



*Sample Paper  
&  
Question Paper Pattern*

2023  
2024

GOA BOARD

**GOA BOARD OF SECONDARY AND HIGHER SECONDARY  
EDUCATION**

**GEOLOGY SYLLABUS STD XI**

**FOR THE ACADEMIC YEAR 2023-2024 ONWARDS**

**Objectives**

The students should be able to:-

- a) Understand the basic concept of Geology
- b) Understand the nature of the planet Earth.
- c) Become acquainted with the fundamentals of mineralogy, petrology, structural, Geology, Economic Geology and stratigraphy
- d) Develop an interest in and enthusiasm for observing nature and its process at work.
- e) Develop an awareness of problems of environment and identify measures to overcome them.
- f) Understand and interpret geological information presented in verbal, cartographical, or illustrative form and translate such information one form to another.
- g) Develop an ability to use and interpret to graphical and geological maps
- h) Understand the contemporary nature of Geology
- i) Link Geology with different areas of national development.

**Geology syllabus for STD XIth science**

**UNIT 1 EARTH (periods) –20**

**1) Introduction to the science of Geology**

Definition, Importance and various branches of Geology. Relation to other sciences, Interdisciplinary nature of the subject.

**2) Earth as planet**

Important parts of earth--- Atmosphere, Lithosphere and Hydrosphere. Age of the earth--- Brief mention of method, Origin of earth—theories of origin of earth, nebular hypothesis, Tidal hypothesis and gas dust hypothesis. Evolution of continents and oceans.

**3) Internal structure of earth**

Description of crust, mantle, and core with respect to their chemical composition, rock types, depth and thickness, brief mention of direct and indirect evidence.

**UNIT II EXTERNAL PROCESS AFFECTING THE EARTH'S CRUST (PERIODS) – 49**

- 1) Weathering and Erosion** --- Types of erosion, weathering and deep physical weathering—Frost action, Thermal effect, chemical weathering, solution, hydration, oxidation, reduction, hydrolysis and leaching carbonation, colloid formation, factors affecting weathering, products of weathering.

**2) Soil**

Introduction, constitution, physical, attributes soil formation, soil profile, classification as soils- Geological classification, soil groups of India, soil erosion and its control

**3) Geological action of rivers**

Introduction, Terminology, sources of stream water, Geological work, method of river erosion, rate of river erosion, Feature of stream erosion--- pot holes, water fall, gorges and river valleys,

River transportation, River deposition and its features—Alluvial fan, Flood plain, and deltas, oxbow lakes. Study of drainage pattern.

**4) Geological action of ground water.**

Introduction, ground water and man, sources of ground water, hydrological cycle zonal distribution, Aquifer and their types porosity and permeability, Artisan aquifer. Different rocks as aquifers, well, springs, and chemical work, constructive and management of ground water.

**5) Geological action of wind**

Introduction, wind erosion ---- Deflation, abrasion, attrition, wind, transportation, wind deposition, and its features.

**6) Geological action of Ice-glaciers**

Introduction, Glacial morphology, types of glaciers, geological work, Glacial erosion, and its rate. Features of glacial erosion---striations, glacial trough, hanging valleys, glacial transport, movement of glaciers, glacial deposits, morphological notes, glaciations in past, ice ages and their causes.

**UNIT –III APPLIED GEOLOGY (periods) 20**

**1) Mass Movements**

Introduction, classification, causes of mass movement, nature of slope, role of water, composition of mass, structure types of mass movements- soil creep, soilfluction, mudflows, slides—rocks slide, subsidence, control and monitoring of mass movements

**2) Building stones**

Study of rocks use as building material w.r.t. strength, durability, color, study of following rocks as building materials, granite, Basalt, sandstone, limestone, marble.

**UNIT IV MINEROLOGY (Periods) 20**

**1) Introduction to crystallography**

Definition of crystal, crystal faces, interfacial angle.

Crystal symmetry—plane, axis, center crystal classes and system. Study of following crystal system w.r.t. definition, Axial diagram, symmetry of normal class. Example of minerals crystallizing in a) Cubic b) Tetragonal c) Triagonal e) Orthorhombic f) Monoclinic g) Triclinic

**2) Study of physical properties of Minerals**

Definition and concept of mineral. Study of following physical properties color, luster streak, fracture, cleavage, hardness, habit, chemical composition, and sp.gravity

**3) Rock forming minerals**

Study of following rock forming minerals group a) silica b) Feldspar c) Mica d) Amphibole e) Olivine f) Pyroxene w.r.t. physical properties, chemical composition and use.

