KUVEMPU UNIVERSITY, DEPARTMENT OF APPLIED GEOLOGY
PROCEEDINGS OF THE UNDER-GRADUATE BOARD OF STUDIES IN GEOLOGY

Meeting of the Board of Studies UG- in Geology was held on 18th June, 2025 at 11.00 am in the Department of Applied Geology, Kuvempu University Shankaraghatta.

Members present:

1. Prof Jagadish T Gudugur. Department of Geology, Karnataka Science College, Dharwad
2. Prof. Sharath Kumar P Dept. of Mineral Processing, VSKD University
3. Prof. Govindaraju Department of Applied Geology, Kuvempu University (Chairman)

Members Absent:

4. Prof R Y Budhihal. Department of Geology, Karnataka Science College, Dharwad
5. Dr. Babu Nallusamy Dept. of Geology, CUK Kalaburagi

Agenda: Preparation of syllabus for Third and Fourth semester B.Sc in Geology and Approve the same for the academic year 2025-26

Proceedings:

The Chairman of BOS (UG) greeted all the BOS members and requested to participate effectively to prepare the syllabus for the third and fourth semester B.Sc in Geology from the academic year 2025-26. All the board members finally prepared the syllabus of two papers (one for Third semester and one for Fourth semester) along with four open elective papers (each two papers for each semester) as mentioned in the table below.

Code	Title	Sub-cat	Hours	Marks exam	Int	Total	Credit	Exam Duration
Semester III								
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								
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

Since already the course structure, scheme, pattern of question paper and evaluation methods were prepared in the last BOS meeting itself, the chairman thanked all the BOS members for actively participated in preparation of syllabus for above said papers

Sl no	**Name and Address**	**BOS**	**Signature**
02	Prof Jagadish T Gudugur. Department of Geology, Karnataka Science College Dharwad	Member	
03	Dr. Sharath Kumar P Dept. of Mineral Processing, VSKD University, PG centre, Nandihalli Sandur Taluk, Bellary dist	Member	
05	Prof. Govindaraju Department of Applied Geology, Kuvempu University	Chairman	

KUVEMPU UNIVERSITY
B.Sc in Geology, Third and Fourth semester syllabus from the Academic year 2025-26

MC-III: Petrology

Unit-I
Introduction- Definition, relationship of petrology with other branches of geology petrography, petrogenesis. Classification and their distinguishing features, rock cycle. of rocks- Igneous, sedimentary and metamorphic
Igneous Petrology: Classification of Igneous rocks- Chemical, mineralogical and textural. Textures and structures of igneous rocks,Petrogenesis: Magma - it generation, nature and composition. Bowen's reaction principle. Crystallization of binary magma-Albite-Anorthite, Diopside-Anorthite, Tertiary magma- Diopside-Wollastanite-Silica system. Phase diagram with their significance. Magmatic differentiation and assimilation.Composition, origin and mode of occurrence of granite dunite, charnockites, anorthocites and alkaline rocks. , syenite, diorite, gabbro, peridodite,

Unit: II
Sedimentary petrology: Introduction, Processes of sedimentation, lithification and diagenesis, size, shape, sedimentary structure and texture and significance, clastic and non- clastic rocks & their classification. Elementary concepts of depositional environments, sedimentary facies and provinces.
Types of deposits- Mechanical/Clastic, Residual deposits their modes of formation, characters and types-laterites and Bauxite.Origin and characteristics of quartz arenites, arkose, greywacke, siliceous and calcareous deposits of chemical and organic origin.

Unit-III
Metamorphic petrology: Metamorphism, metamorphic rocks- agents and types of metamorphism.
Metamorphic grades, index minerals, Texture and structure of metamorphic rocks. zones and facies, ACF, AKF, and AEM diagram.Metamorphism of argillaceous, arenaceous, calcareous and basic rocks. Metasomatism Migmatites and granulites.

