

Krantiguru Shyamji Krishna Verma

**Kachchh University**

**BHUJ : 370 001**



**SYLLABUS (CBCS)**

**Semester 3 and 4**

**GEOLOGY**

(With effect from June 2012)

**K.S.K.V. KACHCHH UNIVERSITY**  
**SYLLABUS OF B. Sc. (GEOLOGY)**  
(In force from June 2012)

**SEMESTER-3**

**GEO-303/CE DYNAMICAL GEOLOGY**

**Unit : 1 Earthquakes and Volcanoes (15 Marks)**

- Volcanoes– Types, Causes, Effects, Products and Distribution.
- Earthquakes– Definition, Mechanism of Earthquakes, Seismic Waves, Scales of Earthquake, Earthquake Prediction, Seismograph and Seismogram, Effect of Earthquake, Tsunami, Seismic Belts, Outline of Plate Tectonics

**Unit : 2 Dynamics of The Earth (15 Marks)**

- Mountains – Causes, Types, Distribution.
- Diastrophism – Evidences of Upheaval and Subsidence.
- Atmospheric circulation, weather and climate changes- Structure of Atmosphere, Land–Air–Sea interaction, Earth’s Heat Budget and Global Climatic Changes.

**Unit : 3 Physical Geology: (15 Marks)**

- Weathering, Erosion, Denudation, Transportation and Deposition.
- Geological agents – Glaciers, Rivers, Lakes, Winds.

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

- Distribution of seas and oceans across the world.
- Movements of sea water: Currents, waves and tides, hypsographic curve,
- Marine erosion and deposition.

**Reference Books:**

- Introduction to Physical Geology, A. K. Datta, Kalyani Publisher, New Delhi.
- A Text Book of Geology, P. K. Mukerjee, World press.
- A Text Book of Geology with Special Reference to India, G. B. Mahapatra.
- General Geology, V. Radhakrishnan (1987), V.V.P. Publishers, Tuticorin.
- Principles Physical Geology, Arthur Holmes (1978), ELBS.
- Patwardhan, A.M. (1999): The Dynamic Earth System. Prentice Hall.

**KSKV Kachchh University, BHUJ**  
SECOND YEAR B.Sc. : Semester : 3 (THREE)  
SUBJECT : GEOLOGY (THEORY)  
(Paper 3)

Total Marks : **60**

Passing standard : **24 Marks**

Duration : **3 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>	–do–	<b>05</b>
	<b>B</b>	–do–	<b>10</b>
<b>Que – 3</b> Unit – III	<b>A</b>	–do–	<b>05</b>
	<b>B</b>	–do–	<b>10</b>
<b>Que – 4</b> Unit – IV	<b>A</b>	–do–	<b>05</b>
	<b>B</b>	–do–	<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.**

### SEMESTER-3

## **GEO-304/CE MINERALOGY & PETROLOGY**

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

- Nature of Light, Phenomenon of Polarisation, Reflection, Refraction, Double Refraction, Construction of Nicol Prism, Petrological Microscope and Its Parts. Passage of Light through Nicol Prism, Properties of Isotropism, Anisotropism. R.I. of Minerals, Beck's Test and Its Effects. Twinkling, Pleochroism, Extinction. Elementary Knowledge of Interference Colors and Twinning.

### **Unit : 2 Crystallography: (15 Marks)**

- Definition, Characteristics, Laws of Crystallography, Interfacial angle, Elements of symmetry, Parameters system of Weiss and Miller Indices. Classifications of crystals, Crystal systems: Cubic, Tetragonal and Orthorhombic – their study with examples in detail

### **Unit : 3 Igneous Petrology: (15 Marks)**

- **Igneous rocks:** Magma: Definition & composition, Modes of occurrence of Intrusive and Extrusive structures, Detailed study of textures and classifications of igneous rocks.

### **Unit : 4 Sedimentary and Metamorphic petrology: (15 Marks)**

- **Sedimentary Petrology:** Detailed study of structures and composition of common sedimentary rocks. Descriptive study of Residual, clastic, Chemical and organic deposits
- **Metamorphic Petrology:** structures and classifications of metamorphic rocks, Metamorphic grades and facies.

#### **Reference Books:**

- Rutley's Elements of Mineralogy, H. H. Read, CBS publishers.
- Introduction to Rock Forming Minerals, R. A. Deer, R. E. Howie and J. Zussman (1978), The English Language Book Society.
- Elements of Optical Mineralogy, N. H. Winchel, A. N. Winchel (1968), Willey, Delhi.
- The Principles of Petrology, G. W. Tyrell (1960), Asia Publishing House.
- Petrology, W. T. Haung (1962), Mc. Graw Hill.
- Dana's Text Book of Mineralogy Revised by W.E. Ford, Wiley Eastern Ltd., New Delhi.

