


UNIVERSITY OF MYSORE
Estd. 1916

Vishwavidyanilaya Karyasoudha
Crawford Hall, Mysuru- 570 005

No.AC2(S)/55/2024-25

Dated: 20.07.2024

Notification


Sub:-Change in nomenclature and Syllabus for 'Earth Science'
(UG) programme from the Academic year 2024-25.

- Ref:-** 1. Decision of Board of Studies in Earth Science (CB) meeting held on 06-06-2024.
2. Decision of the Faculty of Science & Technology meeting held on 19-06-2024.
3. Decision of the Academic Council meeting held on 28.06.2024.

The Board of Studies in Earth Science (CB) which met on 06-06-2024 has resolved to recommend and approved the change in nomenclature of the course from 'Earth Science' to 'Geology' and Syllabus with Scheme of examinations for I & II Semester Geology (UG) (B.Sc.) with effect from the Academic year 2024-25.

The Faculty of Science & Technology and Academic Council at their meetings held on 19-06-2024 and 28-06-2024 respectively has also approved the above said Syllabus and Scheme of examinations hence it is hereby notified.

The Syllabus and Scheme of Examinations content may be downloaded from the University Website i.e., www.uni-mysore.ac.in.


Registrar
Registrar
University of Mysore
Mysore

To;

1. All the Principal of affiliated Colleges of University of Mysore, Mysore.
2. The Registrar (Evaluation), University of Mysore, Mysuru.
3. The Chairman, BOS/DOS in Earth Science, Manasagangothri, Mysore.
4. The Dean, Faculty of Science & Technology, DOS in Mathematics, MGM.
5. The Director, Distance Education Programme, Moulya Bhavan, Manasagangothri, Mysuru.
6. The Director, PMEB, Manasagangothri, Mysore.
7. Director, College Development Council , Manasagangothri, Mysore.
8. The Deputy Registrar/Assistant Registrar/Superintendent, Administrative Branch and Examination Branch, University of Mysore, Mysuru.
9. The PA to Vice-Chancellor/ Registrar/ Registrar (Evaluation), University of Mysore, Mysuru.
10. Office Copy.

MODEL CURRICULUM (UNDER-GRADUATE)

DEGREE: BACHELOR OF SCIENCE (B.Sc.)IN GEOLOGY

SYLLABUS

(With New Regulations)

I Semester Theory Syllabus

Year - I	Course Code	LTP/Credits: 300
Sem – I	Paper Title: GENERAL GEOLOGY	Total Teaching Hours: 48 Hrs. (3hours/Week)
Summative Assessment Marks (C₃): 80 marks		Exam. Duration: 3 Hrs
Formative Assessment C ₁ Test = 10 marks C ₂ Test/Assignment = 10 marks		Exam. Marks Total: 80 + 20 = 100 Marks
Course learning outcome:	The study of this paper strengthens students' knowledge with respect to understanding the essentials of the structural dynamics of the earth.	
Broad contents of the course:	The course presents an understanding of the processes in action on the earth's surface and their impact on man and his institutions.	
Skills to be learned:	The students will understand the origin of our solar system and planets, including earth. The students are exposed to	

the interior of the earth and be able to appreciate the dynamics of earth evolution through time.

Unit No	Course Content	Hours
<p>UNIT 1</p>	<p>Introduction</p> <p>Geology and it's perspectives. Pure and applied branches of geology: scope and applications.</p> <p>The universe and solar system: Origin of the universe - big bang theory. Solar system. Members of solar system – planets (Terrestrial and gaseous planets), satellite, comets, asteroids, meteorite.</p> <p>Earth in the solar system. Size, shape, mass, and density of the earth.</p> <p>Origin of the Earth – Gaseous hypothesis, Nebular hypothesis, Planetesimal hypothesis, Tidal hypothesis, Supernova hypothesis, Interstellar or dust or meteoric hypothesis. Evolution of earth.</p> <p>Age of the Earth: Geochronology; Absolute and relative methods; (a) Relative Methods - Sedimentation, Salinity method, varve chronology, Rate of cooling of earth. (a) Radiometric dating, atomic energy, decay scheme, half life, method - K-Ar; Rb-Sr; U-Pb, Pb-Pb. Age of the earth.</p>	<p>16 Hrs.</p>

