COURSE MODULE FOR THE AY- 2024-25(ODD SEM)

Course Syllabus with CO's

ENGINEERING GEOLOGY		Semester	3
Course Code	BCV303	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	40 hours Theory + 8-10 Lab slots	Total Marks	100
Credits	04	Exam Hours	
Examination nature (SEE)	Theory		

Course objectives:

1. To inculcate the importance of earth's interior and application of Geology in civil engineering in Geo Hazard mitigation and management
2. To create awareness among Civil engineers regarding the resources of earth
3. To provide knowledge on dynamic Geology and its importance in modifying the physical character of rocks which cause rocks suitable or unsuitable in different civil engineering projects such as Dams, bridges, tunnels and highways.
4. To educate the ground water management regarding diversified geological formations, . To highlight the concept of rain water harvesting.
5. To understand the application of Remote Sensing and GIS, Natural disaster and management and environmental awareness. To understand the subsurface using geospatial data
6. To provide decision support on the nature of the basic raw materials used in construction. To provide decision support on Lithological characters and subsurface conditions
7. To describe various geological maps and interpretation of geological data for mining and subsurface investigations.

Teaching-Learning Process (General Instructions)

These are sample Strategies; that teachers can use to accelerate the attainment of the various course outcomes.

- Chalk and Talk method.
- Show Video/animation films to explain earth dyanamics and influence of geology in prime civil constructions
- Encourage collaborative (Group Learning) Learning in the class
- Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking.
- Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking processsuch as the ability to evaluate, generalize, and analyse information rather than simply recall it.
- Topics will be introduced in a multiple representation.
- Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
- Discuss how every concept can be applied to the real world - and when that's possible, it helps improvethe students' understanding.

MODULE-1 7 hrs

Introduction, the scope of earth science in Engineering.

Earth's internal structure and composition, internal dynamics and Plate tectonics, Earthquakes - types, causes, so-seismic lines, seismic zonation, seismic proof structures. Volcanic eruption - types, causes. Landslides-causes types, preventive measures; Tsunami – causes, consequences, mitigation. Cyclones - causes and management.

MODULE-2 5 hrs

Earth Materials in Construction

Minerals -Industrial, rock-forming and ore minerals. Physical properties, composition.
Rocks Types, structure/Texture, mineral composition occurrence, properties.
Decorative (facing/polishing), railway ballast, rocks for masonry work, monumental/architecture, Dressing of stones, Requirement of good building stones.

MODULE-3 7hrs

Earth Surface process and Resources

Weathering, type, causes, soil insitu, drifted soil, soil profile, soil mineralogy, structure, types ofsoil, Black cotton soil v/s Lateritic soil; effects of weathering on monumental rocks. Soil Horizon, Soil Classification by Grain Size.

MODULE-4 7 hrs

Surface and sub investigation for deep foundation

Dip and strike, and outcrop problems(numerical problem geometrical/ simple trigonometry based), Borehole data(and problems), Faults, folds, unconformity, joints, types, recognition and their significance in Civil engineering projects like tunnel project, dam project, Reservoir site,.

MODULE-5 5 hrs

Modern Tools and geophysical methods

Rocks as aquifers, water-bearing properties igneous, sedimentary and metamorphic rocks , coefficient of permeability, factors affecting permeability, Electrical Resistivity meter, depth of water table, (numerical problems), seismic studies.

PRACTICAL COMPONENT OF IPCC *(May cover all / major modules)*

Sl.NO	Experiments 8 hrs
1	Identification of common minerals based on Physical Properties
2	Identification of rocks used in building construction based on Physical properties
3	Solving Geological maps for suitability for aqua duct
4	Geological maps with inclined beds, suitability for tunnels/ Dams
5	Geological maps with folds, in tunnels/ Dams
6	Geological maps with unconformity , in tunnel/dam project
7	Geological maps with faults in Dams/tunnels project
8	One Day Nearest Field Visit Investigation.

