Techno India NJR Institute of Technology

Course File

Engineering Geology

Subject Code:(3CE4-08)

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For Techno India NJR Institute of Technology
पंकज पोरवाल
Dr. Pankaj Kumar Porwal
(Principal)

3CE4-08: ENGINEERING GEOLOGY (L-2)

Credit :2 **Max. Marks: 100 (IA:20, ETE:80)**

End Term Exam: 2 Hours

Contents	Hrs.
Introduction to objective, scope and outcome the subject	1
General Geology: Branches and Scope of Geology, Types ofWeathering & Geological work of natural agencies like River & Wind. Geological Time Scale. Physical Properties of Minerals.	6
Petrology: Formation, Texture, Structure and Classification of Igneous, Sedimentary and Metamorphic Rocks. Engineering Properties of Rocks for Building & Road Material. Laboratory and Field & in-situ Test for Site Construction.	6
Structural Geology: Causes, Terminology, Classification, Recognition, Effects and Engineering consideration of Fold, Fault, Joints and Unconformities.	5
Engineering Geology: Geophysical methods as applied to Civil Engineering for Subsurface Analysis (Electrical and Seismic methods). Terminology, Types and Geological consideration for site selection of Dam & Tunnel.	6
Remote Sensing & GIS: Application of Remote Sensing and GIS in Various fields of Civil Engineering.	4
TOTAL	28

Course Overview:

Student will learn basics of Engineering geology from this 28 hour course. They will know Engineering geology is the application of the geological sciences to engineering projects. ... Engineering geologists provide geological and geotechnical recommendations, analysis, and design associated with human development and various types of Structure .Geological engineering studies are conducted by a geologist or engineering geologist who is educated, trained and has experience in recognizing and interpreting natural processes ; Understanding how these processes affect human – made structures (and vice versa) and knowledge of ways to mitigate hazards caused by adverse natural or human – made conditions. The engineering geologist's main objective is to protect life and property from damage caused by different geological

Engineering Geology is the basic requirement for the job role Civil Engineer in the companies like MINING, INDIAN OIL etc.

Course Outcomes:

CO.NO.	Cognitive Level	Course Outcome
1	**Comprehension**	Define different types of rocks & minerals found on earth.
2	**Application**	List types of faults and folds in earth crust.
3	**Analysis**	State the difference between several minerals by examining their physical & chemical properties.
4	**Synthesis**	Understand the remote sensing process and application in various fields of civil engineering.
5	**Evaluation**	Analyse Engineering consideration of faults, fold, joints and unconformities, Dip and strike.

Prerequisites:

1. Explain different types of rocks & minerals found on earth
2. Explain faults and folds in earth crust.
3. Explain the difference between several minerals by examining their physical & chemical properties ascertain safe, stable and economical civil structures.
4. Recognize the fundamentals of the Earth as a planet, earth's dynamic actions and their importance for civil engineering structures.

Course Outcome Mapping with Program Outcome:

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO237.1	3	1	2	2	1	1	1	1	1	1	1	1	1	1	2
CO237.2	3	1	2	2	1	1	1	1	1	1	1	1	1	1	2
CO237.3	3	1	2	2	1	1	1	1	1	1	1	1	1	1	2
CO237.4	2	1	1	1	2	1	2	1	2	1	1	2	1	1	1
CO237.5	2	1	2	1	1	2	1	1	1	1	1	1	1	1	1
CO237 (AVG)	2.6	1	1.8	1.6	1.2	1.2	1.2	1	1.2	1	1	1.2	1	1	1.6

Course Coverage Module Wise:

Lecture No.	Unit	Topic
1	1	INTRODUCTION: Objective, scope and outcome of the course.
2	1	**GENERAL GEOLOGY:** internal structure of earth
3	1	Types of weathering, and geological work of river
4	1	Geological work of wind
5	1	Geological time scale
6	1	Physical properties of minerals
7	1	Revision
8	2	**PETROLOGY:** Formation, texture of igneous rocks
9	2	Classification of Igneous rocks
10	2	Formation and texture of sedimentary rocks
11	2	Classification of sedimentary rocks
12	2	Structure wind classification of metamorphic rocks
13	2	Engineering properties of rocks lab and field test for construction site
14	3	**STRUCTURE GEOLOGY:** Terminology, classification of folds
15	3	Causes, recognition effect of folds and engineering consideration of folds
16	3	Terminology and classification of faults and dip and strike problem
18	3	Cause, terminology, classification engineering consideration of unconformity

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17	3	Terminology, classification of joint, cause, engineering consideration
18	3	Cause, terminology, classification engineering consideration of unconformity
19	4	**ENGINEERING GEOLOGY**: Geophysical method as application in civil engineering
20	4	Electric method
21	4	Seismic method
22	4	Terminology and type of dams
23	4	Terminology and types of tunnels
24	4	Geological consideration for site selection for tunnel
25	5	**REMOTE SENSING AND GIS**: introduction of RS and GIS
26	5	Application of RS and GIS in land use
27	5	Application in construction
28	5	Application in Agricultural and irrigation

TEXT/REFERENCE BOOKS

1. Parbin Singh-A Text Book of Engineering & General Geology- S.K.Kataria & Sons.
2. S.K.Garg- Physical & Engineering Geology- Khanna Publishers.
3. Remote Sensing and GIS: B.Bhatta- Oxford Publishers.
4. M.T.Maruthesha Reddy- A Text book of Applied Engineering Geology- New Age International Publisher.