	<p>A brief introduction on the Earth's system - Atmosphere, Lithosphere, Hydrosphere, Biosphere.</p> <p>Earth's internal structures and its composition. Evidence for the Earth's composition and mineralogy – 1. Seismic data, 2. Density studies, 3. Meteorites. Earth's internal layers - Crust, mantle and core. Lithosphere, asthenosphere, mesosphere and barysphere.</p>	
<p>UNIT</p> <p>2</p>	<p>GEOMORPHOLOGY</p> <p>Introduction: - Basic concepts of Geomorphology, Definition and scope, Geomorphic agents, Geomorphic processes; endogenetic (epigene) and exogenetic (hypogene). Weathering - physical, chemical, biological.</p> <p>Soil - Definition, Formation, Types of soils. Soil Profile.</p> <p>Rivers and fluvial landforms: - Introduction, Development of rivers - Drainage system and patterns. Stages of rivers – Davi's concept; youth, mature, old. Geological actions: Erosion - hydraulic action, abrasion, attrition, solution. Erosional landforms – Potholes, V shaped valleys, gorges and canyons, waterfalls and types, river meanders, ox-bow lakes, river terraces, structural benches.</p>	<p>16 Hrs.</p>

	<p>Transportation - suspension, solution. Deposition and depositional landforms - alluvial fans and cones, flood plains, natural levees, deltas, channel deposits.</p> <p>Wind and Aeolian landforms: Types of wind – Breeze, Gale, Tempest, Cyclone. Geological action of wind: Wind erosion - Deflation, abrasion, attrition. Erosional features - mushroom rocks, yardangs, Hamda, ventifacts, pedestal rocks, zeugen, milletseed sands. Transportation - suspension, saltation, traction. Deposition and depositional landforms - Sand dunes and types, Loess.</p> <p>Glaciers and glacial landforms:- Types of glaciers – Mountain or valley glaciers, Piedmont glaciers, continental ice-sheets or ice caps. Geological action of glaciers.</p>	
<p>UNIT 3</p>	<p>GEODYNAMICS</p> <p>Introduction to Geodynamics. Origin of oceans, continents and mountains. Concepts and theories of isostasy. Concept of palaeomagnetism, application of palaeomagnetism. Continental drift. Sea floor spreading. Concept of plate tectonics. Nature and types of plate margins, Midoceanic ridges and trenches. Origin and distribution of Island arcs.</p>	<p>16 Hrs.</p>

Earthquakes: definition, Elements of an earthquake, types of earthquake waves, scale based on intensity and magnitude, seismographs and seismometers, causes and prediction of earthquake, Effects of earthquake, Seismic zones of India.

Volcanoes: A typical volcano parts, volcanic activity, types of volcanoes, composition of lava, distribution of volcanoes. Products of a volcano. Volcanic landforms; depressed landforms: Volcanic cone (Cinder Cone), Volcanic craters, Calderas (Caldera Lake). Landforms due to the accumulation of lava: Volcanic mountains, Volcanic plateaus, Volcanic plains, Volcanic necks.

Groundwater:- Meaning and components of groundwater. Geological action of groundwater: Erosion and erosional landforms (lapis, solution holes and associated features, poljes, caves and caverns: valleys of karst topography, natural bridges). Transportation; solution. Depositional work; concretions, stalactites and stalagmites,

Oceans and Coastal landforms: Topography of ocean floor – continental slope, shelf, abyssal zone, mid-oceanic ridges.

