

Bachelor of Science (Geology)
(Choice Based Credit System)
SYLLABUS

SEMESTER – I

DSC 1A- GEODYNAMICS AND GEOMORPHOLOGY - (L T P-3 0 1)

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DSC1B- PRACTICAL

DSC 1A-THEORY

Total Credits: 3

Total Hours: 50

Objectives:

1. To understand the dynamics of the earth and other components of the solar system.
2. To understand the geological processes associated with the earth.

Learning outcome:

1. The candidate will be familiar with the origin of the earth and its interactions with the solar system.
2. The candidate will understand the exogenic and endogenic processes of the earth and formation of various landforms.

Module -1:

10 hrs

Earth as a planet: Holistic understanding of dynamic planet 'Earth' through Astronomy, Geology, Meteorology and Oceanography. Introduction to various branches of Earth Sciences and Geology. General characteristics and origin of the Universe, Solar System and its planets. The terrestrial and jovian planets. Meteorites and Asteroids.

Module - 2:

10 hrs

Solar system & interior of the Earth: Earth in the solar system – origin (various theories and age), size, shape, mass, density, rotational and revolution parameters and its age. Formation of core, mantle, crust, hydrosphere, atmosphere and biosphere. Convection in Earth's core and production of its magnetic field. Mechanical layering of the Earth. Layered structure of Earth.

Module - 3:

10 hrs

Endogenic Processes: Concept of plate tectonics, sea-floor spreading and continental drift. Geodynamic elements of Earth- Mid Oceanic Ridges, trenches, transform faults and island arc. Origin of oceans, continents, mountains and rift valleys. Earthquakes: nature of seismic waves, their intensity and magnitude scale; Origin of earthquake and earthquake belts. Volcanoes- types and their distribution.

Module-4:**10 hrs**

Exogenic Processes: Weathering and Erosion: factors, types and their effects. Soils-processes of formation, soil profile and soil types. Geological action of wind, river, oceans, glacier and ground water.

Module-5:**10 hrs**

Hydrosphere and Atmosphere: Oceanic current system (Pacific, Atlantic, Indian, Southern, and Arctic) and effect of Coriolis force. Concepts of eustasy. Atmospheric circulation, Weather and climatic changes. Earth's heat budget.

Books Recommended:

1. Arthur Holmes, (1992) Principles of Physical Geology. Chapman and Hall, London.
2. Miller, (1949) An Introduction to Physical Geology. East West Press Ltd.
3. Spencer, E.V., (1962) Basic concepts of Physical Geology. Oxford & IBH.
4. Mahapatra, G.B., (1994) A text book of Physical Geology. CBS Publishers.
5. Press and Siever (1998) Understanding Earth, WH Freeman & Co.
6. Emiliani, C. (1992) Planet earth: cosmology, geology, and the evolution of life and environment. Cambridge University Press
7. Gross, M. G. (1977). Oceanography: A view of the earth.

DSC1B- PRACTICAL – (L T P-0 0 1)

1. Study of major geomorphic features and their relationships with outcrops through physiographic models. **1 practical - 2.5 hrs x 2= 5 hrs**
2. Reading topographical maps of the Survey of India; Detailed study of topographic sheets, Identification of geomorphic features and preparation of physiographic description of an area. **1 practicals-2.5 hrs x 2= 5 hrs**
3. Study of soil profile and soil texture of any specific area. **1 practical- 2.5 hrs x 2= 5 hrs**
4. Study of major ocean currents of the World. **2 practical 2.5 hrs x 2= 5 hrs**

DSC2A (THEORY): MINERAL SCIENCE (L T P- 3+ 0+ 2)

Total Credits: 3

Total Hours: 50

Objectives:

1. To understand the characteristics of crystalline substances.
2. To understand the physical, chemical and optical features of minerals.

Learning outcome:

1. The candidate will be equipped to classify crystals into various classes.
2. The candidate will be able to identify minerals based on their properties.

CRYSTALLOGRAPHY

Module 1: Introduction, definition and scope of crystallography, definition of a crystal, formation of crystals: crystalline and amorphous substance, crystal elements: interfacial angle, contact goniometer.

Crystallographic axes: axial characters of geometric constants; axial ratio; classification of crystals into systems based on geometrical constants- Isometric, Tetragonal, Hexagonal, Orthorhombic, Monoclinic and Triclinic systems. **10hrs**

Module 2: Symmetry in crystals, definition, elements of symmetry-centre, plane, axis and roto-inversion axis of symmetry, symmetry notation- Weiss notation, Hermann Mauguin symbols and Millers indices, law of rational indices, grade of symmetry.

Twins: definition, parts of a twin, types of twins, twin laws

10hrs

MINERALOGY

Module 3: Introduction: definition of mineral, history of mineralogy, branches of mineralogy.

Physical mineralogy: 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, phosphorescence, tarnish.

Characters depending upon electricity (conductivity: pyro, piezo) and magnetism: (para and dia). Specific gravity and methods of determining specific gravity – Walker's steel yard. **10hrs**

Module 4: Chemical Mineralogy: Bonding of molecules – Ionic, Covalent, Metallic, Vander Walls. Isomorphism and Polymorphism.

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

Study of groups of minerals: Quartz, feldspar, garnet, mica, pyroxene and amphibole.

