

Krantiguru Shyamji Krishna Verma

# **Kachchh University**

**BHUJ: 370 001**



**SYLLABUS (CBCS)**

**Semester 5 and 6**

# **GEOLOGY**

(With effect from June 2016)

**K.S.K.V. KACHCHH UNIVERSITY**  
**SYLLABUS OF B. Sc. (GEOLOGY)**  
(In force from June 2016)

**SEMESTER-5**

**US CEGE 507 MINERALOGY & SOIL**

**Unit: 1 Mineralogy: (15 Marks)**

- Structure of silicate minerals.
- Study of chief mineral families – Silica, Feldspar, Feldspathoid, Mica, Amphibole, Pyroxene, Olivine, Garnet, Zeolite, Aluminosilicate, Epidote, Zoisite.

**Unit: 2 Optical Mineralogy: (15 Marks)**

- Detail study of Extinction, Interference colours, Order of interference colours – their controlling factors. Uniaxial and Biaxial interference figures and optic sign determination – microscopic accessories.

**Unit: 3 Crystallography: (15 Marks)**

- Hexagonal, Monoclinic and Triclinic crystal systems – their detailed study. Twinning in mineral crystals.

**Unit: 4 Soils: (15 Marks)**

- Introduction, Composition, Physical properties, Engineering properties, Soil formation, Soil profile, Classification of soil, Soil group of India.
- Soil erosion and its control

**Reference Books:**

- Read, H.H. (1960): Rutley's Elements of Mineralogy (26th Edition). CBS Publishers and Distributors.
- Kerr, P.F. (1977): Optical Mineralogy. Mc Graw Hills Inc
- Winchel, N.H.; Winchel, A.N. (1968): Elements of Optical Mineralogy. Willey Eastern Ltd. Delhi.
- Engineering and general geology by P.Singh. (S.K Katariya sons)

**SEMESTER-5****US CEGE 508 PETROLOGY****Unit: 1 Igneous Petrology: (15 Marks)**

- Magma - Types, origin and composition. Pyrogenetic minerals – Ortho-, meta- and poly silicates. Saturated – Undersaturated minerals. Crystallisation of Unicomponent and bicomponent magma with influencing factors and appropriate examples. Bowen reaction series. Textures of igneous rocks.

**Unit: 2 Sedimentary Petrology: (15 Marks)**

- Origin, Types of sedimentary deposits – Residual, Detrital, Chemical and organic. Sedimentary structures in details. Dynamics of aeolian, fluvial, near-shore and deep-sea environments. Concept of sedimentary facies and Walther's law.

**Unit: 3 Metamorphic Petrology: (15 Marks)**

- Stress and Anti stress minerals, Effect of metamorphism on different types of rocks. Detailed study of types of metamorphism – Thermal, Dynamothermal, Cataclastic and Plutonic.

**Unit: 4 Petrological Classification: (15 Marks)**

- Classification of Igneous rocks: Mineralogical, Chemical, Textural, Tabular, IUGS.
- Classification and description of conglomerates, sandstones and Limestones.
- Classification of metamorphic rocks.

**Reference Books:**

- Bose, M.K. (1997): Igneous Petrology. World Press.
- Tyrell, G.W. (1960): The Principles of Petrology. Asia Publishing House.
- Nichols, G. (1999): Sedimentology and Stratigraphy. Blackwell.
- Reading, H.G. (1996): Sedimentary Environments. Blackwell.
- S M Sengupta: Introduction to Sedimentology.
- Pettijohn, F.J.; Potter, P.E. and Siever, R. (1990): Sand and Sandstone. Springer Verlag.

**SEMESTER-5****US CEGE 509 GENESIS OF MINERALS & ORES****Unit: 1 Classification of Ore Deposits: (15 Marks)**

- Historical development of economic geology. Definition of Mineral, Ore, Gangue, and Mineral deposits. Factors controlling mineral availability. Metallogenic epochs and provinces, Global mineral reserves and resources. Classification of mineral deposits – Outlines of Niggli and Lindgren's classification.

