

Ref No:

SRI KRISHNA INSTITUTE OF TECHNOLOGY , BANGALORE-90



COURSE PLAN

Academic Year -2018-19

Program:	B E – Civil Engineering
Semester :	3
Course Code:	18CV36
Course Title:	Engineering Geology
Credit / L-T-P:	4 / 4-0-0
Total Contact Hours:	50
Course Plan Author:	Dr. K. SATISH

Academic Evaluation and Monitoring Cell

#29, Hesaragatta Main Road, Chimney Hills
 Chikkabanavara Post Bangalore-560090
 PH-080-23821488/23821315
www.Skit.org, Email: skitprinci1@gmail.com

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Note : Remove "Table of Content" before including in CP Book

Each Course Plan shall be printed and made into a book with cover page

Blooms Level in all sections match with A.2, only if you plan to teach / learn at higher levels

A. COURSE INFORMATION

1. Course Overview

Degree:	BE	Program:	CV
Semester:	3	Academic Year:	2018
Course Title:	ENGINEERING GEOLOGY	Course Code:	18CV36
Credit / L-T-P:	3 / 3-0-0	SEE Duration:	180 Minutes
Total Contact Hours:	50 Hours	SEE Marks:	60 Marks
CIA Marks:	40 Marks	Assignment	1 / Module
Course Plan Author:	Dr. K SATISH	Sign ..	Dt:
Checked By:	MOHAN K T	Sign ..	Dt:
CO Targets	CIA Target : ...85... %	SEE Target:	...72... %

Note: Define CIA and SEE % targets based on previous performance.

2. Course Content

Content / Syllabus of the course as prescribed by University or designed by institute. Identify 2 concepts per module as in G.

Mod ule	Content	Teachi ng Hours	Identified Module Concepts	Blooms Learning Levels
1	Introduction: Application of Earth Science in Civil Engineering Practices, Understanding the earth, internal structure and composition. Mineralogy: Mineral properties, composition and their use in the manufacture of construction materials – Quartz Group (Glass); Feldspar Group (Ceramic wares and Flooring tiles); Kaolin (Paper, paint and textile); Asbestos (AC sheets); Carbonate Group (Cement); Gypsum (POP, gypsum sheets, cement); Mica Group (Electrical industries); Ore minerals - Iron ores (Steel); Chromite (Alloy); Bauxite (aluminum); Chalcopyrite (copper)	10 (3, 9)	Minerals	L1,L2
2	Petrology: Formation, Classification and Engineering Properties. Rock as construction material, concrete aggregate, railway ballast, roofing, flooring, cladding and foundation. Deformation of rocks, Development of Joints, Folds, Faults and Unconformities. Their impact in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges, Rock Quality Determination (RQD), Rock Structure Rating (RSR); Igneous Rocks - Granite, Gabbro, Dolerite, Basalt; Sedimentary rocks - Sandstone, Shale, Limestone, Laterite; Metamorphic rocks - Gneiss, Quartzite, Slate, Charnockite; Decorative stones - Porphyries, Marble and Quartzite	10 (4, 3)	Rock formation	L2,L3
3	Geomorphology and Seismology: Landforms – Classification, Rock weathering, types and its effects on Civil Engineering Projects. Study of Geo-morphological aspects in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges. Watershed management, Floods and their control, River valley, Drainage pattern – parameters and development; Coastlines and their engineering considerations. Earthquake - Causes and Effects,, Seismic waves, Engineering problems related to Earthquakes, Earthquake intensity, Richter Scale, Seismograph, Seismic zones- World and India, Tsunami – causes and effects. Early warning system. Reservoir Induced Seismicity; Landslides – causes and their control	10 (5, 7)	Landforms, Earthquakes	L2,L3,L5
4	Hydrogeology: Hydrological cycle, Occurrence of Groundwater in different terrains -Weathered, Hard and	10 (7, 6)	Groundwater/surf face water	L2,L4,L5

	Stratified rocks; Determination of Quality aspects - SAR, RSC and TH of Groundwater. Groundwater Pollution, Groundwater Exploration- Electrical Resistivity and Seismic methods, Resistivity curves, Water Bearing Formations, Aquifer types and parameters - Porosity, Specific yield and retention, Permeability, Transmissibility and Storage Coefficient. Springs and Artesian Wells, Artificial Recharging of Groundwater, Sea water intrusion and remedies.		exploration	
5	Geodesy: Study of Topographic maps and Contour maps; Remote Sensing – Concept, Application and its Limitations; Geographic Information System (GIS) and Global Positioning System (GPS) – Concept and their use resource mapping. LANDSAT Imagery-Definition and its use. Impact of Mining, Quarrying and Reservoirs on Environment. Natural Disasters and their mitigation.	10 (5, 5)	Remotesensing& GIS	L2,L4,L5
-	Total	54	-	-

3. Course Material

Books & other material as recommended by university (A, B) and additional resources used by course teacher (C).

1. Understanding: Concept simulation / video ; one per concept ; to understand the concepts ; 15 – 30 minutes
2. Design: Simulation and design tools used – software tools used ; Free / open source
3. Research: Recent developments on the concepts – publications in journals; conferences etc.

Modules	Details	Chapters in book	Availability
A	Text books (Title, Authors, Edition, Publisher, Year.)	-	-
1 to 5	1. P.K. Mukerjee, "A Text Book of Geology", World Press Pvt., Ltd. Kolkatta. 2. Parbin Singh, "Text Book of Engineering and General Geology", Published by S.K.Kataria and Sons, New Dehli		In Lib / In Dept
			In Lib/ In dept
B	Reference books (Title, Authors, Edition, Publisher, Year.)	-	-
	1. Earthquake Tips - Learning Earthquake Design and Construction - C V R Murthy Published by National Information Centre of Earthquake Engineering, Indian Institute of Technology, Kanpur. 2. Dimitri P Krynine and William R Judd, "Principles of Engineering Geology and Geotechnics", CBS Publishers and Distributors, New Delhi. 3. K V G K Gokhale, "Principles of Engineering Geology", BS Publications, Hyderabad. 4. M Anji Reddy, "Text book of Remote Sensing and Geographical Information System", BS Publications, Hyderabad. 5. Ground water Assessment, development and Management by K.R. Karanth, Tata Mc Graw Hills 6. K. Todd, "Groundwater Hydrology", Wiley. 7. D. Venkata Reddy, "Engineering Geology", New Age International Publications, New Delhi. 8. S.K Duggal, H.K Pandey and N Rawal, "Engineering Geology", McGraw Hill Education (India) Pvt, Ltd. New Delhi. 9. M.P Billings, "Structural Geology", CBS Publishers and Distributors, New Delhi. 10. K. S. Valdiya, " Environmental Geology",., Tata Mc Graw Hills. 11. M. B. Ramachandra Rao, "Outlines of Geophysical Prospecting- A Manual for Geologists", Prasaranga, University of Mysore, Mysore		In Lib
C	Concept Videos or Simulation for Understanding	-	-
C1	https://www.youtube.com/watch?v=rAYiBS03JKY		
C2	https://www.youtube.com/watch?v=xgvH7FMIU0		

C3	https://www.youtube.com/watch?v=NhrNJB-43bo		
C4	https://www.youtube.com/watch?v=JLN4ioxHOHk		
C5	https://www.youtube.com/watch?v=-yVBYyWzZo		
C6	https://www.youtube.com/watch?v=OVz4NxCKAMw		
C7	https://www.youtube.com/results?search_query=hydrology+and+hydrological+cycle		
C8	https://www.youtube.com/watch?v=WrvL_KoTQeo		
C9	https://www.youtube.com/watch?v=zqPMYGDxCr0		
C10	https://www.youtube.com/watch?v=hMFl1CBu_EU		
D	Software Tools for Design	-	-
E	Recent Developments for Research	-	-
	https://www.youtube.com/watch?v=PzPW5msevJ0		
F	Others (Web, Video, Simulation, Notes etc.)	-	-
1	http://diginotes.in/		

4. Course Prerequisites

Refer to GL01. If prerequisites are not taught earlier, GAP in curriculum needs to be addressed. Include in Remarks and implement in B.5.

