Programme	B. Sc. Geology				
Course Code	GEL3CJ201				
Course Title	**INTRODUCTORY GEOINFORMATICS**				
Type of Course	Major				
Semester	I				
Academic Level	200 - 299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	4	-	-	60
Pre-requisites	NIL				
Course Summary					

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Students will acquire knowledge of the key sciences and technologies involved in geoinformatics	U	F	Exam
CO2	Students will learn about the origin and development of GIS, its components and its core functions	Ap	C	Quiz
CO3	Students will understand the advantages and limitations of different GIS platforms	An	P	Assignment
CO4	Students will understand the principles and techniques of map-making, and map projection types	E	M	Viva
CO5	Students will grasp the fundamental concepts of remote sensing	Ap	F	Assignment
CO6	Students will be able to define and explain the meaning and scope of geoinformatics, and understand its importance in various fields	E	M	Assignment
* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C) # - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)				

Detailed Syllabus: INTRODUCTORY GEOINFORMATICS

Module	Unit	Content	Hrs	Marks
I	**Introduction to GIS**		**15**	**20**
	1	Geoinformatics –Definition & scope		
	2	Sciences and technologies involved – Remote Sensing, GIS, Cartography, Photogrammetry		
	3	Origin and development of GIS		
	4	GIS – definition		
	5	Components – hardware, software, people, methods, data		
	6	Functions – data input and output, visualization, editing, analysis, map design		
	7	Desktop GIS, mobile GIS, web GIS		
	8	Limitations of GIS		
II	**Maps**		**10**	**15**
	9	Maps – to convey location and extent, characteristics, and spatial relationships		
	10	Classification of maps – topographic maps, thematic maps, cadastral maps		
	11	Elements of a map		
	12	Classification of projection – Cylindrical, Conical, Azimuthal		
	13	Map design		
III	**Introduction to Remote Sensing**		**15**	**20**
	14	History of Remote Sensing		
	15	Introduction to aerial photography: overlaps, flight lines, drift, crab, tilt, dead ground		
	16	Geometry of aerial photographs - scale, principal point, perspective centre, fiducial marks, nadir, focal length, airbase, photo base, isocentre, relief displacement.		
	17	Vertical & oblique aerial photographs		
	18	Visual image interpretation & elements of interpretation - tone, texture, shape, association, pattern, shadow, size		
	19	Stereoscopy - Pocket Stereoscope, Mirror Stereoscope, Parallax Bar		
IV	**Concept of Remote Sensing**		**8**	**15**
	20	Stages in Remote Sensing		
	21	Energy Source – EMR, characteristic of EMR –wave nature and particle nature. EMR spectrum		
	22	Blackbody radiation, Stefan Boltzmann's law, Wein's displacement law		
	23	Interaction of EMR with atmosphere – reflection, scattering, absorption		
	24	Interaction of EMR with earth's surface features – reflection, transmission		
	25	Spectral Reflectance of land covers – Vegetation, Soil, Water		
V	**Open Ended Module**		**12**	**10**
	1	Interpretation of aerial photographs		
	2	Interpretation of toposheets		
	3	Downloading of toposheets from various websites		

Mapping of COs with PSOs and POs:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	1	-	-	-	-	-							
CO 2	2	3	-	-	-	-							
CO 3	-	-	1	-	-	-							
CO 4	-	-	2	3	-	-							
CO 5	-	1	-	-	-	-							
CO 6	-	-	-	3	-	-							

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

External evaluation: 70 marks. Internal Evaluation: 30 marks

INTERNAL MARK SPLIT-UP (TOTAL 30 MARKS)			
	Components of Internal Evaluation	**4 Theory Modules (20)**	**Open ended Module (10)**
1	Test paper/ Mid semester Exam	10	4
2	Seminar/ Viva/ Quiz	6	4
3	Assignment	4	2

Mapping of COs to Assessment Rubrics:

	Internal Exam	Assignment	Seminar	End Semester Examinations
CO 1	✓			✓
CO 2	✓			✓
CO 3	✓			✓
CO 4		✓		✓
CO 5		✓		✓
CO 6			✓	

