



# CBCS SCHEME

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15MN72

Seventh Semester B.E. Degree Examination, Aug./Sept.2020

## Ground Control

Time: 3 hrs.

Max. Marks: 80

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

- 1 a. Discuss the design of the stability of an opening for Hardrock with and without slips/fractures using a flow chart. (08 Marks)
- b. Determine the energy released by
  - (i) Gradual mining excavation
  - (ii) Rapid mining excavation(08 Marks)

OR

- 2 a. Determine the stress, strain and displacement of a location due to an underground excavation using finite element method. (08 Marks)
- b. Draw and explain the stress concentration around a single opening (circular) in a uniaxial stress condition, if the vertical stress is zero and horizontal stress is maximum and also illustrate the state of opening if confining pressure is equal to 0, 1 and 1/3. (08 Marks)

### Module-2

- 3 a. How stress is distributed around and within the coal pillar during an mining excavation. Explain in detail with respect to radial circumferential and compressive stress. (08 Marks)
- b. Determine the load/stress acting on Pillar using tributary method:
  - (i) Square pillar
  - (ii) Rectangular pillar
  - (iii) Rib pillar
  - (iv) Irregular shape pillar(08 Marks)

OR

- 4 a. Determine the strength of a pillar considering size and shape in tributary method. (08 Marks)
- b. Explain the mechanics of designing an Barrier and Yield Pillar. (08 Marks)

### Module-3

- 5 a. A long wall panel of width = 120m is extracted at a depth of 200m, critical width reached when the panel width become 150m. If the seam were to be worked at a depth of 300m, what would be critical subsidence at the panel length? (08 Marks)
- b. Illustrate the use of profile and influence function in determining the surface subsidence. (08 Marks)

OR

- 6 a. Subsidence profile function  $S(x) = 0.8 \left( 0.996 - \tanh \frac{8.3x}{D} \right)$  along lateral section over a long wall panel is given where 'x' is the distance from the inflection point, 'D' is the depth of the seam, consider inflection point lies vertically above the edge of the opening and the angle of draw in degrees for depth of 250m is? (08 Marks)
- b. Explain the methods of determining the sub-surface subsidence movement due to an excavation. (08 Marks)

**Module-4**

- 7 a. Estimate the span of first local fall, main fall, periodic caving span and caving height in long wall working with a face length of 150m planned to be operated under set of strata conditions as given below :
- Layer 3: Fine grained sandstone: 3m thick; flexible strength = 5 MPa, Density =2500 kp/m<sup>3</sup>  
Layer 2: Fine grained sandstone: 8m thick; flexible strength = 5 MPa, Density =2500 kp/m<sup>3</sup>  
Layer 1: Fine grained sandstone: 1m thick; flexible strength = 3 MPa, Density =2500 kp/m<sup>3</sup>  
Coal seam: 2.5m thick (full extraction height)  
Density =2500 kp/m<sup>3</sup>, with Bulking factor = 1.25. (08 Marks)
- b. Explain the methods of monitoring the coal bump/rock burst in an underground mine. (08 Marks)

**OR**

- 8 a. Explain the mechanism of caving in an underground mine. (08 Marks)
- b. Explain the preventing techniques of coal bump/rock burst. (08 Marks)

**Module-5**

- 9 a. Select the method of Rock Mass classification to classify the slope. Explain the method with suitable tabular column to estimate the support to stabilize the slope. (08 Marks)
- b. List the suggestions of Paul's committee on support estimation in underground mine. (08 Marks)

**OR**

- 10 a. Select the method of rock mass classification to adopt active/passive support in an underground mine. Explain the method with suitable tabular column to estimate the support to stabilize the roof/opening. (08 Marks)
- b. Select the method of rock mass classification to adopt support in a Tunneling. Explain the method with suitable tabular column to estimate the support to stabilize the roof /opening. (08 Marks)

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