Students must have learnt the following Courses / Topics with described Content . . .

Modules	Course Code	Course Name	Topic / Description	Sem	Remarks	Blooms Level
-						
-						

5. Content for Placement, Profession, HE and GATE

The content is not included in this course, but required to meet industry & profession requirements and help students for Placement, GATE, Higher Education, Entrepreneurship, etc. Identifying Area / Content requires experts consultation in the area.

Topics included are like, a. Advanced Topics, b. Recent Developments, c. Certificate Courses, d. Course Projects, e. New Software Tools, f. GATE Topics, g. NPTEL Videos, h. Swayam videos etc.

Modules	Topic / Description	Area	Remarks	Blooms Level
1	Internal structure of the earth	Engineering Geology		L1
1	Mineralogy	Engineering Geology		L2

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2	Petrology	Engineering Geology		L2
2	Land forms	Engineering Geology		L3
3	Earthquake	Engineering Geology		L2
4	Water quality	Engineering Geology		L3,L5
4	Groundwater exploration	Engineering Geology		L4
5	Maps, GPS	Engineering Geology		L5
5	RS&GIS	Engineering Geology		L2,L3,L5

B. OBE PARAMETERS

1. Course Outcomes

Expected learning outcomes of the course, which will be mapped to POs. Identify a max of 2 Concepts per Module. Write 1 CO per Concept.

Modules	Course Code.#	Course Outcome At the end of the course, student should be able to . . .	Teach. Hours	Concept	Instr Method	Assessment Method	Blooms' Level
1	18CV36.1	Student will know about the composition of earth.	05	Earth Science	BB/PPT	IA	L1 Knowledge
1	18CV36.2	Students should be able to understand earth materials.	05	Minerals	BB/PPT	IA	L2 Understand
2	18CV36.3	Students should be able to understand rock formation	05	Rock Formation	BB/PPT	IA	L2 Understand
2	18CV36.4	Applying the knowledge in selection of Civil Structures	05	Structural deformation	BB/PPT	IA	L3 Application
3	18CV36.5	Students should be able to understand land forms and weathering	05	Land forms	BB/PPT	IA	L2 Understand
3	18CV36.6	Applying the knowledge in selection of Civil projects and evaluate seismic data by seismograph	05	Earthquake	BB/PPT	IA	L3,L5 Application, Evaluate
4	18CV36.7	Students should be able to analyze aquifer condition and resistivity curves	05	Water quality	BB/PPT	IA	L4 Analyze
4	18CV36.8	Students should be able to evaluate the resistivity data	05	Groundwater exploration	BB/PPT	IA	L5 Evaluate
5	18CV36.9	Students should be able to understand maps, imageries	05	Maps, GPS	BB/PPT	IA	L2, Application
5	18CV36.10	Students should be able to apply the knowledge of RS&GIS to generate maps	05	RS&GIS	BB/PPT	IA	L3,L5 Application, Evaluate
-	-	Total	50	-	-	-	L1-L5

2. Course Applications

Write 1 or 2 applications per CO.

Students should be able to employ / apply the course learnings to . . .

Modules	Application Area Compiled from Module Applications.	CO	Level
1	Internal structure of earth (terrain condition).	CO1	L1
1	Utilization of earth materials.	CO2	L2
2	In building materials	CO3	L2
2	In construction of Civil Engg. Structures	CO4	L3
3	In selection of sites for civil projects	CO5	L2
3	In construction of earthquakes-resistant structures	CO6	L5
4	In identifying aquifer condition	CO7	L4
4	In groundwater exploration and to know the terrain condition	CO8	L5
5	In understanding maps, imageries, GPS	CO9	L3
5	With the knowledge of RS&GIS to generate maps	CO10	L5

3. Mapping And Justification

CO – PO Mapping with mapping Level along with justification for each CO-PO pair.

To attain competency required (as defined in POs) in a specified area and the knowledge & ability required to accomplish it.

Modules	Mapping CO	Mapping PO	Mapping Level	Justification for each CO-PO pair	Level
-	CO	PO		'Area': 'Competency' and 'Knowledge' for specified 'Accomplishment'	
1	CO1	1,2,4,7	2,2,1,1	Student will know about the composition of earth.	L1
1	CO2	1,2,4,7	2,1,1,3	Students should be able to understand earth materials.	L2
2	CO3	1,2,4	3,2,2	Students should be able to understand rock formation	L2
2	CO4	1,2,4,8	3,3,3,2	Applying the knowledge in selection of Civil Structures	L3
3	CO5	1,2,3,4,8	2,2,2,3,2	Students should be able to understand land forms and weathering	L2
3	CO6	1,2,3,4,7,8	3,2,2,3,3,2	Applying the knowledge in selection of Civil projects and evaluate seismic data by seismograph	L5
4	CO7	2,3,4,5,6	2,2,3,2,3	Students should be able to identify aquifers and analyze resistivity curves	L4
4	CO8	2,3,4,5,6	2,2,3,2,3	Students should be able to evaluate the resistivity data	L5
5	CO9	1,4,5	2,3,3	Students should be able to understand maps, imageries	L3
5	CO10	1,4,5,6,7	2,3,3,3,3	Students should be able to apply the knowledge of RS&GIS to generate maps	L5

4. Articulation Matrix

CO – PO Mapping with mapping level for each CO-PO pair, with course average attainment.

Modules	CO.#	Course Outcomes At the end of the course student should be able to . . .	Program Outcomes												Level			
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
1	18CV36.1	Student will know about the composition of earth.	2	2	-	1	-	-	1	-	-	-	-	-	-	-	-	L2
1	18CV36.2	Students should be able to understand earth materials.	2	1	-	1	-	-	3	-	-	-	-	-	-	-	-	L2
2	18CV36.3	Students should be able to understand rock formation	3	2	-	2	-	-	-	-	-	-	-	-	-	-	-	L2
2	18CV36.4	Applying the knowledge in selection of Civil Structures	3	3	-	3	-	-	2	-	-	-	-	-	-	-	-	L3
3	18CV36.5	Students should be able to understand land forms and weathering	2	2	2	3	-	-	2	-	-	-	-	-	-	-	-	L2

3	18CV36.6	Applying the knowledge in selection of Civil projects and evaluate seismic data by seismograph	3	2	2	3		-	3	2	-	-	-	-	-	-	-	L2
4	18CV36.7	Students should be able to identify aquifers and analyze resistivity curves	-	2	2	3	2	3	-	-	-	-	-	-	-	-	-	L3
4	18CV36.8	Students should be able to evaluate the resistivity data	-	2	2	3	2	3	-	-	-	-	-	-	-	-	-	L2
5	18CV36.9	Students should be able to understand maps, imageries	2	-	-	3	3	-	-	-	-	-	-	-	-	-	-	L2
5	18CV36.10	Students should be able to apply the knowledge of RS&GIS to generate maps	2	-	-	3	3	3	3	-	-	-	-	-	-	-	-	L3
-	CS501PC	Average attainment (1, 2, or 3)	2.4	2.5	2	2.6	2.8	2.9	2.3									-
-	<i>PO, PSO</i>	<i>1.Engineering Knowledge; 2.Problem Analysis; 3.Design / Development of Solutions; 4.Conduct Investigations of Complex Problems; 5.Modern Tool Usage; 6.The Engineer and Society; 7.Environment and Sustainability; 8.Ethics; 9.Individual and Teamwork; 10.Communication; 11.Project Management and Finance; 12.Life-long Learning; S1.Software Engineering; S2.Data Base Management; S3.Web Design</i>																

5. Curricular Gap and Content

Topics & contents not covered (from A.4), but essential for the course to address POs and PSOs.

