DIPLOMA WALLAH

JHARKHAND UNIVERSITY OF TECHNOLOGY (JUT)

Diploma in Mining Engineering | Subject: Mining Geology - II

SAMPLE PAPER - 2

Instructions :

- **Full Marks:** 70 | **Time:** 3 Hours
- Question No. 1 is **compulsory** (7 MCQs x 2 Marks = 14 Marks).
- Answer any **FOUR** questions from the remaining (Q.2 to Q.7). Each carries 14 marks.
- Illustrate your answers with neat sketches/diagrams wherever necessary.

Q.1 Choose the correct option for the following: **[7 × 2 = 14]**

i. Which of the following is an example of a Sedimentary Rock?

(a) Granite (b) Sandstone

(c) Marble (d) Basalt

ii. The geometric angle between the True Dip direction and the Strike line of a bed is always:

(a) 0° (b) 45°

(c) 90° (d) 180°

iii. Which geological system in India is highly renowned for its rich deposits of metallic ores like Iron, Gold, and Copper?

(a) Gondwana System (b) Dharwar System

(c) Tertiary System (d) Vindhyan System

iv. Placer deposits are economically important concentrations of heavy minerals formed primarily by:

(a) Magmatic cooling (b) Surface weathering and flowing water

(c) Volcanic eruptions (d) Metamorphism

v. Pyrolusite and Psilomelane are the principal ores of which metal?

(a) Iron (b) Lead

(c) Zinc (d) Manganese

vi. A fracture in rock along which NO visible relative displacement has occurred is called a:

(a) Fault

(b) Joint

(c) Fold

(d) Unconformity

vii. The process where low-grade sulfide ores are converted into high-grade deposits just below the water table is known as:

(a) Sublimation

(b) Placer formation

(c) Supergene Enrichment

(d) Contact Metamorphism

Q.2 (A) What are Igneous Rocks? Classify igneous rocks on the basis of their depth of formation (Plutonic, Hypabyssal, and Volcanic rocks) giving suitable examples for each. **[7]**

Q.2 (B) Define Metamorphism. Discuss the various agents of metamorphism (Heat, Pressure, and Chemically active fluids) and their roles in rock transformation. **[7]**

Q.3 (A) Define the terms "Strike", "True Dip", and "Apparent Dip" of a rock bed. Explain their relationships with the help of a neat 3D block diagram. **[7]**

Q.3 (B) What are Joints in geological formations? How do they differ from faults? Discuss the practical importance and hazards of joints in underground mining operations. **[7]**

Q.4 (A) Give a detailed account of the "Dharwar System" of Indian stratigraphy. Discuss its geological formation, rock types, and economic importance. **[7]**

Q.4 (B) Describe the "Vindhyan System" of rocks. Name the economically important minerals and building stones found in this system. **[7]**

Q.5 (A) What are Placer Deposits? Explain the physical and chemical conditions necessary for the formation of placer deposits. Name any two minerals commonly found in placers. **[7]**

Q.5 (B) Write a detailed note on the process of "Oxidation and Supergene Enrichment" in the formation of ore deposits. Support your answer with a vertical profile diagram showing different zones. **[7]**

Q.6 (A) Describe the physical properties, chemical composition, and origin of Bauxite. Name the major Bauxite producing states in India. **[7]**

Q.6 (B) Discuss the occurrence, geological distribution, and uses of Manganese ores in India. **[7]**

Q.7 Write short notes on any FOUR of the following: **[4 × 3.5 = 14]**

A. Dyke and Sill

B. Cleavage and Fracture in minerals

C. Tertiary Coal deposits in India

D. Outcrop of a rock bed

E. Tenor of ore and Gangue minerals

PAPER 2 - ANSWER KEY & MODEL HINTS

Q1 (MCQ Answers): i-(b), ii-(c), iii-(b), iv-(b), v-(d), vi-(b), vii-(c)

Model Hints for Theory:

Q2(A) Igneous Rocks Classification: Formed by cooling of magma. *Plutonic:* Cooled deep inside the earth slowly, large crystals (e.g., Granite). *Hypabyssal:* Cooled at shallow depths (e.g., Dolerite). *Volcanic:* Cooled quickly on the earth's surface, fine-grained (e.g., Basalt).

Q3(A) Strike & Dip: *Strike:* Direction of the line of intersection of a dipping bed with a horizontal plane. *True Dip:* Maximum angle of inclination of a bed with the horizontal, measured perpendicular to the strike. *Apparent Dip:* Inclination measured in any direction other than the true dip direction (always less than true dip).

Q3(B) Joints vs Faults: Joints are fractures with NO displacement, whereas faults have visible displacement. *Mining Importance:* Joints make rock mass weak. They assist in breaking rock easily during blasting (reducing explosive cost), but they also pose severe roof fall hazards requiring heavy supports (rock bolting).

Q4(A) Dharwar System: Oldest metamorphosed sedimentary rocks (Precambrian era). Highly folded and faulted. *Economic Importance:* It is the most mineral-rich system in India, hosting major deposits of Iron ore, Manganese, Copper, Gold (Kolar), and Lead-Zinc.

Q5(A) Placer Deposits: Concentrations of heavy, chemically resistant minerals (like Gold, Platinum, Diamond, Tin) formed by the mechanical weathering of source rocks and subsequent transport and deposition by running water (streams/rivers) or wave action.

Q5(B) Supergene Enrichment: Near the surface, primary sulfide ores are oxidized and dissolved by rainwater. These solutions percolate downwards to the water table, where lack of oxygen causes secondary precipitation. This creates a highly concentrated (enriched) zone of ore just beneath the water table.

Q6(A) Bauxite: Chief ore of Aluminum ($Al_2O_3 \cdot 2H_2O$). Formed by intense lateritic weathering of aluminous rocks in tropical climates. Major states: Odisha (Kalahandi, Koraput), Jharkhand (Lohardaga), Chhattisgarh.