**Unit: 2 Igneous and Metamorphic processes of ore formation: (15 Marks)**

- Processes of mineral formations with examples from India and world – Magmatic differentiation, Assimilation, Sublimation, Pneumatolytic, Hydrothermal and Cavity filling deposits.
- Metamorphic deposits - Asbestos, Talc, Graphite, Kyanite – Sillimanite – Andalusite deposits with examples from India and other countries. Metasomatic replacement deposits.

**Unit: 3 Sedimentary processes of ore formation: (15 Marks)**

- Weathering processes – Residual: Clay and Bauxite deposits, Mechanical concentrations, Oxidation and Secondary enrichment with necessary chemical reactions involved. Process of Sedimentation. Conditions of deposition of – Iron ores, Manganese ores, Sulphur, Carbonates, Clays. Evaporation deposits – Gypsum, Sodium chloride and Potash deposits.

**Unit: 4: Mining methods and mineral economics (15 Marks)**

- Aspect of mineral exploration, concept of mineral resources and its estimation
- Introduction to mining terminology, Opencast and Underground mining.

**Reference Books:**

- Craig, J.M. and Vaughan, D.J. (1981): Ore Petrography and Minerology. John Willey.
- Bateman, A.M. (1959): Economic Mineral Deposits. Asia Publishing House.
- Gokhale, K.V.G.R. and Rao, T.C. (1972): Ore Deposits of India. Thompson Press.
- Krishnaswamy, S. (1979): Indian Mineral Resources. Oxford & IBH Publishers.
- Sinha, R.K. and Sharma, N.L. (1981): Mineral Economics. Oxford & IBH Publishers.
- Banerjee, D.K. (1992): Mineral Resources of India. The World Press Pvt. Ltd.

**KSKV Kutch University, BHUJ**

B.Sc. Semester 5 (FIVE)

**SUBJECT: GEOLOGY (THEORY)****(Paper 507, 508 & 509)**Total Marks: **60**Passing standard: **24 Marks**Duration: **Hours****PATTERN OF QUESTION PAPER FOR SEMESTER-END EXAMS**

1. Internal options are compulsory (i.e. Q.1 or Q.1; Q.2 or Q.2 likewise.)
2. There are four questions (Q. 1 to Q. 4) each question carries 15 marks

**The structure for the questions is as under:**

Questions	Section		Marks
<b>Que- 1</b> Unit – I	<b>A</b>	(Objective type) <i>(no internal option)</i>	<b>05</b>
	<b>B</b>	(Descriptive - Essay type / Short notes <i>with internal option</i> )	<b>10</b>
<b>Que – 2</b> Unit –II	<b>A</b>	<b>–do–</b>	<b>05</b>
	<b>B</b>	<b>–do–</b>	<b>10</b>
<b>Que – 3</b> Unit – III	<b>A</b>	<b>–do–</b>	<b>05</b>
	<b>B</b>	<b>–do–</b>	<b>10</b>
<b>Que – 4</b> Unit – IV	<b>A</b>	<b>–do–</b>	<b>05</b>
	<b>B</b>	<b>–do–</b>	<b>10</b>

**Note:** Types of questions for section A are varied like: one-line answers/ two-line answers/ definitions/ reasoning/ drawing small figures/ matching the figures etc. **but not fill in the blanks.**

# **KSKV Kachchh University, BHUJ**

B.Sc. Semester 5 (FIVE)

**SUBJECT: GEOLOGY**

**(PRACTICAL - 507)**

Total Marks: **50**

Passing standard: **20 Marks**

**1. Study of the physical properties of the common rock forming minerals:**

- Leucite, Nepheline, Sodalite, Scapolite, Enstatite, Hypersthene, Bronzite, Wollastonite, Tremolite, Actinolite, Serpentine, Andalusite, Sillimanite, Kyanite, Topaz, Staurolite, Sphene, Epidote, Stilbite, Netrolite, Haulandite, Apophyllite, Scolecite, Kaolin, Aragonite.

**2. Study of the following minerals in thin sections:**

- Quartz, Orthoclase, Microcline, Plagioclase, Muscovite, Biotite, Hornblende, Hypersthene, Augite, Olivine, Tourmaline, Calcite, **Sphene**, Garnet, **Apatite**. Chlorite, Staurolite, Kyanite, Sillimanite, Andalusite, Tremolite, Diopside, Nepheline.

