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Vishwavidyanilaya Karyasoudha
Crawford Hall, Mysuru- 570 005

(Re-accredited by NAAC with 3.01 CGPA of 4.0 Scale)

(NIRF-2021 Ranked 19 in University Category & 34 in Overall Category)

No.: PMEB/AC10/759(2)/2019-20

Date: 10-01-2022

NOTIFICATION

Sub.: Introduction of **B.Sc. (Geology)** course under Specialized Programmes from the academic year 2020-21-reg.

- Ref.: 1. Decision of the BOS Meeting held on 09-10-2021.
2. Decision of the Faculty of Science & Technology meeting held on 20-12-2021.
3. Decision of the Academic Council meeting held on 23-12-2021.

The Board of Studies in **B.Sc. (Geology) (UG)** at its meeting held on 09-10-2021 has recommended to approve the 2nd and 3rd year Syllabus of B.Sc. (Geology) course in University of Mysore under specialized/specified programs.

The Faculty of Science & Technology and the Academic Council at their meetings held on 20-12-2021 and 23-12-2021 respectively are also approved the above said proposal and the same is hereby notified.

The Syllabus of **B.Sc. (Geology)** course is uploaded in University website. The contents may be downloaded from the University website <https://uni-mysore.ac.in/PMEB/>.

REGISTRAR

University of Mysore
MYSURU-570 005

To;

1. The Registrar (Evaluation), University of Mysore, Mysuru.
2. The Dean, Faculty of Science & Technology, DOS in Earth Science, Manasagangothri, Mysuru.
3. Prof. K.G. Ashamanjari, DoS in Earth Science, Manasagangothri, Mysuru.
4. The Principal Co-ordinator, MES, PBMM Education Centre, KRS Road, Metagalli, Mysuru.
5. The Deputy Registrar/ Asst. Registrar/ Superintendent, Examination Branch, UOM, Mysuru.
6. The Special Officer to Hon'ble Vice-Chancellor, University of Mysore, Mysuru.
7. The PA to Vice-Chancellor/Registrar/Registrar (Evaluation), University of Mysore, Mysuru.
8. Office Copy.

Specialized Program
Bachelor of Science (Geology)
COURSE CREDIT STRUCTURE & SYLLABUS

S.No	Course	Title	Credits	Total Credits	Maximum Marks			Total
			L + T + P		IA		Exam	Marks
					C1	C2	C3	
I SEMESTER								
1	DSC1A	Geodynamics and Geomorphology	3 + 0 + 0	4	10	10	80	100
	DSC1B	Practical	0 + 0 + 1		05	05	40	50
2	DSC2A	Mineral Science	3 + 0 + 0	5	10	10	80	100
	DSC2B	Practical	0 + 0 + 2		05	05	40	50
3	DSC3A	Paleontology	3 + 0 + 0	4	10	10	80	100
	DSC3B	Practical	0 + 0 + 1		05	05	40	50
4	AECC1	MIL – I (Sanskrit , Hindi or any other as approved by UGC)	3 + 0 + 0	3	10	10	80	100
5	AECC2	English – I	3 + 0 + 0	3	10	10	80	100
6	AECC3	Environmental Studies	3 + 0 + 0	3	10	10	80	100
Total Credits / Marks				22				750
II SEMESTER								
1	DSC4A	Igneous Petrology	3 + 1 + 0	5	10	10	80	100
	DSC4B	Practical	0 + 0 + 1		05	05	40	50
2	DSC5A	Sedimentary Petrology	3 + 0 + 0	4	10	10	80	100
	DSC5B	Practical	0 + 0 + 1		05	05	40	50
3	DSC6A	Metamorphic Petrology	3 + 0 + 0	4	10	10	80	100
	DSC6B	Practical	0 + 0 + 1		05	05	40	50
4	AECC4	MIL – I (Sanskrit , Hindi or any other as approved by UGC)	3 + 0 + 0	3	10	10	80	100
5	AECC5	English - II	3 + 0 + 0	3	10	10	80	100
6	AECC6	Constitution of India	3 + 0 + 0	3	10	10	80	100
Total Credits / Marks				22				750