10hrs

Module 5: OPTICAL MINERALOGY-Nature of light, Nomenclature of wave theory, reflection and refraction of light, Refractive index, Critical angle, Total reflection. Principles of optical mineralogy. Introduction to petrological microscope. Theory of light propagation in Isotropic, uniaxial and biaxial crystals. Interference color, classification of interference color Michael Levy's chart Optical accessories: Mica plate, gypsum plate and quartz wedge and its effects on a mineral section between crossed nicols Pleochroism: dichroism, trichroism.

Extinction, types of extinction straight, inclined, undulose and symmetrical extinction

10hrs

BOOKS RECOMMENDED:

1. Mineralogy, Crystallography & Crystal Chemistry – Bloss.D
2. Textbook of Mineralogy – Dana
3. Rock Forming Minerals – Deer, Howie & Zussman
4. Mineralogy – Shrock
5. Manual of Mineralogy – Klien, C & Hurlburt, C.S.Jr.
6. The 23rd Edition of the Manual of Mineral science (after James D.Dana) Klien, C., Dutrow, B., Dwight, J and Klien, C-J. Wiley and Sons
7. Introduction to Mineral Sciences. Putnis. A- Cambridge University Press
8. An introduction to crystallography- Burger
9. Elementary crystallography- Burger
10. Crystal chemistry – Kutty T.R.N and Tareen J.A.K
11. Elements of x-ray crystallography-Axaroff
12. An Introduction to crystal chemistry- Evans .R.C
13. Elemental crystallography- Tareen J.A.K and Kutty T.R.N

DSC2B-PRACTICAL-CRYSTALLOGRAPHY – (L T P- 0 0 1)

CRYSTALLOGRAPHY:

10hrs

The study of mathematical relationships of crystal elements. Euler's formula $F+A=E+2$

Measurement of interfacial angle using contact goniometer- 1Prac..... **1 x 2.5 =2.5 hrs**

Classification of crystals based on the axial characters & symmetry characters-

1Prac..... **1 x 2.5 =2.5 hrs**

The study of symmetry elements in crystals– Grades of symmetry & Classification of crystals into six systems based on axial and symmetry characters-1Prac... **1 x 2.5 =2.5 hrs**

Simple holohedral forms. Study of twins-contact, penetration, simple, multiple-

-1Prac... **1 x 2.5 =2.5 hrs**

OPTICAL MINERALOGY 10hrs

Determination of vibration direction and sign of elongation of minerals by using different accessories-	1Prac.....	1 x 2.5 =2.5 hrs
Determination of order of interference colors in minerals-	1Prac.....	1 x 2.5 =2.5 hrs
Determination of Pleochroic scheme ex: Hornblende, glaucophane-	1Prac	1 x 2.5 =2.5 hrs
Determination of extinction angles for different minerals-	1Prac.....	1 x 2.5 =2.5 hrs

DSC2B-PRACTICAL- MINERALOGY – (L T P- 0 0 1) -20hrs

Rock forming minerals: Identification of the following minerals based on their physical characters.

- Oxides:** Corundum, halides: Fluorite, halite.-1 Prac..... 1 x 2.5 =2.5 hrs
1. **Carbonates:** Calcite, magnesite, dolomite. - 1 Prac.... .1 x 2.5 =2.5 hrs
 2. **Phosphates:** Monazite, apatite & **Sulphates:** Barytes, gypsum-
1 Prac.... 1 x 2.5 =2.5 hrs
 3. **Silicates: Nesosilicates:** Olivine, garnet, zircon, kyanite, staurolite &
Cyclosilicates: Beryl, tourmaline. 1 Prac... 1 x 2.5 =2.5 hrs
 4. **Ionosilicates: Pyroxenes:** Hypersthene, augite & **Amphibole:**
Hornblende, actinolite.
1 Prac... 1 x 2.5 =2.5 hrs
 5. **Phyllosilicate:** Serpentine, talc, muscovite, vermiculite, biotite, epidote
1 Prac... 1 x 2.5 =2.5 hrs
 6. **Tectosilicates:** Quartz and its varieties.
Feldspars- Microcline, orthoclase, plagioclase- labradorite.
Feldspathoids- Sodalite---- 2 Prac... 2 x 2.5 = 5 hrs

FIELD VISITS: Sargur schist belt , Holenarasipur schist belt and other important areas where interesting minerals occur in the Karnataka state.

DSC 3A (THEORY) - PALEONTOLOGY (L T P- 3 0 1)

Total Credits: 3

Total Hours: 50

Objectives:

- To understand the types of fossils, invertebrates and phylum
- To understand the paleontology, vertebrates, plant kingdom
- To understand the principles of stratigraphy.

Learning outcome:

- The candidate will be equipped to identify the metamorphic rocks both in the field and laboratory.
- The candidate will be able to understand the importance of metamorphic rocks and their occurrence and origin.

Module1:

10hrs

Introduction- Scope and subdivisions – Organic world – Animal Kingdom - Definition of a fossil, types of fossils- index, body fossils and Unaltered hard parts, Altered hard parts : Petrification, permineralisation, carbonisation, recrystallisation, silicification; trace fossils- mould, casts, tracks, trails, borings: synthetic & pseudofossils transported and leaked fossils. Uses of fossils- stratigraphic indicators- climatic indicators- indicators of palaeogeography- indicators of evolution and migration of life forms –uses in the exploration of fossil fuels - Taxonomy and Species concept. Taxonomic hierarchy. Life through the ages.

