Shahid Matangini Hazra Government College for Women

Lesson Plan for the academic session 2020-21

Department: **GEOLOGY**

Semester: Second B.Sc.

Honours

Core Course (CC)

Name of the Teacher	Title of the Teaching Assignment	Dividing the Assignment into Number of Units along with detailed lesson plan as per the University Syllabus		Date of Commencement of the Assignment	Number of classes required to complete each unit	Total number of class
ENAKSHI DAS	**C3 T : Elements of Geochemistry**	**Unit 1: Basic Concepts**	1. Introduction to properties of elements: The periodic table	**17/04/2023**	1	**47**
			2. Chemical bonding, states of matter and atomic environment of elements		2	
			3. Geochemical classification of elements		2	
		Unit 2: Layered structure of Earth and geochemistry	1. Composition of the bulk silicate Earth		1	
			2. Composition of core		2	
			3. Composition of mantle: depleted mantle and enriched mantle		3	
			4. Composition of crust: Continental and Oceanic		3	
			5. Isotope geology: Isotopic and elemental fractionation		3	
			6. Radiogenic and stable isotopes in Earth materials		4	
		Unit 3: Element transport	1. Advection and diffusion Chromatography		2	
			2. Aqueous geochemistry- basic concepts and speciation in solutions, Eh, pH relations		3	

			3. Elements of marine chemistry		2	
			4. Mineral reactions- diagenesis and hydrothermal reactions		4	
		Unit 4: Geochemistry of solid Earth	Geochemical variability of magma and its products. Melting processes.		6	
		Unit 5: Geochemical behavior of selected elements	Si, Al, K, Na, Ca, Fe, Mg, Ti.		6	
	C3 P : Elements of Geochemistry(Lab)	Geochemical variation diagrams and its interpretations: a. Bivariate and trivariate plots to delineate the control of different compositional variables:				
		i. Harker variation diagram			6	
		ii. AFM diagram			4	
		iii. MgO diagram		**17/04/2023**	4	**30**
		b. Chemical variation diagrams based on major elements:				
		i. Alkali-lime index			4	
		ii. Iron enrichment index			4	
		iii. Aluminium saturation index			4	
		iv. Alkalinity index diagrams			4	
APARUPA BANERJEE	**C4T: Structural Geology**	**Unit 1: Basic structural elements**	1. Diastrophic and non- diastrophic structures		2	
			2. Structural elements: planar and linear structures, concept of strike and dip, trendand plunge, rake/pitch	**17/04/2023**	2	
			3. Application of primary sedimentary and igneous structure in structural geology. Unconformity and its types;		2	

			recognition of Unconformity			
			4. Concept of scale of observation of structures		1	
			5. Topographic maps. Outcrop patterns of different structures		1	
		Unit 2: Stress and strain in rocks	1. Concept of rock deformation: Concept of Stress. Basic idea of Shear zone		2	
			2. Concept of Strain: Homogeneous andinhomogeneous strain, Rotational andirrotational strain in rocks		2	34
			3. Strain ellipsoids of different types and their geological significance.		3	
			4. Flinn and Ramsay's diagram		1	
			5. Concept of Rock deformation: Brittle and ductile deformation.		3	
		Unit 3: Folds	1. Fold morphology		2	
			2. Geometric and genetic classification of folds		2	
			3. Introduction to the mechanics of folding: Buckling, Bending, Flexural slip and flowfolding		3	
		Unit4: Foliation and lineation	Description and origin of foliations: axial plane cleavage and its tectonic significance		2	
			Description and origin of lineation and relationship with the major structures		2	
		Unit5: Fractures and faults	1. Geometric and genetic classification of fractures and faults Effects of faulting on the outcrops		2	

			2. Geologic/geomorphic criteria for recognition of faults and fault plane solutions		2	
	C4 P: Structural Geology (Lab)	1. Basic idea of topographic maps, Topographic sheets of various scales		**17/04/2023**	2	34
		2. Interpretation of topographic maps			4	
		3. Interpretation of Geological maps with unconformity, fault, fold and igneous bodies Construction of structural cross section			10	
		4. Stereographic projections of planes and lines			10	
		5. True dip and apparent dip problems, 3-point problems, fold problems, fault problems and their solutions through stereographic projection methods			8	

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Shahid Matangini Hazra Government College for Women

Lesson Plan for the academic session 2020-21

Department: **GEOLOGY**

Semester: Second B.Sc.