**Suggested
Readings:**

1. Duff, P. M. D., & Duff, D. (Eds.). (1993). Holmes' principles of physical geology. Taylor & Francis.
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.
4. Brian, J. S., Barbara, W.M., 2010. The Blue Planet: An Introduction to Earth System Science, 3rd Edition, Wiley.
5. Ernst, W.G., 2000. Earth Systems: Processes and Issues, Cambridge University Press.
6. Sarah, E., Cornell, I., Prentice, C., Joanna, I.H., Catherine, J.D., 2012. Understanding the Earth System Global Change Science for Application, Academic Press.
7. Jacobson, M., Charlson, R., Rodhe, H., Orians, G., 2000. Earth System Science: From Biogeochemical Cycles to Global Changes, Elsevier.
8. Ehlers, E., Krafft, T., 2006. Earth System Science in the Anthropocene, Springer.
9. *Jacobson, M. C., Charlson, R. J., Rodhe, H., and Orians, G. H., 2000, Earth System Science:*

San Diego, CA, Academic Press, 523 p., ISBN 0-12-379370-X

10. The Earth System, Lee R. Kump, James F. Kasting, and Robert G Crane; Prentice Hall, 2nd Ed., 2004
11. Principles of Geology – Arthur Holmes
12. Physical Geology – Longwell & Flint
13. General Geology – Radhakrishnan. Y
14. The Dynamic Earth – Wyllie. P. J
15. The way earth works - Wyllie. P. J
16. Physical Geology – Springfield
17. Geomorphology – Thornbury
18. Geomorphology – Davies
19. Physical Geography Today – Muller & Oberlander

First semester Practical syllabus

Year - I	Course Code	LTP/Credits: 004/2
Sem – I	Paper Title: Maps, Soil and Field Visit	Total Teaching Hours: 64 Hrs. (4 hours /Week)
Summative Assessment Marks (C₃): 40 marks		Exam. Duration: 3 Hrs
Formative Assessment C ₁ Test = 05 Marks C ₂ Test/Assignment/ Tour Report = 05 Marks		Exam. Marks Total:

	40 + 10 = 50 Marks
1. Introduction to maps. Study of maps. Types of maps. Types of scale.	1 practical
2. Reading topographical maps of the Survey of India; Detailed study of topographic sheets	2 practical
3. Preparation of topographical map	1 practical
4. Identification of drainage patterns	2 practical
5. Preparation of LU/LC maps.	2 practicals
6. Study of soil profile and determination of soil texture	3 practicals
7. Study of major geomorphic features and their relationships with outcrops through physiographic models and using lens stereoscope and mirror stereoscope.	1 practical
8. Field visit to a place of geological/geomorphological interest.	

MODEL QUESTION PAPER FOR C₃

First Semester

CORE COURSE: GDSC/P- 1: PRACTICALS-1

Time: 3 Hour

Max.

Marks: 40

Determination of the soil texture.	5 X 1 = 5 mark
Interpretation and description of a part of a toposheet as regard to topography, slope and drainage.	
Interpretation and description of a physiographic model.	5 X 1 = 5 mark
Interpretation and description of geomorphic features using lens/mirror stereoscope.	5 X 2 = 10 mark
Preparation of Land use/Land cover map with report	10 X 1 = 10 mark
Record	5 mark
Viva-Voce	5 mark

II Semester Theory Syllabus

Year - I	Course Code	LTP/Credits: 300
Sem – II	Paper Title:CRYSTALLOGRAPHY AND MINERALOGY	Total Teaching Hours: 48 Hrs. (3 hours/Week)
Summative Assessment Marks (C₃): 80 marks		Exam. Duration: 3 Hrs
Formative Assessment		Exam. Marks Total:

C ₁ Test = 10 marks		80 + 20 = 100
C ₂ Test/Assignment/ Tour Report = 10 marks		Marks
Course learning outcome:	Studying the basics of mineralogy and crystallography helps in understanding and building the overall knowledge in Geology.	
Broad contents of the course:	The course deals with the study of minerals, their chemistry and identification in hand specimen. Further, it also deals with the study of crystals with respect to their morphology, symmetry and the normal crystal classes	
Skills to be learned:	The students will be able to identify common rock-forming minerals in hand specimens as well as in thin sections. Besides, they will familiarise themselves with Bavarias crystal lattice and crystal systems.	

Unit No	Course Content	Hours
UNIT 1	CRYSTALLOGRAPHY Introduction. Definition of a crystal. Elementary ideas about crystal structure (crystalline, cryptocrystalline, Amorphous). Crystal elements; faces, edges and Solid angle. Euler's formula. Interfacial angles and its measurement (Contact Goniometer and its use). Crystallographic axes;	16 Hrs.