Mod ules	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1					
2					
3					
4					
5					

6. Content Beyond Syllabus

Topics & contents required (from A.5) not addressed, but help students for Placement, GATE, Higher Education, Entrepreneurship, etc.

Mod ules	Gap Topic	Area	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1						
1						
2						
2						
3						
3						
4						
4						
5						
5						

C. COURSE ASSESSMENT

1. Course Coverage

Assessment of learning outcomes for Internal and end semester evaluation. Distinct assignment for each student. 1 Assignment per chapter per student. 1 seminar per test per student.

Mod ules	Title	Teach. Hours	No. of question in Exam						CO	Levels
			CIA-1	CIA-2	CIA-3	Asg	Extra Asg	SEE		
1	Introduction and Mineralogy	10	2	-	-	1	-	1	CO1, CO2	L2
2	Petrology	10	2	-	-	1	-	1	CO3, CO4	L3
3	Geomorphology and Seismology	10	-	2	-	1	-	1	CO5, CO6	L5
4	Hydrogeology	10	-	2	2	1	1	1	CO7, Co8	L4
5	Geodesy	10	-	-	2	1	2	1	CO9, CO10	L5
-	Total	50	4	4	4	5	3	5	-	-

2. Continuous Internal Assessment (CIA)

Assessment of learning outcomes for Internal exams. Blooms Level in last column shall match with A.2.

Mod ules	Evaluation	Weightage in Marks	CO	Levels
1, 2	CIA Exam - 1	15	CO1, CO2, CO3, Co4	L2, L4, L3, L2
3, 4	CIA Exam - 2	15	CO5, CO6, CO7, Co8	L2, L3, L3, L4
5	CIA Exam - 3	15	CO9, CO10	L2, L2
1, 2	Assignment - 1	05	CO1, CO2, CO3, Co4	L2, L4, L3, L2
3, 4	Assignment - 2	05	CO5, CO6, CO7, Co8	L2, L3, L3, L4
5	Assignment - 3	05	CO9, CO10	L2, L2
1, 2	Seminar - 1	05	CO1, CO2, CO3, Co4	L2, L4, L3, L2
3, 4	Seminar - 2	05	CO5, CO6, CO7, Co8	L2, L3, L3, L4
5	Seminar - 3	05	CO9, CO10	L2, L2
1, 2	Quiz - 1		-	-
3, 4	Quiz - 2		-	-
5	Quiz - 3		-	-
1 - 5	Other Activities - Mini Project	-	CO9, CO10	L2, L2
	Final CIA Marks	20	-	-

D1. TEACHING PLAN - 1

Module - 1

Title:	Introduction Mineralogy	Appr Time:	10 Hrs
a	Course Outcomes	-	Blooms Level
-	The student should be able to:	-	
1	Know about the composition of earth.	CO1	L2
2	Understand earth materials.	CO2	L2
b	Course Schedule	-	-
Class No.	Module Content Covered		Level
1	Application of Earth Science in Civil Engineering Practices	CO1	L1
2	Understanding the earth, internal structure and composition	CO1	L1
3	Mineral properties, composition and their use in the manufacture of construction materials	CO2	L2
4	Quartz Group (Glass); Feldspar Group (Ceramic wares and Flooring tiles)	CO2	L2
5	Kaolin (Paper, paint and textile); Asbestos (AC sheets)	CO2	L2
6	Carbonate Group (Cement); Gypsum (POP, gypsum sheets, cement)	CO2	L2
7	Mica Group (Electrical industries)	CO2	L2
8	Ore minerals - Iron ores (Steel)	CO2	L2
9	Chromite (Alloy)	CO2	L2
10	Bauxite (aluminum); Chalcopyrite (copper)	CO2	L2
c	Application Areas	CO	Level
1	Internal structure of earth (terrain condition).	CO1	L1
2	Utilization of earth materials.	CO2	L2
d	Review Questions	-	-
1	What are the applications of Earth Science in Civil Engineering?	CO1	L1
2	With a neat diagram explain internal structure of the earth.	CO1	L2
3	Define mineral and its physical properties.	CO2	L2
4	Explain how quartz group of minerals used in industry.	CO2	L2
5	What are the industrial uses of mica.	CO2	L2
e	Experiences	-	-
1		CO1	L2
2			
3			
4		CO2	L3
5			

Module – 2

Title:	Introduction and Mineralogy	Appr Time:	10 Hrs
a	Course Outcomes	-	Blooms
-	The student should be able to:	-	Level
1	Understand rock formation	CO3	L2
2	Apply the knowledge in selection of Civil Structures	CO4	L3
b	Course Schedule	-	-
Class No	Module Content Covered	CO	Level
11	Formation, Classification and Engineering Properties	CO3	L2
12	Rock as construction material, concrete aggregate, railway ballast, roofing, flooring, cladding and foundation	CO3	L2
13	Deformation of rocks, Development of Joints, Folds, Faults and Unconformities	CO4	L2
14	Their impact in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges	CO4	L3
15	Rock Quality Determination (RQD), Rock Structure Rating (RSR)	CO4	L3
18	Igneous Rocks - Granite, Gabbro, Dolerite, Basalt	CO3	L3
19	Sedimentary rocks - Sandstone, Shale, Limestone, Laterite	CO3	L3
20	Metamorphic rocks - Gneiss, Quartzite, Slate, Charnockite: Decorative stones - Porphyries, Marble and Quartzite	CO3	L3
c	Application Areas	CO	Level
1	In building materials	CO3	L2
2	In construction of Civil Engg. Structures	CO4	L3
d	Review Questions	-	-
06	What is rock? Add note on classification of rock.	CO3	L2
07	Explain the uses of different types of rocks in civil engineering.	CO3	L2
08	With a neat diagram explain folds.	CO3	L2
9	What are the geological considerations in selecting a site for tunnel in the folded area?	CO4	L3
10	What are the geological considerations in selecting a site for dams/reservoirs in the faulted area?	CO4	L3
11	Add a note on different types sedimentary rocks.	CO4	L3
e	Experiences	-	-
1		CO3	L2
2			
3			
4		CO4	L3
5			

E1. CIA EXAM – 1

a. Model Question Paper - 1

Crs Code:	18CV36	Sem:	III	Marks:	30	Time:	90 minutes	
Course:	Engineering Geology							
-	-	Note: Answer any 2 questions, each carry equal marks.				Marks	CO	Level
1	a	With a neat sketch explain the internal structure of the earth.				5	CO3	L2
	b	What are the applications of Engg. Geology in civil engineering?				5	CO3	L2
	c	Write physical properties of Quartz Group of minerals and its industrial use.				5	CO3	L2
		or						
2	a	Define mineral and its physical properties.				5	CO3	L2
	b	What are rock forming and ore minerals? Add a note on chalcopyrite and its uses in industry?				5	CO3	L2
	c	Write short note on asbestos and gypsum.				5	CO3	L2
		or						
3	a	What are the impacts of folds in the selection of sites for tunnels ?				5	CO4	L3
	b	What are igneous rocks? Explain with examples and their uses in construction.				5	CO3	L3
	c	What are the impacts of faults and joints in the selection of sites for reservoirs?				5	CO4	L3
		or						
4	a	Write engineering properties of granite, basalt and sandstone.				5	CO3	L3
	b	What are metamorphic rocks? Explain with examples and their uses in construction.				5	CO3	L3
	c	With neat sketches define faults and folds.				5	CO3	L3
		or						

