Sixth Semester B.E. Degree Examination, Jan./Feb. 2021 **Rock Mechanics**

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

1	a.	Define the ten parameters used to describe discontin	nuities in rocks with suitable sketches.
			(10 Marks)
	b.	Write a procedure to determine "bend and plunge"	of two intersecting discontinuity planes

- by hemispherical projection.
- What are the following state of stress conditions: (i) Uniaxial stress (ii) Biaxial stress (iii) Triaxial stress
 - (v) Hyrdostatic (10 Marks)
 - b. Show that $\tau_{max} = \frac{1}{2}(\sigma_1 \sigma_3)$ and that the plane at which the τ_{max} acts makes a 45° with the direction of the largest and the smallest principal stresses.
- 3 At a certain point, a material is subjected to the following state of strains: $\epsilon_x = 400 \times 10^{-6}$ units; $\epsilon_y = 200 \times 10^{-6}$ units and $\gamma_{xy} = 350 \times 10^{-6}$ radians Determine the magnitudes of the principal strains, the direction of the principal strains axes and the strain on an axis inclined at 30° clockwise to the x-axis.
 - a. By Analytical method (10 Marks) b. By Mohr's circle method (10 Marks)
- A dry rock sample of diameter 50mm and length 100mm weighs 300g. After saturating in brine solution of specific gravity 1.05, its weight increased to 330g. Determine porosity of
 - the rock sample in percentage. (05 Marks) b. Define: Hardness, Moisture content, Permeability, Specific gravity, Porosity. (05 Marks)
 - Write a procedure to determine moisture content in the laboratory. (10 Marks)

- Explain with a neat sketch, how to determine tensile strength of the rock specimen having t/d ratio of 0.5. (10 Marks)
 - b. In a 1.5m rock run, the following rock pieces were recovered from a bare hole: 50mm, 105mm, 123mm, 68mm, 128mm, 320mm, 72mm, 161mm, 32mm and 138mm. Find the RQD and core recovery. (05 Marks)
 - A core sample of 54mm diameter having Young's modulus of 68.97 GPa fails in uniaxial compression at 0.1% axial strain. Find the axial load at failure in kN. (05 Marks)
- Describe with a neat sketch, "The cable Jack Test" to determine deformability in situ.
 - (10 Marks) b. Describe in detail necessity and requirement of in situ tests. (10 Marks)
- a. Define rheology and rheological model. (02 Marks)
 - b. Explain elementary rheological models with neat sketches. (08 Marks)
 - c. Describe the following with neat sketches: (i) The Maxwell model (ii) The Kelvin model. (10 Marks)
- 8 Describe the following with neat sketches:
 - a. LVDT b. Load cell (20 Marks)