General

Core Course-DSC

Name of the Teacher	Title of the Teaching Assignment	Dividing the Assignment into Number of Units along with detailed lesson plan as per the University Syllabus		Date of Commencement of the Assignment	Number of classes required to complete each unit	Total number of class
LOVELY BURMAN	**DSC1BT: Crystallography and Mineralogy**	**Unit-I**	Crystals and their characters:	**17/04/2023**	2	**30**
		Unit-II	Crystal form, face, edge, solid angle; Interfacial angle and their measurements;Crystallographic axes and angles.		3	
		Unit-III	Crystal parameters, Weiss and Miller system of notations.		3	
		Unit-IV	Symmetry elements and description of normal class of Isometric, Tetragonal,Hexagonal, Trigonal, Orthorhombic, Monoclinic and Triclinic systems.		6	
E NAKSHI DAS	**DSC1BT: Crystallography and Mineralogy**	**Unit-V**:	Introduction to Mineralogy, Definition and characters of mineral.		2	
		Unit-VI:	Common physical properties of minerals; Chemical composition and diagnosticphysical properties of minerals such as: Quartz, Orthoclase, Microcline, Hypersthene, Hornblende, Garnet, Muscovite, Biotite, Chlorite, Olivine, Epidote,		5	

Shahid Matangini Hazra Government College for Women

Lesson Plan for the academic session 2020-21

Department: **GEOLOGY**

Semester: Fourth B.Sc.

Honours

Core Course (CC)

Name of the Teacher	Title of the Teaching Assignment	Dividing the Assignment into Number of Units along with detailed lesson plan as per the University Syllabus		Date of Commencement of the Assignment	Number of classes required to complete each unit	Total number of classes required to complete the assignment
ENAKSHI DAS	**C8T: Metamorphic Petrology**	**Unit I: Metamorphism: controls and types**	1. Definition of metamorphism. Factors controlling metamorphism, Types of metamorphism– contact, regional, fault zone metamorphism, impact metamorphism	**11/03/2023**	3	**37**
			2. Causes of metamorphism and concept of metamorphic P-T-t paths		3	
		Unit 2: Metamorphic Facies and Grades. Metamorphic Structures and Textures	1. Index minerals, metamorphic zones and isograds. Structure and textures of metamorphicrocks		4	
			2. Concept of metamorphic facies and grade		2	
			3. Mineralogical phase rule of closed and open system		2	
			4. Composition-paragenesis diagrams. ACF, AKF and AFM diagrams		3	
			5. Metamorphic products of pelitic, carbonate and mafic igneous rocks		7	
		Unit 3:	1. Progressive and retrogressive		2	

		Metamorphic reactions. Metamorphism and deformation.	metamorphism			
			2. Prograde and retrograde metamorphic minerals reactions.		2	
			3. Relationship between metamorphism and deformation.		2	
		Unit 4: Migmatites and their origin	1. Metasomatism and role of fluids in metamorphism.		1	
			2. Brief idea of crustal anatexis. Migmatites and its origin.		2	
		Unit 5: Metamorphic rock associations and plate tectonic settings	Regional occurrence and tectonic significance of metamorphic rocks: Metamorphism along convergent plate margins, in continent-continent collisions, in rifting terrains and sea floor metamorphism.		4	
	C8P: Metamorphic Paleontology Lab	1. Hand specimen study of following metamorphic rocks: Slate, Phyllite, Schist, Gneiss, Amphibolite, Charnockite, Khondalite, Mafic granulite, Marble		**11/03/2023**	4	**24**
		2. Textural and mineralogical study of following metamorphic rocks in thin sections: slate,varieties of schists, gneiss, amphibolite, charnockite, khondalite, mafic granulite, eclogite,marble, high Mg-Al granulites			15	
		3. Graphical plots of metamorphic mineral assemblages using chemographic diagrams			5	
LOVELY BURMAN	**C9T: Principles of Stratigraphy and Precambrian Stratigraphy of India**	**Unit 1: Principles of stratigraphy**	1. Fundamentals of lithostratigraphy, biostratigraphy and chronostratigraphy.	**11/03/2023**	2	**44**
			2. Introduction to concepts of dynamic stratigraphy (chemostratigraphy, seismic stratigraphy,sequence stratigraphy).		3	
			3. Relevance of Type section.		2	