Reference Books:

1. Principles of petrology- Tyrrell W.
2. Igneous and metamorphic petrology- Turner W and Verhoogen J.
3. Evolution of Igneous rocks - NI Bowen
4. Sedimentary Petrology- Pettijohn
5. Metamorphic petrology -Winkler HCF
6. Text book of geology- P.K. Mukherjee
7. Igneous and Metamorphic Petrology by Myron G Best

Practical: MC-III: Petrology

Megascopic identification of minerals in rocks
Megascopic identification of Igneous, Sedimentary, and metamorphic rocks
Igneous rocks: Granite, Syenite, Diorite, Gabbro, Peridotite, Dunite, Porphyries- Granite, Syenite, Diorite, Aplite, Felsite, Pegmatite. Dolerite, Trachyte, Rhyolite, Basalt, Obsidian, Pitchstone
Sedimentary rocks: Sandstone, Shale, Conglomerate, Breccia, Grit, Limestone
Metamorphic rocks: Quartzite, Marble, Schist, Gneiss, Charnockite, Slate.
Microscopic identification of minerals in rocks
Study of the optical properties of following rock forming minerals:- Quartz, Orthoclase, Plagioclase, Microcline, Biotite mica, Hornblende, Augite, Hyperstene, Calcite, Olivine, Garnet, Actinolite, Sillimanite and Tourmaline..
Microscopic identification of Igneous, sedimentary and metamorphic rocks
Igneous rocks: Granite, Syenite, Diorite, Gabbro, Dunite, Syenite, Diorite, Aplite,Pegmatite. Dolerite, Trachyte, Rhyolite, Basalt.
Sedimentary rocks: Sandstone,Limestone.
Metamorphic rocks: Quartzite, Marble, Schist, Gneiss, Charnockite.

Open Elective: Basics of Earth System Science

Unit-I:

Introduction to Earth Sciences with a special focus to Geology, scope, sub-disciplines and relationship with other branches of sciences. Earth in the solar system, origin Earth's size, shape, mass, density, rotational and evolutional parameters Solar System- Introduction to Various planets - Terrestrial Planets Solar System- Introduction to Various planets - Jovian Planets.

Unit-II:

Internal constitution of the earth - core, mantle and crust. Convections in the earth's core and production of magnetic field Composition of earth in comparison to other bodies in the solar system. Origin and composition of hydrosphere and atmosphere Origin of biosphere Origin of oceans, continents and mountains. Age of the earth; Radioactivity and its application in determining the age of the Earth, rocks, minerals and fossils

Reference Books

1. Arthur Holmes, Principles of Physical Geology. 1992. Chapman & Hall.
2. Emiliani, C, 1992. Planet Earth, Cosmology, Geology and the Evolution of Life and Environment. Cambridge University Press.
3. Gross,M.G., 1977. Oceanography: A view of the Earth, Prentice Hall.
4. The Dynamic Earth – Wyllie. P.J
5. The way earth works - Wyllie. P.J
6. D.R. Johnson, M. Ruzek, M. Kalb, What is Earth System Science? Proceedings of the 1997 International Geoscience and Remote Sensing Symposium Singapore, August 4 - 8, 1997, pp 688 – 691

Open Elective: Paleobiology

Unit -I

Modes of preservation of fossils- Cast, moulds, petrification, coalification, Tracks and Trails, Foot prints, Burrowing and Boring. Types of fossils -Index fossil, Synthetic fossil, Persistent fossils.Invertebrate and Vertebrate fossils Definition, Classification, and stratigraphic significance of phylum: Mollusca (Pelecypoda, Cephalopoda, Gastropoda) Phylum: Arthropoda, Class: Trilobita

Unit-II

Paleobotany and Microfossils classification of plants, plants through geological ages, Gondwana plants, Microfossils- Classification of microfossils. Foraminifera, Ostracoda.

References:

1. Clarkson, E.N.K., 1998, Invertebrate Paleontology and Evolution, IV edition, Publ., Blackwell.
2. Smith, A.B., 1994, Systematics and the Fossils Record- Documenting Evolutionary Patterns, Publ., Balckwell
3. Colbert, Introduction to Vertebrate Paleontology.
4. D.J.Jones, 1956. Microfossils.