**KSKV Kachchh University, BHUJ**  
SECOND YEAR B.Sc. : Semester : 3 (THREE)  
SUBJECT : GEOLOGY (THEORY)  
(Paper 4)

Total Marks : **60**

Passing standard : **24 Marks**

Duration : **3 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
Que- 1 Unit – I	A	(Objective type) ( <i>no internal option</i> )	<b>05</b>
	B	(Descriptive - Essay type / Short notes <i>with internal option</i> )	<b>10</b>
Que – 2 Unit –II	A	–do–	<b>05</b>
	B	–do–	<b>10</b>
Que – 3 Unit – III	A	–do–	<b>05</b>
	B	–do–	<b>10</b>
Que – 4 Unit – IV	A	–do–	<b>05</b>
	B	–do–	<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**  
SECOND YEAR B.Sc. : Semester : 3(THREE)  
SUBJECT : GEOLOGY  
(PRACTICALS)

Total Marks : **100**

Passing standard : **40 Marks**

1. Study of the physical properties of the common rock forming minerals: Beryl, Garnet, Asbestos, Hornblende, Augite, Tourmaline, Olivine, Baryte, Halite, Magnesite, Aragonite, Dolomite.
2. Determination of specific gravity of minerals by Walker Steelyard Balance and Jolly's spring Balance.
3. Study of the physical properties of the Ores: Magnetite, Hematite, Limonite, Siderite, Ilmenite, Chromite, Pyrolusite, Pyrite, Chalcopyrite, Galena, Sphalerite Malachite, Azurite, Bauxite.
4. Classification of crystals in to six types. Study of Elements of Symmetry of Eleven (11) types of symmetry.
5. Megascopic identification of typical rocks: Granite, Syenite, Gabbro, Dolerite, Rhyolite, Trachyte, Andesite, Obsidian, Pumice, Scoria (Volcanic Tuff), Pitchstone, Grit, Kaolin clay, Bentonite, Slate, Phyllite, Quartzite.

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

**KSKV Kachchh University, BHUJ**  
SECOND YEAR B.Sc. : Semester : 3(THREE)  
SUBJECT : GEOLOGY  
(PRACTICALS)

Total Marks : **100**

Passing standard : **40 Marks**

**QUESTION PAPER**

**Q-1 Identify the Mineral specimen** megascopically in **Group no.** To . Give their physical properties, chemical composition, crystal system and at least two uses.

**(20 Marks)**

**Q-2 Determine the Specific gravity** of the given mineral samples with the help of instruments provided to you.

**(10 Marks)**

**Q.3 Identify the Ore specimen** megascopically in **Group no.** to . Give their physical properties, chemical composition, crystal system and at least two uses.

**(20 Marks)**

**Q-4 Describe the Rock specimen** megascopically in **Group no.** to ,giving their textures, mineral constituents in the order of abundance, origin and structures if any.

**Q-5 Give the Elements of symmetry** along with type, crystal system for the given crystal models in **Group no.** to.

**(15 Marks)**

**Q-6 Certified Journal and Viva Voce**

**(10 Marks)**

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**K.S.K.V. KACHCHH UNIVERSITY**  
**SYLLABUS OF B. Sc. (GEOLOGY)**

(In force from June 2012)

**SEMESTER- 4**

**GEO- 405/CE STRATIGRAPHY & HYDROGEOLOGY**

**Unit : 1 General Stratigraphy: (15 Marks)**

- General principles of Stratigraphy, Stratification, Geological Time scale – major divisions, Correlation and Homotaxis of strata, lithostratigraphic, chronostratigraphic and biostratigraphic units. Imperfection of geological records – their causes and importance, Concept of Zone fossils and Index fossils.

**Unit : 2 Indian Stratigraphy: (15 Marks)**

- Physiographic and structural subdivisions of India and their characteristics. Classification of geological formations of India. Brief account of different geological formations of India. Study of Archean and Dharwar formations of India along with their economic importance.

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

- Terminology, Hydrological cycle, Hydrological properties of rocks - porosity, permeability, specific yield.; Subsurface classification of ground water. Classification of aquifers. Darcy's law and its validity; Ground water as a geological agent, Springs,

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

- Basic concepts and significance. Land forms: their types and nature of development; land forms in relation to structures and drainage patterns. Major geomorphological sub-divisions of India; their characteristics and drainage pattern.

