

B.Sc. Geology programme layout and credit details

| <u>Semister No.</u> | <u>Title of the paper</u> | <u>Credit</u> |
|-----------------------|--|---------------|
| <u>I T</u> | Principal of Geology | 4 |
| <u>I P</u> | Interpretation of maps and remote sensing | 2 |
| <u>II T</u> | Study of crystallography and mineralogy | 4 |
| <u>II P</u> | crystallography and mineralogy | 2 |
| <u>III T</u> | <u>Lithology</u> | 4 |
| <u>III P</u> | Petrology and petrography | 2 |
| <u>IV T</u> | Palaeontology and strtigraphy | 4 |
| <u>IV P</u> | Palaeontology and strtigraphy | 2 |
| <u>V PAPER 1 T</u> | Sturctural Geology and engineering geology | 4 |
| <u>V PAPER 1P</u> | Sturctural Geology and engineering geology | 2 |
| <u>VI PAPER 1 T</u> | Ground water and environmental geology | 4 |
| <u>VI PAPER 1 P</u> | Hydrogeology | 2 |
| <u>VII PAPER 1 T</u> | Mineral exploration and mining geology | 4 |
| <u>VII PAPER 2 P</u> | Dissertatin/project work | 2 |
| <u>VIII PAPER 1 T</u> | Ore-genesis | 4 |
| <u>VIII PAPER 1 P</u> | Ore minerals and exploration geology | 2 |
| Total credits | | 48 |


Dr. U.S. MAHABALESHWAR
M.Sc., M.Phil., Ph.D.
Professor & Dean, Science & Technology
Davangere University, Shivangotri
Davangere-577 007, Karnataka, India


18/2024
Registrar
Davangere University
Shivangotri, Davangere

Paper-1: BSC 1ST YEAR SEP GEOLOGY SYLLABUS 2024-25

FIRST SEMESTER

PAPER 1: GENERAL GEOLOGY, MINERALOGY AND CRYSTOLOGY

Marks: 80 Total: 56 hrs

Theory 4 Hours/week UNIT-I: General Geology

FUNDAMENTALS OF GEOLOGY

Definition of geology. Relationship with other branches of science, importance, scope and different branches of geology. Application of geology to different fields.

Components of earth system: Atmosphere, lithosphere, hydrosphere and biosphere.

Origin of earth: Nebular hypothesis, gaseous, tidal hypothesis. Age of earth.

Interior of the earth: Crust, mantle and core.

Age of the earth: Radiometric methods (Rb-Sr, U-Pb, Pb-Pb) of age determination.

UNIT-II:

GEODYNAMICS

Geodynamic elements of earth- Mid oceanic ridges, trenches, origin of Oceans, continents, mountains and rift valleys.

Plate Tectonic theory; Plates and their margins, constructive margins, destructive margin, Continental plate boundaries, Oceans-Ocean plate boundaries, Causes of movement of Plates, Sea floor Spreading, and hot spots.

Earth Quakes: nature of seismic waves, their intensity and magnitude scale: origin of earth quake and their belts.

Volcanoes:- types, products and their distribution.

UNIT-III:

GEOMORPHOLOGY

Weathering: Definition, Types- Mechanical, Chemical and Biological Weathering.

Soils : Processes of formation, soil profile and soil types.

Geological Agents: definition, classification- a) Epigene and b) Hypogene.

EPIGENE AGENTS:

Wind: Geological action of wind, deflation, abrasion, attrition, erosional features- Pedestal rocks, Transportation- suspension, saltation, traction, deposition – sand, barchans, loess.

Rivers: Stages of rivers-young, mature and old. Geological action of river: Erosion-hydraulic action, abrasion, attrition. Erosional feature-pot holes V-shaped valley, waterfall,


Dr. U.S. MAHABALESHWAR
M.Sc., M.Phil., Ph.D.
Professor & Dean, Science & Technology
Davangere University, Shivangotri,
Davangere-577 007, Karnataka, India.


Registrar
Davangere University
Shivangotri, Davangere

canyons, base level erosion, meanders, ox-bow lakes, transportation-suspension, solution, deposition-alluvial fans, & deltas. River system of India.

Oceans: topography of oceans floor – continental slope, shelf, abyssal zone, mid-oceanic ridges. Waves, Tides, Currents and Circulation of water. Geological work of oceans- erosion, Transportation, Deposition.

Glaciers: movement of Glaciers, Types of glaciers- Valleys, piedmonts, Icecaps, Geological action of glaciers: Erosion-Abrasion, Excavation, frost wedging. Erosional features- Cirques, u shaped valleys hanging valleys transportation – Glacial drift. Deposition- Moraines and Tillites.

Ground water: Geological action of ground water- erosional features - sinks, caverns, solution valley transportation – solution, depositional feature – concretion, stalactites and stalagmites.

UNIT- IV

REMOTE SENSING AND GIS

REMOTE SENSING: Introduction

Aerial Remote Sensing: Definition, Aerial photography: Scale, Sidelap overlap, drift and crabs. Types of aerial photography. Viewing Instruments – lens and mirror stereoscopes.

Satellite Remote Sensing: Principles of remote Sensing.

GIS: Definition, components of GIS, Data, types of data – Spatial, attribute, Data models – vector data model-entities, point in polygon, line in polygon, polygon on polygon operations, raster data model.

GPS- Components of GPS, working principles, types of GPS, GPS satellite systems- GPS, GLONAS, NAVIC.

SURVEYING: Introduction – Different methods & Their applications.