Course Level Problems (Test Items):

CO.NO.	Problem description
1	A. Explain detail scope of geology B. What is mineralogy Explain in detail C. Write a note on use of geology in construction D. Write a short note on use of geology in water resource development E. Write a note on physical geology
2	A. Write a note on Igneous rock in detail. B. Write Chemical composition of Igneous rock in detail C. Explain in detail Sedimentary rock D. Explain in detail the Texture of Sedimentary rock E. Write a note Metamorphic rock and process of metamorphosis
3	A. Explain detail Structural features in detail. B. Write a note on Fold in detail. C. Explain in detail Classification of Fold in detail D. Explain in detail effects of Folds on Engineering projects E. Write about faulting in rocks in detail

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4	A. Write about Surface investigation in geology B. Explain in detail Geophysical method of investigation C. Write a note on Resistivity method of Investigation D. Explain in detail Seismic Method of Investigation E. Write a note on Tunnels and Dams
5	A. Explain in detail Remote Sensing B. Explain in detail GIS C. Write a note on EMR D. Write a note on Signatures in detail E. Explain in detail application of Remote Sensing and GIS in civil Engineering

Assessment Methodology:

1. Practical exam in lab where they have to write practical of Subject. (Once in a week)
2. Assignments one from each unit.
3. Midterm subjective paper where they have to write about Subject (Twice during the semester)
4. Final paper at the end of the semester subjective.

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Teaching and Learning resources unit-wise:

Unit-1

General Geology

Video Tutorials: https://www.youtube.com/watch?v=aTVDiRtRook

Theory concepts: https://web.viu.ca/earle/geol111/notes-1.pdf

Sample Quiz: https://www.geeksforgeeks.org/data-structure-gq/stack-gq/

Unit-2

Petrology

Video Tutorials: https://www.youtube.com/watch?v=kqbLyfWfmxE

Theory concepts: https://web.viu.ca/earle/geol111/notes-4.pdf

Sample Quiz: https://www.geeksforgeeks.org/data-structure-gq/queue-gq/

Unit-3

Structural Geology

Video Tutorials: https://www.youtube.com/watch?v=EBiLLJAxBuU

Theory concepts: https://www.soest.hawaii.edu/martel/Courses/GG303/

Sample Quiz: https://quizizz.com/admin/quiz/5908846d159cc1110045422c/structural-geology-quiz-review

Unit-4

Engineering Geology

Video Tutorials: https://www.youtube.com/watch?v=aTVDiRtRook

Theory concepts:
https://www.iare.ac.in/sites/default/files/lecture_notes/EG_LECTURE_NOTES.pdf

Sample Quiz: http://redmine.coolbluei.com/cgi-bin/content/view.php?data=engineering_geology_exam_question_with_answer&filetype=pdf&id=5dc6e7fff5195c5214cbc15abb769040

Unit-5

Remote sensing and GIS

Video Tutorials: https://www.youtube.com/watch?v=qGBA_RVM-t0

Theory concepts: https://lecturenotes.in/subject/572/remote-sensing-and-gis

Sample Quiz: https://www.proprofs.com/quiz-school/story.php?title=pp-mjk2mza0oa46qc

Previous Year Question Papers:

3E1135

Roll No.: Total No of Pages: 2

3E1135

B. Tech. III - Sem. (Main / Back) Exam., Dec. 2019

PCC Civil Engineering

3CE4-08 Engineering Geology

Time: 2 Hours **Maximum Marks: 80**

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 Define Geology & name various branches of Geology.

Q.2 Write five names of Igneous, Sedimentary & Metamorphic rocks.

Q.3 Define Fold, Fault & Unconformity.

Q.4 Name various Geophysical Methods applied for subsurface analysis.

Q.5 Define Remote Sensing & GIS.

PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 Write an Essay on Scope of Geology for Civil Engineers.

Q.2 Describe about identical characteristics of Igneous, Sedimentary & Metamorphic rocks.

Q.3 Describe various types of Texture and Structures of Sedimentary rocks.

Q.4 Define Parts of a Fold and Fault with diagram.

Q.5 Describe various types of Dam and Draw a neat sketch showing various parts of a Dam.

Q.6 Write a note on application of Remote Sensing in various fields.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

Q.1 Describe classification of Folds with diagram.

Q.2 Write an essay on Geological Investigation of a Dam Site.

Q.3 Describe various Geophysical Methods applied for subsurface analysis.