Module 2:

10hrs

Invertebrates : Phylum **Arthropoda:** class: **Trilobita:** General morphology. Cephalon- glabella, facial suture, free cheek, fixed cheek, genal angle, genal spine, cranidium, Thorax- segments, pleurae, pleural spine. Pygidium. Classification, Functional adaptation in trilobites- geological history- stratigraphic importance.

Phylum **Cnidaria:** class **Anthozoa:** General morphology, corallum, corallite, theca, chambers, septa, tabulae, dissepiments, sinapicalae, fossula, columella, septal developments, classification- rugose corals, tabulate corals and modern corals, geological range and stratigraphic importance. Phylum: **Hemicordita,** Subphylum; **Graptolithina:** Order: **Graptoloidea:** General morphology, rhabdosome, stipe, theca, common canal, nema, virgula, sicula, uniserial, biserial, classification, geological distribution and stratigraphic importance.

Module 3:

10hrs

Phylum **Mollusca:** Phylum **Pelecypoda-** General characters, ornamentation, classification , geological history.

Class – **Gastropoda:** General morphology, shell forms, **types of coiling-** dextral & sinistral, orientation, ornamentation, classification and geological history.

Class- **Cephalopoda**: General morphology, (Nautilitic, Goniatic, Ceratic and Ammonitic)-shell forms-ornamentation- classification, geological history-. Significance of Ammonites in Mesozoic biostratigraphy and their paleobiogeographic implications.

Phylum **Brachiopoda**: General morphology- brachial skeleton, morphometric details, ornamentation- classification, geological history.

Module 4

10hrs

Phylum Echinodermata Class - Echinoidea-Morphology of the shell, regular and irregular echinoids: Apical system-ambulacral and interambulacral areas, peristome.

Vertebrates - A brief outline of the classification of Vertebrates. A short account of Devonian fishes, Mesozoic Reptiles with special reference to origin, diversity and extinction of dinosaurs. Siwalik mammals - A very short account of the evolution of man, elephant and horse.

Plant kingdom: General classification of plant kingdom- plant fossils from India with special reference to Gondwana flora- A brief account of the following plant fossils Ex: Glossopteris, Gangamopteris, Ptilophyllum, Calamites, Lepidodendron and Sigillaria.

Module 5:

10 hrs

Micro Palaeontology: Phylum **Protozoa:** Order: **Foraminifera**-General morphology, test wall- calcareous, chitinous, agglutinated- septa, arrangement of chambers, suture, aperture, dimorphism, classification, geological history and stratigraphic importance. Applications of foraminifera in oil exploration and Palaeo climatic studies.

BOOKS RECOMMENDED:

- 1.Swinnerton:- Outlines of Palaeontology
- 2.Moore, Lalicker and Higher: - Invertebrate Palaeontology
- 3.Remer : - Invertebrate Palaeontology
- 4.Shrock and Twenhofel: - Principles of Invertebrate Palaeontology
- 5.Arnold: - Introduction to Palaeontology
- 6.Lahmann and Hillmer: - Fossil Invertebrates
- 7.Glaessner: - Principles of Micropalaeontology
- 8.Wadia, D.N. Indian Stratigraphy
- 9.Krishnan, M.S. Geology of India and Burma
- 10.Mem.GeoI.Soc.India Geology of Karnataka
- 11.GSI Publication Geology of Karnataka.
- 12.Mem. Geol. Soc of India Deccan Basalts
13. Ravindrakumar. Principles of historical geology.
- 14.Henry Woods - Invertebrate paleontology - Cambridge press
- 15.Romer. A.S - Vertebrate paleontology, Chicago press.
- 16.Arnold. C.A - An introduction to paleobotany, MC-Graw-Hill
- 17.B.U.Hag and A. Boersma (1978) Introduction to Marine Micropaleontology, Elsevier, Netherlands
18. Ramp. D.M. and Stanely.M.S - Principles of Paleontology Moore.R.C. Laliker C.G & ishcher.A.G – CBSPublishers
19. InvertebrateFossils, Horper brothers
20. Shrock.R.R and Twenhofel. W.H.1953 - Principles of Invertebrate,
21. Palaeontology, Arnold Publication.
22. The Elements of Palaeontology Rhona M.Black Cambridge University press.
23. Shukla,A.C., &Misra, S.P., Essentials of Paleobotany. Vikas Publishers

24. Armstrong, H.A., & Brasier, M.D., (2005) Microfossils. Blackwell Publishing
 25. Jain, P.C., & Anantharaman, M.S., 1983 Paleontology: Evolution and Animal Distribution. Vishal Publ
 26. Rastogi 1968 organic evolution, Kedarnath and Ramnath Publ

DSC3B-PRACTICAL - PALAEOLOGY (L T P - 0 0 1) - 20hrs

Megascopic identification and description of the following fossils:

Corals: Calceola, zaphrentis, lithostrotion, favosites, halysites **1 Pra...1 x 2=2hrs.**

