Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering - SEMESTER - IV EXAMINATION - SUMMER 2025

Subject Code: 3142209 **Date: 19-05-2025**

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.

			Marks
Q.1	**(a)**	What do you understand by bulk density?	**03**
	(b)	Discuss the application of rock mechanics in mining.	**04**
	(c)	What do you mean by Compressive strength of rock? Explain the determination of uni-axial compressive strength of rock with one example.	**07**
Q.2	**(a)**	Write the different ways of roof testing.	**03**
	(b)	How to determine porosity of rock sample? Explain with one example.	**04**
	(c)	Discuss rock mass rating (RMR) & rock structure rating (RSR) system in detail.	**07**
		OR	
	(c)	Discuss in detail the theory of reinforcement of rock mass by rock bolting.	**07**
Q.3	**(a)**	Define Ideally Plastic, perfectly Plastic and Elastic Plastic materials.	**03**
	(b)	Explain moisture content of rock with one example.	**04**
	(c)	What is Rock Quality Designation Index (RQD)? How it is determined?	**07**
		OR	
	(a)	What do you understand by permeability?	**03**
	(b)	Explain Modulus of elasticity and Poisson's ratio.	**04**
	(c)	Describe the tests or methods to determine the Permeability of rock sample.	**07**
Q.4	**(a)**	Write the mohr's scale of hardness.	**03**
	(b)	Discuss the effect of joints and fracture on mechanical properties of rocks.	**04**
	(c)	Discuss the Griffith's theory of fracture in rock mass.	**07**
		OR	
	(a)	Explain the creep behaviour of rock.	**03**
	(b)	What is Brazilian test? Explain with one example.	**04**
	(c)	Explain hydraulic fracturing method in detail.	**07**
Q.5	**(a)**	What do you understand by pre-mining state of stress?	**03**

(b)	Explain different types of failure in rock.	**04**
(c)	Describe the dynamic properties of rock in detail.	**07**

OR

(a)	With the help of neat diagram, explain stress-strain curve.	**03**
(b)	Explain Mohr's and Coulomb theories of rock failure.	**04**
(c)	Name the methods of determining of shear strength of rock? Explain any one method in detail.	**07**

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Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3142209 Date:03-07-2024

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)**	Define rock mechanics and rock mass.	**03**
	(b)	Explain importance of rock mechanics in mining.	**04**
	(c)	List out physico-mechanical properties of rock.	**07**
Q.2	**(a)**	Define density, porosity and Moisture content.	**03**
	(b)	Explain permeability and durability.	**04**
	(c)	Explain dynamic properties of rock.	**07**
		OR	
	(c)	Explain Griffith theory of fracture in rock mass.	**07**
Q.3	**(a)**	Explain analysis of stress-strain curve.	**03**
	(b)	Explain uniaxial and triaxial compressive strength.	**04**
	(c)	Explain shotcreting and roof stitching.	**07**
		OR	
Q.3	**(a)**	Define strength and list out various types of strength.	**03**
	(b)	Explain objective of rock mass classification.	**04**
	(c)	Explain Empirical criteria of rock failure.	**07**
Q.4	**(a)**	Explain Rock Quality Designation (RQD).	**03**
	(b)	Explain slake durability test.	**04**
	(c)	Explain rock mass rating by Bieniawski.	**07**
		OR	
Q.4	**(a)**	Define isotropic and anisotropic properties of rock.	**03**
	(b)	Explain rock failure with its types.	**04**
	(c)	Describe method for determination of modulus of elasticity.	**07**
Q.5	**(a)**	Explain Creep deformation.	**03**
	(b)	Explain rock bolting and cable bolting.	**04**
	(c)	Explain the forces and displacements associated with cable bolting.	**07**
		OR	
Q.5	**(a)**	Explain sources of pre-mining stress.	**03**
	(b)	Define abrasivity and its determination.	**04**
	(c)	Explain Mohr’s scale of hardness.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3142209 Date:19-07-2023

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 the term rock mechanics. Discuss the application of rock mechanics in mining.	**03**
	(b)	State the aims and objectives of a rock mass classification.	**04**
	(c)	Explain dynamic properties of rock and rock mass.	**07**
Q.2	**(a)**	Discuss the factors influencing velocity of waves through a rock mass.	**03**
	(b)	Explain the analysis of stress-strain curve with neat sketch.	**04**
	(c)	Explain the Griffith's theory of fracture in rock mass.	**07**
		OR	
	(c)	Explain the Empirical criteria of rock failure.	**07**
Q.3	**(a)**	Discuss the size and scale effect on strength of rocks. How does information about elasticity of a rock mass help in designing structures over them?	**03**
	(b)	Explain the constitutive relations in isotropic and anisotropic rock under static and dynamic loading.	**04**
	(c)	Describe the method for determination of modulus of elasticity and Poisson's ratio of a rock sample.	**07**
		OR	
Q.3	**(a)**	Explain how slake durability of rock is determined.	**03**
	(b)	Define the physical and mechanical properties of rocks. Discuss which information's we get out of them.	**04**
	(c)	Define strength of rock. Explain different types of strength.	**07**
Q.4	**(a)**	Discuss the factors on which mechanical properties of rocks depends.	**03**
	(b)	Explain failure of rocks. Describe the types of failure.	**04**
	(c)	Explain Mohr's scale of hardness and role of hardness in rock mass.	**07**
		OR	
Q.4	**(a)**	Discuss the effect of texture of rocks on the propagation of waves through it.	**03**
	(b)	Define abrasivity. Explain how it is determined in rock.	**04**
	(c)	Explain the permeability of rocks with its experimental determination.	**07**
Q.5	**(a)**	Discuss the sources of pre-mining stress.	**03**
	(b)	Explain the Rock Quality Designation Index (RQD).	**04**
	(c)	Explain the forces and displacements associated with cable bolting.	**07**

OR

Q.5	**(a)**	Explain the application of rock mass classification in mining problems.	**03**
	(b)	Describe the Rock Mass Rating (RMR) by Bieniawski.	**04**
	(c)	Explain the redistribution of rock pressure on conventional and powered support.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3142209 Date:04-07-2022

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

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