MC-IV: Paleontology and Stratigraphy

Unit-I

Introduction: Fossil-definition, classification of organic World -Animal kingdom (invertebrate and vertebrate), Plant classsification Nomenclature-Phylum, class, order, family. genera, species. Conditions for fossilization, Mode of preservation of fossils. Uses/Significance of fossils.

Brief morphology, classification and geological history of plant fossils. Kinds of fossils-i) Based on and geological history of fossils and it types, ii) based on -persistence: Index, Synthetic, extinct. Microfossils and their Applications. Evolution of Man

Invertebrate palaeontology: Study of morphology, classification and geological history including evolutionary trends of Corals, Brachiopods, Lemellibranchs, Gastropods, Cephalopods and Trilobites.

Vertebrate palaeontology: Reptiles, Mammals, etc. and plant fossils

Unit-II

Pinciples of stratigraphy: Introduction, Fundamental laws of stratigraphy-Law of uniformitarianism, law of order of superposition, Conformity and unconformity, law of catastrophism and law of faunal and floral succession. Sratigraphic categories-litho, bio and chrono-stratigraphic units and nomenclature. Correlation-Lithological and paleontological. Geologic time scale.

Unit-III

Indian Stratigraphy: Physiographic divisions and outline of stratigraphy of India. A brief study of lithology, fossils, distribution, classification and economic importance of Precambrian

rocks/cryptozoic rocks- Sargur & Dharwar super group, Peninsular Gneissic Complex (PGC), Cuddapah, Vindhyan, Kaladgi and Bhima groups.
A brief study including classification, distribution, lithology, life and economic importance of phanerozoic rocks- Gondwana Super Group and Cretaceousof Kutch, Spiti and Thiruchinapalli.
Brief account on (1) Deccan traps and its economic importance (2) Siwalik group

Reference books:

1. Principles of paleontology -H.Woods..
2. Principles of invertebrate paleontology- Shrock & Twanhofal
3. Principles of invertebrate paleontology-Jain
4. Elements of paleontology- R.M.Black.
5. Principles of stratigraphy -Ravindrakumar
6. Indian stratigraphy- Wadia.D.N
7. Geology of India- Ramakrishnanand and Vaidyanathan
8. Geology of India & Burma- M.S.Krishnan
9. Geology of Karnataka -B. P. Radhakrishna
10. Structural geology- Billings.M.P
11. Invertebrate Palaeontology and Evolution E.N.K. Clarkson Professor of Palaeontology Department ofGeology University of Edinburgh Scotland
12. Palaeontology Invertebrate By Henry Wood

Practical: MC-IV: Paleontology and Stratigraphy

1. Identification of fossils on the basis of mode of preservation.
2. Invertebrate palaeontology: Drawing, labelling, description, classification and Identification with Geological age of the following invertebrate: (a) Corals, (b) Brachiopods, (c) Lamellibranches, (d) Gastropod, (e) Cephalopod& (f) Trilobites.
3. Drawing, labelling, description ,classification, identification with Geological age of the Plant fossils: (a) Calamites, (b) Lepidodendron, (c) Sigillaria, (d) Glossopteris, and (e) Ptilophyllum
4. Mapping of stratigraphic units of various group/formation of India.

Open Elective: Industrial Minerals

Unit-I

Introduction to minerals and rocks: Introduction to rock forming and economically important minerals. Principles of rock cycle, origin and classification of economically important mineral deposits. Properties of minerals and rocks, and their occurrences: Physical properties, chemical composition, and diagnostic criteria for the identification of minerals. Ore ninerals and gangue minerals, tenor and grade of the ore for industrial processing of minerals. Selection criteria followed for quarrying of decorative and dimensional rock blocks/slabs. National mineral policy.

Unit-II

Properties, occurrences and distribution of the following minerals/rocks in India, with special reference to Karnataka:
Jewelry: gold, diamonds, precious minerals, corals, pearl and opals, sapphires, rubies, and emeralds.

