

USN

--	--	--	--	--	--	--	--	--	--

10MN65

Sixth Semester B.E. Degree Examination, June/July 2019

Rock Mechanics

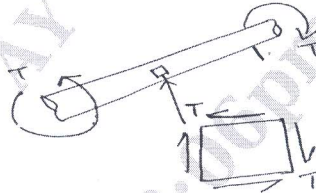
Time: 3 hrs.

Max. Marks:100

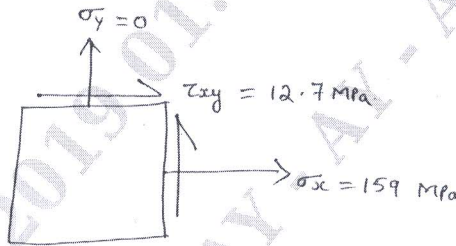
Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- 1 a. Define Ten parameters used to describe discontinuities in rocks. (14 Marks)  
b. Define Rock mechanics and explain its applications in Mining Industry. (06 Marks)
- 2 a. What are the following stress states :  
i) Uniaxial stress ii) Biaxial stress iii) Triaxial stress iv) Polyaxial stress  
v) Pure shear stress. (05 Marks)  
b. When torsional loading 'T' is applied to bar, it produces a state of pure shear stress in the material. Determine the principal stresses and their planes. (07 Marks)



- c. For the state of plane stress given, determine the principal planes, the principal stresses and the maximum shear stress by graphical method. (08 Marks)



- 3 a.  $e_x = 340 \times 10^{-6}$ ,  $e_y = 110 \times 10^{-6}$ ,  $\gamma_{xy} = 180 \times 10^{-6}$ . Determine the strains for  $\theta = 30^\circ$ , principal strains and their planes, maximum shear strain by analytical method. (10 Marks)  
b. With the help of neat sketch, explain step by step procedure of Mohr's circle of strain. (10 Marks)
- 4 a. Define Permeability of rock. Explain with neat sketches, how to determine the same in laboratory [any one]. (10 Marks)  
b. A rock specimen had moisture content of 1.34 percent volume of solids was found to be 89 percent. Determine degree of saturation of the rock sample. (04 Marks)  
c. Determine coefficient of permeability of a rock sample, if discharge collected in 3 hours was 5CC, the cross-sectional area of the sample was 50 sq.cm long. The discharge took place at a head of 300cm. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

**PART – B**

- 5 a. Explain with a neat sketch, how to determine tensile strength of rock specimen (lab test) whose t/d ratio is 0.5. (08 Marks)
- b. For determination of shear strength of a rock sample, block shear test was done on a rock sample of 100mm cube. If failure occurred at a load of 14.7 kN, what will be the shear strength of the sample? (06 Marks)
- c. For determination of shear strength of a rock sample punching shear test was done on a sample of thickness 25mm. The diameter of the puncher was 100mm and failure occurred at a load of 4.9kN, what will be the shear strength of the rock specimen? (06 Marks)
- 6 a. Describe in detail necessity and requirements of in – situ tests. (08 Marks)
- b. What points are kept in mind while selecting a site for in-situ test? (05 Marks)
- c. 100kN of load is proposed on an area of 620mm × 620mm. If modulus of elasticity of the rock material is  $2.4 \times 10^3$  kg/cm<sup>2</sup> and Poisson's ratio is 0.3 ; Evaluate the expected surface displacement on the rock surface. Displacement coefficient for a square area may be taken as 0.95. (07 Marks)
- 7 a. Explain elementary rheological models with neat sketches. (10 Marks)
- b. Define Rheology and Rheological model. (03 Marks)
- c. Explain Actual behaviour of Visco – elastic substance by Rheological model. (07 Marks)
- 8 Write short notes on :
- a. LVDT principle.
- b. Load cell application.
- c. Bore – hole extensometer principle.
- d. Dilatometer application. (20 Marks)

\*\*\*\*\*