Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering - SEMESTER - IV EXAMINATION - WINTER 2025

Subject Code: 3142209 **Date: 24-11-2025**

Subject Name: Rock Mechanics

Time: 02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions

1. Attempt all questions.

2. Make suitable assumptions wherever necessary.

3. Figures to the right indicate full marks.

4. Simple and non-programmable scientific calculators are allowed.

			Marks
Q.1	**(a)**	State the application of rock mechanics in mining.	**03**
	(b)	How to calculate density of rock sample? Explain with one example.	**04**
	(c)	Describe briefly about the different tests to determine the Permeability of rock sample.	**07**
Q.2	**(a)**	Name the physico-mechanical properties of rock.	**03**
	(b)	With the help of neat diagram, explain stress-strain curve.	**04**
	(c)	Briefly explain “Compressive strength of rock”.	**07**
		OR	
	(c)	What are the methods of determining of shear strength of rock? Discuss about any one method in detail.	**07**
Q.3	**(a)**	What is meant by hardness of rocks? Also write the mohr’s scale of hardness.	**03**
	(b)	What is Brazilian test? Explain with one example.	**04**
	(c)	Discuss rock mass rating (RMR) & Q system in detail.	**07**
		OR	
	(a)	Define Porosity and moisture content of rock.	**03**
	(b)	Explain Rock Quality Designation Index (RQD) in detail.	**04**
	(c)	Explain briefly about rheology & rheological models.	**07**
Q.4	**(a)**	State the effect of joints and fracture on mechanical properties of rocks.	**03**
	(b)	Discuss about the creep behaviour of rock.	**04**
	(c)	Discuss the Griffith’s theory of fracture in rock mass.	**07**
		OR	
	(a)	Define Modulus of elasticity and Poisson’s ratio.	**03**
	(b)	Explain different types of failure in rock.	**04**

	(c)	What do you understand by pre-mining state of stress? Explain hydraulic fracturing method in detail.	**07**
Q.5	**(a)**	How to do the roof testing?	**03**
	(b)	Discuss Mohr's and Coulomb theories of failure.	**04**
	(c)	Write in detail the theory of reinforcement of rock mass by rock bolting	**07**

OR

	(a)	Define Ideally Plastic, perfectly Plastic and Elastic Plastic materials.	**03**
	(b)	What do you understand by permeability?	**04**
	(c)	Explain dynamic properties of rock.	**07**

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Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–IV (NEW) EXAMINATION – WINTER 2024

Subject Code:3142209 Date:27-11-2024

Subject Name:Rock Mechanics

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Name the physico-mechanical properties of rock.	**03**
	(b)	Why knowledge of physico-mechanical properties is important for a mining engineer?	**04**
	(c)	Discuss "Compressive strength of rock" in detail.	**07**
Q.2	**(a)**	What do you understand by permeability?	**03**
	(b)	How to calculate density of rock sample? Explain with one example.	**04**
	(c)	Explain the Rock Quality Designation Index (RQD) in detail with one example.	**07**
		OR	
	(c)	Discuss in detail the theory of reinforcement of rock mass by rock bolting.	**07**
Q.3	**(a)**	Define Modulus of elasticity and Poisson's ratio.	**03**
	(b)	How hardness of rock is determined? Also write the mohr's scale of hardness.	**04**
	(c)	Discuss rock mass rating (RMR) & Q system in detail.	**07**
		OR	
Q.3	**(a)**	What do you understand by pre-mining state of stress?	**03**
	(b)	Explain Porosity and moisture content of rock.	**04**
	(c)	Explain dynamic properties of rock.	**07**
Q.4	**(a)**	Define Ideally Plastic, perfectly Plastic and Elastic Plastic materials.	**03**
	(b)	Explain different types of failure in rock.	**04**
	(c)	Name the methods of determining of shear strength of rock? Discuss any one method in detail.	**07**
		OR	
Q.4	**(a)**	With the help of neat diagram, explain stress-strain curve.	**03**
	(b)	Explain Mohr's and Coulomb theories of rock failure.	**04**
	(c)	Explain hydraulic fracturing method in detail.	**07**
Q.5	**(a)**	How to do the roof testing?	**03**
	(b)	Explain the creep behaviour of rock.	**04**
	(c)	Describe briefly about the different tests to determine the Permeability of rock sample.	**07**
		OR	
Q.5	**(a)**	Write the effect of joints and fracture on mechanical properties of rocks.	**03**
	(b)	What is Brazilian test? Explain with one example.	**04**
	(c)	Discuss the Griffith's theory of fracture in rock mass.	**07**

Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (NEW) EXAMINATION – WINTER 2023