**UNIT V PETROLOGY (periods) 33**

**1) Igneous rocks**

Introduction, definition, Magma its generation and composition, volcanic Hypabyssal and plutonic rocks

Texture – coarse, medium and fine

Structure – flow, pillow, ropy, vesicular, columnar, and amygdaloidal, forms of igneous rocks.

Study of following rocks Granite, Diorite, Syenite, Gabbro, Dunite with their volcanic and glassy

equivalents.

**2) Sedimentary rocks**

Introduction, formation, structures

Mechanical ---- Stratification, Lamination, Cross bedding, graded bedding, mud cracks, rain prints ripple marks w.r.t. their uses.

Chemical --- Pisolitic

Classification based on mode of origin study of following rocks laterite, bauxite, sandstone, shale, conglomerate, limestone, and breccias.

**3) Metamorphic rocks**

Introduction, Definition, kinds of metamorphism, Agents of metamorphism, structures of metamorphic rocks, classification

Study of following rocks: - slate, Phyllite, schist's, gneiss, marble and quartzite.

**UNIT VI MAPS (periods) 10**

**1) Map reading**

Definition of map, introduction to various elements of map, scale and their types, types of maps, contour and their use.

**2) Bearings**

Definition, fore, and back bearing, types of bearing, whole circle Quadrantal, conversions of bearings

**3) Slope analysis**

Definition, types of slopes- concave, convex, and uniform .calculation of slope using geometric methods and expressing it as gradient, degrees etc.

**PRACTICAL COURSE FOR XI SCIENCE**

**1) Description and Identification of crystal models with respect to axis, plane and center of symmetry.**

Isometric system, Tetragonal system, Hexagonal system, Trigonal system, orthorhombic system, monoclinic system, and triclinic system.

**2) Description and Identification of Rock Forming mineral w.r.t to their physical properties.**

Crystalline varieties quartz (min four), crypto-crystalline varieties of quartz (min four), orthoclase, microcline, Hornblende, Actinolite, tremolite, asbestos, Biotite, Muscovite, olivine, calcite, nepheline, stilbite.

**3) Description and Identification of rocks**

Igneous rocks----- Granite, Rhyolite, Gabbro, Dolerite, Basalt, Diorite, Syenite, Trachyte,

Sedimentary rocks- Breccia, conglomerate, sandstone, limestone, coal, shelf limestone, laterite, bauxite.

Metamorphic rocks---- marble, quartzite slate, Phyllite, mica schist hornblende schist gneiss.

**4) Map work**

Orientation of map, location of position, determine features bearing and distances determination

of gradients on contour map.

**5) Study of contour maps with profile sections**

Identification of following relief features

- 1) (Symmetrical and asymmetrical)
- 2) Valley (u and v shaped)
- 3) Ridge
- 4) Plateau
- 5) Basin
- 6) Spur

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**PATTERN AND DESIGN OF THEORY QUESTION PAPERS (2023-2024)**  
**CLASS XI SCIENCE**