Brachiopoda: Spirifer, productus, terebratula, rhyconella, atrypa. **1 Pra...1 x 2=2hrs.**

Pelecypoda: Cardita, pecten, trigonia, gryphea. **1 Pra...1 x 2=2hrs.**

Gastropoda: Natica, turritella, cerithium, conus, voluta, physa. **1 Pra...1 x 2=2hrs.**

Cephalopoda: Nautilus, goniatites, ceratites, acanthoceras. **1 Pra...1 x 2=2hrs.**

Trilobita: Paradoxide, calamene, phacops, trinucleus. **1 Pra...1 x 2=2hrs**

Identification of Micro fossils: Foraminifera: lagenae, nodosaria, textularia

1 Pra...1 x 2=2hrs

Plant fossils: Glassopteris, gangamopteris, ptillophyllum, lepidodendron, sigillaria and calamites.

2 Pra...2 x 2=4hrs

Techniques of separation of palynofossils from the sediments

1 Pra...1 x 2=2hrs

FIELD VISITS: Trichirapalli, Tamilnadu, Gujarat and Himalayas.

ENGLISH - I

Total Credits: 3 + 0 + 0=3

Total Hours: 45 Hours

Poetry:

1. The Oxford Clerk – Geoffrey Chaucer
2. Shall I Compare Thee – William Shakespeare
3. Sparkles from the Wheel – Walt Whitman
4. Where the Mind is without Fear – Rabindranath Tagore
5. The Tiger and the Deer – Sri Aurobindo

Prose:

1. Toba Tek Singh – Saadat Hasan Manto
2. The Clay Mother-in-law: A South Indian Folktale (Collected by A. K. Ramanujan)
3. On the Way to Goregaon – B. R. Ambedkar

Language Component and Literary Activity:

1. Homophones (Words often confused)
2. Articles
3. Verbs in relation to tense, person and number of the subject
4. Prepositions (of place, time, position)
5. Reading Comprehension (of an unseen passage)

HINDI - I

Title of the Paper – Hindi Gadya aur Anuvaad

Total Credits (LTP): 3+ 0 + 0 = 3

Total Hours: 45hrs

Unit- 1 & 2: Hindi Gadya - Gadya Pratibha, Edited by Dr. Basavaraj K.Baraker, Javahar Pustakalaya, Sadar Bazar, Mathura, (UP) 281001 (Omitted 2.4.6.8.10.12..14, 16, 18, 20, 22)

Unit – 3 & 4: Anuvaad

- Anuvaad ki Paribhasha
- Anuvaad kala hai ya vigyan
- Anuvaad ke prakar- Shabdanuvaad, Bhavanuvaad, Vaijyanik
- Anuvaad, Takniki Anuvaad
- Vanijya Anuvaad- Prashasanik Aur Kanuni Anuvaad
- Paribhashik Shabdavali.

Recommended Books

- Anuvaad Vigyan- Bholanatha Tiwari, Shabdkar, Delhi,110092
- Anuvaad kala-Kuch vichar- by Anand Prakash Khemani, S.Chand & Co., New Delhi.
- Anuvaad Siddhant aur samsyayen: R.N.Srivastav and K.K. Goswami, Alok Prakashan, Delhi.
- Anuvaad-Patrika ke Ank, Pub. Anuvaad Sahitya Parishass, New Delhi
- Anuvaad- Siddhant Evam Swarup by Manohar Saraph and Dr. Shivkanth Goswamy.

ENVIRONMENT STUDIES

Total Credits: 3 + 0 + 0=3

Total Hours: 45 Hours

Unit 1: Introduction to Environmental Studies

- Multidisciplinary nature of environmental studies; Components of environment: Atmosphere, hydrosphere, lithosphere, biosphere. Scope and importance; Concept of sustainability and sustainable development.

Unit 2: Ecosystems

- What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession.
- Case studies of the following ecosystems:
 - a) Forest ecosystem
 - b) Grass land ecosystem
 - c) Desert ecosystem
 - d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 3: Natural Resources: Renewable and Non-renewable Resources

- Land resources and land use change; Land degradation, soil erosion and desertification.
- Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal Populations.
- Water: Use and over- exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter- state).
- Energy resources: Renewable and non renewable energy sources, Use of alternate energy sources, growing energy needs case studies.

Unit 4: Biodiversity and Conservation

- Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots
- India as a mega-biodiversity nation; Endangered and endemic species of India
- Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

Unit 5: Environmental Pollution

- Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution
- Nuclear hazards and human health risks
- Solid waste management: Control measures of urban and industrial waste.
- Pollution case studies.

Unit 6: Environmental Policies & Practices

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols, UNFCCC (The United Nations Framework Convention on Climate Change, CBD (Convention on Biological Diversity) and IUCN (International Union for Conservation of Nature).
- Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

Unit 7: Human Communities and the Environment

- Human population growth: Impacts on environment, human health and welfare.
- Resettlement and rehabilitation of project affected persons; case studies.
- Disaster management: floods, earthquake, cyclones and landslides.
- Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan.
- Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.
- Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

Unit 8: Field work

- Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural

- Visit to Industries for study on Occupational health and safety.
- Study of Biodiversity and protected areas.
- Study of Solid waste management/drinking/waste-water treatment plant etc.

