KUVEMPU UNIVERSTY

Bachelor of Science (Geology)

Sl No	Course Code	Title of the Paper	Subject Category	Teaching Hours	Semester End Examination	Internal assessment	Total Marks	Credits	Examination Duration
Semester I									
1	**MC-I**	General Geology, Crystallography and Mineralogy	Theory	3	80	20	100	3	3 Hours
		Crystallography and Mineralogy	Practical	4	40	10	50	2	3 Hours
Semester II									
2	**MC-II**	Geomorphology, Structural Geology and Hydrogeology	Theory	3	80	20	100	3	3 Hours
		Geomorphology, Structural Geology and Hydrogeology	Practical	4	40	10	50	2	3 Hours
Semester III									
3	**MC-III**	Petrology	Theory	3	80	20	100	3	3 Hours
		Petrology	Practical	4	40	10	50	2	3 Hours
		Basics of Earth System Science	Open Elective	2	40	10	50	2	2 Hours
		Paleobiology	Open Elective	2	40	10	50	2	2 Hours
		Environmental studies	Compulsory						
Semester IV									
4	**MC-IV**	Paleontology and Stratigraphy	Theory	3	80	20	100	3	3 Hours
		Paleontology and Stratigraphy	Practical	4	40	10	50	2	3 Hours
		Industrial Minerals	Open Elective	2	40	10	50	2	2 Hours
		Geohazards and mitigation strategies	Open Elective	2	40	10	50	2	2 Hours
Semester V									
5	**MC-V**	Economic Geology and Engineering Geology	Theory	3	80	20	100	3	3 Hours
		Economic Geology and Engineering Geology	Practical	4	40	10	50	2	3 Hours
Semester VI									
6	**MC-VI**	Exploration and Mining Geology	Theory	3	80	20	100	3	3 Hours
		Exploration and Field Geology	Practical	4	40	10	50	2	3 Hours
Grand Total				**48**	**800**	**200**	**1000**	**34**	

KUVEMPU UNIVERSITY
Bachelor of Science (B.Sc) Geology Semester Scheme
Course structure, Scheme of teaching and Evaluation based on SEP Guideline, Government of Karnataka

B.Sc Geology course structure and Syllabus Semester wise

MC-1 General Geology, Crystallography and Mineralogy

Unit-I

Introduction:- Definition, aim and scope of geology, relationship with other branches of science, branches of geology. The Solar System, Meteorites, Earth-Theories of origin of earth-Nebular, Tidal and Big Bang. Age of the Earth, Interior of the earth. Volcanoes:- Definition, Parts of a volcano, classification- Central, fissure, active, dormant, extinct. Types- Hawaiian, Strombolian, Vulcanean, Vesuvian, Pelion. Causes, effects, products, volcanic belts. Earth quake:- Definition, Focus, Epicenter, Causes, Effects, Seismograph and Seismorgram, Scales-intensity & magnitude, distribution related to volcanic belts, seismicity of India. Tsunami.

Unit-II

Definition of a Crystal, formation of crystals, crystalline, noncrystalline substances, elements of crystals, Laws of crystallography. Classification of crtsyals:- Into 6 systems based on geometrical constants, symmetry-definition, elements of symmetry-centre, plane, axes and grade of symmetry, symmetry notation-Study of Holohedral forms in 6 systems. Parameter, Weiss, Miller indices, An introduction to X-ray crystallography. Twinning: Definition, parts of Twins, Types of twins and Twin laws.

Unit-III

Introduction:- Definition, branches of mineralogy-Physical, optical, descriptive, chemical.

Physical Mineralogy: Characters depending upon aggregation- Habit, forms. Characters depending upon light-colour, streak, lustre, diaphaneity, iridescence, opalescence, luminescence, fluorescence, tarnish. Characters depending upon cohesion-cleavage, fracture, hardness, tenacity. Characters depending upon electricity-pyro, piezeo and magnetism- Dia, Para, Ferro. Specific gravity.

Chemical mineralogy:- Bonding of molecule- ionic, radii, coordination numbers, Co-valent, metallic, Vanderwal, Isomorphism, polymorphism, pseudomorphism. Classification of minerals-based on composition, based on Silicate structure-neso, soro, cyclo, iono, phylllo, tecto Silicates Study of the following groups of rock forming minerals- Quartz, Feldspars, Mica, Pyroxene, Amphibole, Olivine, Garnet, Chlorite, Carbonates, Aluminosilicates.

