AND GIS PRACTICAL

(For the Geology stream)

MODEL QUESTION PAPERS

UNIVERSITY OF CALICUT

MODEL QUESTION PAPER

COMPLEMENTARY COURSE REMOTE SENSING AND GIS PRACTICAL IV

Course Code: RS4C16(P) Total Weightage:30 Time 3 hours

1. The height of a light house is 70m from the base level. Assume the relief displacement of the top of the light house is 3.5mm.Radial distance from the principal point to the top of the light house is 54.8mm.Find the flying height above the base of the light house

(20 minutes)

2. Describe the Salient Geomorphological features of the given stereopair

(20 minutes)

3. Prepare an aerial mosaic with given aerial photographs.

(20 minutes)

4. List out the marginal details of the given satellite imagery and describe the Geomorphological/ Cultural features of the given satellite imagery.

(30 minutes)

5. From the Aerial Photographs supplied to you, identify the Cultural/ geomorphological features and mark them on the corresponding toposheet.

(15 minutes)

6. Digitize the drainage network/roads/cultural features.

(45 minutes)

7 Prepare an aerial mosaic with the given photographs.

(30 minutes)