GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC Semester: 1

Civil Engineering

Subject Name ENGINEERING GEOLOGY

Sr.No	Course contents
(A)	**Engineering Geology** **I.** **Geology and Engineering Geology:** Introduction, Branches of Geology, Scope of geology in engineering projects. **II.** **Geo – morphology:** Natural processes – Weathering, Erosion, and Denudation. Different physical agents such as Wind, River, Glaciers, Seas & Oceans, Ground water and their geological works. **III.** **Mineralogy:** Mineral Definition, Megascopical study of minerals through their physical properties. Basic ideas of crystalline system of minerals. **IV.** **Petrology:** Interior of the Earth, Definition & types of the rock, Origin, Textures, Structures, Classification of Igneous, Sedimentary & Metamorphic Rocks. Igneous intrusions – Sills & Dykes. Engineering properties of building material. **V.** **Structural Geology:** Primary & Secondary structures, Outcrop, Inlier & Outlier, Dip & Strike, Unconformity. Mechanism of Folding, Faulting & Jointing in Rocks.
(B)	**Applied Geology:** **I.** **Geology exploration:** Surface exploration, topographical and geological mapping, Techniques in brief. **II.** **Dams & Reservoir:** Geological Investigation of site, Site Selection Criteria for Dams & Reservoir. **III.** **Tunneling:** Geological Investigation at tunneling site. Difficulties encountered during tunneling. **IV.** **Landslides:** Types, Causes and Prevention of landslides, Stability of hill slopes. **V.** **Geo-hydrology:** Water holding properties of rocks, Investigation techniques of ground water table. Cone of depression, Sea water intrusion in aquifer. **VI.** Introduction and Application of remote sensing & GIS.

Term Work: Term work shall be based on the above mentioned Course Content.

Reference Books:

1. Engineering Geology by Parbin Singh
2. Text book of geology by P.K. Mukerjee

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GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–I • EXAMINATION – SUMMER 2013

Subject Code: X10602 Date: 11-06-2013

Subject Name: Engineering Geology

Time: 02.30 pm - 05.00 pm Total Marks: 70

Instructions:

1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Each question carries equal marks (14 marks)**

Q.1	(a)	Define geology and engineering geology. Elaborate the significance of study of geology in Civil Engineering.	**07**
	(b)	Enlist the important physical properties of minerals. Describe the streak and hardness properties of minerals with suitable examples.	**07**
Q.2	(a)	Describe the chemical weathering of rocks giving illustrations.	**07**
	(b)	Giving any two uses, classify the following rocks as per their origin: (i) Basalt (ii) Granite (iii) Sandstone (iv) Marble (v) Shale (vi) Limestone (vii) Slate	**07**
Q.3	(a)	Write detailed notes on factors and types of metamorphism.	**07**
	(b)	Describe how igneous rocks are formed.	**07**
Q.4	(a)	Narrate the merits and demerits of a tunnel alignment in folded sequence of rocks.	**07**
	(b)	Write brief notes on the following topics: (i) Rock cycle (ii) Site selection criteria for dams	**07**
Q.5	(a)	Describe the zones of ground water movement.	**07**
	(b)	Write an explanatory note on water holding properties of rocks.	**07**
Q. 6	(a)	Describe how the landslides are caused.	**07**
	(b)	Write brief notes on the following topics: (i) Dip and strike of a bed (ii) Components of a typical fault	**07**
Q. 7	(a)	Describe important engineering properties of a good building stone.	**07**
	(b)	Write brief notes on the following topics: (i) Sills and dykes (ii) Applications of remote sensing and GIS	**07**

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GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER – I • EXAMINATION – WINTER 2012