Metallic: Bauxite, chromite, ilmenite, magnetite, hematite, sphalerite, galena, chalcopyrite, pyrolusite.
Cement and Refractory minerals: Calcite, lime stone, gypsum, clay minerals, magnesite, graphite, chalk, marble, dolomite, zircon, kaolin, magnesia and alumina minerals
Ceramics and glass: clay minerals, kaolinite, silica sand and bauxite, limestone and feldspar.
Abrasives, and rock and mineral polishing : industrial diamond, corundum, garnet and quartz magnesite, pumice, and diatomaceous
Electronic and electrical: Rare earth elements, mica, wolframite, native metallic minerals, ores of copper, aluminium.
Strategic/defense: Rare earth elements, Ilmenite, monazite, mica, vanadium from magnetite, poly metallic nodules and rock encrustation in the ocean to extract cobalt and nickel.
Chemicals and fertilizers: Barite, calcite, magnesite, asbestos, diatomite, feldspar, gypsum, kaolinite, phosphorite, mica, talc, zeolite, bauxite, chromite, ilmenite, magnetite, hematite, sphalerite, galena, clay minerals chalcopyrite, pyrolusite, pyrite and monazite.
Dimensional and decorative rocks & dimensional: Marble, granites, gneiss, dolerite, phyllite, slate, sand stones, sand, gravel, pebble and boulders.
Nanotechnology: Clay minerals, ilmenite, polymorphs of carbon, titanium and anhydrous iron oxide minerals and mineral composite for rare mineral substitutes.

Open Elective: Geohazards and mitigation strategies

Unit-I

Geohazards: assessment and planning- Introduction, types of hazards; characteristic features, occurrcnce and impact of different types, Causes and Strategies for Mitigation of Geological Hazards; Risk assessment, Hazard maps, Land-use planning and hazards. **Earthquakes, Mitigation Approaches:** Causes, Specific threats, Community impacts, and Mitigation strategies. Characteristic features; | Magnitude and Intensity of earthquake; Major earthquakes;| Seismic zoning; Earthquake vulnerability of India; - Seismic performance examination off RCC. Buildings, retrofitting of vulnerable buildings, Construction of earthquake resistant buildings following proper IS codes, Earthquake preparedness: Case study – Bhuj, Lathur and kilari Earthquake

Unit-II

Volcanic hazards: Introduction, Types of volcanoes, volcanic form and structure, Types of central eruption, Causes of volcanic eruptions, volcanic products: volatiles, volcanic products: pyroclasts, volcanic products: lava flows, Specific threats, Community impacts, volcanic hazard and prediction Mitigation strategies.**Tsunami events, Mitigation Approaches:** An introduction to Tsunami; Magnitude Intensity of a Tsunami; Types of Tsunami; features of Tsunamis: Prediction of Tsunamis: Tsunami Hazard Mitigation. **Flood and Mitigation Approaches:** Types of floods, Causes of floods, Specific threats, Community impacts. Mitigation strategies: Floodplain Management, Flood Insurance, Flood Mitigation Programs, Property acquisitions, retrofitting flood Prone Residential Structures **Mass Movement:** Soil creep and valley bulging, Causes of landslides, Classification of landslides, Landslides in soils Landslides in rock masses, A brief note on slope stability analysis. Monitoring slopes, Landslide hazard, investigation and

mapping, Methods of slope control and stabilization Landslide Specific threats, Community impacts, Mitigation strategies.

Reference:

1. Alexander, D. 1993: Natural disasters. London: UCL Press
2. Alden, W. C.,1928.Landslide and Flood at Gros Ventre, Wyoming, Focus on Environmental Geology, Tank R., Ed., Oxford University Press, New York (1973), 1928, pp. 146–153.
3. Baker, P.E. (1979) Geological aspects of volcano prediction. Journal of Geological Society, 136, 341-346.
4. Bell, F.G.,(1999).Geological hazards: their assessment, avoidance, and mitigation. (an imprint of Routledge). E&FN Spon London, UK, Hardbound, ISBN 0419-16970-9;631 Pages. September
5. Bell, F.G. (1994) Floods and landslides in Natal and notably the greater Durban region, 1987: a Engineering Geologists, 31, 59-74.
6. Broms, BB., Landslides , retrospective Foundation view. Bulletin Association Engineering Handbook Winterkorn, H. F. and Fang, H.-Y., eds., Van Nostrand Reinhold Co.,