Course outcomes (Course Skill Set):

At the end of the course the student will be able to:

- Apply geological knowledge in different civil engineering practice.
- Acquire knowledge on durability and competence of foundation rocks, and will be able to use the best building materials.
- Students will become competent enough for the safety, stability, economy and life of the structures that they construct
- Able to solve various issues related to ground water exploration, build up dams, bridges, tunnels which are often confronted with ground water problems
- Students will become Intelligent enough to apply GIS, GPS and remote sensing as a latest tool in different civil engineering for safe and solid construction.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for

the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CIE for the theory component of the IPCC (maximum marks 50)

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are **25 marks** and that for the practical component is **25 marks**.
- 25 marks for the theory component are split into **15 marks** for two Internal Assessment Tests (Two Tests, each of 15 Marks with 01-hour duration, are to be conducted) and **10 marks** for other assessment methods mentioned in 22OB4.2. The first test at the end of 40-50% coverage of the syllabus and the second test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for **25 marks)**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

CIE for the practical component of the IPCC

- **15 marks** for the conduction of the experiment and preparation of laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.
- On completion of every experiment/program in the laboratory, the students shall be evaluated including viva-voce and marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to **15 marks**.
- The laboratory test **(duration 02/03 hours)** after completion of all the experiments shall be conducted for 50 marks and scaled down to **10 marks.**
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **25 marks**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

SEE for IPCC

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.

Note: Subject to be taught by Geologist with qualification M. Sc Geology/MPhil/ Ph. D in Geology

Suggested Learning Resources:

Books

1. Engineering Geology, by Parthasarathy et al, Wiley publications
2. A textbook of Engineering Geology by ChennaKesavulu, Mac Millan India Ltd
3. Principle of Engineering Geology, by K.M. Bangar, Standard publishers
4. Physical and Engineering Geology, by S.K. Garg, Khanna publishers
5. Principles of Engineering Geology, by KVGK Gokhale, BS Publications

Reference Books

1. Introduction to Environmental Geology by Edward A Keller, Pearson publications.
2. Engineering Geology and Rock Mechanics B. P. Verma, Khanna publishers
3. Principles of Engineering Geology and Geotechnics, Krynine and Judd, CBS Publications

Web links and Video Lectures (e-Resources):

- **https://www.youtube.com/watch?v=aTVDiRtRook&list=PLDF5162B475DD915F**
- **https://www.youtube.com/watch?v=EBiLLJAxBuU&index=2&list=PLDF5162B475DD915F**
- **https://www.youtube.com/watch?v=sTY-ao4RZck&list=PLDF5162B475DD915F&index=3**
- **https://nptel.ac.in/courses**
- **https://youtu.be/fvoYHzAhvVM**
- **https://youtu.be/aTVDiRtRook**
- **https://serc.carleton.edu/NAGTWorkshops/hazards/events/12262004.html?serc_source=recommendation**
- https://serc.carleton.edu/NAGTWorkshops/visualization/examples/CBezanson.html?sercsource=recommendation
- **https://serc.carleton.edu/NAGTWorkshops/coursedesign/goalsdb/14712.html**
- **https://www.earthsciweek.org/classroom-activities**
- NPTEL materials

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class
- Demonstration of Geological models and animations
- Hands on experiments with Rock and Minerals

The Correlation of Course Outcomes (CO's), Program Outcomes (PO's)& Program Specific Outcomes (PSO's)

Subject Code:	BCV303		TITLE: Engineering Geology											
List of Course Outcomes	Program Outcomes (PO's)												PSO's	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO-1	1	-	-	-	-	-	-	-	-	-	-	1	-	-
CO-2	2	-	-	-	-	-	-	-	-	-	-	2	2	-
CO-3	2	-	-	-	-	2	-	-	-	-	-	2	2	-
CO-4	2	-	-	-	-	-	-	-	-	-	-	2	-	2
CO-5	2	-	-	-	-	-	-	-	-	-	-	2	2	-

Note: 3 = Strong Contribution 2= Average Contribution 1 = Weak Contribution -= No Contribution