Gemstones- general description

Principles of optics:- Light, laws of reflection and refraction, refractive index, critical angle, total internal refraction, double refraction,

Optical classification of minerals: - Isotropism, anisotropism, indicatrix, uniaxial, biaxial

Petrological microscope- Construction of Nicol prisms. Optical accessories-construction and uses of mica plate, gypsum plate and quartz wedge.

Pleochroism: types-dichroic and trichroic, Interference colour and their production, extinction-types of extinction extinction angle, birefringence, twinning and dispersion with examples.

Reference Books

1. Elements of mineralogy by Rutley.
2. Text book mineralogy by J.D. Dana.
3. Elements of mineralogy by H H Reed
4. Text book of geology by P K Mukerjee.
5. Crystallography and crystal chemistry by Evans R C
6. Optical mineralogy by Winchel
7. Gems and gem industry in India by R V Karanth
8. Engineering and general geoogy by Parabin Singh.
9. Physical geology By Longwell and Flint.
10. Optical mineralogy by P R J Naidu
11. Optical mineralogy by Kerr P F
12. Elementary crystallography by Berger.

13. Principles of Physical geology by Arthur Holmes
14. Earth's dynamic surface by K. Siddartha

Practical: Crystallography and Mineralogy

Crystallography

1. Crystal elements and Euler's formula Interfacial angle and its measurement. Classification of crystals into 6 systems based on axial and Symmetry characters. Study of holohedral forms-Isometric, Tetragonal, Hexagonal, Trigonal, Orthorhombic, Monoclinic and Triclinic systems.
Twins-Types and laws.

Physical Mineralogy

Study of physical properties of minerals
Identification of the following mineral groups in hand specimen :Quartz. Feldspars-orthoclase,plagioclase, microcline, Feldspathoid - natrolite, stilbite. Pyroxene-diopside, augite, hypersthene.group Amphibole-hornblende, tremolite, actinolite, asbestos. Olivine Micas-muscovite, biotite, lepidolite. Epidote, beryl, Sillimanite, kyanite, staurolite, andalucite, gypsum, barite, Corundum, fluorite, halite, calcite, magnesite, dolomite, apatite

Optical Mineralogy

Optical properties of Minerals:- quartz groups, Feldspar group, Amphibole groupm, Pyroxene group, Mica group etc.

MC-II: Geomorphology, Structural Geology and Hydrogeolgy

Unit-I

Introduction: definition, basic concepts of Geomorphology in brief. Geomorphic processes-external and internal.
Weathering: definition, types, mass wasting- forms-slides, falls, flows. Types of movements- soil creep, solifluction, earth and mud flows, slides- rock slides, rock fall, and avalanches.
Geomorphic cycles: Fluvial cycle- stages, erosion-hydraulic action, attrition, abrasion. Erosional land forms, transportation- suspension, solution, saltation, traction. Depositional land forms-alluvial fans and cones, deltas.
Aeolian Cycle: deflation, abrasion, attrition. Erosional land forms-pedestal rocks. Transportation-suspension, saltation, traction. Deposition-sand dunes, barchans, loess
Glacial cycle:-types-valley, piedmont, icecaps. Erosion-abrasion, excavation, frost wedging. Erosional land forms- cirque, U-shaped valleys, hanging valleys. Transportation- Glacial drift. Depositional features- moraines and tillites.

Unit-II

Introduction to structural geology and importance. Concept of deformation Stress and strain, force-tensional, torsion, shearing and compression.
a) Primary structures:-Lamination, bedding, graded bedding, current bedding, Ripple marks, sun cracks, tracks and trails.• Confirmity, Unconformity: definition, origin, types-disconformity, nonconformity, angular unconformity.• Attitude of beds:- definition of dip and strike,
b) Secondary structures: - Folds- definition, parts of a fold- axis, axial plane, limb, plunge, crest and trough. Types of folds-Symmetrical, asymmetrical, anticline, syncline, anticlinorium and synclinorium, overturned, recumbent, isoclinal, chevron, fan, monocline, drag folds. Denudation structure- outlier and inliers.
Joints:-Definition, block joint, joint set, joint system. Classification-Geometrical- Dip, Strike, Oblique, bedding joints, Genetic-columnar, mural, sheet joints, Master joints. Importance of joints. Faults-definition, elements of faults- fault plane, dip, strike, hade, heave and throw, hanging and foot wall. Classification of faults: Geometric- based on attitude of faults as compared to the adjacent beds- Dip, Strike, diagonal and bedding faults. Based on apparent movement-Normal & reverse fault. Genetic:-Thrust faults, over thrust, under thrust. Gravity faults-step fault, ridge fault, trough fault, Criteria for recognition of faults in the field. Lineation and foliation.