			4. Principles of stratigraphic correlation.		2	
		Unit 2: Code of stratigraphic nomenclature	1. International Stratigraphic Code – development of a standardized stratigraphic nomenclature		1	
			2. Concepts of Stratotypes. Global Stratotype Section and Point (GSSP)		1	
			3. Brief introduction to the concepts of lithostratigraphy, biostratigraphy, chronostratigraphy, seismic stratigraphy, chemostratigraphy, magnetostratigraphy, sequence stratigraphy and their subdivisions with Indian examples		8	
		Unit 3: Principles of stratigraphic analysis Facies concept in stratigraphy	1. Walther's Law of Facies.		1	
			2. Concept of paleogeographic reconstruction		2	
APARUPA BANERJEE	**C9T: Principles of Stratigraphy and Precambrian Stratigraphy of India**	**Unit 4: Stratigraphic boundaries in India**	1. Archaean-Proterozoic boundary.	**11/03/2023**	2	
			2. Precambrian-Cambrian boundary and their status in global perspective.		2	
		Unit 5: Physiographic and tectonic subdivisions of India	1. Brief introduction to the physiographic and tectonic subdivisions of India		1	
			2. Introduction to Indian Shield, Craton		2	
			3. Introduction to Indian		2	

			Precambrian belts.			
			4. Introduction to Proterozoic basins of India		2	
		Unit 6: Geologic evolution Important Precambrian terrains	1. Geologic evolution with emphasis on sedimetation, lithology, magmatism, structure, metamorphism and geochronology of: Singhbhum, Dharwar, Rajasthan, Central India and Eastern Ghats.		8	
			2. Vindhyan and Cudappah basins of India.		3	
	C9P: Stratigraphic Principles and Indian Stratigraphy Lab	1. Study of geological map of India and identification of major stratigraphic units			5	
		2. Major features of paleogeographic maps – Precambrian		**11/03/2023**	5	**10**
LOVELY BURMAN	**C10T: Phanerozoic Stratigraphy of India**	**Unit 1: Introduction**	1. Definition		1	
			2. Important Stratigraphic boundaries during Phanerozoic time in India - a. PrecambrianCambrian boundary, b. Permian-Triassic boundary, and c. Cretaceous-Tertiary boundary.		2	
		Unit 2: Important Palaeozoic successions in India	1. Paleozoic Succession of Kashmir		1	
			2. Stratigraphy Structure of Gondwana basins.	**11/03/2023**	1	**30**
			3. Mesozoic stratigraphy of India: a. Triassic successions of Spiti, b. Jurassic of Kutch, c. Triassic and Jurassic non marine successions of peninsular India (Upper Gondwana formations, relevant Formations of Rajasthan basin)		1 1 2 1 1	

			d. Cretaceous, successions of Cauvery basins e. Lameta and Jabalpur Formations			
			4. Cenozoic stratigraphy of India: a. Kutch basin, b. Siwalik successions, c. Assam, Andaman and Arakan basins.		1 2 3	
			5. Stratigraphy and structure of Krishna-Godavari basin, Cauvery basin, Bombay offshore basin, Kutch and Saurashtra basins and their potential for hydrocarbon exploration		5	
		Unit 3: Stratigraphy of the intertrappeans				
			1. Deccan,		2	
			2. Rajmahal, 3. Sylhet Trap		1 1	
		Unit 4: Quaternary Geology	1. Definition 2. Principles of subdivision of Quaternary succession in India		1 3	
	C10P: Phanerozoic Stratigraphy of India Lab	1. Study of geological map of India and identification of major Phanerozoic stratigraphic units. 2. Stratigraphic correlation of Phanerozoic stratigraphic units in geological map of India 3. Proterozoic supercontinent reconstructions		**11/03/2023**	3 4 3	**10**

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Shahid Matangini Hazra Government College for Women

Lesson Plan for the academic session 2020-21

Department: **GEOLOGY**

Semester: Fourth B.Sc.

