

Bachelor of Metallurgical Engg. Examination, 2024
2nd Year, 1st Semester, Supplementary
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. a) Why streak rather than colour of a mineral is considered as a diagnostic property?
What is lustre? On which factors does the lustre of a mineral depend? **10**
b) Arrange the following in (i) Acid (ii) Basic & (iii) ultrabasic igneous rocks: **05**
Granite, Rhyolite, Andesite, Basalt, Gabbro, Peridotite & Dunite.
c) Arrange the following rocks according to decreasing SiO₂ content: **05**
Gabbro, Granulite, Peridotite
2. 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**
3. a) Mention the type of feldspar that is recorded in each of the following rocks: **5**
Granite, Diorite, Pegmatite, Basalt
b) Describe textural characters of Conglomerate, Gneiss and Phyllite. **5**
4. Define mineral. Is pearl a mineral? Arrange the following minerals in order of decreasing hardness-Apatite, Diamond, Fluorite and Gypsum. What is Mohs' Scale of hardness?
Why the hardness of minerals is considered as a vector property? **10**
5. a) Group the following minerals under the classes- **10**
i) Oxides ii) Sulfides iii) Silicates and iv) Carbonates:
Amphibole, Magnetite, Pyroxene, Calcite, Galena, Ilmenite, Pyrite, Garnet, Biotite, Pyrolusite
b) Is continental crust thinner than oceanic crust? What is the bulk composition of oceanic crust?

[Turn over

B.E. METALLURGICAL AND MATERIAL ENGG. SECOND YEAR**FIRST SEMESTER SUPPLEMENTARY EXAMINATION 2024****GEOLOGY AND MINERALS BENEFICATION**

Time : Three hours

(50 Marks for each Part)

Full Marks : 100

PART II (50 Marks)

Instructions: Use Separate Answer scripts for each Group/part / Attempt all the questions answer from each "CO" is mandatory following the given instruction

COI: (Answer any four questions from CO I)

1. Define mineral and ore with example? Explain the Bond's law. 3+2=5
2. Explain the forces which typically are used to affect the comminution of particles 5
3. What are the differences between open circuit crushing and closed-circuit crushing?
What are the differences between single toggle jaw crusher and double toggle jaw crusher?
3+2=5
4. What are the advantages of uses of cone crusher? 5
5. A crushing roll having a roll diameter of 1m. is set so that the crushing surface is 12.5mm apart and nip angle $2\alpha = 31^\circ$. What is the maximum feed size to the rolls? 5

COII: (Answer any two questions from CO II)

6. How size of the screen opening and friction of sieve and soluble salt can affect the sizing process? 2+2+1=5
7. What is classification process? Velocity of the particles are in fluid medium depending on which properties of the particle? What are the differences between free settling process and hindered process?
1+2+2=5
8. Consider a mixture of Galena (density 7.5) and Quartz (density 2.65) particles classifying in water. Calculate the free Settling ratio for small particles and coarser particles. 5

COIII: (Answer any two questions from CO III)

9. Define flowing film concentration. Explain the working principles of shaking table.
1+4=5
10. What are the facts used in flotation process? How contact angle depends on the surface chemistry of the minerals? 3+2=5
11. Explain Pneumatic jig. What are the disadvantages of pneumatic jig? 3+2=5

COIV: (Answer any two questions from CO IV)

12. What are the important factors influencing the magnetic properties of a material? Explain the mechanism of dry-drum type magnetic separator used in the mineral beneficiation industry. 2+3=5
13. How temperature of the pulp can affect the flocculation process? Explain the diamagnetism properties of a magnetic material. 2+3=5
14. How pollution can be controlled in mineral beneficiation plant? How water can be removed from the particles? 3+2=5