	<p>classification of crystals based on geometrical constants.</p> <p>Laws of crystallography; the law of constancy of interfacial angles, the law of symmetry; Plane, axis and centre of symmetry , Grade of symmetry- classification of crystals based on grade of symmetry. The law of rational indices- crystallographic parameters and crystallographic notation; Weiss notation, Miller's Indices. Crystal form.</p> <p>Study of forms of normal classes (Holoedral)- Isometric, Tetragonal, Hexagonal, Orthorhombic, Monoclinic, Triclinic .</p>	
<p>UNIT 2</p>	<p>MINERALOGY</p> <p>Introduction. Definition of a mineral. Formation of minerals.</p> <p>Physical properties of minerals. Characters depending upon the state of aggregation; habit, form. Characters depending upon cohesion and elasticity; cleavage, fracture, hardness, tenacity. Characters depending upon light; colour, streak, luster, diaphaneity, iridescence, Opalescence, Luminescence, Fluorescence, Tarnish. Characters</p>	<p>16 Hrs.</p>

	<p>depending upon electricity (conductivity, pyro, piezo) and magnetism (para and diamagnetism).</p> <p>Specific gravity and methods of determining specific gravity; Walker's steel yard. Chemical Mineralogy; Bonding of molecules – Ionic, Covalent, Metallic, Vander Walls. Isomorphism, Polymorphism and Pseudomorphism.</p>	
<p>UNIT 3</p>	<p>OPTICAL AND DESCRIPTIVE MINERALOGY</p> <p>Nature of light, nomenclature of wave theory, Ordinary and polarized light, isotropic and anisotropic minerals, their wave surfaces and wave fronts, Reflection and refraction of light, Refractive index, critical angle, total internal reflection, Double refraction (Uniaxial, Biaxial minerals), Nicol Prism its construction and working. Behaviour of light under crossed nicols with mineral section.</p> <p>Optical properties under microscope: Petrological microscope- its parts and functioning.</p> <p>Optical properties of minerals: Mica plate, Gypsum plate and Quartz wedge (construction and use). Pleochroism (Dichroism, Trichroism), Interference colours, Michael Levy's chart. Order of</p>	<p>16 Hrs.</p>

Interference colour. Extinction- Straight, inclined, undulose and symmetrical extinctions. Extinction angle.

Classification of minerals based on chemical composition. Silicates: abundance in the crust, classification of silicates, based on structures – Neso, Soro, Cyclo, Ino, Phyllo, Tectosilicates.

Chemical composition, physical, optical properties, mode of occurrence and uses of the following group of minerals: - Olivine group, Pyroxene group, Amphibole group, Mica group, Feldspar group, Quartz group and Garnet group.

Suggested Readings:

1. James D Dana. A Textbook of minerology, John Wiley and Sons
2. Verma, P K (2010), Optical mineralogy. Ane books Pvt.Ltd.Buerger, Elementary crystallography
3. Ram S. Sharma and Anurag Sharma (2013) Crystallography and Mineralogy -
4. Concepts and Methods. Text Book Series, Geological Society of India, Bangalore
5. Dana, E.S. and Ford, W.E., (2002) A textbook of Mineralogy (Reprints).
6. Flint, Y., (1975) Essential of crystallography, Mir Publishers.

7. Phillips, F.C., (1963) An introduction to crystallography. Wiley, New York.
8. Berry, L.G., Mason, B. and Dietrich, R.V., (1982) Mineralogy. CBS Publ.
9. Read, H.H., (1968) Rutley's Element of Mineralogy (Rev. Ed.). Thomas Murby and Co.
10. Berry and Mason, (1961) Mineralogy. W.H. Freeman & Co.
11. Kerr, B.F., (1995) Optical Mineralogy 5th Ed. McGraw Hill, New York.
12. Deer, Howie and Zussman (1996) Introduction to Rock forming Minerals, Pearson
13. Wahlstrom E.E. (1971) Optical crystallography, John Wiley and sons.
14. R.N. Hota (2012) Practical approach to Mineralogy and Crystallography, CBS Publications & Distributions.
15. Perkin D. (2010) Mineralogy, Pearson.