Suggested Readings:

1. Carson, R. 2002. *Silent Spring*. Houghton Mifflin Harcourt.
2. Gadgil, M., & Guha, R. 1993. *This Fissured Land: An Ecological History of India*. Univ. of California Press.
3. Gleeson, B. and Low, N. (eds.) 1999. *Global Ethics and Environment*, London, Routledge.
4. Gleick, P.H. 1993. *Water in Crisis*. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. *Principles of Conservation Biology*. Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M. K. 2013. Threats from India's Himalaya dams. *Science*, 339:36--37.
7. McCully, P. 1996. *Rivers no more: the environmental effects of dams* (pp.29--64). Zed Books.
8. McNeill, John R. 2000. *Something New Under the Sun: An Environmental History of the Twentieth Century*.
9. Odum, E. P., Odum, H. T. & Andrews, J. 1971. *Fundamentals of Ecology*. Philadelphia: Saunders.
10. Pepper, I. L., Gerba, C. P. & Brusseau, M. L. 2011. *Environmental and Pollution Science*. Academic Press.
11. Rao, M. N. & Datta, A. K. 1987. *Waste Water Treatment*. Oxford and IBH Publishing Co. Pvt. Ltd.
12. Raven, P. H., Hassenzahl, D. M. & Berg, L. R. 2012. *Environment*. 8th edition. John Wiley & Sons.
13. Rosencranz, A., Divan, S., & Noble, M. L. 2001. *Environmental law and policy in India*. Tripathi 1992.
14. Sengupta, R. 2003. *Ecology and economics: An approach to sustainable development*. OUP.

15. Singh, J. S., Singh, S. P. and Gupta, S. R. 2014. *Ecology, Environmental Science and Conservation* .S. Chand Publishing, New Delhi.
16. Sodhi, N. S., Gibson, L. & Raven, P. H. (eds). 2013. *Conservation Biology: Voices from the Tropics*. John Wiley & Sons.
17. Thapar, V. 998. *Land of the Tiger: ANatural History of the Indian Subcontinent*.
18. Warren, C. E. 1971. *Biology and Water Pollution Control*. WB Saunders.
19. Wilson, E. O. 2006. *The Creation: appeal to save life on earth*. New York: Norton.
20. World Commission on Environment and Development. 1987. *Our Common Future*. Oxford University Press.
21. www.nacwc.nic.in
22. www.opcw.org

SEMESTER - II

DSC4A-THEORY-IGNEOUS PETROLOGY – (L T P - 3 1 1)

&

DSC 4B-PRACTICAL

DSC 4A-THEORY

Total Credits: 3

Total Hours: 40

Objectives:

- To understand the different types of igneous rocks, their textures and structures followed by rock cycle
- To understand the role of magma in the formation of igneous rocks and geological processes associated with the earth.
- To understand the occurrence and genesis of igneous rocks through practical identification of the igneous rocks both in the laboratory and field visits.

Learning outcome:

- The candidate will be equipped to identify the igneous rocks both in the field and laboratory studies.
- The candidate will be able to understand the genesis of igneous rocks and the processes behind it

Module 1 - Introduction: Definition of a rock. Classification of rocks - Igneous, Sedimentary & Metamorphic rocks. Rock cycle.

Igneous petrology: Introduction to Igneous petrology. Classification of igneous rocks based on grain size – Phaneritic, Aphanitic, Fragmental. Phaneritic rocks classification – fine, medium, coarse and very coarse grained. Classification based on composition – acidic, intermediate, basic & ultrabasic. Classification based on colour Index – Leucocratic, Mesocratic, Melanocratic & Hypermelanic. Classification based on depth – plutonic, hypabyssal and volcanic. Tabular classification of Tyrrell.

08 hrs

Module 2 - Igneous rock Structures & Textures: Structures: Amygdaloidal, Blocky, Ropy, Pillow, Glassy and Columnar.

Textures: Texture – Definition. Crystallinity (Holocrystalline, Hypocrystalline and Holohyaline), granularity (Aphanitic, Phaneritic and Cryptocrystalline), Form of Individual Grains (Euhedral, Subhedral and Anhedral) and mutual relationship of crystals. Kinds of textures: Equigranular - Panidiomorphic, hypidiomorphic and allotriomorphic; Inequigranular - Porphyritic, poikilitic, ophitic, basaltic, intergrowth and flow textures.

08 hrs

Module 3 - Magma: Definition, types and composition. The Process of Magma Rise and Emplacement: Diapir, Room Problem, Stopping, Liquid Immiscibility, Assimilation and Fractional Crystallization, Mixing of Magmas. Crystallization behavior of natural magmas: Bowen's Reaction Principle. **08 hrs.**

Module 4 - Forms of igneous rocks- extrusive and intrusive: Concordant - sill, laccolith, lopolith and phacolith. Discordant - dyke, ring dyke, cone sheets, volcanic neck, stock, boss and batholiths **Systems :** One-Component Systems, Two-Component (Binary) Systems – A) Binary Systems with Complete Solid Solution B) Binary Eutectic Systems **08 hrs**

