22251

24225

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

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

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

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

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

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

Marks

1. Attempt any FIVE of the following : **10**

a) Define rockmass and rock substance.

b) Define stress and strain.

c) Define porosity.

d) Define permeability of rock.

e) For determination of indirect tensile strength of rock, the cylindrical core specimen was prepared as per ISRM standards. The specimen was loaded on the curved surface keeping its axis horizontal. If the failure load was 6 tons for a core diameter 3.80 cm. then calculate the indirect tensile strength of the rock.

f) Define coal bump and state its two types.

g) Write the function of linear variable differential transformer which is used in strata monitoring instruments.

Marks

2. Attempt any THREE of the following : **12**

a) Describe thermal properties of rock.

b) Explain how will you determine the shear strength of cylindrical rock specimen by double shear method with its schematics.

c) Describe the procedure to find out rebound hardness of a rock sample.

d) State the purpose of providing instrumentation in a underground excavations.

3. Attempt any THREE of the following : **12**

a) Explain how will you determine uniaxial compressive strength of rock sample in the laboratory.

b) Define convergence and state the factors on which convergence depends.

c) Classify the field instrumentation for ground control and rock mechanics studies.

d) Explain the construction and working of remote convergence indicators.

4. Attempt any THREE of the following : **12**

a) Explain the objectives of engineering rock mechanics studies.

b) In a point load strength test a 45 mm diameter core sample ruptured at 600 kg load. Find out its uniaxial compressive strength in MPa.

c) Describe the qualities of a rockmass classification system.

d) Justify how will you prevent the underground excavation from the dangers of rock burst.

e) Explain the construction and working of Rock Bolt Load Cell.

Marks

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

a) State the need to develop rock strength indices and enlist four types of index properties of rock. Also explain the procedure to find out point load strength index for irregular lump sample.

b) Give the classification of intact rock based on RQD and Calculate the percentage of core recovery and RQD for the following drill core sample :

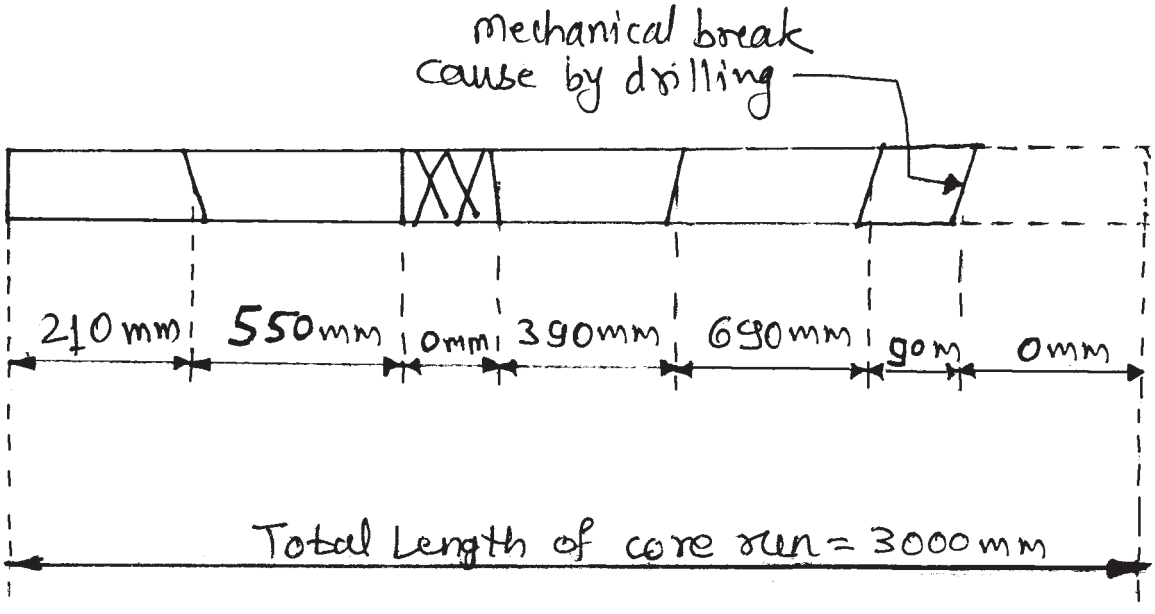

Fig. No. 1

c) Calculate the number of roof bolts to be supported in a continuous miner depillaring panel at a splits gallery. Assume the roof RMR is 46, gallery width is 4.8 m, width of split gallery is 6.6 m, rock density is 2.03 te/m^3, Anchorage capacity of roof bolt is 18 tons.

Marks

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

a) Compare Bieniawski RMR system with CMRI-ISM RMR system.

b) Explain the factors which affects the size of pillar in an underground excavation.

c) A 2.8 m thick coal seam is lying at a depth of 300 m. It is proposed to develop the seam by bord and pillar method. The centre-to-centre distance between two pillars is 35m and gallery width is 4.2 m. Calculate the stability of coal pillar.

———