b. Assignment -1

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions								
Crs Code:	18CV36	Sem:	III	Marks:	5 / 10	Time:	90 – 120 minutes	
Course:	Engineering Geology							
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.								
SNo	USN	Assignment Description				Marks	CO	Level
1	1KT15CV053	Application of Earth Science in Civil Engineering Practices				5	CO1	L1
2	1KT15CV088	Understanding the earth, internal structure and composition				5	CO1	L1
3	1KT16CV020	Mineral properties, composition and their use in the manufacture of construction materials				5	CO2	L2
4	1KT16CV026	Quartz Group (Glass); Feldspar Group (Ceramic wares and Flooring tiles)				5	CO2	L2
5	1KT16CV028	Kaolin (Paper, paint and textile); Asbestos (AC sheets)				5	CO2	L2
6	1KT16CV035	Carbonate Group (Cement); Gypsum (POP, gypsum)				5	CO2	L2

		sheets, cement)			
7	1KT16CV038	Mica Group (Electrical industries)	5	CO2	L2
8	1KT16CV039	Ore minerals - Iron ores (Steel)	5	CO2	L2
9	1KT16CV042	Chromite (Alloy)	5	CO2	L2
10	1KT16CV047	Bauxite (aluminum); Chalcopyrite (copper)	5	CO2	L2
11	1KT16CV048	Formation, Classification and Engineering Properties	5	CO3	L2
12	1KT17CV007	Rock as construction material, concrete aggregate, railway ballast, roofing, flooring, cladding and foundation	5	CO3	L2
13	1KT17CV008	Deformation of rocks, Development of Joints, Folds, Faults and Unconformities	5	CO4	L2
14	1KT17CV010	Their impact in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges	5	CO4	L3
15	1KT17CV011	Rock Quality Determination (RQD), Rock Structure Rating (RSR)	5	CO4	L3
16	1KT17CV012	Igneous Rocks - Granite, Gabbro, Dolerite, Basalt	5	CO3	L3
17	1KT17CV013	Sedimentary rocks - Sandstone, Shale, Limestone, Laterite	5	CO3	L3
18	1KT17CV015	Metamorphic rocks - Gneiss, Quartzite, Slate, Charnockite: Decorative stones - Porphyries, Marble and Quartzite	5	CO3	L3
19	1KT17CV017	Rock as construction material, concrete aggregate, railway ballast, roofing, flooring, cladding and foundation	5	CO3	L2
20	1KT17CV019	Deformation of rocks, Development of Joints, Folds, Faults and Unconformities	5	CO4	L2
21	1KT17CV020	Their impact in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges	5	CO4	L3
22	1KT17CV021	Rock Quality Determination (RQD), Rock Structure Rating (RSR)	5	CO4	L3
23	1KT17CV023	Igneous Rocks - Granite, Gabbro, Dolerite, Basalt	5	CO3	L3
24	1KT17CV024	Sedimentary rocks - Sandstone, Shale, Limestone, Laterite	5	CO3	L3
25	1KT17CV025	Metamorphic rocks - Gneiss, Quartzite, Slate, Charnockite: Decorative stones - Porphyries, Marble and Quartzite	5	CO3	L3
26	1KT17CV026	Rock as construction material, concrete aggregate, railway ballast, roofing, flooring, cladding and foundation	5	CO3	L2
27	1KT17CV412	Deformation of rocks, Development of Joints, Folds, Faults and Unconformities	5	CO4	L2
28	1KT18CV400	Their impact in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges	5	CO4	L3

29	1KT18CV401	Rock Quality Determination (RQD), Rock Structure Rating (RSR)	5	CO4	L3
39	1KT18CV402	Igneous Rocks - Granite, Gabbro, Dolerite, Basalt	5	CO3	L3
31	1KT18CV403	Sedimentary rocks - Sandstone, Shale, Limestone, Laterite	5	CO3	L3
32	1KT18CV404	Metamorphic rocks - Gneiss, Quartzite, Slate, Charnockite: Decorative stones - Porphyries, Marble and Quartzite	5	CO3	L3
33	1KT18CV405	Application of Earth Science in Civil Engineering Practices	5	CO1	L1
34	1KT18CV406	Understanding the earth, internal structure and composition	5	CO1	L1
35	1KT18CV407	Mineral properties, composition and their use in the manufacture of construction materials	5	CO2	L2
36	1KT18CV408	Quartz Group (Glass); Feldspar Group (Ceramic wares and Flooring tiles)	5	CO2	L2
37	1KT18CV409	Kaolin (Paper, paint and textile); Asbestos (AC sheets)	5	CO2	L2
38	1KT18CV410	Carbonate Group (Cement); Gypsum (POP, gypsum sheets, cement)	5	CO2	L2
39	1KT18CV411	Mica Group (Electrical industries)	5	CO2	L2
40	1KT16CV055	Ore minerals - Iron ores (Steel)	5	CO2	L2
41	1KT16CV060	Chromite (Alloy)	5	CO2	L2
42	1KT16CV077	Bauxite (aluminum); Chalcopryite (copper)	5	CO2	L2
43	1KT16CV082	Formation, Classification and Engineering Properties	5	CO3	L2
44	1KT16CV088	Rock as construction material, concrete aggregate, railway ballast, roofing, flooring, cladding and foundation	5	CO3	L2
45	1KT16CV094	Deformation of rocks, Development of Joints, Folds, Faults and Unconformities	5	CO4	L2
46	1KT16CV098	Their impact in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges	5	CO4	L3
47	1KT16CV102	Rock Quality Determination (RQD), Rock Structure Rating (RSR)	5	CO4	L3
48	1KT17CV028	Igneous Rocks - Granite, Gabbro, Dolerite, Basalt	5	CO3	L3
49	1KT17CV029	Sedimentary rocks - Sandstone, Shale, Limestone, Laterite	5	CO3	L3
50	1KT17CV031	Metamorphic rocks - Gneiss, Quartzite, Slate, Charnockite: Decorative stones - Porphyries, Marble and Quartzite	5	CO3	L3
51	1KT17CV032	Rock as construction material, concrete aggregate, railway ballast, roofing, flooring, cladding and foundation	5	CO3	L2
52	1KT17CV033	Deformation of rocks, Development of Joints, Folds, Faults and Unconformities	5	CO4	L2