**Reference Books:**

- Geology of India, D. N. Wadia (1978), Tata Mc. Graw Hill.
- Ground Water, C. E. Tallman (1937), Mc Graw Hill
- Geomorphology, Enayat Ahmed, Kalyani Publisher, New Delhi.
- Principles of Geomorphology, W. D. Thornbury (1969), John Willey Inc..



# KSKV Kachchh University, BHUJ

SECOND YEAR B.Sc. : Semester : 4(FOUR)

SUBJECT : GEOLOGY (THEORY)

(Paper 5)

Total Marks : 60

Passing standard : 24 Marks

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

**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.**

## SEMESTER- 4

### **GEO- 406/CE ECONOMIC & APPLIED GEOLOGY**

#### **Unit : 1 Economic Geology: (15 Marks)**

- Introduction to common rock forming, ore forming and industrial minerals.
- Basic ideas about the methods of mineral exploration.
- Important economic minerals of India.
- Study of the following economic minerals with reference to India: Mica, Iron-, Manganese-, Chromium-, Aluminium-ores, Diamond, Asbestos,

#### **Unit : 2 Industrial minerals and Fossil fuels: (15 Marks)**

- Minerals used for Cement, Glass and Ceramic industries. Fertilizer minerals.
- Fossil fuels: Coal Petroleum and Natural gas.: their Origin, Distribution and economic significance in global context.

#### **Unit : 3 Applied Geology: (15 Marks)**

- Maps, Scales – their representation on maps, use of clinometer compass.
- Soils – definition, classification, composition, texture, fertility, chief types and soil profile. Soil-erosion and conservation.

#### **Unit : 4 Structural Geology: (15 Marks)**

- Terminology, Elevation and Relief, Contours, Outcrops, Dip, Strike, Unconformity and Overlap. Inliers and Outliers. Types of Stresses. Structures In Rocks – Primary and Secondary. Elementary Study of Joints, Faults, and Folds – Their Types and Classification. Criteria to find out faults, folds, intrusions in the field.

#### **Reference books:**

- Mineral Economics, R. K. Sinha and N. L. Sharma (1981), Oxford IBH Publishers.
- Manual of Geological Maps, Gokhale.
- Structural Geology, M. P. Billings (1977), Prentice Hall.
- India's Mineral Resources, S. Krishnaswamy, (1979) Oxford & IBH Co.
- Engineering and General Geology, Parbin Singh (1994), S.K. Kataria and Sons, Delhi.

# KSKV Kachchh University, BHUJ

SECOND YEAR B.Sc. : Semester : 4(FOUR)

SUBJECT : GEOLOGY (THEORY)

(Paper 6)

Total Marks : 60

Passing standard : 24 Marks

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

**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**

SECOND YEAR B.Sc. : Semester : 4(FOUR)

SUBJECT : GEOLOGY

(PRACTICALS)

Total Marks : **100**

Passing standard : **40 Marks**

1. Drawing of contours depicting typical landforms.
2. Sections and descriptions of Geological Maps with Horizontal and Inclined continuous One series strata with Inliers, Outliers and Igneous Intrusions.
3. Outcrop filling problems of Horizontal and Inclined strata.
4. Geometrical solutions of simple structural problems– width of Outcrop, True Thickness and Vertical Thickness.
5. Exercise on showing the major stratigraphic and lithotectonic units in geological map of India.
6. Use of Clinometer and Brunton Compass.
7. Compulsory field work in a suitable geological area to study the elementary aspects of field geology.

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

**KSKV Kachchh University, BHUJ**  
SECOND YEAR B.Sc. : Semester : 4(FOUR)  
SUBJECT : GEOLOGY  
(PRACTICALS)

Total Marks : **100**

Passing standard : **40 Marks**

**QUESTION PAPER**

- Q-1** Draw a section of given **Map** along provided section line. Describe physiography, geology, structural features and geological history of the area. *(25 Marks)*
- Q-2** Draw a section of given **Map** along provided section line. Describe physiography, geology, structural features and geological history of the area. *(25 Marks)*
- Q-3** Complete the given **Outcrop filling problem** with the help of given data. *(20 Marks)*
- Q-4** Solve the given **Geometrical Problem** *(15 Marks)*
- DATA: DATA WILL BE PROVIDED BY THE EXAMINER SCALE : 1 CM = 30 MTS.**
- Q-5** **Certified Journal and Viva voce** *(10 Marks)*
- Q-6** **Field work report, Use of Field instruments** *(05 Marks)*