22251

23242

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any <u>FIVE</u> of the following: **10**

a) Define the terms stress and strain.

b) Explain what is Competent rock and Intact rock.

c) Define Abrasivity.

d) What is meant by TCR and RQD?

e) Explain the terms Shockbump and Pressure Bump.

f) Define Strata Dillation.

g) Define Triaxial Compressive Strength.

Marks

2. Attempt any <u>THREE</u> of the following: **12**

a) List out the various strength indices of a rock and explain any one of them.

b) Explain how will you determine shear strength of a rock specimen by using punch test.

c) Describe the specimen requirement and scope of uniaxial compressive strength of rock material.

d) Illustrate the ductility and brittleness characteristics of rock material with its graphical representation.

3. Attempt any <u>THREE</u> of the following: **12**

a) State the ISRM standards for testing of rock specimens in laboratory.

b) Describe Young's modulus. Poisson's Ratio and Poisson's number.

c) Calculate shear strength of rock (in MPa) situated at a depth of 160m. The average density of rockmass is 2.04 te/m^3. The cohesion and angle of internal friction are 70 kg/cm^2 and 21° respectively.

d) Write the objectives of a rockmass classification system for engineering application.

e) Explain the objectives for installing different instruments in an excavation.

4. Attempt any <u>THREE</u> of the following: **12**

a) Explain the terms Inherent stress and Induced stress.

b) State Engineering classification of rock based on strength.

c) Elaborate factors considered for pillar design in underground mines.

d) What are the types and applications of Convergence Indicators.

e) Explain working principle of Dual Height Tell Tale.

Marks

5. Attempt any TWO of the following: **12**

a) Draw the curve that explains stress-strain relationship under compression and define all its stages.

b) Calculate the number of roof bolts to be supported in a continuous miner depillaring panel at a junction of 4.0 m wide gallery. The RMR is 44 and the rock density is 2.06 tons/m^3. The anchorage capacity of bolt is 20 tons.

c) Explain the various causes of rock burst and their preventive measures.

6. Attempt any TWO of the following: **12**

a) Explain the various factors on which CMRI-ISM Geomechanics classification depends. Also give its RMR classification.

b) A 4.0 m thick coal seam lying at a dept of 300 m. It is proposed to develop seam by bord and pillar method. The centre-to-centre distance between two pillars is 30 m. The gallery width is 4.0 m. Calculate the stability of coal pillar.

c) Explain how will you use flat jack for insitu stress determination.