53	1KT17CV034	Their impact in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges	5	CO4	L3
54	1KT17CV035	Rock Quality Determination (RQD), Rock Structure Rating (RSR)	5	CO4	L3
55	1KT17CV036	Igneous Rocks - Granite, Gabbro, Dolerite, Basalt	5	CO3	L3
56	1KT17CV037	Sedimentary rocks - Sandstone, Shale, Limestone, Laterite	5	CO3	L3
57	1KT17CV038	Metamorphic rocks - Gneiss, Quartzite, Slate, Charnockite: Decorative stones - Porphyries, Marble and Quartzite	5	CO3	L3
58	1KT17CV040	Rock as construction material, concrete aggregate, railway ballast, roofing, flooring, cladding and foundation	5	CO3	L2
59	1KT17CV041	Deformation of rocks, Development of Joints, Folds, Faults and Unconformities	5	CO4	L2
60	1KT17CV042	Their impact in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges	5	CO4	L3
61	1KT17CV050	Rock Quality Determination (RQD), Rock Structure Rating (RSR)	5	CO4	L3
62	1KT17CV053	Igneous Rocks - Granite, Gabbro, Dolerite, Basalt	5	CO3	L3
63	1KT17CV055	Sedimentary rocks - Sandstone, Shale, Limestone, Laterite	5	CO3	L3
64	1KT18CV412	Metamorphic rocks - Gneiss, Quartzite, Slate, Charnockite: Decorative stones - Porphyries, Marble and Quartzite	5	CO3	L3
65	1KT18CV413	Decorative stones - Porphyries	5	CO3	L3
66	1KT18CV414	Marble and Quartzite	5	CO3	L3
67	1KT18CV415	Application of Earth Science in Civil Engineering Practices	5	CO1	L1
68	1KT18CV416	Understanding the earth, internal structure and composition	5	CO1	L1
69	1KT18CV417	Mineral properties, composition and their use in the manufacture of construction materials	5	CO2	L2
70	1KT18CV418	Quartz Group (Glass); Feldspar Group (Ceramic wares and Flooring tiles)	5	CO2	L2
71	1KT18CV419	Kaolin (Paper, paint and textile); Asbestos (AC sheets)	5	CO2	L2
72	1KT18CV420	Carbonate Group (Cement); Gypsum (POP, gypsum sheets, cement)	5	CO2	L2
73	1KT18CV421	Mica Group (Electrical industries)	5	CO2	L2
74	1KT18CV422	Ore minerals - Iron ores (Steel)	5	CO2	L2
75	1KT18CV423	Chromite (Alloy)	5	CO2	L2
76	1KT18CV424	Bauxite (aluminum); Chalcopryite (copper)	5	CO2	L2
77	1KT18CV425	Kaolin (Paper, paint and textile); Asbestos (AC sheets)	5	CO2	L2

D2. TEACHING PLAN - 2

Module – 3

Title:	Geomorphology and Seismology	Appr Time:	10 Hrs
a	Course Outcomes	-	Blooms
-	The student should be able to:	-	Level
1	Understand land forms and weathering	CO5	L2
2	Apply the knowledge in selection of Civil projects and evaluate seismic data by seismograph	CO6	L3
b	Course Schedule		
Class No	Module Content Covered	CO	Level
1	Landforms – Classification, Rock weathering, types and its effects on Civil Engineering Projects	CO5	L2
2	Study of Geomorphological aspects in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges	CO5	L2
3	Watershed management, Floods and their control	CO5	L3
4	River valley, Drainage pattern – parameters and development	CO5	L3
5	Coastlines and their engineering considerations	CO5	L3
6	Earthquake - Causes and Effects, Seismic waves, Engineering problems related to Earthquakes	CO6	L5
7	Earthquake intensity, Richter Scale, Seismograph	CO6	L5
8	Seismic zones- World and India	CO6	L5
9	Tsunami – causes and effects. Early warning system	CO6	L5
10	Reservoir Induced Seismicity; Landslides – causes and their control	CO6	L5

Module – 4

Title:	Hydrogeology	Appr Time:	10Hrs
a	Course Outcomes	-	Blooms
-	The student should be able to:	-	Level
1	Identify aquifers and analyze resistivity curves	CO7	L4
2	Evaluate the resistivity data	CO8	L5
b	Course Schedule		
Class No	Portion covered per hour	-	-
1	Hydrological cycle, Occurrence of Groundwater in different terrains -Weathered, Hard and Stratified rocks	CO7	L4
2	Determination of Quality aspects - SAR, RSC and TH of Groundwater. Groundwater Pollution	CO7	L4
3	Groundwater Exploration- Electrical Resistivity	CO7	L5
4	Seismic methods, Resistivity curves	CO8	L5
5	Water Bearing Formations, Aquifer types	CO8	L5
6	Parameters - Porosity, Specific yield and retention,	CO8	L5
7	Permeability, Transmissibility and Storage Coefficient	CO8	L5
8	Springs and Artesian Wells	CO8	L5
9	Artificial Recharging of Groundwater,	CO8	L5
10	Sea water intrusion and remedies	CO8	L5

c	Application Areas	CO	Level
1	In identifying aquifer condition	CO7	L4
2	In groundwater exploration and to know the terrain condition	CO8	L5
d	Review Questions	-	-
1	With a neat diagram explain hydrological cycle.	CO7	L4
2	Add a note on quality aspects of SAR, RSC and TH of Groundwater.	CO7	L4
3	With neat circuit diagram (Schlumberger) explain how electrical resistivity helps in groundwater exploration.	CO7	L5
4	What are aquifers? Add a note on confined aquifer.	CO8	L5
5	Define the terms porosity, specific yield and retention.	CO8	L5
6	Add a note on artificial recharge of groundwater.	CO8	L5
7	What are the causes of sea water intrusion. Explain their remedies.	CO8	L5
e	Experiences	-	-
1			
2			
3			
4			
5			

E2. CIA EXAM – 2

a. Model Question Paper - 2

Crs Code:	18CV36	Sem:	III	Marks:	30	Time:	90 minutes	
Course:	Engineering Geology							
-	-	Note: Answer any 2 questions, each carry equal marks.				Marks	CO	Level
1	a	Write a short note on classification of landforms.				5	CO3	L3
	b	Explain watershed management.				5	CO3	L3
	c	What is mechanical weathering?				5	CO3	L3
		or						
2	a	What are the causes of and effects of earthquake?				5	CO3	L3
	b	Add a note on drainage pattern.				5	CO3	L3
	c	Write a short on floods and its control.				5	CO3	L3
3	a	Add a note on aquifers and its types with neat sketches.				10	CO4	L3
	b	What are seismic waves? How it helps in defining the internal structure of the earth.				5	CO3	L3
		or						
4	a	Explain hydrological cycle with a neat diagram.				5	CO3	L3
	b	What are the geomorphological aspects in the selection of sites for dams/reservoirs, tunnels, highways and bridges				10	CO4	L3

b. Assignment – 2

Model Assignment Questions							
Crs Code:	18CV36	Sem:	III	Marks:	5 / 10	Time:	90 – 120 minutes
Course:	Engineering Geology						
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.							
SNo	USN	Assignment Description	Marks	CO	Level		
1	1KT15CV053	Landforms – Classification, Rock weathering, types and its effects on Civil Engineering Projects	5	CO5	L2		
2	1KT15CV088	Study of Geomorphological aspects in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges	5	CO5	L2		
3	1KT16CV020	Watershed management, Floods and their control	5	CO5	L3		
4	1KT16CV026	River valley, Drainage pattern – parameters and development	5	CO5	L3		
5	1KT16CV028	Coastlines and their engineering considerations	5	CO5	L3		
6	1KT16CV035	Earthquake - Causes and Effects, Seismic waves, Engineering problems related to Earthquakes	5	CO6	L5		
7	1KT16CV038	Earthquake intensity, Richter Scale, Seismograph	5	CO6	L5		
8	1KT16CV039	Seismic zones- World and India	5	CO6	L5		
9	1KT16CV042	Tsunami – causes and effects. Early warning system	5	CO6	L5		
10	1KT16CV047	Reservoir Induced Seismicity; Landslides – causes and their control	5	CO6	L5		
11	1KT16CV048	Hydrological cycle, Occurrence of Groundwater in different terrains -Weathered, Hard and Stratified rocks	5	CO7	L4		
12	1KT17CV007	Determination of Quality aspects - SAR, RSC and TH of Groundwater. Groundwater Pollution	5	CO7	L4		
13	1KT17CV008	Groundwater Exploration- Electrical Resistivity	5	CO7	L5		
14	1KT17CV010	Seismic methods, Resistivity curves	5	CO8	L5		
15	1KT17CV011	Water Bearing Formations, Aquifer types	5	CO8	L5		
16	1KT17CV012	Parameters - Porosity, Specific yield and retention,	5	CO8	L5		
17	1KT17CV013	Permeability, Transmissibility and Storage Coefficient	5	CO8	L5		
18	1KT17CV015	Springs and Artesian Wells	5	CO8	L5		
19	1KT17CV017	Artificial Recharging of Groundwater,	5	CO8	L5		
20	1KT17CV019	Sea water intrusion and remedies	5	CO8	L5		
21	1KT17CV020	Landforms – Classification, Rock weathering, types and its effects on Civil Engineering Projects	5	CO5	L2		
22	1KT17CV021	Study of Geomorphological aspects in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges	5	CO5	L2		
23	1KT17CV023	Watershed management, Floods and their control	5	CO5	L3		
24	1KT17CV024	River valley, Drainage pattern – parameters and development	5	CO5	L3		
25	1KT17CV025	Coastlines and their engineering considerations	5	CO5	L3		
26	1KT17CV026	Earthquake - Causes and Effects, Seismic waves, Engineering problems related to Earthquakes	5	CO6	L5		
27	1KT17CV412	Earthquake intensity, Richter Scale, Seismograph	5	CO6	L5		
28	1KT18CV400	Seismic zones- World and India	5	CO6	L5		