|                        | MID TERM                                       | 1st Terminal                                 |                                   |                 | 2nd Terminal                                 |                                                                   |
|------------------------|------------------------------------------------|----------------------------------------------|-----------------------------------|-----------------|----------------------------------------------|-------------------------------------------------------------------|
| TIME IN MINS/HR        | 60/ONE HOUR                                    | TWO& HALF HOUR                               |                                   | INNOVATIVE TEST | TWO& HALF HOUR                               |                                                                   |
| MAX MARKS              | 20(THEORY)                                     | 60(THEORY)                                   | 20 (PRACTICAL)                    | 20              | 60                                           | 20 (PRACTICAL)                                                    |
| NO OF QUESTIONS        | 2                                              | MCQ and subjective questions                 |                                   |                 | MCQ and subjective questions                 | 5                                                                 |
| WEIGHTAGE TO OBJECTIVE | KNOWLEDGE:25%<br>UNDESTANDING AND SKILL: 50%   | KNOWLEDGE:25%<br>UNDESTANDING AND SKILL: 50% |                                   |                 | KNOWLEDGE:25%<br>UNDESTANDING AND SKILL: 50% |                                                                   |
|                        | APPLICATION:25%                                | APPLICATION:25%                              |                                   |                 | APPLICATION:25%                              |                                                                   |
| WEIGHTAGE TO CONTENTS  | Introduction to the science to geology (2)     | 1 earth as a planet(15)                      | 1.Identification of minerals (10) |                 | 1.Igneous rocks(15)                          | 1. drawing of contours and cross section of various landforms (8) |
|                        | 2.Introduction to crystallography(6)           | 2. Mineralogy (15)                           | 2. Study of crystal modals (8)    |                 | 2.sedimentary rock(10)                       | 2. identification of rocks (10)                                   |
|                        | 3. study of physical properties of minerals(6) | 3. Geological action of rivers(5)            | Viva(2)                           |                 | 3.metamorphic rocks(10)                      | Journal & Viva(2)                                                 |
|                        | 4. Rock forming minerals(6)                    | 4. Geological action of wind (5)             |                                   |                 | 4. mass movement (10)                        |                                                                   |
|                        |                                                | 5.weathering and erosion (5)                 |                                   |                 | 5.building stone (5)                         |                                                                   |
|                        |                                                | 6. Geological action of glacier's (5)        |                                   |                 | 7.Map reading, Bearings & slope analyses(5)  |                                                                   |
|                        |                                                | 7. soil (5)                                  |                                   |                 | 8. Geological action of ground water (5)     |                                                                   |
|                        | Total marks: 20                                | Total marks: 60                              | Total marks: 20                   | Total marks: 20 | Total marks: 60                              | Total marks 20                                                    |

**THEORY MARKS:-**

Midterm Examination-----20 MARKS

1st Terminal-----**60 MARKS (Theory)**

2nd Terminal-----**60 MARKS (Theory)**

TOTAL-----**140/2=70MARKS**

1st Terminal-----**20 MARKS (Practical)**

2nd Terminal-----**20 MARKS (Practical)**

INNOVATIVE TEST-----20 MARKS

TOTAL-----**60/2=30MARKS**

# GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

**Matter pertaining to scheme of evaluation in Geology for STD XII for the academic year  
2023-2024 Onwards**

Scheme In General  
Board Examination- marks-90  
Internal Assessment- marks-10  
Total-100

## Pattern of board examination (External Component)

| Examination                             | Total Marks | Type of questions                      | Topic/Unit                         | Marks allotted | weightage  |
|-----------------------------------------|-------------|----------------------------------------|------------------------------------|----------------|------------|
| <b>Final Board Examination (Theory)</b> | <b>70</b>   | <b>M.C.Q. And Subjective questions</b> | <b>1.Economic Geology</b>          | <b>12</b>      | <b>17%</b> |
|                                         |             |                                        | <b>2.Structural Geology</b>        | <b>16</b>      | <b>23%</b> |
|                                         |             |                                        | <b>3.Petrology</b>                 | <b>12</b>      | <b>17%</b> |
|                                         |             |                                        | <b>4.Dynamical Geology</b>         | <b>16</b>      | <b>23%</b> |
|                                         |             |                                        | <b>5.Stratigraphy paleontology</b> | <b>14</b>      | <b>20%</b> |
| <b>Practical coarse</b>                 | <b>20</b>   | <b>As per the draft circulated</b>     | <b>As per the draft circulated</b> | <b>20</b>      |            |
| <b>Total</b>                            | <b>90</b>   |                                        |                                    | <b>90</b>      |            |

## Pattern of internal Assessment

| Test               | Total Marks | Type of questions                                      | Topic/Unit                                             |
|--------------------|-------------|--------------------------------------------------------|--------------------------------------------------------|
| <b>First test</b>  | <b>20</b>   | <b>Subjective questions carrying 1,2,3 and 4 marks</b> | <b>Economic Geology</b>                                |
| <b>Second test</b> | <b>20</b>   | <b>Subjective questions carrying 1,2,3 and 4 marks</b> | <b>Structural Geology<br/>Petrology</b>                |
| <b>Third test</b>  | <b>20</b>   | <b>Different innovative topics related to Geology*</b> | <b>Presentations/ creations/other innovative ideas</b> |
| <b>Total</b>       | <b>60</b>   |                                                        |                                                        |