S.No	Course	Title	Credits	Total Credits	Maximum Marks			Total Marks
					IA		Exam	
			L + T + P		C1	C2	C3	Marks
III SEMESTER								
1	DSC7	Principles of Stratigraphy and Indian Stratigraphy	4 + 0 + 0	4	10	10	80	100
2	DSC8A	Structural Geology	4 + 0 + 0	5	10	10	80	100
	DSC8B	Practical	0 + 0 + 1		05	05	40	50
3	DSC9A	Ore Genesis	4 + 0 + 0	5	10	10	80	150
	DSC9B	Practical	0 + 0 + 1		05	05	40	50
4	AECC7	Gemology and Medical Geology	3 + 0 + 0	3	10	10	80	100
5	AECC8	Communicative Skills -I	3 + 0 + 0	3	10	10	80	100
6	AECC9	Disaster Management	2 + 0 + 0	2	05	05	40	50
Total Credits / Marks				22				650
IV SEMESTER								
1	DSC10A	Indian Mineral Deposits and Ore Microscopy	4 + 0 + 0	5	10	10	80	100
	DSC10B	Practical	0 + 0 + 1		05	05	40	50
2	DSC11A	Remote Sensing and Geographical Information System	3 + 0 + 0	5	10	10	80	100
	DSC11B	Practical	0 + 0 + 2		05	05	40	50
3	DSC12A	Principles of Geophysics	3 + 0 + 0	4	10	10	80	100
	DSC12B	Practical	0 + 0 + 1		05	05	40	50
4	DSC13A	Principles of Geochemistry	3 + 0 + 0	4	10	10	80	100
	DSC13B	Practical	0 + 0 + 1		05	05	40	50
5	AECC10	Analytical Methods in Geology	3 + 0 + 0	3	10	10	80	100
6	AECC11	Communicative Skills-II	3 + 0 + 0	3	10	10	80	100
Total Credits / Marks				24				800

S.No	Course	Title	Credits	Total Credits	Maximum Marks			Total Marks
					IA		Exam	
			L + T + P		C1	C2	C3	
V SEMESTER								
1	DSC14A	Exploration Geology	4 + 0 + 0	5	10	10	80	100
	DSC14B	Practical	0 + 0 + 1		05	05	40	50
2	DSC15A	Geotechnical Engineering and Hydrogeology	3 + 0 + 0	5	10	10	80	100
	DSC15B	Practical	0 + 0 + 2		05	05	40	50
3	DSC16	Mining Geology and Mineral Processing	4 + 0 + 0	4	10	10	80	100
4 & 5	DSE1 & DSE2	Choose any two A. Surveying and Field Geology B. Marine Geology C. Environmental Geology D. Geostatistics	5 + 0 + 0	5	10	10	80	100
			5 + 0 + 0	5	10	10	80	100
			5 + 0 + 0	5	10	10	80	100
			5 + 0 + 0	5	10	10	80	100
6	SEC1	Skill Development - I	4 + 0 + 0	4	10	10	80	100
Total Credits / Marks				28				700
VI SEMESTER								
1 & 2	DSC17 & DSC18	Training components A. Industrial training in industry (100 Marks) B. Training Report Evaluation	0 + 0 + 5	5	---	---	100	200
			0 + 0 + 5	5	---	---	100	
3	DSC19A & DSC19B	Information Technology for Geologists Practical	2 + 0 + 0	4	05	05	40	50
			0 + 0 + 2		05	05	40	50
4 & 5	DSE3 & DSE4	Choose any two A. Project Report B. Geotourism C. Mineral Economics D. Land and Resource Management	0 + 0 + 5	5	10	10	80	100
			5 + 0 + 0	5	10	10	80	100
			5 + 0 + 0	5	10	10	80	100
			5 + 0 + 0	5	10	10	80	100
6	SEC2	Skill Development - II	4 + 0 + 0	4	10	10	80	100
Total Credits / Marks				28				600
Total Credits (All Semesters)				146				
DSC - Discipline Specific Course DSE - Discipline Specific Elective SEC - Skill Enhancement Courses AECC - Ability Enhancement Compulsory Courses								

Bachelor of Science (Geology)

(Choice Based Credit System)

SYLLABUS

SEMESTER – III

DSC 7 PRINCIPLES OF STRATIGRAHY AND INDIAN STRATIGRAPHY (L T P-4 0 0)

Total Credits: 4

Total Hours: 50

Objectives:

To know about the principles of stratigraphy in Geological record of India, economic Importance of Cuddapah, Vindhyan, Gondwana Tiruchirapalli formations and other Indian formations.

Learning outcome:

1. Be able to understand fundamental stratigraphic units and the scientific methods for determining the age and significance of depositional sequence.
2. Be able to decipher the geological history as an area from geological map. Information about fossil content: and mineral deposits associated with stratigraphic units.

Module- 1:

10 hrs

Introduction to Stratigraphy and its relationship with other branches of geology. Law of order of superposition, Law of uniformitarianism and Law of faunal and floral succession. Standard stratigraphic scale. Imperfections in geological record. Approaches to measurement of geologic time.

Stratigraphic concepts of correlation, criteria and methods. Elements of lithostratigraphic, biostratigraphic and chronostratigraphic classification and their units. A brief study of individual era with regard to their nomenclature, classification, lithology, climate, earth movement and life. Concept of sequence stratigraphy, brief idea of magneto- seismic-chemo- and event -stratigraphy.

Module- 2:

12 hrs

Physiographic divisions of India: Peninsular India, Indogangetic alluvial plains and Extra Peninsular India.

Precambrian Era: Brief introduction to cratons and mobile belts. Precambrian stratigraphy of India.