Module 5 : Igneous Rock Associations: An introduction on Igneous rocks of oceanic regions, Igneous rocks associated with convergent plate boundaries, Continental flood basalts and large igneous provinces, Large layered igneous complexes, Continental alkaline rocks, Ultra-alkaline and silica-poor alkaline rocks, Special Precambrian associations, Meteorite-impact-generated rocks. **08 hrs**

Tutorial: Assignment & Seminars in Igneous Petrology **10hrs**

Books Recommended:

- John D. Winter (2010): An Introduction to Igneous and Metamorphic Petrology. Pearson Education, Inc. Published by Pearson Prentice Hall. P. 745
- Principles of petrology: Tyrrell - Chapman and Hall publications.
- Igneous and Metamorphic petrology: Turner and Verhoogen - 1962, Allied Publishers, Bombay. Metamorphic petrology by Winkler HGF 1987 - Nirosa publications
- Bose, M.K., 1997. Igneous petrology. World press
- Tyrrell, G. W., 1989. Principles of Petrology. Methuren and Co (Students ed.).
- Ehlers, WG, and Blatt, H., 1987. Petrology, Igneous, Sedimentary and Metamorphic rocks, CBS Publishers
- Moorhouse, WW., 1969. The study of rocks in thin sections. Harper and sons.

DSC-4B: PRACTICAL-: IGNEOUS PETROLOGY – (L T P-0 0 1)

1. Identification of the following Rocks in hand specimens : **Megascopy:**

Plutonic rocks - Granite, Syenite, Diorite, Gabbro, Dunite, Peridotite;

Hypabyssal rocks - Granite porphyry, Syenite porphyry. Diorite porphyry, Pegmatite, Dolerite;

Volcanic rocks - Rhyolite, Trachyte, Andesite, Basalt, Obsidian, Pitchstone

.....4prac.

4 x 2.5 = 10 hrs

2. Identification of the following rocks in thin sections: **Microscopy:**

Plutonic - Granite, Syenite, Diorite, Gabbro, Dunite;

Hypabyssal - Granite porphyry, Syenite porphyry, Diorite porphyry, Dolerite & Pegmatite;

Volcanic - Rhyolite, Trachyte, Andesite, Basalt 4 prac.

4 x 2.5 = 10 hrs

FIELD VISITS: 1. Visit to Chamundi and Madapura areas, Mysore district.

2. Visit to Doddakanya, Talur, Mysore district

ultramafic rocks.

3. Visit to Bettada bidu and Hulimavu, Mysore district
4. Visit to Mogaravalli and KRS road and railway cuttings
5. Visit to Gomatagiri area, Mysore district.
6. Visit to Gulbarga, Gulbarga district.

DSC5A-THEORY- SEDIMENTARY PETROLOGY – (LTP-3 0 1)

&

DSC 5B-PRACTICAL

DSC 5A-THEORY

Total Credits: 3

Total Hours: 50

Objectives:

- To understand the different aspects of sedimentary rocks and their textures and structures
- To understand the depositional systems and origin of sedimentary rocks.
- To understand the occurrence and genesis through practical identification of the sedimentary rocks both in the laboratory and field.

Learning outcome:

- The candidate will be equipped to identify the sedimentary rocks both in the field and laboratory.
- The candidate will be able to understand the depositional systems and genetic classification of sedimentary rocks.

Module 1: Introduction to sedimentary petrology and sedimentary cycle, applications of sedimentology.

Sedimentary Textures: Particles - Particles shape - roundness, Wentworth grade scale, methods of particle size analysis (sieve analysis), methods of measurement of porosity and permeability (field and laboratory methods), porosity and permeability – grain packing and grain orientation, relationship between fabrics.

10 hrs

Module 2: Transportation and Sedimentation: 1. Aqueous processes: Sedimentation from traction currents, 2. Eolian processes: Sedimentation from traction and suspension, 3. Glacial processes and 4. Gravitational processes. Sedimentary basins.

10 hrs

Module 3: Sedimentary Structures: Primary and Secondary structures. Primary structures – A) Organic: Burrows and trails B) Inorganic: Classification of inorganic structures i] pre-depositional – channels, scour and fill, flute and groove marks ii] syn-depositional – flat bedding, graded bedding, cross bedding and lamination iii] post-depositional – slump, slide, convolute lamination and bedding, recumbent foresets and load structures iv] Miscellaneous – rain prints and shrinkage cracks. Significance of sedimentary structures.

10 hrs

Module 4 :Depositional systems: Sedimentary Environments; Definition of sedimentary environment, classification of environments of deposition - Terrestrial, Lacustrine, Delta:

onshore and offshore, Beach, Tidal flat area: salt marsh, tidal flat and channel, Continental slope and shelf. Sedimentary Facies.

10 hrs

Module 5: Sediment to Rock: Subsurface temperatures, pressures, fluids and cementing material .

Genetic classes of sediment – chemical, organic, residual, terrigenous and pyroclastics. Classification of Sedimentary Rocks with examples: I. Allochthonous sediments – Terrigenous and pyroclastic deposits and II. Autochthonous sediments - chemical, organic, residual deposits. Classification of terrigenous rocks based on particle size –Rudaceous, Arenaceous and Argillaceous.

