22251

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.   Define the following terms. (Any FIVE)   **10**

a) Homogeneous and Heterogeneous rock.

b) Moisture content and Degree of saturation.

c) Durability of rock.

d) Triaxial compressive strength

e) Coal bump

f) Factor of safety of pillar

g) Convergence

h) Strata dilation.

Marks

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

  a) Explain the importance of electrical properties of rock.

  b) Describe the procedure of determination of shear strength of rock by double shear method.

  c) In a point load strength test, a 43 mm diameter core sample ruptured at 4.9 KN load. Find out its uniaxial compressive strength.

  d) Define creep and describe factors contributing the creep.

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

  a) Explain the terms Young's modulus, Poisson's ratio and Poisson's number.

  b) i) Calculate indirect tensile strength of a rock specimen prepared as per ISRM standards, having the average core diameter of 52 mm, failed at a load of 55 KN.

     ii) Calculate the shear strength of the rock which is normally stressed by 2.1 MPa. The cohesion and angle of internal friction are 5.5 MPa and 30°, respectively.

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

  d) Describe the purpose of instrumentation in a excavation.

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

  a) How will you find out protodyakonov strength index.

  b) State the objectives of rockmass classification for engineering applications.

  c) Elaborate the controlling measures for rockburst.

  d) Explain the working of Telescopic convergence indicator.

  e) State classification of field instrumentation for rock mechanics studies.

5.   **Attempt any <u>TWO</u> of the following :**   **12**

    a) Describe the various stages of typical uniaxial compression stress-strain curve of rock material.

    b) Justify how the rock is classified by RQD.

    c) Explain the procedure of installation of dual height tell tale in an underground excavation.

6.   **Attempt any <u>TWO</u> of the following :**   **12**

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

    b) An underground mine is working with continuous miner at a depth of 240 m from the surface. The immediate overlying strata are coal and sandstone having 2.5 m and 3.0 m thickness respectively. The RMR of coal is 43 and that of sandstone is 54. The working span is 5.5 m. Calculate the rock load, assuming the sp.gr. of coal and sandstone is 1.41 and 1.82, respectively.

    c) Explain the tributory area concept for calculating load on pillar.

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