**60 marks to be calculated out of 10**

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**Suggested topics for third test (innovative type)**

- 1. Individual collection of rock samples**
- 2. Individual collection of mineral samples**
- 3. Preparation of mineral map of India**
- 4. Preparation of Geological models/ chart of India**
- 5. Collection of different type of soil samples**
- 6. Individual Collection of photographs of Geological features.**

**Note:**

**The teacher is free to suggest innovative ideas to students or is free to accept ideas suggested by students other than those mentioned above.**

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MODEL QUESTION PAPER 2023-2024 ONWARDS

TIME: 2 ½ HOURS

GEOLOGY

Total No. of Questions: 35

Max. Marks: 70

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**INSTRUCTIONS:**

- (i) *All questions are compulsory.*
- (ii) *Draw neat labeled diagram wherever necessary.*
- (iii) *Answer each question on afresh page*
- (iv) *Figures to the right indicate full marks.*
- (v) *The question paper consists of FOUR SECTIONS. A,B,C and D*
  - a. *Section A has 14 questions 01 mark each*
  - b. *Section B has 10 questions 02 mark each*
  - c. *Section C has 08 questions 03 mark each*
  - d. *Section D has 03 questions 04mark each*
- (vi) *The total number of questions in the paper are 35*
- (vii) *There is no overall choice, however an intern-al choice is provided in one question of SECTION C and two questions of SECTION D*
- (viii) *Select the proper alternative for multiple choice type questions and write the completed statement. Multiple choice type questions should be attempted only once*
- (ix) *Answer to the questions carrying 1, 2, 3, and 4 marks should be written in 1 to 10, 50, 80 and 120 words.*

## Section A

- 1 'Oceanic Trench' is a feature related to ..... 1
- (a) Transform Faults
  - (b) Subduction Zone
  - (c) Mid Oceanic Ridge
  - (d) Constructive Plate Margins
- 2 The mineral least likely to occur as 'Placer Deposit' is \_\_\_\_\_. 1
- (a) Magnetite
  - (b) Diamond
  - (c) Chromite
  - (d) Galena
- 3 The fold with inclined 'Axial plane' is \_\_\_\_\_. 1
- (a) Recumbent fold
  - (b) Symmetrical Syncline
  - (c) Symmetrical anticline
  - (d) Overturned Fold
- 4 If the rocks of 'Mesozoic Era' are found rusting over rocks of 'Paleozoic Era' the geological feature could be \_\_\_\_\_. 1
- (a) Reverse Faults
  - (b) Thrust Faults
  - (c) Normal Stratigraphic Sequence
  - (d) Overturned Fold
- 5 The pair of rock not related from the following is \_\_\_\_\_. 1
- (a) Gabbro-Dolerite
  - (b) Diorite-Andesite
  - (c) Granite- Rhyolite
  - (d) Syenite- Basalt
- 6 Deposits of coal are confirmed to \_\_\_\_\_. 1

- (a) Magnetite
- (b) Chromite
- (c) Calcite
- (d) Chalcopyrite

7 If the strata of the joint is parallel to dip of the bed, it will be termed as \_\_\_\_\_ 1

- (a) Master Joint
- (b) Strike Joint
- (c) Dip Joint
- (d) Dip -Strike Joint

8 State the 'Essential minerals' in rock 'Gabbro'. 1

9 What do you understand by the term 'Hade' of the fault? 1

10 Name the oldest rock in the Stratigraphic sequence of Goa 1

11 Define 'Gangue' in relation to economic geology 1

12 What kinds of mountains are related to "Laccoliths"? 1

13 Name a mechanical rudaceous rock. 1

14 In which rock do we encounter "Gasa Veins"? 1

### Section B

15 A seismic recording station located at  $150^0$  from the epicenter, only records P waves. Explain 2

16 Explain the concepts 'Throw' and 'Heave' in structural geology? 2

17 Illustrate and explain the concept of 'Apparent Dip'? 2

18 'Quartz' and 'Orthoclase' are often found together in igneous rocks. Explain 2