**(PRACTICAL - 508)**

Total Marks: **50**

Passing standard: **20 Marks**

**1. Study of the physical properties of the following rocks:**

- Anorthosite, Pyroxenite, Schrol Rock, Greisen Rock, Luxullianite, Norite. Dunite, Dolerite, Pitchstone, Andesite, Breccia, Grit, Oolitic and Pisolitic Limestone, Phyllite, Schist-Different Varieties, Granulite, Peat, Lignite, Bituminous, Anthracite, China Clay, Fire Clay, Laterite.

**2. Study of the following rocks in thin sections:**

- Granite, Syenite, Gabbro, Dolerite, Rhyolite, Trachyte, Basalt, Conglomerate, Sandstone, Limestone – fossiliferous, Quartzite, Marble, Mica-schist, Gneiss. Hypersthene granite, Diorite, **Picrite**, Andesite, Limburgite, Sillimanite garnet gneiss, Andalusite schist, Actinolite schist.

**(PRACTICAL - 509)**

Total Marks: **50**

Passing standard: **20 Marks**

1. **Study of the physical properties of the Ores:**
  - Stibnite, Rutile, Psilomelane, Cassiterite, Corundum, Wolframite, Azurite,
2. **Classification of crystals** in to Hexagonal, Monoclinic and Triclinic System. Study of their Elements of Symmetry
3. **Stereographic projection** of Hexagonal, Monoclinic and Triclinic System.



**PATTERN OF QUESTION PAPER FOR SEMESTER-END PRACTICAL EXAM**

**KSKV Kutch University: BHUJ**

B.Sc. Semester 5 (FIVE)

**SUBJECT: GEOLOGY**

**(PRACTICAL- 507)**

Total Marks: **50**  
Centre: BHUJ

Passing standard: **20 Marks**

Time: 9:30 onwards

Place: Shri R. R. Lalan College, Bhuj

**QUESTION PAPER**

- Q-1** Identify the **Mineral sections M1 to M4** in **Group no. 1**. Give their optical properties. State the origin of each Mineral. Draw neat sketch of each section showing typical characters. **(20 Marks)**
- Q-2** Identify the **Mineral specimen** megascopically in **Group no. 2**. Give their physical properties, chemical composition, crystal system and origin. **(15 Marks)**
- Q-3** State the type of **Interference figure** shown by Anisotropic Mineral section in **Group no. .** Determine the **Optic sign** of the section with the help of **Fast accessories** supplied to you. Draw labelled sketch of each. **(10 Marks)**
- Q-4** **Viva voce.** **(5 Marks)**

**(PRACTICAL- 508)**

**QUESTION PAPER**

- Q-1** Identify the **Rock sections R1 to R4** in **Group no. &** . Give their textures, mineral constituents in the order of abundance & origin with reasons. **(10 Marks)**
- Q-2** Describe the **rock specimen** megascopically in **Group no. to** , giving their textures, mineral constituents in the order of abundance, origin and structures **(15 Marks)**
- Q-3** Describe the **rock specimen** megascopically in **Group no. and** , giving their textures, origin and structures. Draw neat labelled diagram of the structure if any. **(15 Marks)**
- Q-4** Field reports and **Viva-Voce** **(10 Marks)**

---

**(PRACTICAL- 509)**

**QUESTION PAPER**

- Q-1** Describe the given **Crystal models** with reference to their crystal system, elements of symmetry, type and forms with indices in **Group no.** . State the twin laws, twin planes if any. Give the name of the Mineral represented by the model. **(20 Marks)**
- Q-2** Describe **using neat sketch (stereographic projection)**, the given **Crystal models** with reference to their crystal system, elements of symmetry, type and forms with indices in **Group no.** State the twin laws, twin planes if any. Give the name of the Mineral represented by the model. **(10 Marks)**
- Q-3** Identify the **Ore specimen** megascopically in **Group no. 2.** Give their physical properties, chemical composition, crystal system and origin. **(15 Marks)**
- Q-4** Certified Journal and Viva Voce **(5 Marks)**