PRACTICALS – 1 INTERPRETATION OF MAPS AND REMOTE SENSING

1. Introduction to Maps, types of Maps
2. Study and Interpretation of toposheet
 - a. Numbering, Scale
 - b. Contour and drainage
 - c. Use of toposheet in the field
3. Introduction to aerial photography
4. Stereoscope
5. Introduction to Satellite remote sensing
6. Interpretation of satellite imagery and thematic maps

Paper –II: STUDY OF CRYSTALLOGRAPHY AND MINERALOGY- THEORY

Marks : 80.

Total: 56 Hrs

Theory 4 Hrs / week

UNIT-I

Crystallography

Definition of crystals, formation Of crystals,crystalline,crystallane,crystallised and amorphous crystals, crystal form,elements of crystals-face, edge and solid angle.

Euler's formula, inter facial angle and law of crystallography.

Crystallographic axes and angles.

Elements of symmetry-Centre,plane axis and roto-inversion symmetry.

Crystal symmetry. Classification and description of normal class of Isometric, Tetragonal, Hexagonal, Orthorhombic, Monoclinic and Triclinic system.

UNIT II

MINERALOGY

Introduction : Definition of mineral. branches of mineralogy – physical, optical, descriptive and chemical physical mineralogy : Characters depending upon the state of aggregation – habit, form. characters depending upon cohesion and elasticity – cleavage, fracture, hardness and tenacity, Characters depending upon light : Color, Streak, luster, diaphaneity.

characters depending upon electricity and mangnetism : Conductivity, pyro, piezo, para and diamagnetism,. specific gravity.

classification of minerals based on composition. silicate structure – neso, soro, cyclo, iono, prnyllo and tecto silicates


Dr. U.S. MAHABALESHWAR
M.Sc., M.Phil., Ph.D.
rofessor & Dean, Science & Technology
Davangere University, Shivagangotri,
Davangere-577 007, Karnataka, India.


Registrar
Davangere University
Shivagangotri, Davangere

study of following groups of rock forming minerals : Quartz, feldspars, mica, pyroxene, amphibole, olivine, garnet, chlorite, carbonates and alumina – silicates.

UNIT III

OPTICAL MICROSCOPY

nature of light, Nomenclature of wave theory, reflection and refraction of light, refractive index, critical angle, Total reflection.

principles of optical mineralogy.

Introduction to the petrological microscope.

double refraction – Isotropic and Anisotropic crystals, Uniaxial and Biaxial minerals, Polarisation of light. Behaviour of light under crossed nicols with minerals section. common optical properties observed under ordinary. polarized lights and crossed nicols.

UNIT IV : OPTICAL ACCESSORIES

16 hours

Mica plate, Gypsum plate and Quartz wedge (construction and use), Absorption, Pleochroism (Dichroism, Trichroism) Interference colours, Michael Levy's chart. Order of Interference colour, Extinction – Straight, inclined, undulose and symmetrical extinctions. Extinction angle. Indicatrix, Birefringence, Twinning – types – simple, multiple or polysynthetic, cross – hatched twinning. Dispersion.


PRACTICALS – II CRYSTALLOGRAPHY AND MINERALOGY

CRYSTALLOGRAPHY

1. The study of mathematical relationships of crystal elements (Euler's formula) $F+A=E+2$.
2. Measurement of Interfacial angles using contact goniometer.
3. Classification of crystal systems based on the axial characters.
4. Classification of crystal systems based on symmetry characters.
5. study of Twin models.

MINERALOGY

1. Study of Physical Properties of Minerals.
2. Identification of the following mineral groups in hand specimen.
3. Quartz group minerals.
4. Feldspar group – Orthoclase, Plagioclase, Microcline.
5. Zeolite group – Natrolite, Stilbite.
6. Pyroxene group – Augite, Hypersthene. Diopside.
7. Amphibole group – Hornblende, Tremolite, Actinolite.
8. Micas (Muscovite, Biotite, Lepidolite, Phlogopite),
9. Absetos, olivine, Talc, Epidote, Beryl, Sillimanite, Kyanite, Staurolite, Andalusite, Gypsum, Barite, Corundum, Fluorite, Halite, Calcite, Magnesite, Dolomite, Topaz, Garnet, Tourmaline, Serpentine, Nepheline, Zeolite, Apatite, Apatite.
10. Student should be taken to the areas of geological importance to acquaint with the field occurrences of the minerals, rocks and geological features for 1-4 days and submit the field / tour report at the time of practical examination, which shall be evaluated by the examiner.


Dr. U.S. MAHABALESHWAR
 M.Sc., M.Phil., Ph.D.
 Professor & Dean, Science & Technology
 Davangere University, Shivagangotri,
 Davangere-577 007, Karnataka, India



Registrar
 Davangere University
 Shivagangotri, Davangere

Second semester B.Sc. Degree Practival examination Geology – Practical – II
Crystallography and Mineralogy.

- I. Find out the interfacial angle and Euler's formula for the given crystal models. 1 and 2 2x4=8.
- II. Identify the axial and symmetrical characters for the given crystal models. and mention the crystal system. 3 and 4 2x2=4
- III. Identify the Holohedral form and crystal system for given crystal model. write the Weiss notation and miller's indices for given crystal model 5 and 6 2x2.5=5
- IV. Identify the given minerals based on its physical properties. 8 to 15
- V. Submission of field/field visit report. 5
- VI. Record. 5
- VII. Viva-voce. 5

References:

1. An Introduction to crystallography-buerger 9. elementary crystallography-buyerger
2. Crystallography and crystal chemistry- Bloss D


Dr. U.S. MAHABALESHWAR
M.Sc., M.Phil., Ph.D.
Professor & Dean, Science & Technology
Davangere University, Shivagangotri,
Davangere-577 007, Karnataka, India.


Registrar
Davangere University
Shivagangotri, Davangere