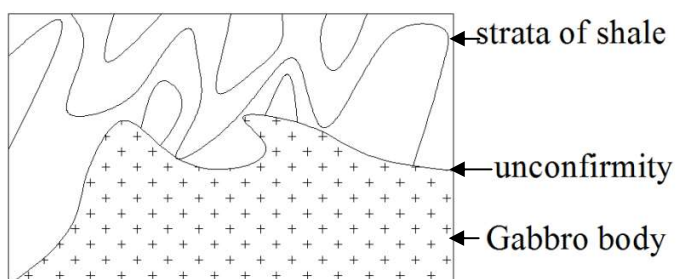
19 Differentiate between 'Sandstone' and 'Shell limestone' 2

20 Write the metamorphic products of the following 2

- (i) Shale  
(ii) Limestone
- 21 State the classification of 'Cuddapah' supergroup 2  
OR  
State the classification of 'Vindhyan supergroup'. 2
- 22 Differentiate between an Anticline and a Syncline 2
- 23 What do you understand by the following terms with reference to crude oil? 2  
(i) Source rocks  
(ii) Cap rock
- 24 Explain deposits of 'Early magmatic segregation' 2

### Section C

- 25 Write a brief note on the distribution of 'Evaporite' deposits of India 3
- 26 Explain various time units with reference to standard geological time scale. 3
- 27 Draw and explain types of volcanic cones. 3
- 28 Illustrate and explain 'Slaty Cleavage' and 'Gneissosity' with reference to metamorphic rocks 3
- 29 Study the following diagram, identify the type of unconformity and explain its evolution 3



- 30 How are coal deposits classified? 3
- 31 Write a brief note on various 'Pyroclastic' products of volcanoes. 3
- OR
- List out various effects of an earthquake.
- 32 What is an 'Index Fossil'? Illustrate its use in stratigraphy. 3

#### Section D

- 33 Explain the procedure to determine the 'Epicenter' of an earthquake. 4
- OR
- Explain the concept of 'Seismic discontinuity' with examples
- 34 Describe the stratigraphy of 'Goa Group' 4
- OR
- Describe the various modes of preservation of fossils 4
- 35 Draw and explain various elements of 'Fold' 4

The weightage or the distribution of marks over different dimensions of the question paper shall be as follows:

1. **WEIGHTAGE TO LEARNING OUTCOMES:**

| <b>SR.NO.</b> | <b>LEARNING OUTCOMES</b> | <b>MARKS</b> | <b>PERCENTAGE OF MARKS</b> |
|---------------|--------------------------|--------------|----------------------------|
| <b>1.</b>     | <b>KNOWLEDGE</b>         | <b>21</b>    | <b>30</b>                  |
| <b>2.</b>     | <b>UNDERSTANDING</b>     | <b>28</b>    | <b>40</b>                  |
| <b>3.</b>     | <b>APPLICATION</b>       | <b>14</b>    | <b>20</b>                  |
| <b>4.</b>     | <b>SKILL</b>             | <b>07</b>    | <b>10</b>                  |
|               | <b>TOTAL</b>             | <b>70</b>    | <b>100</b>                 |

2. **WEIGHTAGE TO CONTENT/SUBJECT UNITS:**

| <b>SR. No.</b> | <b>Units</b>              | <b>Marks</b> |
|----------------|---------------------------|--------------|
| <b>1.</b>      | <b>Economic Geology</b>   | <b>12</b>    |
| <b>2.</b>      | <b>Structural Geology</b> | <b>16</b>    |
| <b>3.</b>      | <b>Petrology</b>          | <b>12</b>    |
| <b>4.</b>      | <b>Dynamical Geology</b>  | <b>16</b>    |
| <b>5.</b>      | <b>Stratigraphy</b>       | <b>14</b>    |
|                | <b>Paleontology</b>       |              |
|                | <b>TOTAL</b>              | <b>70</b>    |

### 3. WEIGHTAGE TO FORMS OF QUESTIONS:

| SR.NO | Form of Questions           | Marks for each question | Number of questions | Total Marks |
|-------|-----------------------------|-------------------------|---------------------|-------------|
| 1.    | Long Answer Type (LA)       | 04                      | 03                  | 12          |
| 2.    | Short Answer Type (SA-I)    | 02                      | 10                  | 20          |
| 3.    | Short Answer Type (SA-II)   | 03                      | 08                  | 24          |
| 4.    | Very Short Answer Type(VSA) | 01                      | 07                  | 07          |
| 5     | Multiple choice question    | 01                      | 07                  | 07          |
|       | <b>Total</b>                |                         | <b>35</b>           | <b>70</b>   |