29	1KT18CV401	Tsunami – causes and effects. Early warning system	5	CO6	L5
39	1KT18CV402	Reservoir Induced Seismicity; Landslides – causes and their control	5	CO6	L5
31	1KT18CV403	Hydrological cycle, Occurrence of Groundwater in different terrains -Weathered, Hard and Stratified rocks	5	CO7	L4
32	1KT18CV404	Determination of Quality aspects - SAR, RSC and TH of Groundwater. Groundwater Pollution	5	CO7	L4
33	1KT18CV405	Groundwater Exploration- Electrical Resistivity	5	CO7	L5
34	1KT18CV406	Seismic methods, Resistivity curves	5	CO8	L5
35	1KT18CV407	Water Bearing Formations, Aquifer types	5	CO8	L5
36	1KT18CV408	Parameters - Porosity, Specific yield and retention,	5	CO8	L5
37	1KT18CV409	Permeability, Transmissibility and Storage Coefficient	5	CO8	L5
38	1KT18CV410	Springs and Artesian Wells	5	CO8	L5
39	1KT18CV411	Artificial Recharging of Groundwater,	5	CO8	L5
40	1KT16CV055	Sea water intrusion and remedies	5	CO8	L5
41	1KT16CV060	Landforms – Classification, Rock weathering, types and its effects on Civil Engineering Projects	5	CO5	L2
42	1KT16CV077	Study of Geomorphological aspects in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges	5	CO5	L2
43	1KT16CV082	Watershed management, Floods and their control	5	CO5	L3
44	1KT16CV088	River valley, Drainage pattern – parameters and development	5	CO5	L3
45	1KT16CV094	Coastlines and their engineering considerations	5	CO5	L3
46	1KT16CV098	Earthquake - Causes and Effects, Seismic waves, Engineering problems related to Earthquakes	5	CO6	L5
47	1KT16CV102	Earthquake intensity, Richter Scale, Seismograph	5	CO6	L5
48	1KT17CV028	Seismic zones- World and India	5	CO6	L5
49	1KT17CV029	Tsunami – causes and effects. Early warning system	5	CO6	L5
50	1KT17CV031	Reservoir Induced Seismicity; Landslides – causes and their control	5	CO6	L5
51	1KT17CV032	Hydrological cycle, Occurrence of Groundwater in different terrains -Weathered, Hard and Stratified rocks	5	CO7	L4
52	1KT17CV033	Determination of Quality aspects - SAR, RSC and TH of Groundwater. Groundwater Pollution	5	CO7	L4
53	1KT17CV034	Groundwater Exploration- Electrical Resistivity	5	CO7	L5
54	1KT17CV035	Seismic methods, Resistivity curves	5	CO8	L5
55	1KT17CV036	Water Bearing Formations, Aquifer types	5	CO8	L5
56	1KT17CV037	Parameters - Porosity, Specific yield and retention,	5	CO8	L5
57	1KT17CV038	Permeability, Transmissibility and Storage Coefficient	5	CO8	L5
58	1KT17CV040	Springs and Artesian Wells	5	CO8	L5
59	1KT17CV041	Artificial Recharging of Groundwater,	5	CO8	L5
60	1KT17CV042	Sea water intrusion and remedies	5	CO8	L5
61	1KT17CV050	Landforms – Classification, Rock weathering, types and its effects on Civil Engineering Projects	5	CO5	L2

62	1KT17CV053	Study of Geomorphological aspects in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges	5	CO5	L2
63	1KT17CV055	Watershed management, Floods and their control	5	CO5	L3
64	1KT18CV412	River valley, Drainage pattern – parameters and development	5	CO5	L3
65	1KT18CV413	Coastlines and their engineering considerations	5	CO5	L3
66	1KT18CV414	Earthquake - Causes and Effects, Seismic waves, Engineering problems related to Earthquakes	5	CO6	L5
67	1KT18CV415	Earthquake intensity, Richter Scale, Seismograph	5	CO6	L5
68	1KT18CV416	Seismic zones- World and India	5	CO6	L5
69	1KT18CV417	Tsunami – causes and effects. Early warning system	5	CO6	L5
70	1KT18CV418	Reservoir Induced Seismicity; Landslides – causes and their control	5	CO6	L5
71	1KT18CV419	Hydrological cycle, Occurrence of Groundwater in different terrains -Weathered, Hard and Stratified rocks	5	CO7	L4
72	1KT18CV420	Determination of Quality aspects - SAR, RSC and TH of Groundwater. Groundwater Pollution	5	CO7	L4
73	1KT18CV421	Groundwater Exploration- Electrical Resistivity	5	CO7	L5
74	1KT18CV422	Seismic methods, Resistivity curves	5	CO8	L5
75	1KT18CV423	Water Bearing Formations, Aquifer types	5	CO8	L5
76	1KT18CV424	Parameters - Porosity, Specific yield and retention,	5	CO8	L5
77	1KT18CV425	Permeability, Transmissibility and Storage Coefficient	5	CO8	L5

D3. TEACHING PLAN - 3

Module – 5

Title:	Geodesy	Appr Time:	10 Hrs
a	Course Outcomes	-	Blooms Level
-	The student should be able to:	-	
1	Understand maps, imageries	CO9	L3
2	Apply the knowledge of RS&GIS to generate maps	CO10	L5
b	Course Schedule	-	-
Class No	Portion covered per hour	-	-
1	Study of Topographic maps and Contour maps	CO9	L3
2	Remote Sensing – Concept.	CO10	L5
3	Application and its Limitations	CO10	L5
4	Geographic Information System	CO10	L5
5	Geographic Information System	CO10	L5
6	Global Positioning System – Concept and their use resource mapping	CO10	L5
7	LANDSAT Imagery – Definition and its use	CO9	L3
8	Impact of Mining on Environment	CO9	L3

9	Impact of Quarrying and Reservoirs on Environment.	CO9	L3
10	Natural Disasters and their mitigation.	CO9	L3
1	In understanding maps, imageries, GPS	CO9	L3
2	With the knowledge of RS&GIS to generate maps	CO10	L5
d	Review Questions	-	-
1	What are the applications of topographic maps and contour maps?	CO9	L3
2	What are the applications of Remote Sensing?	CO10	L5
3	What are the applications of GIS and GPS?	CO10	L5
4	Define LANDSAT Imagery and its uses.	CO9	L3
5	What are the impact of Mining and Quarrying on Environment?	CO9	L3
6	What are the Impact of and Reservoirs on Environment?	CO9	L3
7	Explain natural disasters and their mitigation.	CO9	L3
e	Experiences	-	-
1		CO10	L2
2		CO9	
3			
4		CO9	L3
5			