Subject Code:3142209 Date:24-01-2024

Subject Name: Rock Mechanics

Time: 10:30 AM TO 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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	What do you understand by engineering rock mechanics & its application in mining?	**03**
	(b)	With the help of neat diagram, explain stress-strain curve.	**04**
	(c)	Describe briefly about the different tests to determine the Permeability of rock sample.	**07**
Q.2	**(a)**	Write the name of different physical properties of rock. Why knowledge of these properties is important for a mining engineer?	**03**
	(b)	A rock sample has bulk density of 2.85 gm/cc. Its moisture content was found to be 1.40 %. Find out its dry density.	**04**
	(c)	Briefly explain "Compressive strength of rock".	**07**
		OR	
	(c)	What are the methods of determining of shear strength of rock? Describe about any one method in detail.	**07**
Q.3	**(a)**	What is meant by hardness of rocks? Also write the mohr's scale of hardness.	**03**
	(b)	A rock specimen had moisture content of 2.25 %.Volume of solids was found to be 85 % find out the degree of saturation of rock sample.	**04**
	(c)	Discuss rock mass rating (RMR) & Q system in detail.	**07**
		OR	
Q.3	**(a)**	Explain the Rock Quality Designation Index (RQD).	**03**
	(b)	Explain Porosity, density and moisture content of rock.	**04**
	(c)	Explain briefly about rheology & rheological models.	**07**
Q.4	**(a)**	Discuss about the effect of joints and fracture on mechanical properties of rocks.	**03**
	(b)	Briefly describe about the creep behaviour of rock.	**04**
	(c)	Discuss the Griffith's theory of fracture in rock mass.	**07**
		OR	
Q.4	**(a)**	Define Modulus of elasticity and Poisson's ratio.	**03**
	(b)	A sample of diameter 50 mm and thickness 25 mm was tested by Brazilian test. If failure occurs at a load of 1964.28 kg, determine the tensile strength in kg/cm^2.	**04**
	(c)	What do you understand by pre-mining state of stress? Explain hydraulic fracturing method in detail.	**07**

Q.5	**(a)**	How to do the roof testing?	**03**
	(b)	Define failure in rocks. Explain different types of failure in rock.	**04**
	(c)	Two rock samples of 50 mm diameter were subjected to point load test. The rupture was observed at a load of 500 kg and 600 kg respectively. Find out the point load strength in kg/cm^2.of both sample and also calculate the unconfined compressive strength of each sample.	**07**

OR

Q.5	**(a)**	Discuss Ideally Plastic, perfectly Plastic and Elastic Plastic materials.	**03**
	(b)	Discuss Mohr's and Coulomb theories of failure.	**04**
	(c)	Write in detail the theory of reinforcement of rock mass by rock bolting.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV(NEW) EXAMINATION – WINTER 2022

Subject Code:3142209 Date:17-12-2022

Subject Name:Rock Mechanics

Time:10:30 AM TO 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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define rock mechanics. Discuss the application of rock mechanics.	**03**
	(b)	Explain failure of rocks. Describe the types of failure.	**04**
	(c)	Define strength of rock. Explain different types of strength.	**07**
Q.2	**(a)**	List out the name of physical and mechanical properties of rock.	**03**
	(b)	Explain the analysis of stress and strain curve.	**04**
	(c)	Explain Mohr's scale of hardness and role of hardness in rock mass.	**07**
		OR	
	(c)	Discuss the Griffith's theory of fracture in rock mass.	**07**
Q.3	**(a)**	Explain the application of rock mass classification in mining problems.	**03**
	(b)	Explain porosity and density of rock.	**04**
	(c)	Discuss the theory of reinforcement of rock mass by different types of support system.	**07**
		OR	
Q.3	**(a)**	Discuss the factors on which mechanical properties of rocks depends.	**03**
	(b)	Explain the Rock Quality Designation Index (RQD).	**04**
	(c)	Discuss Mohr's and Coulomb theories of failure.	**07**
Q.4	**(a)**	Compare RMR classification system with Q system.	**03**
	(b)	State the aims and objectives of a rock mass classification.	**04**
	(c)	Define abrasivity. Explain how it is determined in rock.	**07**
		OR	
Q.4	**(a)**	Explain how slake durability of rock is determined.	**03**
	(b)	Differentiate between isotropic and anisotropic rock.	**04**
	(c)	Explain dynamic properties of rock and rock mass.	**07**
Q.5	**(a)**	Discuss the factors affecting strength of rock.	**03**
	(b)	Describe the method for determination of modulus of elasticity and Poisson's ratio of a rock sample.	**04**
	(c)	Describe roof testing and stitching in the support system.	**07**
		OR	
Q.5	**(a)**	Determine hydro-fracturing of rock in pre-mining state of stress.	**03**
	(b)	Define permeability. Discuss the uses of permeability.	**04**
	(c)	Explain static and dynamic methods for determining elastic constant of rock.	**07**

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