

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. **07**
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.
- 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**