Subject code: X 10602 **Date: 21/01/2013**

Subject Name: Engineering Geology

Time: 10.30 am - 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	What are primary and secondary structures of rocks? Explain in the same context origin of bedding.	**07**
	(b)	Explain origin of igneous rocks? Classify them based on silica percentage and depth of origin.	**07**
Q.2	**(a)**	Discuss various geological criteria to be considered in selection of a dam site.	**07**
	(b)	List the agents of weathering and explain mechanical weathering of rocks in detail.	**07**
		OR	
	(b)	Explain with examples what are aquifer, porosity, permeability and specific yield?	**07**
Q.3	**(a)**	How are sedimentary rocks formed? Explain with examples what are clastic and non-clastic rocks?	**07**
	(b)	Explain different parts of fault and discuss effects of faulting on rocks.	**07**
		OR	
Q.3	**(a)**	What are the agents of metamorphism? Explain effects of metamorphism on pre-existing rocks?	**07**
	(b)	Engineering consideration of jointing in rocks.	**07**
Q.4	**(a)**	Explain parts of fold with neat figure and classify them on the basis of position of the axial plane.	**07**
	(b)	Explain internal structure of the earth with neat diagram.	**07**
		OR	
Q.4	**(a)**	State the various methods of geophysical exploration. Describe electrical resistivity method of geophysical exploration.	**07**
	(b)	What are different preventive measures for landslide?	**07**
Q.5	**(a)**	Discuss the merit and demerit: when tunnel is passing thorough inclined sedimentary rocks.	**07**
	(b)	Discuss the merit and demerit; when dam is proposed on sedimentary rocks.	**07**
		OR	
Q.5	**(a)**	Describe applications of remote sensing techniques in civil engineering Practices.	**07**
	(b)	Elaborate the usefulness of geological maps and sections in civil engineering.	**07**

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GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - Ist Semester–Examination – May/June- 2012

Subject code: X10602

Subject Name: ENGINEERING GEOLOGY

Date:02/06/2012 **Time: 10:30 am – 01:00 pm**

Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Describe any three important physical properties of minerals.	**07**
	(b)	Describe the disintegration of rocks, giving suitable examples.	**07**
Q.2	**(a)**	Write notes on the following topics: (i) Parts of a typical fold (ii) Mechanism of faulting	**07**
	(b)	How are landslides caused?	**07**
		OR	
	(b)	Write a note on uses of remote sensing techniques in civil engineering.	**07**
Q.3		Write notes on the following topics:	
	(a)	Textures in Igneous rocks	**07**
	(b)	Factors and kinds of metamorphism	**07**
		OR	
Q.3		Write notes on the following topics:	
	(a)	Formation of sedimentary rocks	**07**
	(b)	Rock cycle	**07**
Q.4		Write on the following topics:	
	(a)	Outcrops, inliers and outliers	**07**
	(b)	Role of geology in civil engineering	**07**
		OR	
Q.4	**(a)**	Describe the electrical resistivity method for subsurface geological investigation.	**07**
	(b)	Discuss the importance of geological maps and sections.	**07**
Q.5	**(a)**	Describe the properties of a good building stone.	**07**
	(b)	Classify the following rocks as per their origin: (i) Granite (ii) Limestone (iii) Marble (iv) Shale (v) Basalt (vi) Quartzite (vii) Sandstone	**07**
		OR	
Q.5	**(a)**	Narrate the merits and demerits of dam sites situated on faulted sequence of rock formations.	**07**
	(b)	Describe various sources of ground water.	**07**

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GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC SEM-I Examination-Dec-2011

Subject code: X10602 **Date: 23/12/2011**

Subject Name: Engineering Geology

Time: 10.30 am -1.00 pm **Total marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Write brief notes on the following topics: i) Scope of engineering geology in Civil Engineering ii) Applications of remote sensing techniques in Civil Engineering	**07**
	(b)	Describe the Fracture and Lustre properties of minerals with suitable examples.	**07**
Q.2	**(a)**	Describe chemical weathering of rocks.	**07**
	(b)	Narrate the merits and demerits of dam sites located on folded sequence of rock formations.	**07**
		OR	
	(b)	Describe the rock cycle.	**07**
Q.3		Write brief notes on the following topics:	
	(a)	Terminology of a typical fault	**04**
	(b)	Dykes and Sills	**05**
	(c)	Mechanism of folding	**05**
		OR	
Q.3		Write brief notes on the following topics:	
	(a)	Inliers and outliers	**04**
	(b)	Factors and kinds of metamorphism	**05**
	(c)	Wind erosion through deflation	**05**
Q.4	**(a)**	What are sedimentary rocks? Narrate how are these formed.	**07**
	(b)	What are landslides? How are these caused?	**07**
		OR	
Q.4	**(a)**	Describe briefly the important structures observed in Igneous rocks.	**07**
	(b)	Discuss various difficulties encountered during tunnelling.	**07**
Q.5	**(a)**	Discuss the implications of faults on the foundation of various civil engineering structures.	**07**
	(b)	Write short notes on the following topics: i) Zonal distribution of sub-surface water ii) Porosity and Permeability of rocks	**07**
		OR	
Q.5	**(a)**	State engineering properties of a good building stone.	**07**
	(b)	Discuss the role of surface geological investigation in site selection for various civil engineering projects.	**07**