Honours

Skill Enhancement Course (SEC)

Name of the Teacher	Title of the Teaching Assignment	Dividing the Assignment into Number of Units along with detailed lesson plan as per the University Syllabus	Date of Commencement of the Assignment	Number of classes required to complete each unit	Total number of classes required to complete the assignment
-	**SEC2P: Field Geology**	-	-	-	-

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Shahid Matangini Hazra Government College for Women

Lesson Plan for the academic session 2020-21

Department: **GEOLOGY**

Semester: Fourth B.Sc.

Honours

Generic Elective (GE)

Name of the Teacher	Title of the Teaching Assignment	Dividing the Assignment into Number of Units along with detailed lesson plan as per the University Syllabus		Date of Commencement of the Assignment	Number of classes required to complete each unit	Total number of class
LOVELY BURMAN	**GE-4T Earth Resources**	**Unit 1**	1. Resource reserve definitions; mineral, energy and water resources	**11/03/2023**	3	**26**
			2. A brief overview of classification of mineral deposits with respect to processes of formation		3	
		Unit 1I	1. Difference between Energy, Power and Electricity		1	
			2. Renewable and Non- Renewable Sources of Energy		1	
			3. The concept and significance of Renewability: Social, Economic, Political and Environmental Dimension of Energy		2	
		Unit 1II	1. Resources of Natural Oil and Gas		3	
			2. Coal and Nuclear Minerals		3	
			3. Potential of Hydroelectric Power, Solar Energy, Wind, Wave and Biomass Based power and Energy		4	
		Unit 1V	1.Ground water resources in India and its role in economic development of the country		3	
			2. Current Scenario and Future Prospects of Solar Power, Hydrogen Power and Fuel Cells.		3	

	GE-4P Earth Resources	1. Study of coal ain Hand specimen	**11/03/2023**	2	**20**
		2. Plotting of major Indian oil fields on map of India		2	
		3. Problems related to assessment of possible oil exploration site from geological maps andsections.		4	
		4. Construction of cross section of mineral deposits from maps and drill hole data.		4	
		5. Estimation of reserves.		4	
		6. Preparation and interpretation of depth to water level maps and water level contourmaps		4	

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Shahid Matangini Hazra Government College for Women

Lesson Plan for the academic session 2020-21

Department: **GEOLOGY**

Semester: Fourth B.Sc.

General

Core Course-DSC

Name of the Teacher	Title of the Teaching Assignment	Dividing the Assignment into Number of Units along with detailed lesson plan as per the University Syllabus	Date of Commencement of the Assignment	Number of classes required to complete each unit	Total number of class
ENAKSHI DAS	**DSC1DT: Straigraphy and Palaeontology**	**Unit I:** Definition, Principle of stratigraphy; Geological Time Scale and stratigraphic classification; Physiographic division of India.	**11/03/2023**	4	**36**
		Unit II: Study of following Precambrian succession: Dharwar, Cuddapha, Vindhyan and Delhi Supergroups; Brief idea of Palaeozoic succession of northwestern Himalaya; Triassic of Spiti; Mesozoic type seccession of Kutch and Rajasthan; Cretaceous of Tiruchirapalli;		8	
		Unit III: Study of following type localities: Gondwana and Deccan Trap.		3	
		Unit IV: Palaeogene-Neogene sequences of northwest Himalaya and Assam.		2	
APARUPA BANERJEE	**DSC1DT: Straigraphy and Palaeontology**	**Unit-V**: Palaeontology: definition, Fossils: definition, characters, binomial nomenclature in taxonomy, mode of preservation, condition of fossilization and significance of fossils.		6	
		Unit VI: Morphology and geological distribution of brachiopods, pelecypods, cephalopods and gastropods.		8	
		Unit VII: Morphology and geological distribution of trilobite, echinoidea.		4	
		Unit VIII: Evolutionary history of horse;		3	

		Morphology, distribution and significance of Gondwana flora.			
	DSC1DP: Practical	1. Morphological characters, systematic position and age of fossil genera pertaining to brachiopods, pelecypods, cephalopods, gastropods, trilobite. 2. Preparation of lithostratigraphic maps of India showing distribution of important geological formations.	**11/03/2023**	10 4	**14**

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Shahid Matangini Hazra Government College for Women

Lesson Plan for the academic session 2020-21

Department: **GEOLOGY**

Semester: Sixth B.Sc.

