

**Bachelor of Metallurgical Engg. Examination, 2019**

**2<sup>nd</sup> Year, 1<sup>st</sup> Semester**

**GEOLOGY AND MINERALS BENEFICIATION**

Time: Three Hours

Full Marks: 100

(50 marks for each part)

Part-I

Use Separate Answer scripts for each part.

**Answer Question No.1 and any THREE from the rest**

1. Enumerate the physical properties that help in the identification of minerals in hand specimens. State the diagnostic physical properties of the following minerals in hand specimens: Magnetite, Galena, Quartz. What is 'placer deposit'? Define the terms metallic & non-metallic deposits, ore mineral, gangue minerals, hypogene & supergene deposits with suitable examples. Write a short note on Bauxite and its Indian resources. **20**
2. Why only oxide and sulphide minerals are used for extraction of metals? Who are the proponents of 'Periodic' & 'Geochemical' classification of elements? What are Rare Earth Elements (REEs)? What is the likely textural difference between granite and sandstone constituted principally by quartz, feldspar and mica? What is Geochemical cycle? **10**
3. What are "Crystal" and "Mineral"? Should coal be called a mineral?- justify your answer. In which system the mineral "Garnet" crystallizes? What are the similarities and dissimilarities between porphyritic and poikilitic texture? **10**
4. What are evidences in support of the presence of fluid outer core in the Earth? What is Geological Time Scale? Write the names of the periods of Palaeozoic and Mesozoic eras. "The Earth's layered structure is represented by i) Crust, ii) Mantle, iii) Core" Is this statement true? If so why there is variation in density of one layer from the other? **10**
5. What is Bowen's Reaction Principle? How does it help in understanding nature of crystallization of basic magmas? What are the limitations of the Reaction Principle? Write a brief account on classification of igneous rocks in relation to mineralogy. **10**
6. a) Group the following minerals under the classes-  
i) Oxides ii) Sulfides iii) Silicates and iv) Carbonates: **10**  
Amphibole, Magnetite, Pyroxene, Calcite, Galena, Ilmenite, Pyrite, Garnet, Biotite, Pyrolusite  
b) Arrange the following rocks according to decreasing SiO<sub>2</sub> content:  
Gabbro, Granulite, Peridotite  
c) Is continental crust thinner than oceanic crust? What is the bulk composition of oceanic crust?

[ Turn over

Ex/Met/Geo/T/212/2019

**B.E. Metallurgical & Material Engineering 2<sup>nd</sup> yr 1<sup>st</sup> semester, Exam-2019**

**Sub: Geology and Minerals Beneficiation**

**Time: 3 hours**

**Full Marks: 100**

**( 50 marks for each part )**

**Use separate answer-script for each part)**

**Part-II**

Question no. 1 and any two from the rest.

2.5x4

- Q.1 (a). Distinguish between Mineral and ore.  
 (b). Write the role of collector in froth flotation  
 ©. Differentiate between open circuit and close circuit operation.  
 (d). Define laminar flow and turbulent flow.

4X5

- Q.2 (a). Derive the terminal velocity of a particle under stoke's condition  
 (b). Explain the functional diagram of a double toggle jaw crusher.  
 ©. Write the various factors which affect the rate of falling of a particle in a fluid  
 (d). State the Tyler's series.

2X10

- Q.3 (a). State the principle of gravity concentration process and describe the tabling operation.  
 (b). Describe the different screening operations.

4x5

- Q.4. (a). Hydraulic Classifier.  
 (b). Tumbling Mill  
 ©. Separation efficiency  
 (D). Capacity of screen