22251

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) 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 Density and specific gravity.

b) List the Length / Diameter (L / D) ratio for

i)   Calculation of the compressive strength of a hard rock core specimen, prepared as per ISRM standards.

ii)   Calculation of the point load index of a hard rock core specimen, prepared as per ISRM standards.

c) Define dilation and convergence.

d) Define Elastic and Plastic Material.

e) Define Shear strength.

f) Define Coal Bump.

g) Describe factor of safety in pillar design.

Marks

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

a) Describe the difference between Isotropic material and Anisotropic material.

b) Describe the procedure of Protodykonov Strength Index of a rock sample.

c) Explain how will you determine tensile strength by using Brazilian Test.

d) Compare the brittle material with ductile material.

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

a) Calculate the shear strength of a rock at a depth of 190 m. The average bulk density of the rock mass is 2.86 te/m^3. The respective values for cohesion and angle of internal friction for the rock are 51×10^5 N/m^2 and 26°.

b) Define and give formula for

i) Young Modulus

ii) Poisson's Ratio

iii) Shear Modulus

iv) Bulk Modulus

c) Describe Abrasitivity and Hardness of the material.

d) Explain the different types of Tele tell used for underground roof monitoring.

4. **Describe in brief any THREE of the following:** **12**

a) Point Load strength Index.

b) RMR.

c) Types of rock bumps.

d) Load cell.

e) Borehole extensometer.

Marks

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

a) Describe the procedure of compressive strength determination by UCS.

b) Describe the procedure of determination of RQD using CMRI-ISM geomechanics classification system.

c) Enlist the parameters are to be monitored for strata management in continuous miner and longwall working. Describe the system of strata monitoring there with a neat sketch.

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

a) Explain the Bieniawski RMS classification system. State the factors on which it depends.

b) Explain the factors on which design of pillars depends.

c) Design a roof bolting system of support (for cement capsule bolt) in a development gallery and in junction under the following conditions :

Width of gallery = 4.8 m; RMR = 44;
rock density = 2.04 te/m^3. Assume suitable data if necessary.

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