Honours

Core Course (CC)

Name of the Teacher	Title of the Teaching Assignment	Dividing the Assignment into Number of Units along with detailed lesson plan as per the University Syllabus		Date of Commencement of the Assignment	Number of classes required to complete each unit	Total number of class
ENAKSHI DAS	**C13T: Geomorphology, Remote Sensing and GIS**	**Unit-1: Introduction to Geomorphology**	1. Introduction to Geomorphology	**22/02/2023**	1	
			2. Relationship between the landforms and the properties of earth material and differentkind of processes		1	
			3. Endogenic and Exogenic processes		1	
		Unit-2	1. Geoid, Topography, Hypsometry, Major Morphological features of the earth surface		2	
			2. Large Scale Topography - Plate tectonics overview. Large scale mountain ranges (with emphasis on Himalaya)		2	
		Unit-3	Surficial Processes and geomorphology, Weathering and associated landforms, Hill slopes Glacial, Periglacial processes and landforms, Fluvial processes and landforms, Aeolian Processes and landforms, Coastal Processes and landforms, Landforms associated with igneous activities		8	

		Unit-4	1. Endogenic- Exogenic interactions. Rates of uplift and denudation. Tectonics and drainage development, Sea-level change, Long-term		4	
			landscape development. 2. Landform dating techniques.		2	
APARUPA BANERJEE	**C13T: Geomorphology, Remote Sensing and GIS**	**Unit-5: Remote Sensing, Concepts in Remote Sensing**	1. Concepts in Remote Sensing.	**23/02/2023**	1	**51**
			2. Sensors and scanners.		1	
			3. Satellites and their characteristics.		2	
			4. Data formats- Raster and Vector.		1	
		Unit-6: Photogeology	1.Types and acquisition of aerial photographs; Scale and resolution; Principles of stereoscopy, relief displacement, vertical exaggeration and distortion		4	
			2. Elements of air photo interpretation		2	
			3. Identification of sedimentary, igneous and metamorphic rocks and various aeolian, glacial, fluvial and marine landforms		2	
		Unit-7: Digital Image Processing	1. Image Errors, Rectification and Restoration, FCC, Image Enhancement, Filtering, Image Rationing.		4	
			2. Image classification and accuracy assessment.		2	
			3. GIS integration and Case studies- Indian Examples.		2	
		Unit-8: GIS and GPS	1. Datum, Coordinate systems and Projection systems. 2. Spatial data models and data editing. 3. Introduction to DEM analysis. 4. Concepts of GPS.		2 2 1 1 2 1	

			5. Integrating GPS data with GIS. 6. Applications in earth system sciences.			
	C13P: Geomorphology, Remote Sensing and GIS Lab	1.Reading topographic maps. Preparation of a topographic profile. 2. Preparation of longitudinal profile of a river. 3. Calculating Stream length gradient index 4. Morphometry of a drainage basin. 5. Interpretation of geomorphic processes from the geomorphology of the area. 6. Aerial Photo interpretation: Identification of sedimentary, igneous and metamorphic rocks and various aeolian, glacial, fluvial and marine landforms. 7. Introduction to DIP and GIS softwares. 8. Digital Image Processing exercises including analysis of satellite data in different bands and interpretation of various objects on the basis of their spectral signatures. 9. Registration of satellite data with a toposheet of the area. 10. DEM analysis: generating slope map, aspect map and drainage network map and its applications. 11. Use of stereoscope. Flight line determination using aerial photograph.	**22/02/2023**	4 2 2 4 2 4 6 6 4 6 4	**44**
APARUPA BANERJEE	**C14T: Engineering Geology**	**Unit-1** Role of engineering geologists in planning, design and construction of major man-made structural features	**22/02/2023**	2	**30**
		Unit-2 Site investigation and characterization		2	
		Unit-3 Foundation treatment; Grouting, Rock Bolting and other support mechanisms		2	
		Unit-4 Rock aggregates; Significance as Construction Material		2	