The expected time for different types of question would be as follows:

| SR.N O. | Form of Questions                 | Approx. time for each Question in mins (t) | Number of questions (n) | Approx. time for each form of Questions in mins (n x t) |
|---------|-----------------------------------|--------------------------------------------|-------------------------|---------------------------------------------------------|
| 1.      | Long Answer Type (LA) (04)        | 12                                         | 03                      | 12x03= 36                                               |
| 2.      | Short Answer Type (SA-I) (02)     | 03                                         | 10                      | 03x10=30                                                |
| 3.      | Short Answer Type (SA-II) (03)    | 07                                         | 08                      | 07x08=56                                                |
| 4.      | Very Short Answer type (VSA) (01) | 02                                         | 14                      | 02x14=28                                                |
|         | <b>Total</b>                      |                                            | <b>35</b>               | <b>150Minutes</b>                                       |

**GOA BOARD OF SECONDARY AND HIGHER SECONDARY  
EDUCATION**

**Matter pertaining to scheme of evaluation in Geology for STD XII (Practical) for the  
academic year 2023-2024**

| <b>Sr.<br/>No</b> | <b>Syllabus</b>                                                        | <b>Total Marks</b> |
|-------------------|------------------------------------------------------------------------|--------------------|
| <b>1</b>          | <b>Description and identification of<br/>Economic Minerals</b>         | <b>4</b>           |
| <b>2</b>          | <b>Description and identification of<br/>rocks</b>                     | <b>4</b>           |
| <b>3</b>          | <b>Description and identification of<br/>Structural Geology models</b> | <b>4</b>           |
| <b>4</b>          | <b>Study of Geological Maps</b>                                        | <b>4</b>           |
| <b>5</b>          | <b>Study of Survey of India<br/>Topographic maps</b>                   | <b>2</b>           |
| <b>6</b>          | <b>Journal and Viva</b>                                                | <b>2</b>           |
|                   |                                                                        | <b>20</b>          |

**GOA BOARD OF SECONDARY AND HIGHER SECONDARY  
EDUCATION GEOLOGY SYLLABUS STD XII**

| Unit     | Contents/sub topics                                                                                                                                                                                                                                                                                                | Period    |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>I</b> | <b>Dynamical Geology</b>                                                                                                                                                                                                                                                                                           |           |
| <b>1</b> | Earthquakes- introduction, Focus Epicentre ,seismic waves ,P.S.L waves, magnitude ,brief mention of Richter scale ,Intensity , Isoseismic, causes of earthquakes ,Elastic Rebound theory ,location of Epicenter of earthquakes, global distribution of Earthquakes ,risk zones map of India.                       | <b>8</b>  |
| <b>2</b> | <b>Internal structure of the earth-</b> Introduction seismological evidence ,behaviour of body waves ,shadow zone ,discontinuities, internal structure of the earth as continental crust, oceanic crust, upper mantle ,lower mantle ,outer core ,inner core with respect to their composition thickness and depth. | <b>3</b>  |
| <b>3</b> | <b>Volcanoes-</b> Definition causes of volcanism ,classification based on continuity of eruption, types of eruptions, types of volcanic cones, products of volcanoes ,Deccan trap of volcanism, post of volcanic phenomena hot spring geysers etc.                                                                 | <b>5</b>  |
| <b>4</b> | <b>Mountains –</b> Introduction, classification, as tectonic mountains, volcanic mountains, dome mountains, fold mountains, block mountains, non-tectonic residual mountains with their mode of origin, and examples.                                                                                              | <b>4</b>  |
| <b>5</b> | <b>Plate Tectonics and mountain building-</b> Introduction, divergent, convergent. And strike slip boundaries convergent boundaries-ocean-ocean, ocean-continent and continent-continent interactions with diagrams. Himalayan orogeny, sea of Tethys.                                                             | <b>4</b>  |
|          |                                                                                                                                                                                                                                                                                                                    | <b>16</b> |