E3. CIA EXAM – 3

a. Model Question Paper - 3

Crs Code:	18CV36	Sem:	III	Marks:	30	Time:	90 minutes	
Course:	Engineering Geology							
-	-	Note: Answer any 2 questions, each carry equal marks.				Marks	CO	Level
1	a	Define the terms SAR and TH.				5	CO7	L2
	b	Explain how electrical resistivity method is useful in groundwater exploration.				5	CO7	L5
	c	What is saline water intrusion.				5	CO8	L2
		or						
2	a	With a neat sketch explain artificial technique of groundwater recharge.				5	CO7	L3
	b	Define porosity and permeability.				5	CO7	L2
	c	Define specific yield and retention.				5	CO7	L2
		or						
3	a	What are topographic and contour maps?				5	CO9	L2
	b	What are the applications of remote sensing in modern ages?				5	CO10	L3
	c	Define GPS.				5	CO10	L2
		or						
4	a	What are the applications of GIS?				5	CO10	L3
	b	What are the impacts of mining and quarrying on environment.				5	CO9	L2
	c	Write a short on natural disaster and its mitigation.				5	CO10	L2

Model Assignment Questions

Crs Code:	18CV36	Sem:	III	Marks:	5 / 10	Time:	90 – 120 minutes	
Course:	Engineering Geology							
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.								
SNo	USN	Assignment Description				Marks	CO	Level
1	1KT15CV053	What are the applications of topographic maps and contour maps?				5	CO9	L3
2	1KT15CV088	What are the applications of Remote Sensing?				5	CO10	L5

3	1KT16CV020	What are the applications of GIS and GPS?	5	CO10	L5
4	1KT16CV026	Define LANDSAT Imagery and its uses.	5	CO9	L3
5	1KT16CV028	What are the impact of Mining and Quarrying on Environment?	5	CO9	L3
6	1KT16CV035	What are the Impact of and Reservoirs on Environment?	5	CO9	L3
7	1KT16CV038	Explain natural disasters and their mitigation.	5	CO9	L3
8	1KT16CV039	What are the applications of topographic maps and contour maps?	5	CO9	L3
9	1KT16CV042	What are the applications of Remote Sensing?	5	CO10	L5
10	1KT16CV047	What are the applications of GIS and GPS?	5	CO10	L5
11	1KT16CV048	Define LANDSAT Imagery and its uses.	5	CO9	L3
12	1KT17CV007	What are the impact of Mining and Quarrying on Environment?	5	CO9	L3
13	1KT17CV008	What are the Impact of and Reservoirs on Environment?	5	CO9	L3
14	1KT17CV010	Explain natural disasters and their mitigation.	5	CO9	L3
15	1KT17CV011	Water Bearing Formations, Aquifer types	5	CO8	L5
16	1KT17CV012	Parameters - Porosity, Specific yield and retention,	5	CO8	L5
17	1KT17CV013	Permeability, Transmissibility and Storage Coefficient	5	CO8	L5
18	1KT17CV015	Springs and Artesian Wells	5	CO8	L5
19	1KT17CV017	Artificial Recharging of Groundwater,	5	CO8	L5
20	1KT17CV019	Sea water intrusion and remedies	5	CO8	L5
21	1KT17CV020	Landforms – Classification, Rock weathering, types and its effects on Civil Engineering Projects	5	CO5	L2
22	1KT17CV021	Study of Geomorphological aspects in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges	5	CO5	L2
23	1KT17CV023	Watershed management, Floods and their control	5	CO5	L3
24	1KT17CV024	River valley, Drainage pattern – parameters and development	5	CO5	L3
25	1KT17CV025	Coastlines and their engineering considerations	5	CO5	L3
26	1KT17CV026	Earthquake - Causes and Effects, Seismic waves, Engineering problems related to Earthquakes	5	CO6	L5
27	1KT17CV412	What are the applications of topographic maps and contour maps?	5	CO9	L3
28	1KT18CV400	What are the applications of Remote Sensing?	5	CO10	L5
29	1KT18CV401	What are the applications of GIS and GPS?	5	CO10	L5
39	1KT18CV402	Define LANDSAT Imagery and its uses.	5	CO9	L3
31	1KT18CV403	What are the impact of Mining and Quarrying on Environment?	5	CO9	L3
32	1KT18CV404	What are the Impact of and Reservoirs on Environment?	5	CO9	L3
33	1KT18CV405	Explain natural disasters and their mitigation.	5	CO9	L3
34	1KT18CV406	Seismic methods, Resistivity curves	5	CO8	L5
35	1KT18CV407	Water Bearing Formations, Aquifer types	5	CO8	L5
36	1KT18CV408	Parameters - Porosity, Specific yield and retention,	5	CO8	L5
37	1KT18CV409	Permeability, Transmissibility and Storage	5	CO8	L5

		Coefficient			
38	1KT18CV410	Springs and Artesian Wells	5	CO8	L5
39	1KT18CV411	Artificial Recharging of Groundwater,	5	CO8	L5
40	1KT16CV055	Sea water intrusion and remedies	5	CO8	L5
41	1KT16CV060	Landforms – Classification, Rock weathering, types and its effects on Civil Engineering Projects	5	CO5	L2
42	1KT16CV077	Study of Geomorphological aspects in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges	5	CO5	L2
43	1KT16CV082	What are the applications of topographic maps and contour maps?	5	CO9	L3
44	1KT16CV088	What are the applications of Remote Sensing?	5	CO10	L5
45	1KT16CV094	What are the applications of GIS and GPS?	5	CO10	L5
46	1KT16CV098	Define LANDSAT Imagery and its uses.	5	CO9	L3
47	1KT16CV102	What are the impact of Mining and Quarrying on Environment?	5	CO9	L3
48	1KT17CV028	What are the Impact of and Reservoirs on Environment?	5	CO9	L3
49	1KT17CV029	Explain natural disasters and their mitigation.	5	CO9	L3
50	1KT17CV031	Reservoir Induced Seismicity; Landslides – causes and their control	5	CO6	L5
51	1KT17CV032	Hydrological cycle, Occurrence of Groundwater in different terrains -Weathered, Hard and Stratified rocks	5	CO7	L4
52	1KT17CV033	Determination of Quality aspects - SAR, RSC and TH of Groundwater. Groundwater Pollution	5	CO7	L4
53	1KT17CV034	Groundwater Exploration- Electrical Resistivity	5	CO7	L5
54	1KT17CV035	Seismic methods, Resistivity curves	5	CO8	L5
55	1KT17CV036	Water Bearing Formations, Aquifer types	5	CO8	L5
56	1KT17CV037	Parameters - Porosity, Specific yield and retention,	5	CO8	L5
57	1KT17CV038	Permeability, Transmissibility and Storage Coefficient	5	CO8	L5
58	1KT17CV040	Springs and Artesian Wells	5	CO8	L5
59	1KT17CV041	Artificial Recharging of Groundwater,	5	CO8	L5
60	1KT17CV042	Sea water intrusion and remedies	5	CO8	L5
61	1KT17CV050	Landforms – Classification, Rock weathering, types and its effects on Civil Engineering Projects	5	CO5	L2
62	1KT17CV053	Study of Geomorphological aspects in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges	5	CO5	L2
63	1KT17CV055	Watershed management, Floods and their control	5	CO5	L3
64	1KT18CV412	River valley, Drainage pattern – parameters and development	5	CO5	L3
65	1KT18CV413	Coastlines and their engineering considerations	5	CO5	L3
66	1KT18CV414	Earthquake - Causes and Effects, Seismic waves, Engineering problems related to Earthquakes	5	CO6	L5
67	1KT18CV415	Earthquake intensity, Richter Scale, Seismograph	5	CO6	L5
68	1KT18CV416	Seismic zones- World and India	5	CO6	L5
69	1KT18CV417	What are the applications of topographic maps and	5	CO9	L3