10 hrs

DSC5B-PRACTICAL-SEDIMENTARY PETROLOGY- (L T P- 0 0 1)

1. Identification of the following sedimentary rocks in hand specimens: **Megascopy:**
Conglomerate, Breccia, Sandstone, Shale, Grit, Limestone, Shell limestone, Oolitic limestone ..2 prac **2 x 2.5 =05 hrs**
2. Structural studies of sedimentary rocks.....2 prac **2 x 2.5 =05 hrs**
3. Identification of the following sedimentary rocks in thin sections: **Microscopy:**
Sandstone, Limestone (oolitic)...2 prac. **2 x 2.5 =05 hrs**
4. Textural study of sedimentary rocks.....2 prac **2 x 2.5 =05 hrs**

FIELD VISITS: 1. Visit to Bagalkot, Badami and Gulbarga areas, North Karnataka

BOOKS RECOMMENDED:

- Richard P. Selley (2000): Applied Sedimentology. Second Edition Academic Press, UK. P. 543
- Ricci Lucchi F (1995): Sedimentographica: A Photographica Atlas of Sedimentary Structures. 2nd Edn., Columbia University Press, New York. P.255.
- Collinson J.D., and Thompson D.B (1988): Sedimentary structures.2nd ed., Allen and Unwin., London p. 194.
- Selley R.C. (1996): Ancient sedimentary environment and their subsurface diagnosis. 4th ed. Chapman & Hall, London. P. 300.
- Reineck H. E.,& Singh I.B., (1980): Depositional Sedimentary Environments. 2nd ed., Springer-Verlag, Berlin., p. 549
- Sedimentary rocks by Pettijohn 1984 - CDS Pub\, NEW DELHI
- Sedimentary rocks by Greensmith 1984
- Manual of sedimentary petrology - Krynbein & Pettijohn
- Petrology of Sedimentary rocks - Folk. R.L.
- Origin of Sedimentary Rocks - Blatt. H, Middleton, G.V. & Murray. R.C.
- Ehlers, WG, and Blatt, H., 1987. Petrology, Igneous, Sedimentary and Metamorphic rocks, CBS Publishers
- Friedman & Sanders, 1978. Principles of Sedimentology. John Wiley and sons.
- Prasad, C., 1980. A text book of sedimentology.
- Sengupta. S., 1997. Introduction to sedimentology. Oxford-IBH.

DSC 6A- THEORY METAMORPHIC PETROLOGY (L T P- 3 0 1)
&
DSC 6B: PRACTICAL

Total Credits: 3

Total Hours: 50

Objectives:

- To understand the different aspects of metamorphic rocks and their textures and structures
- To understand the metamorphic grades and effects of metamorphism.
- To understand the occurrence and genesis through practical identification of the metamorphic rocks both in the laboratory and field.

Learning outcome:

- The candidate will be equipped to identify the metamorphic rocks both in the field and laboratory.
- The candidate will be able to understand the importance of metamorphic rocks and their occurrence and origin.

Module 1: Introduction: Metamorphism – definition; Metamorphic agents - Temperature, pressure, fluids and time. Geothermal gradient.

Types of metamorphism: (A) Contact Metamorphism – Pyrometamorphism (B) Regional Metamorphism - Orogenic Metamorphism, Regional contact metamorphism, Burial Metamorphism, Ocean Floor Metamorphism, (C) Hydrothermal Metamorphism (D) Fault-Zone Metamorphism (E) Impact or Shock Metamorphism (F) Pneumatolytic Metamorphism. Prograde and retrograde metamorphism. **10 hrs**

Module 2: Classification of metamorphic rocks and a brief description of: (A) Foliated and Lineated Rocks: Slate, Phyllite, Schist and Gneiss (B) Non-Foliated and Non-Lineated Rocks: Hornfels. **10 hrs**

Module 3: Textures and Structures of metamorphic rocks: (1) Non-Foliated Texture/Structure:

Granoblastic, mosaic, Decussate, (2) Texture/Structure of Dynamic Metamorphism: Cataclastic, Mylonitic, Sutured and Augen (3) Texture/Structure of Regional Metamorphism: Foliation, Lineation, Crenulation, Schistose, Gneissose, Layering/banding. **10 hrs**

Module 4: Metamorphic grades: Low, Medium, High and Very High. Geothermometry, Geobarometry, Isograd and Index Minerals. **Metamorphic facies:** Eskola's facies concept. **10 hrs**

Module 5: Effects of metamorphism: Effects of thermal metamorphism on Argillaceous Sediments and calcareous sediments. Effects of regional metamorphism on argillaceous sediments and basic Igneous rocks. **10 hrs**

DSC6B-PRACTICAL-METAMORPHIC PETROLOGY – (L T P- 0 0 1)

1. Identification of the following Metamorphic Rocks in hand specimens: **Megascopy:**

Phyllite, Slate, Quartzite, Marble, Schist, Gneiss, Granulites

..... 2 prac **2 x 2.5 =05 hrs**

2. Structural studies of Metamorphic rocks.....2 prac **2 x 2.5 =05 hrs**

3. Identification of the following metamorphic rocks in thin sections: **Microscopy:**

Phyllite, Slate, Quartzite, Marble, Schist, Gneiss, Granulites

.....2 prac. **2 x 2.5 =05 hrs**

4. Textural studies of metamorphic rocks.....2 prac **2 x 2.5 =05 hrs**

FIELD VISITS: 1. Visit to Holenarsipur schist belt.
2. Visit to Sandur schist belt, Bellary
3. Visit Hutti schist belt- Raichur
2. Visit to Doddakanya, Talur, Mysore district
3. Visit to Bettada bidu and Hulimavu, Mysore district
5. Visit to Gomatagiri area, Mysore district.
6. Visit to Lalbaagh area and NICE road cutting, Bangalore