Second semester practical syllabus

Year - I	Course Code	LTP/Credits: 004/2
Sem – II	Paper Title:Crystallography and Mineralogy	Total Teaching Hours: 64 Hrs.

	(4hours/Week)
Summative Assessment Marks (C₃): 40 marks	Exam. Duration: 3 Hrs
Formative Assessment C ₁ Test = 05 Marks C ₂ Test/Assignment/ Tour Report = 05 Marks	Exam. Marks Total: 40 + 10 = 50 Marks
1. Study of crystals based on geometrical constants.Measurement of interfacial angle using contact goniometer and Verification of Euler's theorem	1 practical
2. Study of holohedral forms of six crystal system	4 practical
3. Study of Physical properties of rock forming minerals (list-given below)	4 practicals
4. Study of Physical properties of rock ore minerals (list-given below)	2practicals
5. Study of the optical properties of important rock forming minerals using polarizing microscope: Quartz, Plagioclase, Orthoclase, Microcline, Biotite, Hornblende, Augite, Hypersthene, Olivine, Garnet, Calcite.	2 practical

6. Visit to field to study the mode of occurrence of minerals.	1 practical
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Non-silicates				Native elements
Non-Metallic minerals		Metallic minerals		
Sulphates	Barite, Gypsum	Sulphides	Chalcopyrite, Galena Realgar, Orpiment, Spalerite (& dodecahedral), Cinnabar, Pyrite, Stibnite	
Oxides	Corundum	Oxides	Haematite (& botryoidal, micaceous), Magnetite, Pyrolusite, Chromite, Bauxite, Psilomelane	
Carbonates	Dolomite, Calcite, Magnesite	Carbonates	Malachite, Azurite	
Phosphates	Monazite	Halides	Rock salt (Halite), Fluorite	

*Silicates	Group	Mineral Name
Nesosilicates	Olivine Group	Olivine
	Garnet Group	Garnet
	Al ₂ SiO ₅ Group	Andalusite, Sillimanite, Kyanite, Staurolite
	Zircon Group	Zircon
Sorosilicates	Epidote Group	-
Cyclosilicates	Beryl Group	Beryl

		Tourmaline	Tourmaline
Inosilicates	Single Chain Silicates	Pyroxene Group	Augite, Hypersthene
	Double Chain Silicates	Amphibole Group	Actinolite, Hornblende
Phyllosilicates		Serpentine Group	Serpentine, Asbestos
		Clay Minerals Group	Talc, Kaolin
		Mica Group	Muscovite, Biotite, Phlogopite, Vemiculite
Tectosilicates		Quartz Group	Quartz
		Feldspar Group	Orthoclase, Plagioclase, Microcline
		Feldspathoid Group	Nepheline, Sodalite
		Zeolite Group	Zeolite

MODEL QUESTION PAPER FOR C₃

I B.Sc., II Semester Examination

Paper Title:

Time: 3 Hour

Max.

Marks: 40

1	Verification of Euler's formula	1 X 2 = 2 Marks
2	Identification of the crystal model as to its system based on geometrical constants	2 X 2=4 marks
3	Identification of the crystal model as to its holohedral system based on symmetrical Characters	1 X 5 = 5 marks
4	Identification of silicate group of minerals based on physical properties	4 X 2 = 8 marks
5	Identification of non-silicate group of minerals based on physical properties.	2 X 3 = 6 marks
6	Identification of a mineral based on optical properties.	1 X 5 = 5 mark
7	Record	5 Marks
8	Viva-Voce	5 marks

MODEL QUESTION PAPER FOR C₃

I B.Sc.,Examination

GEOLOGY

Paper Title:

Time: 3 Hour

Max. Marks: 80

SECTION : A

Answer any FIVE questions
10 Mark

5 X 2 =

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- .

SECTION : B

Answer any SIX questions
Mark.

6 X 5 = 30

- 7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.

SECTION : C

Answer any Four questions
Mark

10 X 4 = 40

- 15.
- 16
- 17
- 18
- 19
- 20