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GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC Sem-I June-July Examination 2011

Subject code: X10602 **Subject Name: Engineering Geology**

Date: 25/06/11 **Total Marks: 70** **Time: 10:30am to 1:00pm**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Define the terms weathering, erosion and denudation. Describe the chemical weathering of rocks giving suitable illustrations.	**07**
	(b)	Describe the Lustre and Form (Structure) properties of minerals with suitable examples.	**07**
Q.2	**(a)**	Discuss the importance of engineering geology in civil engineering practices.	**07**
	(b)	What are sedimentary rocks? How are they formed?	**07**
		OR	
	(b)	Describe important structures observed in igneous rocks.	**07**
Q.3		Write notes on the following topics:	**07**
	(a)	Rock Cycle	
	(b)	Parts of a Typical Fault	
		OR	
Q.3		Write notes on the following topics:	**07**
	(a)	Sills and Dykes	
	(b)	Kinds of Metamorphism	
Q.4	**(a)**	What are landslides? How are they caused?	**07**
	(b)	Discuss the suitability of a dam site in folded and faulted sequence of rocks.	**07**
		OR	
Q.4	**(a)**	Discuss how hill slopes can be made stable.	**07**
	(b)	Discuss the implication of folds on the foundation of various civil engineering structures.	**07**
Q.5	**(a)**	Briefly discuss various geological criteria to be considered in the selection of a tunnel alignment.	**07**
	(b)	Define aquifer, aquifuse and aquiclude. Describe the porosity and permeability of rocks.	**07**
		OR	
Q.5	**(a)**	Describe the applications of remote sensing and GIS techniques in civil engineering practices.	**07**
	(b)	Discuss wind erosion through deflation and abrasion.	**07**

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GUJARAT TECHNOLOGICAL UNIVERSITY

P.D.D.C. Sem- I Regular / Remedial Examination January 2011

Subject code: X 10602

Subject Name: Engineering Geology

Date: 06 / 01 /2011 **Time: 10.30 am – 01.00 pm**

Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Explain outcrop, strike and dip, types of dip of rock bed and angular unconformity with neat diagrams.	**07**
	(b)	Explain difficulties arising and precautions to be taken, if fault is present at dam construction site.	**07**
Q.2	**(a)**	List the physical properties of mineral for megascopic study. And explain hardness & form properties with suitable illustrations.	**07**
	(b)	How are igneous rocks formed? Classify them based on depth of origin and silica percentage. Describe properties of granite as building stone.	**07**
		OR	
	(b)	Describe zones of groundwater, porosity and permeability. Explain how porosity and permeability affect the specific yield of a rock body?	**07**
Q.3	**(a)**	Define weathering and erosion. Explain physical weathering of rocks.	**07**
	(b)	Explain origin of sedimentary rocks and classify them. Describe properties of sandstone and limestone as building stone.	**07**
		OR	
Q.3	**(a)**	What are the effects of metamorphism on pre-existing rocks? Explain with suitable examples.	**07**
	(b)	Narrate engineering consideration of glacial deposits.	**04**
	(c)	River meandering.	**03**
Q.4	**(a)**	Explain, with the help of neat figures, types of faults based on relative movement of two blocks and discuss effects of faulting on rocks.	**07**
	(b)	Explain internal structure of the earth with neat diagram.	**07**
		OR	
Q.4	**(a)**	State the various methods of geophysical exploration. Describe seismic method of geophysical exploration.	**07**
	(b)	Explain techniques for landslide prevention.	**07**
Q.5	**(a)**	Explain parts of fold with neat figure and classify them on basis of position of the axial plane.	**10**
	(b)	Explain factors of metamorphism.	**04**
		OR	
Q.5	**(a)**	Discuss the merit and demerit: when tunnel is passing thorough metamorphic rocks.	**07**
	(b)	Explain, how geological maps and sections are useful in civil engineering?	**07**