References:

1. Lo, C.P. and Yeung, A.K.W., 2007. Concepts and Techniques in GeographicInformation Systems.

Programme	B. Sc. Geology				
Course Code	GEL3CJ202				
Course Title	**CRYSTALLOGRAPHY & STRATIGRAPHY**				
Type of Course	Major				
Semester	III				
Academic Level	200 - 299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	NIL				
Course Summary	The course has two parts. First part deals with classification of crystals into various systems and classes. Second part is an introduction to geoinformatics.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Students will be able to identify the basic crystal systems	U	F	Exam
CO2	Students will be able to identify the different forms present in crystals, based on their symmetry elements	Ap	C	Quiz
CO3	The students will be able to define various laws of stratigraphy	An	P	Assignment
CO4	The students will be able to differentiate physical and biological criteria of correlation	E	C	Viva
CO5	The students will be able to explain major events of mass extinction	Ap	F	Assignment
CO6	The students will be able to explain different types of stratigraphic classification	E	F	Assignment

* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C)
# - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)

Detailed Syllabus: CRYSTALLOGRAPHY & STRATIGRAPHY

Module	Unit	Content	Hrs	Marks
I		**Introduction to Crystallography and Symmetry Elements**	**10**	**15**
	1	Scope and applications of crystallography. Symmetry elements in crystallography	1	
	2	Crystallographic axes, notation, parameter system of Weiss and Miller indices. Axial ratio	2	
	3	Laws of crystallography	2	
	4	Symmetry elements and forms of Normal, pyritohedral, tetrahedral, and plagiohedral classes in the Cubic system		
	5	Symmetry elements and forms of Normal, Hemimorphic, Tripyramidal, Sphenoidal, and Trapezohedral classes in the Tetragonal system		
II		**Symmetry Elements and Forms in Various Systems**	**15**	**25**
	6	Symmetry elements and forms of Normal, Hemimorphic, Tripyramidal, Trapezohedral, Rhombohedral, Rhombohedral Hemimorphic, and Trapezohedral classes in the Hexagonal system	3	
	7	Symmetry elements and forms of Normal and Sphenoidal classes in the Orthorhombic system	4	
	8	Symmetry elements and forms of Normal classes in the Monoclinic and Triclinic systems	4	
	9	Twin crystals. Definitions and effects of twinning	4	
	10	Laws of twinning, composition plane, twinning plane, and twinning axis		
	11	Indices of twins: simple and repeated (polysynthetic twins), contact and penetration twins (secondary twins)		
III		**Stratigraphy**	**8**	**12**
	12	Laws of Stratigraphy: Concept of uniformitarianism	2	
	13	Law of order of superposition, Law of faunal succession and Law of original horizontality	1	
	14	Principle of Lateral Continuity, Principle of Inclusion, Law of cross-cutting relationship	2	
	15	Correlation: Physical criteria of correlation	1	
	16	Biological criteria of correlation and homotaxis		
IV		**Stratigraphy**	**12**	**18**
	17	Major events of Mass extinction: Ordovician-Silurian and late Devonian extinction events	2	
	18	Permian- Triassic and Cretaceous- Tertiary extinction events	3	
	19	Facies and facies changes: Litho and bio facies	3	
	20	Break in stratigraphic records: Unconformities and diastems	3	
	21	Stratigraphic classification: Biostratigraphic classification: Biozones, biohorizon, index fossil. Range zone, taxon range zone, concurrent range zone, interval zone, assemblage zone, Acme zone	3	
	22	Lithostratigraphic classification: Group, Formation, Member, Bed. Chronostratigraphic classification: Eonothem, erathem, system, series, stage	3	
V		**Practical**	**30**	**10**
	1	Practical involving identification of crystal forms of normal classes of all systems		

Mapping of COs with PSOs and POs:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	1	-	-	-	-	-							
CO 2	2	3	-	-	-	-							
CO 3	-	-	1	-	-	-							
CO 4	-	-	2	3	-	-							
CO 5	-	1	-	-	-	-							
CO 6	-	-	-	3	-	-							

