

**B.E. Metallurgical and Material Engineering Second Year
First Semester Examination-2023**

Ref. No. : Ex/Met/ES/B/Geo-Met/TS/215/2023

Subject: GEOLOGY AND MINERALS BENEFICIATION

Time: 3hrs.

(50 Marks for each Part)

Full Marks: 100

Part I (50 Marks)

Instruction: Use separate answer scripts for each Part

(Answer any 10 questions from part I)

(10X5=50)

1. What is the principle of comminution process for mineral materials? 5
2. How the single toggle jaw crusher is difference from the double toggle jaw crusher? How the Blake Jaw crusher is different from the Dodge Jaw crusher based on their application? 3+2=5
3. If crushing rolls, 1m in dia, are set so that the crushing surface are 12.5mm apart and the angle of nip is 31°. What is the maximum size of the particle which should be feed to the rolls? 5
4. What is the main purpose of using screening process in mineral beneficiation plant? How friction of sieve and soluble salt can affect the screening efficiency? 2+3=5
5. The mixture of Quartz (density 2.65) and Galena (density 7.5) particle settling in a pulp of density 1.5. Calculate the settlings ratio? 5
6. What are the characteristic features of collectors in Froth Flotation process? Give one example of collector used in the Froth Flotation process. 4+1=5
7. How the three different products in the gravity separation process can be differentiated from each other? Explain the Curie temperature for magnetic materials. 2+3=5
8. How the pollution causes from mineral beneficiation plants can be control? What is the importance role of comminution process in mineral industry? 3+2=5
9. How the temperature of pulp and PH of the pulp can affects the flocculation process? 5
10. What are differences between hindered settling of flocks and free settling of flocks? 5
11. What are the principles of classification process? 5
12. What are the precautions should follow for efficient screening operation? 5

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Bachelor of Metallurgical Engg. Examination, 2023
2nd Year, 1st Semester
GEOLOGY AND MINERALS BENEFICIATION

Time: Three Hours

Full Marks: 100
(50 marks for each part)

Part-II

Use Separate Answer scripts for each part.

Answer Question No.1 and any TWO from the rest

1. Choose the correct answer:

2 X 10 = 20

- i. The most abundant sedimentary rock found in the Earth's crust is
 - a) Shale
 - b) Sandstone
 - c) Limestone
 - d) None of the above

- ii. Which of the following is non-directional property of mineral?
 - a) Hardness
 - b) Cleavage
 - c) Streak
 - d) None of these

- iii. Which physical properties of a given mineral displays the greatest variation
 - a) Colour
 - b) Hardness
 - c) Luster
 - d) Streak

- iv. 'Luster' is defined as the appearance of of a mineral in
 - a) White light
 - b) Monochromatic light
 - c) Incident light
 - d) Reflected light

- v. Hardness of minerals increases with a/an
 - a) Increase in valency
 - b) Increase in bond strength
 - c) Increase in density of packing atoms
 - d) All of the above

- vi. Explosive eruptions often involve rhyolitic magmas. This is because of their
 - a) High silica content
 - b) High water content
 - c) Low volatile solubility

- d) Deep-seated nature
- vii. Which of the following does not correspond with the others given in the series?
- a) Hornfelses
 - b) Slate
 - c) Schist
 - d) Phyllite
- viii. The softest mineral known as per Mohs scale is
- a) Quartz
 - b) Orthoclase
 - c) Talc
 - d) Calcite
- ix. The purple colour of Amethyst is due to the presence of
- a) Titanium
 - b) Manganese
 - c) Iron
 - d) Chromium
- x. A mineral is inorganic, which means that it contains
- a) Compounds
 - b) materials made by humans
 - c) parts of living things
 - d) no materials that are once part of living things
2. Define mineral. Is pearl a mineral? Should coal be called a mineral?- justify your answer. What is Mohs' Scale of hardness? Why the hardness of minerals is considered as a vector property? Arrange the following minerals in order of decreasing hardness-Apatite, Diamond, Fluorite and Gypsum. What is lustre? On which factors does the lustre of a mineral depend? What is 'placer deposit'? Why Chromite is considered as 'strategic' mineral? **15**
3. a) Group the following minerals under the classes-
- i) Oxides ii) Sulfides iii) Silicates and iv) Carbonates:
Haematite, Magnetite, Pyroxene, Calcite, Galena, Malachite, Pyrite, Garnet, Biotite, Pyrolusite
 - b) Arrange the following rocks according to decreasing SiO₂ content:
Gabbro, Granulite, Granite
 - c) Is continental crust thinner than oceanic crust? What is the bulk composition of oceanic crust? What are evidences in support of the presence of fluid outer core in the Earth?
 - e) Distinguish between Talc and Muscovite on the basis of their physical properties.
 - f) Distinguish between Kyanite and Psilomelane on the basis of their physical properties and underline their diagnostic properties. **15**

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4. Why only oxide and sulphide minerals are used for extraction of metals? Write the difference between the cleavage and fracture. What are Rare Earth Elements (REEs)? What is the likely textural difference between granite and sandstone constituted principally by quartz, feldspar and mica? In which environment Lead and iron are immobile in nature? Name one mineral having a high dielectric capacity?
- a) Mention the type of feldspar that is recorded in each of the following rocks:
Granite, Diorite, Pegmatite, Basalt