

MASTER OF SCIENCE EXAMINATION, 2018

(2nd Year, 1st Semester)

APPLIED GEOLOGY

**Geochemical Exploration, Drilling, Mineral Beneficiation, Mining
Paper - XII**

Time : Two hours

Full Marks : 50

Use separate answer script for each group.

GROUP - A (10 marks)
(Geochemical Exploration)

1. Answer any **two** questions from the following : 2x5=10
 - (a) What do you understand by local and regional background, threshold and anomaly? What is the difference between indicator and pathfinder elements? Give some examples of pathfinder elements. 3+1+1
 - (b) Using necessary sketches describe different soil horizons found in a well-developed soil profile. Which horizon (horizons) is (are) commonly sampled for pedogeochemical exploration, and why? What are the different steps followed in such exploration? 2+1½+1½
 - (c) Briefly discuss the different types of rock and soil sampling carried out at different stages of geochemical exploration and mining activities. 5

(Turn over)

(2)

GROUP - B (10 marks)
(Drilling Methods)

2. Answer **q.no. (A)** and any **two** from the rest. 4x1=4
- A. (a) Choose the correct answer for the following :
- (i) for deep drilling in hard rock terrain
 - (ii) to drill specially the soft rocks
 - (iii) to place explosive for rock blasting
 - (iv) for foundation purpose during civil construction.
- (b) Reich Drill is generally used for tunnelling in –
- (i) hard rock hilly area
 - (ii) intercalated area with hard and soft rocks
 - (iii) alluvial plane having a thick soil cover
 - (iv) hilly slope with thin residual soil cover
- (c) For drilling in limestone, drill bit to be used should be –
- (i) 8 to 10 SPC-TC
 - (ii) Impregnated – 30 to 60 SPC
 - (iii) Impregnated – TC
 - (iv) 80-110 SPC-TC

(5)

- (b) What is “cut-off grade” ? How does the cut-off grade of different types of deposits vary with depth and overburden ratios ? 3+2
- (c) Present a flow chart to show the classification of deposits, suitable for ‘open pit mining’. 5
- (d) What are the different mining techniques adopted for ‘artificially supported underground mining’ ? What is VCR stoping ? 3+2
- (e) Write short notes on : 2x2.5=5
- (i) Disseminated and Massive ore.
 - (ii) Milling and Smelting
- (f) Select the correct match (**one** only) from the column B for column A. 5

	A	B
1.	Adit	a. Block caving b. Passage driven downward between the levels
2.	Tabular hard rock deposit at depth	c. 30 m d. Horizontal passage from the surface into a mine
3.	Raise	e. Short hole mining for steeply dipping ore body f. Room and pillar method of mining successive levels
4.	Difference of depth between two	g. Short hole mining for tabular ore body h. 40 m
5.	Shrink stoping	i. Passage driven upward between the levels j. Vertical passage from the surface into a mine

(4)

Group - C (10 marks)
(Mineral Beneficiation)

3. Answer any **two** questions from the following : $2 \times 5 = 10$
- (a) Define “mineral beneficiation”. What are its purposes? Briefly describe the different types of operation carried out in mineral beneficiation? $1+2+2$
- (b) What is the basic principle of froth floatation? Discuss about the different types of reagents used in froth floatation and their functions. $1\frac{1}{2}+3\frac{1}{2}$
- (c) What are heavy liquid separation and heavy medium separation? “Heavy liquid separation is not commonly carried out in industrial scale” – accept or reject with reason. Mention the important criteria of a “medium solid” used for heavy medium separation? $2+2+1$

GROUP - D (20 marks)
(Mining)

4. Answer any **four** questions of the following : $4 \times 5 = 20$
- (a) Mention the major factors that affect the open pit mining. How does overburden ratio differ from the stripping ratio? $3+2$

(3)

- (d) Main variables those are taken to estimate the Drillability are –
- (i) Rock properties – Drill rate – Bit wear – Method of drilling
- (ii) Rock properties – Weathering status of rock – RPM of the bit – Method of drilling
- (iii) Rock texture – RPM of the bit – Bit wear – Method of drilling
- (iv) Rock texture – Drill rate – Bit wear – Method of drilling
- B. What is Churn drill? Mention the specific applications of it. $1+2$
- C. What is meant by ‘SPC’? How does it vary with the broad variations of rock types? $1+2$
- D. What is a ‘core lifter’? Discuss its working principle with relevant sketch. $1+2$
- E. Distinguish between wire-line and conventional rotary drill. 3

(Turn over)