LOVELY BURMAN	**C14T: Engineering Geology**	**Unit-5** Concept, Mechanism and Significance of: a) Rock Structure Rating (RSR) b) Rock Mass Rating (RMR) c) Tunneling Quality Index (Q) Geological, Geotechnical and Environmental considerations for Dams and Reservoirs	**22/02/2023**	8	
		Unit-6 Tunnels and Tunneling Methods		2	
		Unit-7 Landslides: Causes, Factors and corrective/Preventive measures		4	
		Unit-8 Earthquakes: Causes, Factors and corrective/Preventive measures. Mitigating the damagecaused byEarthquake		4 4	
		Unit-9 Case histories related to Indian Civil Engineering Projects			
	C14P: Engineering Geology Lab	1. Computation of reservoir area, catchment area, reservoir capacity and reservoir life. 2. Merits, demerits & remedial measures based upon geological cross sections of project sites. 3. Computation of Index properties of rocks. 4. Computation of RQD, RSR, RMR and 'Q	**22/02/2023**	8 4 4 4	**20**

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Shahid Matangini Hazra Government College for Women

Lesson Plan for the academic session 2020-21

Department: **GEOLOGY**

Semester: Sixth B.Sc.

Honours

Discipline Specific Elective (DSE)

Name of the Teacher	Title of the Teaching Assignment	Dividing the Assignment into Number of Units along with detailed lesson plan as per the University Syllabus		Date of Commencement of the Assignment	Number of classes required to complete each unit	Total number of class
APARUPA BANERJEE	**DSE3T: Exploration Geology**	**Unit-1: Mineral Resources**	Resource: Definitions, Mineral resources in industries – historical perspective and present scenario, classification of mineral deposits with respect to processes of formation; exploration strategies.	**22/02/2023**	6	**38**
		Unit-2: Prospecting and Exploration	1. Principles of mineral exploration 2. Prospecting and exploration: conceptualization, methodology and stages, Sampling, subsurface sampling including pitting, trenching and drilling 3. Geochemical exploration. 4. Outline of exploration techniques for ferrous and non-ferrous metals, limestone and coal and petroleum.		1 4 3 6	
ENAKSHI DAS	**DSE3T: Exploration Geology**	**Unit-3: Evaluation of data**	Evaluation of sampling data - Mean, mode, median, standard deviation and variance		2	

		Unit-4: Drilling and Logging	1. Core and non-core drilling 2. Planning of bore holes and location of boreholes on ground Core-logging		2 2	
		Unit-5: Reserve estimations and Errors	1. Principles of reserve estimation, Factors affecting reliability of reserve estimation. 2. Reserve estimation based on geometrical models (square, rectangular, triangular and polygon blocks). 3. Regular and irregular grid patterns. 4. Statistics and error estimation		4 4 2 2	
	DSE3P: Practical	1. Identification of anomaly: Gravity and Magnetic. 2. Concept of weighted average in anomaly detection. 3. Geological cross-section. 4. Models of reserve estimation			4 4 4 4	**16**
LOVELY BURMAN	**DSE4T: Geodynamics**	**Unit-1: Introduction**	1.Definition. Continents and Oceans. Continental and Oceanic Crust. Internal Process of Earth. 2. Concept of lithosphere and asthenosphere. Physical character of lithosphere and asthenosphere. Concept of Plate 3. Concept of hot spot and mantle plume. Ophiloites. Palaeomagnetism	**22/02/2023**	2 2 4 2	**41**
		Unit-2: Continental Drift, Sea floor	1.Wegner Continental Drift hypothesis and its evidences Continental position in the past			

		spreading and Plate tectonics	2.Sea-floor spreading process and its evidences.		2	
			3. Plate tectonics models and its evidences. Distribution of plates in the Earth		4	
		Unit-3: Plate and plate boundaries	1.Plates: Physical characters of plates. Macro and Micro Plates		2	
			2. Plate boundaries: Types, Character, Identification of boundaries. Movement of plates along boundaries. Plate velocities.		4	
			3. Volcanic arcs, island arcs, trenches, accretionary prisms, oceanic ridges, transform faults.		4	
ENAKSHI DAS	**DSE4T: Geodynamics**		Magmatism in oceanic ridges and in subduction zones.		3	
		Unit-4:	1.Paleomagnetism and motion of plates		2	
			2.Driving mechanism of plates.		4	
			Plate tectonics and mantle Convection			
			3. Supercontinents and their breakup and assembly. Wilson cycle		6	