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

External evaluation: 70 marks. Internal Evaluation: 30 marks

INTERNAL MARK SPLIT-UP (TOTAL 30 MARKS)			
	Components of Internal Evaluation	**4 Theory Modules (10)**	**Practical (20)**
1	Test paper/ **Continuous Evaluation of Practical Exercises**	5	**10**
2	Seminar/ **End Sem Exam &Viva-Voce**	3	7
3	Assignment / **Lab Record**	2	**3**

Mapping of COs to Assessment Rubrics:

	Internal Exam	Assignment	Seminar	End Semester Examinations
CO 1	✓			✓
CO 2	✓			✓
CO 3	✓			✓
CO 4		✓		✓
CO 5		✓		✓
CO 6			✓	

References:

1. Borchardt-Ott, W., 2011. Crystallography– An Introduction. Springer Heidelberg, 355p.
2. Dana, F.S., 1955. A Text Book of Mineralogy. Asia publishing House, Wiley.
3. Klen, C., Hurlbut, C.S., 1985. Manual of Minerology, John Wiley & Sons
4. Perkins, D., 2015. Mineralogy. Pearson Education (3Ed), 568 p
5. Boggs, S., 2016. Principles of Sedimentology and Stratigraphy. Pearson Education. 568 p.
6. Brookfield, M.E., 2003. Principles of Stratigraphy. Wiley-Blackwell, 340 p.
7. Nichols, G., 2016. Sedimentology and Stratigraphy. Wiley-Blackwell, 419 p.

Programme	B. Sc. Geology				
Course Code	GEL3MN201				
Course Title	**GEOINFORMATICS - III**				
Type of Course	Minor				
Semester	III				
Academic Level	100 - 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	NIL				
Course Summary	Advanced course for beginners in Geoinformatics				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Students will demonstrate a thorough understanding of optical remote sensing thermal remote sensing, and microwave remote sensing (	U	F	Exam
CO2	Students will gain proficiency in digital image processing techniques, enabling them to extract meaningful information from remote sensing data.	Ap	P	Practical Assignment
CO3	Students will apply remote sensing techniques to various domains.	Ap	P	Assignment
CO4	Students will learn about database management systems (DBMS) and data management techniques in GIS.	E	M	Viva
CO5	Students will explore the diverse applications of gaining practical skills in utilizing GIS	Ap	F	Practical Assignment
CO6	Students will integrate remote sensing and GIS techniques to address real-world challenges and applications.	E	M	Practical Assignment

* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C)
# - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)

Detailed Syllabus: GEOINFORMATICS - III

Module	Unit	Content	Hrs	Marks
I	**Types of Remote Sensing**		**15**	**20**
	1	Optical remote sensing – panchromatic, multispectral, superspectral & hyperspectral		
	2	Thermal remote sensing: principles and applications		
	3	Microwave remote sensing : Active & Passive		
	4	Radars: Synthetic Aperture Radar & Real Aperture Radar		
	5	Introduction to digital image processing		
	6	Preprocessing – Geometric and radiometric corrections		
	7	Image registration, enhancement & filtering		
	8	Image classification: Supervised & Unsupervised		
II	**Applications of Remote Sensing**		**10**	**15**
	9	Landuse land cover mapping		
	10	Agriculture – crop monitoring, crop damage assessment, NDVI		
	11	Geology – structural mapping, lineament extraction, mineral exploration		
	12	Hydrology – water quality monitoring		
	13	Mapping - planimetry, DEM, Topographic & BTM		
	14	Oceans – measurement of SST, oil spill detection		
III	**Data Management in GIS**		**10**	**20**
	15	DBMS & Data management in GIS		
	16	Topology and spatial relationships- adjacency, containment, connectivity		
	17	Database query		
	18	Geospatial measurement		
	19	Overlay operations		
	20	Network analysis		
	21	Surface analysis		
IV	**Applications of GIS**		**10**	**15**
	22	Facilities Management		
	23	Environment and Natural Resources Management		
	24	Street Network		
	25	Planning and Engineering		
	26	Land Information System		
V	**Practical**		**30**	**10**
	27	Attribute data entry		
	28	Map layout		