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GUJARAT TECHNOLOGICAL UNIVERSITY

P.D.D.C. Sem- I Remedial Examination March / April 2010

Subject code: X10602 **Subject Name: Engineering Geology**

Date: 03 / 04 / 2010 **Time: 12.00 noon – 02.30 pm**

Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Explain with examples what are aquifer, porosity, permeability and specific yield?	**07**
	(b)	What is difference between primary and secondary structures of rocks? Also explain dip, strike and outcrop with neat figure.	**07**
Q.2	**(a)**	List the physical properties of mineral. And explain luster & form with their sub-types. Provide suitable examples.	**07**
	(b)	What are different preventive measures of landslide?	**07**
		OR	
	(b)	List the agents of weathering and explain mechanical weathering of rocks in detail.	**07**
Q.3	**(a)**	How are sedimentary rocks formed? What are clastic and non-clastic rocks? Explain with examples.	**05**
	(b)	Explain with figure dykes and sills.	**05**
	(c)	Classify following rocks. (i) Conglomerate, (ii) Gabbro, (iii) Limestone, (iv) marble, (v) Schist, (vi) Gneiss, (vii) Granite, (viii) Shale.	**04**
		OR	
Q.3	**(a)**	Describe types of fluvial deposits.	**07**
	(b)	State the various methods of geophysical exploration. Add a note on seismic method.	**07**
Q.4	**(a)**	Agents of metamorphism.	**04**
	(b)	Structures of metamorphic rocks.	**06**
	(c)	Write short note on joints and vesicles in basalt.	**04**
		OR	
Q.4	**(a)**	Role of water in landslide.	**05**
	(b)	Write a short note on mantle.	**04**
	(c)	What are fold and unconformity? Describe parts of fold.	**05**
Q.5	**(a)**	Discuss what are the advantages & disadvantages, if igneous or sedimentary or metamorphic rocks are present at dam construction site.	**07**
	(b)	Discuss the merit and demerit: when tunnel is passing thorough inclined sedimentary rocks.	**07**
		OR	
Q.5	**(a)**	Zonal distribution of subsurface water.	**07**
	(b)	Explain different parts of fault and discuss effects of faulting on rocks.	**07**

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GUJARAT TECHNOLOGICAL UNIVERSITY

P.D.D.C. Sem- I Examination January 2010

Subject code: X10602 **Subject Name: Engineering Geology**
Date: 05 / 01 / 2010 **Time: 11.00 – 1.30 pm**
Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Describe the hardness and streak properties of minerals with suitable illustrations.	**07**
	(b)	What is weathering of rocks? Describe the physical weathering of rocks.	**07**
Q.2	**(a)**	Discuss various geological criteria to be considered in selection of a dam site.	**07**
	(b)	Describe important structures observed in sedimentary rocks.	**07**
		OR	
	(b)	What are igneous rocks? How are they formed?	**07**
Q.3		Write notes on the following topics:	
	(a)	Dip and strike of a bed	**05**
	(b)	Parts of a typical fold	**05**
	(c)	Normal faults	**04**
		OR	
Q.3		Write notes on the following topics:	
	(a)	Engineering consideration of jointing in rocks	**05**
	(b)	Factors of metamorphism	**05**
	(c)	River erosion through hydraulic action	**04**
Q.4	**(a)**	Discuss the suitability of a tunnel alignment in folded sequence of rocks.	**07**
	(b)	How land slides can be prevented?	**07**
		OR	
Q.4	**(a)**	Discuss the implication of faults on various civil engineering structures.	**07**
	(b)	Narrate the role of water in hill slope failures.	**07**
Q.5	**(a)**	Elaborate the usefulness of geological maps and sections.	**07**
	(b)	Discuss critically the statement, "Storage capacity of a reservoir depends on the porosity of rocks and the nature and inter-connections of pores."	**07**
		OR	
Q.5	**(a)**	Write brief notes on the following topics: i. Applications of remote sensing techniques in civil engineering practices ii. Soft ground tunnelling	**04** **03**
	(b)	What is geophysical investigation? Describe the electrical resistivity method for sub-surface geological investigation.	**07**

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