BOOKS RECOMMENDED:

- John D. Winter (2010): An Introduction to Igneous and Metamorphic Petrology. Pearson Education, Inc. Published by Pearson Prentice Hall. P. 745
- Principles of petrology: Tyrrell - Chapman and Hall publications.
- Igneous and Metamorphic petrology: Turner and Verhoogen - 1962, Allied Publishers, Bombay. Metamorphic petrology by Winkler HGF 1987 - Nirosa publications
- Ehlers, WG, and Blatt, H., 1987. Petrology, Igneous, Sedimentary and Metamorphic rocks, CBS Publishers
- Turner, F.J., 1980. Metamorphic petrology. McGraw Hill.
- Mason, R., 1978. Petrology of Metamorphic Rocks. CBS Publ.
- Winkler, H.G.C., 1967. Petrogenesis of Metamorphic Rocks. Narosa Pub

ENGLISH - II

Total Credits: 3 + 0 + 0=3

Total Hours: 45 hrs

Poetry:

1. On His Blindness – John Milton
2. Sower – Victor Hugo (Translated by Toru Dutt)
3. Once upon a Time – Gabriel Okara
4. I am not that Woman – Kishwar Naheed
5. Remembrance – Mamang Dai

Prose:

1. Pepe – Maxim Gorky
2. My Greatest Olympic Prize – Jesse Owens
3. Letters from *The Diary of a Young Girl* – Anne Frank

Language Component and Literary Activity:

1. Punctuation (capitalization, comma, period, question mark, exclamation mark, quotation marks and apostrophe)
2. Framing Questions (with wh-words & yes/no questions)
3. Use of Negatives
4. Linkers (Conjunctions)
5. Reading Comprehension (of an unseen passage)

HINDI - II

Title of the Paper – Hindi Kahani Sahitya aur Prayojanmulak Hindi

Total Credits (LTP): 3 + 0 + 0 = 3

Total Hours: 45hours

Unit -1 & 2: Aath Acchi Kahaniyan-Ed. Markandey- Lokbharati Prakashan,Allahabad-

Unit -3 & 4 : Prayojan Moolak Hindi

Portion Prescribed

- Patravvyavahar ka samanya parichay, Patron ke prakar, Parivarik Patra
- Vyavasayik Patravvyavahar- Bank Sambandhee Patra, Beema sambandhee Patra, Poochha- taachha Sambandhee Patra, Aadesh sambandhee Patra, Paripatra- Agency Sambandhee Patra- Naukari Sambandhee Patra.
- Aalekhan- Paribhasha aur Prakar, Tippan- Paribhasha- Karyalay Me Tippan ka Kshetra aur prayog
- Sankshiptikaran- Sankshipt lekhan ke Pradhaan Gun

Recommended Books.

- Vyavasayik Sampreshan- Dr. Anupchand Bhayani, Pub. Rajpal and Sons, Kashmiri Gate, Delhi-6
- Karyalaya Aalekhan aur Tippan- Karnatak Mahila Hindi Seva Samithi, 178, 4th Main Chamraj pet, Bangalore.
- Vanijya Patra Vyavahar Anuvaad Nibandha Tatha Samkshiptikaran. Prof. A.v. Narti, jaanoday Prakashan, Dharwad.
- Prashasanik Hindi-Ed. Ramdarash Mishra and Ramswaroop Shastri
- Vyavaharik Hindi- Dr. Omprakash Simhal, Kitab Ghar, Dariaganj, New Delhi.

CONSTITUTION OF INDIA

Total Credits: 3 + 0 + 0=3

Total Hours: 45 hrs

Module 1:

1. Meaning and importance of Constitution
2. Making of Indian Constitution
3. Salient features and preamble

Module 2:

1. Fundamental Rights
2. Fundamental Duties
3. Directive Principles

Module 3: Union Government

1. Lok Sabha & Rajya Sabha (Composition, Powers and Functions)
2. President & Prime Minister (Powers, Functions, Position)
3. Supreme Court - Powers, Functions, Position

Module 4: Major Functionalities

1. Union Public Service Commission
2. Election Commission
3. Planning Commission

Books for reference-

1. Indian Constitution-Durga Das Basu.
2. Indian Constitution – M.V. Pylee.
3. Indian Government and Politics- J.C. Johri.
4. Indian Government- S.R. Maheshwari.
5. Indian Government and Politics- J.C. Joothri.
6. India's Constitution -- Faida
7. Indian Government and Politics - Dr. S.N. Dubey.
8. Indian Political System- R.C. Agarwal.
10. Indian Constitution --Vidhya Bhushan and Vishnu Bhagawan.
11. Bharathada sarkara matthu Rajakiya- Dr. H.M. Rajshekara
12. Bharathada sarkara matthu Rajakiya- Dr. K.J. Suresha.