Mapping of COs with PSOs and POs:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	1	-	-	-	-	-							
CO 2	2	3	-	-	-	-							
CO 3	-	-	1	-	-	-							
CO 4	-	-	2	3	-	-							
CO 5	-	1	-	-	-	-							
CO 6	-	-	-	3	-	-							

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

External evaluation: 70 marks. Internal Evaluation: 30 marks

INTERNAL MARK SPLIT-UP (TOTAL 30 MARKS)			
	Components of Internal Evaluation	**4 Theory Modules (10)**	**Practical (20)**
1	Test paper/ **Continuous Evaluation of Practical Exercises**	5	**10**
2	Seminar/ **End Sem Exam &Viva-Voce**	3	7
3	Assignment / **Lab Record**	2	**3**

Mapping of COs to Assessment Rubrics:

	Internal Exam	Assignment	Seminar	End Semester Examinations
CO 1	✓			✓
CO 2	✓			✓
CO 3	✓			✓
CO 4		✓		✓
CO 5		✓		✓
CO 6			✓	

References:

1. "Introduction to Geographic Information Systems" by Kang-Tsung Chang (McGraw-Hill Education, 2018)
2. "Remote Sensing and Image Interpretation" by Thomas M. Lillesand, Ralph W. Kiefer, and Jonathan W. Chipman., (Wiley, 2015)
3. "Geographic Information Systems and Science" by Paul A. Longley, Michael F. Goodchild, David J. Maguire, and David W. Rhind., (Wiley, 2015)
4. "Elements of Photogrammetry with Applications in GIS" by Paul R. Wolf, Bon A. Dewitt, and Benjamin E. Wilkinson., (McGraw-Hill Education, 2014)
5. "Principles of Geographic Information Systems" by Rolf A. de By and Henk J. Scholten (ITC,2010)
6. "The GIS 20: Essential Skills" by Gina Clemmer., (ESRI Press, 2013)
7. "Introduction to Remote Sensing" by James B. Campbell and Randolph H. Wynne (Guilford Press, 2011)
8. "Remote Sensing and Image Interpretation" by Thomas M. Lillesand, Ralph W. Kiefer, and Jonathan W. Chipman (Wiley, 2015)
9. "Fundamentals of Remote Sensing" by George Joseph., (Universities Press, 2005)
10. "Remote Sensing Digital Image Analysis" by John A. Richards., (Springer, 2013)
11. "Principles of Geographical Information Systems" by Peter A. Burrough and Rachael A. McDonnell., (Oxford University Press,1998)
12. "GNSS Applications and Methods" by Scott Gleason and Demoz Gebre-Egziabher., Artech House, 2009)

Programme	B. Sc. Geology				
Course Code	GEL3MN202				
Course Title	**HISTORICAL GEOLOGY**				
Type of Course	**Minor**				
Semester	III				
Academic Level	200-299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	4	-	2	75
Pre-requisites	Nil				
Course Summary	The course enables the students to get an overall view of the use of fossils in understanding the geological history and thereby to utilise that in stratigraphic classification				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	The students will be able to describe fossils and their preservation	R	F	Instructor created exam/ Quiz
CO2	The students will be able to discuss different type of fossils and their uses	U	C	Home assignment
CO3	The students will be able to define various laws of stratigraphy	R	C	Home assignment
CO4	The students will be able to differentiate physical and biological criterias of correlation	An	P	Instructor created exam/ Group tutorial works
CO5	The students will be able to explain major events of mass extinction	U	F	Seminar presentation
CO6	The students will be able to explain different types of stratigraphic classification	U	C	Instructor created exam
* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C) # - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)				