2. SEE Important Questions

Course:	Engineering Geology				Month / Year	May /2018	
Crs Code:	18CV36	Sem:	III	Marks:	100	Time:	180 minutes
Module	Qno.	Important Question	Marks	CO	Year		
1	a	With a neat sketch explain the internal structure of the earth.	8	CO3	L2		
	b	What are the applications of Engg. Geology in civil engineering?	7	CO3	L2		
	c	Write physical properties of Quartz and mica Group of minerals and its industrial use.	5	CO3	L2		
2	a	What are the impacts of folds in the selection of sites for tunnels ?	8	CO4	L3		
	b	What are igneous rocks? Explain with examples and their uses in construction.	6	CO3	L3		
	c	What are the impacts of faults and joints in the selection of sites for reservoirs?	6	CO4	L3		
3	a	What are the causes of and effects of earthquake?	5	CO3	L3		
	b	Explain watershed management.	5	CO3	L3		
	c	What is mechanical weathering?	5	CO3	L3		
	d	What are seismic waves? How it helps in defining the internal structure of the earth.	5	CO3	L3		
4	a	Add a note on aquifers and its types with neat sketches.	8	CO4	L3		
	b	What are the geomorphological aspects in the selection of sites for dams/reservoirs, tunnels, highways and bridges	7	CO4	L3		
	c	Explain hydrological cycle with a neat diagram.	5	CO3	L3		
5	a	Explain how electrical resistivity method is useful in groundwater exploration.	5	CO7	L5		
	b	What are the impacts of mining and quarrying on environment.	5	CO9	L2		
	c	What are the applications of GIS and remote sensing?	8	CO10	L3		

G. Content to Course Outcomes

1. TLPA Parameters

Table 1: TLPA – Example Course

Module-#	Course Content or Syllabus (Split module content into 2 parts which have similar concepts)	Content Teaching Hours	Blooms' Learning Levels for Content	Final Blooms' Level	Identified Action Verbs for Learning	Instruction on Methods for Learning	Assessment Methods to Measure Learning
A	B	C	D	E	F	G	H

1	Introduction: Application of Earth Science in Civil Engineering Practices, Understanding the earth, internal structure and composition.	3	L1	L1	Learn	- Lecture -PPT	- Assignment -
1	Mineralogy: Mineral properties, composition and their use in the manufacture of construction materials – Quartz Group (Glass); Feldspar Group (Ceramic wares and Flooring tiles); Kaolin (Paper, paint and textile); Asbestos (AC sheets); Carbonate Group (Cement) ; Gypsum (POP, gypsum sheets, cement); Mica Group (Electrical industries); Ore minerals - Iron ores (Steel); Chromite (Alloy); Bauxite (aluminum); Chalcopyrite (copper)	7	L2	L2	Understand	- Lecture - PPT -	- Assignment -
2	Petrology: Formation, Classification and Engineering Properties. Rock as construction material, concrete aggregate, railway ballast, roofing, flooring, cladding and foundation. Deformation of rocks, Development of Joints, Folds, Faults and Unconformities. Their impact in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges. Rock Quality Determination (RQD), Rock Structure Rating (RSR)	6	L2	L2	Understand	- Lecture -PPT	- Assignment -
2	Igneous Rocks - Granite, Gabbro, Dolerite, Basalt; Sedimentary rocks - Sandstone, Shale, Limestone, Laterite; Metamorphic rocks - Gneiss, Quartzite, Slate, Charnockite; Decorative stones - Porphyries, Marble and Quartzite	4	L3	L3	Apply	- Lecture -PPT	Assignment
3	Geomorphology and Seismology: Landforms – Classification, Rock weathering, types and its effects on Civil Engineering Projects. Study of Geo-morphological aspects in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges. Watershed management, Floods and their control, River valley, Drainage pattern – parameters and development; Coastlines and their engineering considerations.	5	L2 L3	L3	Understand	- Lecture -PPT	Assignment
3	Earthquake - Causes and Effects,, Seismic waves, Engineering problems related to Earthquakes, Earthquake intensity, Richter Scale, Seismograph, Seismic zones- World and India, Tsunami – causes and effects. Early warning system. Reservoir Induced Seismicity; Landslides – causes and their control	5	L5	L5	Apply	- Lecture -PPT	- Assignment -
4	Hydrogeology: Hydrological cycle, Occurrence of Groundwater in different terrains -Weathered, Hard and Stratified rocks; Determination of Quality aspects - SAR, RSC and TH of Groundwater. Groundwater Pollution, Groundwater Exploration- Electrical Resistivity and Seismic methods, Resistivity curves	5	L2	L2	Analyze	- Lecture -PPT	- Assignment -
4	Water Bearing Formations, Aquifer types and parameters - Porosity, Specific yield and retention, Permeability, Transmissibility and Storage Coefficient. Springs and Artesian	5	L4 L5	L5	Evaluate	- Lecture -PPT	- Assignment -

	Wells, Artificial Recharging of Groundwater, Sea water intrusion and remedies.						
5	Geodesy: Study of Topographic maps and Contour maps; Remote Sensing – Concept, Application and its Limitations; Geographic Information System (GIS) and Global Positioning System (GPS) – Concept and their use resource mapping.	7	L2	L2	Understand	- Lecture -PPT	- Assignment - -
5	LANDSAT Imagery-Definition and its use. Impact of Mining, Quarrying and Reservoirs on Environment. Natural Disasters and their mitigation.	3	L4 L5	L5	Apply	- Lecture -PPT	- Assignment - -

2. Concepts and Outcomes:

Table 2: Concept to Outcome – Example Course

Module #	Learning Outcome from study of the Content or Syllabus	Identified Concepts from Content	Final Concept	Concept Justification (What all Learning Happened from the study of Content / Syllabus. A short word for learning or outcome)	CO Components (1.Action Verb, 2.Knowledge, 3.Condition / Methodology, 4.Benchmark)	Course Outcome Student Should be able to ...
A	I	J	K	L	M	N
1	Structure of earth	Earth Materials	Earth Materials	Structure of the earth	Learn	Student will know about the composition of earth.
1	Earth materials	Minerals	Minerals	Mineral Properties	Understand	Students should be able to understand earth materials.
2	Rock Origin and types	Rock Formation	Rock Formation	Lithology	Understand	Students should be able to understand rock formation
2	Folds, Faults	Structural deformation	Structural deformation	Folds, faults, Joints	Apply	Applying the knowledge in selection of Civil Structures
3	Weathering and Geomorphology	Land forms	Land forms	Weathering, geomorphology	Understand	Students should be able to understand land forms and weathering
3	Seismic waves	Earthquake	Earthquake	Seismic waves	Apply	Applying the knowledge in selection of Civil projects and evaluate seismic data by seismograph
4	Aquifers	Water quality	Water quality	Water - Qualitative and quantitative	Analyze	Students should be able to analyze aquifer condition

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						and resistivity curves
4	Geophysical Exploration	Groundwater exploration	Groundwater exploration	Resistivity curves	Evaluate	Students should be able to evaluate the resistivity data
5	Toposheets, maps, imageries	Maps, GPS	Maps, GPS	Toposheets, maps, imageries	Understand	Students should be able to understand maps, imageries
5	Remote sensing and GIS	RS&GIS	RS&GIS	Remote sensing and GIS	Apply	Students should be able to apply the knowledge of RS&GIS to generate maps