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| II  | <b>Structural Geology</b>                                                                                                                                                                                                                                                                                                                                                                                                                                   |    |
| 1   | <b>Strike And Dip</b> -Introduction to basic terms outcrop, bedding, dip, and strike, dip amount, dip direction, apparent and true dip, clinometer compass its use.                                                                                                                                                                                                                                                                                         | 2  |
| 2   | <b>Folds</b> -Introduction, definition, parts of folds into axis, axial plane, width, height and plunge, study of following types of folds- Anticline ,syncline ,overturned, isoclinal. Recumbent, fan and monocline, importance study of folds                                                                                                                                                                                                             | 6  |
| 3   | <b>Faults</b> -Introduction ,definition, elements of faults, faults plane, hanging wall and foot wall throw and heave ,Genetic classification of faults, Geometrical classification of fault ,thrust fault, block fault ,step fault ,importance of studying fault.                                                                                                                                                                                          | 6  |
| 4   | <b>Joint –</b> Definition ,terms such as master joint, joint system, geometric classification, strike joint, dip joint, oblique joint bedding joint, genetic classification i.e. tension and shear joints.                                                                                                                                                                                                                                                  | 3  |
| 5   | <b>Unconformities</b> -Definition ,concept, stages of development of a) angular unconformity b) Non conformity c) disconformity , various possible fields situations .                                                                                                                                                                                                                                                                                      | 4  |
|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 21 |
| III | <b>Petrology -</b>                                                                                                                                                                                                                                                                                                                                                                                                                                          |    |
| 1   | <b>Igneous Rocks –</b> Introduction, Textures- degree of crystallization, granularity, shape of the crystals, equigranular and inequigranular texture, porphyritic and Poikilitic textures, directive and intergrowth textures. Classification chemical- based on silica percentage and silica saturation mineralogical classification formation of igneous rocks, Bowen's reaction series factors governing crystallization, broad tabular classification. | 7  |

|    |                                                                                                                                                                                                                                                                                                                                     |    |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 2  | <b>Sedimentary Rocks-</b> Introduction, environment of formation, textures of sedimentary rocks, classification based on origin and grain size.                                                                                                                                                                                     | 4  |
| 3  | <b>Metamorphic Rocks-</b> Introduction, kinds and agents of metamorphism, progressive metamorphism of shale, metamorphic scale, metamorphic grades, metamorphic zone, study of metamorphic fabric such as salty phyllitic schistose and gneissose rocks                                                                             | 4  |
|    |                                                                                                                                                                                                                                                                                                                                     | 15 |
|    |                                                                                                                                                                                                                                                                                                                                     |    |
| IV | <b>Paleontology and stratigraphy</b>                                                                                                                                                                                                                                                                                                |    |
| 1  | <b>Fossils-</b> Introduction, concepts and various modes of preservation of fossils ,importance of fossils ,uses of fossils in palaeo-geography palaeo climate and palaeo tectonics ,concept of index fossils and its use in stratigraphy                                                                                           | 4  |
| 2  | <b>Stratigraphy-</b> Introduction ,principal of stratigraphy such as inclusions, intrusion and uniformitarianism and their applications, stratigraphic correlation- introduction, elements of correlation such as time unit, time stratigraphic units and litho-stratigraphic units Methods of co relation and radioactive methods. | 7  |
| 3  | <b>Standard Geological Time scale-</b> study of geological time scale with respect to various evolutionary changes and time spans of various time units' study of Palaeozoic, Mesozoic and Cenozoic Era.                                                                                                                            | 3  |