Detailed Syllabus: HISTORICAL GEOLOGY

Module	Unit	Content	Hrs.	Marks
I		**Introduction to Palaeontology and Fossilization**	**10**	**15**
	1	Definition of Palaeontology	1	
	2	Organic world classification: Flora and Faun	2	
	3	Fossils & Fossilisation: Petrifaction, permineralization, carbonization, recrystallization, silicification, amber preservation, mummification.	4	
	4	Types of fossils: Body fossil, moulds, casts, tracks, trails, borings	3	
II		**Uses of Fossils and Laws of Stratigraphy**	**15**	**25**
	5	Uses of fossils: Stratigraphic, climatic and palaeogeographic indicators	2	
	6	Fossils as indicators of evolution and migration of life forms	2	
	7	Fossils: indicators of new deposits of coal and petroleum	1	
	8	Laws of Stratigraphy: Concept of uniformitarianism	1	
	9	Law of order of superposition, Law of faunal succession and Law of original horizontality	2	
	10	Principle of Lateral Continuity, Principle of Inclusion, Law of cross-cutting relationship	2	
	11	Correlation: Physical criteria of correlation	3	
	12	Biological criteria of correlation and homotaxis	2	
III		**Major Events of Mass Extinction, Facies Changes, and Stratigraphic Classification**	**10**	**20**
	13	Major events of Mass extinction: Ordovician-Silurian and late Devonian extinction events	2	
	14	Permian- Triassic and Cretaceous- Tertiary extinction events	2	
	15	Facies and facies changes: Litho and bio facies	2	
	16	Break in stratigraphic records: Unconformities and diastems	1	
	17	Stratigraphic classification: Biostratigraphic classification: Biozones, biohorizon, index fossil. Range zone, taxon range zone, concurrent range zone, interval zone, assemblage zone, Acme zone	3	
	18	Lithostratigraphic classification: Group, Formation, Member, Bed	2	
	19	Chronostratigraphic classification: Eonothem, erathem, system, series, stage	1	
IV		**Application of Palaeontology in Earth Sciences**	**10**	**10**
	20	Practical applications of Palaeontology	4	
	21	Integration of fossil evidence in understanding Earth's history	3	
	22	Contemporary research and advancements in Palaeontology	3	
V		**Practical**	**30**	**10**
		Identify important fossils of stratigraphic significance		
		Exercises to familiarise with the laws of stratigraphy		
		Familiarise with World's Palaeontology Institutes / Museums		
		Discuss about the books / films that features palaeontology		

Mapping of COs with PSOs and POs:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	1	-	-	-	-	-							
CO 2	2	3	-	-	-	-							
CO 3	-	-	1	-	-	-							
CO 4	-	-	2	3	-	-							
CO 5	-	1	-	-	-	-							
CO 6	-	-	-	3	-	-							

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

External evaluation: 70 marks. Internal Evaluation: 30 marks

INTERNAL MARK SPLIT-UP (TOTAL 30 MARKS)			
	Components of Internal Evaluation	**4 Theory Modules (20)**	**Open ended Module (10)**
1	Test paper/ Mid semester Exam	10	4
2	Seminar/ Viva/ Quiz	6	4
3	Assignment	4	2

Mapping of COs to Assessment Rubrics:

	Assignment	Seminar	End Semester Examinations
CO 1			✓
CO 2	✓		
CO 3	✓		
CO 4		✓	✓
CO 5			
CO 6			✓

References:

1. Boggs, S., 2016. Principles of Sedimentology and Stratigraphy. Pearson Education. 568 p.
2. Brookfield, M.E., 2003. Principles of Stratigraphy. Wiley-Blackwell, 340 p.
3. Nichols, G., 2016. Sedimentology and Stratigraphy. Wiley-Blackwell, 419 p.
4. Henry woods: Invertebrate palaeontolgy – Cambridge.
5. Romer , A.S.: Vertebrate palaeontology, Chicago press.
6. Arnold, C.A., An introduction to Palaeobotany., MC-Graw Hill.
7. B.U. Haq and A. Boersma (1978) Introduction to marine Micropalaeontology. Elsevier,Netherlands
8. Raup, D.M. and Stanely, M.S.: Principles of Palaeontology, CBS Publishers.
9. Moore , R.C., Laliker , C.G.&Fishcher, A.G.: Invertebrate Fossils , Harper brothers
10. Shrock. R.R. and Twenhofel , W.H – 1953.: Principles of invertebrate Palaeontology, Amold publication.