Unit-III

Hydrological cycle - elements and their importance, water budget surface Hydrology – River, lakes, ponds, Glaciers, sea water and atmospheric water, Ground water - Introduction - Origin and occurrence of ground water, movement and distribution of groundwater, zones of ground water. Hydrological properties rocks- Porosity, permeability, transitivity, storage co-efficient. Darcy's law and its application. Water bearing formations - aquifers - confined, unconfined, perched, aquifuge, aquitard, aquiclude.

Water chemistry - Properties of ground water Physical Color, Odor, Taste, Turbidity, Temperature, electrical conductivity. Chemical and biological properties - pH, eH, alkalinity, acidity, hardness, DO, Ground water recharge - Problems and management of ground water and rain water harvesting, artificial recharge of ground wate

Reference Books:

1. Physical Geology by Montgomerry
2. Physical Geology, Bob F Mallory, David N Cargo- McGraw Hill Book Company
3. Principles of Geomorphology by Dayal
4. Principles of Geomorphology, Thornburry
5. Structural Geology 3rd edition ,Marland P Billings, Prentice-Hall, Inc., Englewood Cliffs, New Jersey
6. Structural Geology, 2nd edition, Haakon Fossen, Cambridge University Press
7. Structural Geology of Rocks and Regions, George H. Davis, Stephen J. Reynolds, Charles F. Kluth : John Wiley & Sons, INC.
8. Ground water Hydrology-DK Todd
9. Ground water hydrology -DK Todd
10. Hydrology - S N Davis and R J M Dewiest
11. Environmental Geosciences - AN Strahler and A Strahler
12. Man and his environments and climate – B M Gates
13. The earth's environments –JEFagan
14. Ecology, environment and pollution -A Balasubramanian

Practical: Geomorphology, Structural Geology and Hydrogeology

Geomorphology

Identification of drainage pattern and interpretation.

Structural Geology Contour maps, horizontal Inclined. Folded, Fault Unconformities, complex**.** Drawing of profile, section of the following geological maps and interpretation structural maps.Tracing of out crop maps. Dip and Strike problems- 3 types 5. Thickness of Strata problems: 3Typs

Hydrogeology: Determination of alkalinity, acidity. hardness. dissolved oxygen. Hydrochemistry problems. Problems on evapotranspiration and porosity. Water budget calculation.

Theory Question Paper Model
B.Sc. Semester-I Degree Examination; 2024-2025
(Semester Scheme; New Syllabus: 2024-25)
Paper-I: General Geology, Crystallography and Mineralogy
Paper Code:

Time: 3 Hours **Max. Marks: 80**

Instruction to candidates:

1) All sections are compulsory
2) Draw neat and labeled diagram wherever necessary

Section-A

1. Answer **all** the Flowing questions: **(2x10=20)**

a)
b)
c)
d)
e)
f)
g)
h)
i)
j)

Section-B

Answer **any Six** of the Flowing questions: **(5x6=30)**

2.
3.
4.
5.
6.
7.
8.
9.

Section-C

Answer **any Three** of the Flowing questions: **(10x3=30)**

10. Question from Unit-I
11. Question from Unit-II
12. Question from Unit-III
13. Question from any Unit

Open elective Question Paper Model
B.Sc. Semester- III& IV Degree Examination; 2024-2025
(Semester Scheme; New Syllabus: 2024-25)
Paper-I: Basics of Earth System Science
Paper Code:

Time: 2 Hours **Max. Marks: 40**

Instruction to candidates:

1) All sections are compulsory
2) Draw neat and labeled diagram wherever necessary

Section-A

Answer **all** the Flowing questions: **(2x5=10)**

1.
2.
3.
4.
5.

Section-B

Answer **any Six** of the Flowing questions: **(5x6=30)**

6.
7.
8.
9.
10.
11.
12.

Practical paper Examination I-VI semesters
Duration: 3Hrs

- Experimentation (Major & Minor /Spotters) – 30 Marks
- Viva Voice- 10 Marks

Total 40 Marks

Internal assessment for Practical paper from I to VI semesters

- Attendance 05 Marks
- Record 05 Marks