|   |                                                                                                                                                                                                                                                                                                                                                                                                  |    |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 4 | <b>Brief outline of stratigraphy of peninsular India-</b><br>physiographic divisions of India. Study of following Supergroups' with respect to their distribution, classification (upto group level) lithology and economic importance (a) Dharwar Supergroup (b) Cuddappah Supergroup (C) Vindhayan Supergroup (d) Gondawana Supergroup (e) Deccan Traps .Brief outline of stratigraphy of Goa. | 6  |
|   |                                                                                                                                                                                                                                                                                                                                                                                                  | 20 |
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|   | <b>Economic Geology</b>                                                                                                                                                                                                                                                                                                                                                                          |    |
| 1 | <b>Introduction-</b> Basic terms such as Ore, Gangue, Ore Minerals Beneficiation and Tenor ,cut-off grade                                                                                                                                                                                                                                                                                        | 2  |
| 2 | <b>Origin of ore deposits-</b> Syngenetic and epigenetic deposits, igneous deposits, pegmatite deposits, Hydrothermal deposits, Metasomatic deposits, sedimentary deposits, Metamorphic deposits.                                                                                                                                                                                                | 10 |
| 3 | <b>Petroleum-</b> Definition, chemical composition origin, organic theory, accumulation and Indian distribution. Coal-Introduction, classification as peat, lignite, bituminous and Anthracite, formation of coal, Indian distribution.                                                                                                                                                          | 4  |
| 4 | <b>Distribution of economic minerals in India - Metallic</b><br>Minerals (a) Aluminium Ore (b) Copper Ore (C) Chromium Ore (d) Gold (e) Iron Ore (f) Manganese Ore (g) Lead zinc. Non-metallic minerals (a) Gypsum (b) Baryte (c) Mica (d) Radioactive minerals                                                                                                                                  | 5  |
| 5 | <b>Economic minerals wealth of Goa -</b> Brief outline of Goa mining industry with respect to Iron, Manganese and Aluminium deposits with their distribution.                                                                                                                                                                                                                                    | 3  |
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| <b>GEOLOGY PRACTICAL COURSE FOR STD XII SCIENCE</b> |                                                                                                                                                                       |                           |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Sr. No                                              | CONTENTS                                                                                                                                                              | No .of practical sessions |
| 1                                                   | <b>Description and identification of the following economic minerals with respect to physical properties, chemical composition, occurrence and use.</b>               | 4                         |
|                                                     | Metallic Mineral:                                                                                                                                                     |                           |
|                                                     | Iron Ore :- Hematite, Magnetite, Pyrite, Limonite                                                                                                                     |                           |
|                                                     | Manganese Ores :-Pyrolusite , psilomelane                                                                                                                             |                           |
|                                                     | Copper Ore:- Chalcopyrite                                                                                                                                             |                           |
|                                                     | Lead Ore :- Galena                                                                                                                                                    |                           |
|                                                     | Chromium Ore :- Chromite                                                                                                                                              |                           |
|                                                     | Aluminium Ore :- Bauxite                                                                                                                                              |                           |
|                                                     | Non Metallic Minerals :-                                                                                                                                              |                           |
|                                                     | Gypsum , Graphite, Barite, Asbestos Biotite, Muscovite, Talc Amethyst, Kyanite, calcite                                                                               |                           |
| 2                                                   | <b>Description and identification of the following rock types.</b>                                                                                                    | 3                         |
|                                                     | <b>Igneous Rocks:-</b> Pegmatite, granite, Rhyolite, Syenite, Trachyte, Micro Granite, diorite, Gabbro Basalt, Pyroxenite, Dolerite along with Porphyritic varieties. |                           |
|                                                     | <b>Sedimentary rocks :-</b> Breccia, Conglomerate, Sandstone, Shale, Limestone, Coal, Bauxite, Laterite                                                               |                           |
|                                                     | <b>Metamorphic rocks: -</b> Slate, Phyllite, Schist (at least three varieties), Gneiss Marble, Quartzite.                                                             |                           |
| 3                                                   | <b>Study of Structural geological Models :-</b>                                                                                                                       | 4                         |
|                                                     | <b>Strike and dip:-</b>                                                                                                                                               |                           |
|                                                     | <b>Folds:-</b> Anticline Syncline (symmetrical and asymmetrical), Isoclinals, Fan, Recumbent, Monocline.                                                              |                           |

|   |                                                                                                                                          |    |
|---|------------------------------------------------------------------------------------------------------------------------------------------|----|
|   | <b>Faults:</b> - Normal Fault, Reserve fault, Step fault, and Block Fault.                                                               |    |
|   | <b>Unconformities</b> :-Angular, Disconformities, and non-conformity                                                                     |    |
| 4 | <b>Study of Geological maps with cross sections having horizontal sequence and vertical instructions</b> (at least six maps)             | 3  |
| 5 | <b>Study of survey of India topographic maps with respect to marginal information, relief, drainage and vegetation [at least 5 maps]</b> | 2  |
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