Programme	B. Sc. Geology				
Course Code	GEL3FV108_				
Course Title	**GEOLOGY & SUSTAINABLE DEVELOPMENT GOALS**				
Type of Course	Foundation – Value Added Course				
Semester	III				
Academic Level	100-199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	3	3	-	0	45
Pre-requisites	NIL				
Course Summary	Course in Geology & Sustainable Development Goals provides students with a comprehensive understanding of the intersections between geology and global sustainability initiatives, through exploration of the United Nations Sustainable Development Goals (SDGs).				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Understand the interconnectedness between geology and the Sustainable Development Goals (SDGs) and the role of geology in addressing global challenges.	U	F	Exam
CO2	Analyze the geological drivers and impacts of climate change and evaluate geologically-based solutions for climate action and adaptation (SDG 13).	Ap	C	Quiz
CO3	Apply geological principles to the management of water resources, including groundwater exploration, and contamination mitigation (SDG 6).	An	P	Assignment
CO4	Critically evaluate the environmental and social implications of resource extraction activities and apply principles of responsible resource management (SDG 12).	E	M	Viva
CO5	Assess the role of geology in biodiversity conservation, habitat preservation, and ecosystem restoration efforts to promote life on land (SDG 15).	Ap	F	Assignment
CO6	Advocate effectively about the intersections between geology and SDGs	E	M	Assignment
* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C) # - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)				

Detailed Syllabus: GEOLOGY & SUSTAINABLE DEVELOPMENT GOALS

Module	Unit	Content	Hrs	Marks
I		**Introduction to Sustainable Development Goals (SDGs)**	9	10
	1	Overview of the United Nations Sustainable Development Goals (SDGs)		
	2	Linkages between geology, Earth sciences, and the SDGs		
	3	Importance of geology in achieving sustainable development		
	4	Interdisciplinary approach to addressing global challenges through the SDGs		
	5	Overview of the United Nations Sustainable Development Goals (SDGs)		
II		**Geology and Climate Action (SDG 13)**	9	10
	6	Understanding climate change and its geological drivers		
	7	Impacts of climate change on geology, including sea level rise, glacier retreat, and extreme weather events		
	8	Role of geology in climate mitigation and adaptation strategies		
	9	Carbon capture and storage technologies and geological sequestration		
	10	Understanding climate change and its geological drivers		
III		**Geology and Clean Water & Sanitation (SDG 6)**	9	10
	11	Geology of water resources: aquifers, groundwater recharge, and contamination pathways		
	12	Groundwater exploration and management techniques		
	13	Geohydrology and its role in providing clean water and sanitation services		
	14	Geological hazards related to water, such as floods, landslides, and droughts		
IV		**Geology and Responsible Resource Management (SDG 12 & 15)**	9	20
	15	Geological exploration and sustainable extraction of mineral and energy resources		
	16	Environmental impacts of resource extraction and land use change		
	17	Geological hazards associated with resource extraction activities		
	18	Sustainable development of geological resources for economic and social benefit		
	19	Geology's role in biodiversity conservation and habitat preservation		
	20	Land degradation and desertification: geological causes and solutions		
V		**Open Ended Module**	9	5
	Discussion on SDGs with particular reference to India and Kerala			

Mapping of COs with PSOs and POs:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	1	-	-	-	-	-							
CO 2	2	3	-	-	-	-							
CO 3	-	-	1	-	-	-							
CO 4	-	-	2	3	-	-							
CO 5	-	1	-	-	-	-							
CO 6	-	-	-	3	-	-							

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:
External evaluation: 50 marks. Internal Evaluation: 25 marks

INTERNAL MARK SPLIT-UP (TOTAL 25 MARKS)			
	Components of Internal Evaluation	**4 Theory Modules (20)**	**Open ended Module (5)**
1	Test paper/ Mid semester Exam	10	2.5
2	Seminar/ Viva/ Quiz	6	1.5
3	Assignment/ Group Discussion	4	1

Mapping of COs to Assessment Rubrics:

	Internal Exam	Assignment	End Semester Examinations
CO 1	✓	✓	✓
CO 2	✓	✓	✓
CO 3		✓	✓
CO 4		✓	✓
CO 5		✓	✓
CO6		✓	✓

References:

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