B.E. Mining Engineering Seven Semester

# MN701 - Ground Control in Mines

P. Pages : 2 **GUG/W/18/1842**

Time : Three Hours * 1 4 4 1 * Max. Marks : 80

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Notes : 1. Assume suitable data wherever necessary.
2. Illustrate your answers wherever necessary with the help of neat sketches.
3. Marks are indicated to the right.

**1.** Discuss Bieniawski's engineering classification scheme for rock masses. Also briefly mention various modifications suggested to it to make it more suitable to mining applications. **11+5 =16**

**OR**

**2.** Discuss CMRI-ISM Engineering classification scheme for rock masses stating how it is used to estimate rock load in galleries and at junctions. **16**

**3.** Using Kirsch's solution compute radial, tangential and shear stresses induced around a single circular opening having a radius of 5m at (i) mid - height points in the sides and (ii) top and bottom points at a distance of 10m from the centre of the opening. Assume K=0. Plot the results. Also state assumptions made by Kirsch. **16**

**OR**

**4.** With respect to the following information available in respect of a Bord & Pillar working, calculate the average axial pillar pressure and pillar strength using Salamon & Munro's formula and CMRI formula and comment on the stability of the pillar: **16**

1. Depth of working:50m
2. Uni-axial compressive strength of coal: 10MPa.
3. Thickness of coal seam and the overlying strata & starting from ground surface are as follows:

| Sl. No. | Strata | Thickness (m) | Density $\left(te/m^3\right)$ |
|---|---|---|---|
| 1 | Black Cotton Soil | 15 | 1.9 |
| 2. | Sandstone | 20 | 2.3 |
| 3. | Shaly Sandstone | 10 | 2.2 |
| 4. | Shale | 5 | 2.1 |
| 5. | Coal Seam | 8m | 1.4 |

4. Plan size of pillars in coal: $20^{m} \times 25m(c \text{ to } c)$
5. Width of gallery = 4.5m
   Assume suitable values for data not given.

**5.** What is rock burst? Why and under which circumstances rock bursts take place? Discuss the factors governing process of rock masses to Crusting. **3+4+ 9=16**

**OR**

**6.** Discuss the concepts of abutment pressure, main roof and immediate roof. What are the various ways of monitor and predict rock bursts? **6+10 =16**

**7.** Define subsidence, sub-surface subsidence, surface-subsidence, pothole, angle of Greek and super-critical width of excavation. Discuss how surface subsidence could the minimised using harmonic mining. **12+4 =16**

**OR**

**8.** Discuss various measures to effect prevention and control of subsidence caused due to underground excavation activities. **16**

**9.** Write short notes on **any three.**

a) Photoelasticity: Principle and Applications. **6**

b) Strain Gauges and Strain Rossettes. **5**

c) Geophones. **5**

d) Tell tales. **5**

**OR**

**10.** What and how does pit slope impact the economics of mining operations? Discuss, briefly, measures you would suggest to monitor and protect slopes in opencast mining systems. **4+12 =16**

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