Archaean of Karnataka: Ancient supracrustals - Sargur group and Peninsular Gneissic Complex.

Proterozoic Era: - Classification - Bababudan and Chitradurga group of rocks. Chitradurga schist belt: Distribution and economic importance.

An introduction to Purana Basins - Lower Puranas: Kaladgi and Cuddapahs basins. Upper Puranas: Badami, Bhima, Kurnool and Vindhyan basins. Distribution, lithology classification and economic importance. Life in Proterozoic.

Module-3:

08hrs

Paleozoic stratigraphy of India:

Paleozoic succession of Kashmir and its correlatives from Spiti.

Gondwana formations of India: Depositional environment- distribution-life-classification and economic importance of Gondwana formations of India. Coastal Gondwana of India.

Module-4:

08 hrs

Mesozoic stratigraphy of India

Triassic of Spiti- The Lilang System, Jurassic of Kutch, Cretaceous of Tiruchirapalli.

Deccan Volcanic Episode: Introduction, distribution, nature of eruption, nomenclature, intra(Bagh and lametabeds), inter(Gurumatkal), supra trapeans (Nummulitic limestone). Age and economic importance of Deccan traps.

Module-5:

12hrs

Cenozoic Stratigraphy: Comprehensive account of the geological events during Cenozoic Era in India. Rise of Himalayas.

Stratigraphy of Siwalik System: Distribution, lithology, classification, fauna and flora of Siwaliks with particular reference to mammalian fossils. Pleistocene glaciation.

Economic importance of Cenozoic Period: Stratigraphy and structure of onshore and offshore hydrocarbon basins of India. Important stratigraphic boundary problems in India. Precambrian-Cambrian boundary, Permian- Triassic boundary, Cretaceous - Tertiary boundary.

Books Recommended:

- Ravindra Kumar, (2010), Fundamentals of Historical Geology and Stratigraphy of India, John Wiley and Sons.
- Krishnan M.S, (2017), Geology of India and Burma, CBS Publishers.
- O.P.Mathur, (2020), A to Z Geology of India-Scientific Publishers.
- M.Ramakrishnan and R. Vaidyanadhan, (2008), Geology of India, Vol. 1 & 2, Geological Society of India.
- H.Nanda. (2020). Indian Stratigraphy: Anmol Publishers.
- Boggs Jr, S. (2014). Principles of sedimentology and stratigraphy. Pearson Education.
- Gary Nichols, (2019), Principles of Stratigraphy, Wiley Blackwell.
- Brookfield.ME, (2016), Principles of Stratigraphy, Wiley India.
- Doyle, P. & Bennett, M. R., (1996) ,Unlocking the Stratigraphic Record, John Wiley.
- Gary Nichols, (2019), Sedimentology and Stratigraphy, Aiden Williams Pearson Publ.
- Geological Survey of India, (1971). Code of stratigraphic nomenclature of India, Geological Survey of India.
- Subbarao K.V, (1988), Deccan Flood Basalts, Geological society of India.
- Radhakrishna, B. P., & Vaidyanadhan, R. (2011). Geology of Karnataka. GSI Publications.
- Krishnan, M. S. (1960). Geology of India and Burma.
- Wadia, D. N. (1919). Geology of India: For Students. Macmillan.
- Geological Survey of India, Oldham, R. D., Medlicott, H. B., & Pascoe, E. H. (1950). Manual of the Geology of India and Burma.
- Berggren, W. A. (1990). Stratigraphy: Principles and Methods.
- Krumbein, W. C., & Sloss, L. L. (1951). Stratigraphy and sedimentation (Vol. 71, No. 5, p. 401). LWW.

- Jnr, C. W. F. (1980). Stratigraphic principles and practices as related to soil mantles. *Catena*, 7(2-3), 169-194.
- Radhakrishna, B. P., & Naqvi, S. M. (1986). Precambrian continental crust of India and its evolution. *The Journal of Geology*, 94(2), 145-166.
- Doyle, P. & Bennett, M. R. (1996) *Unlocking the Stratigraphic Record*. John Wiley.
- Valdiya, K. S. (2015). *The making of India: geodynamic evolution*. Springer.

DSC8A (THEORY): STRUCTURAL GEOLOGY (L T P- 4+0+1)

Objective

- To know about the Topographic, Geological maps and its applications.
- Primary and secondary structures, geometry and elements of fold, fault and joint surface recognition in the fields.
- Foliation mechanism and Uses of compass in the field.

Learning outcome:

- Able to know the concept of rock deformation in time and space.
- Able to interpret structures in field outcrop.
- Able to interpret geological history.

Module- 1:

10 Hrs

Scope and Aim of Structural Geology - methods of representing physiographic features – Contours-topographic and geological maps, their preparation and uses. Physical properties of rocks: Deformation- brittle, plastic and elastic properties. Beds and their attitudes –dip and strike – trends of outcrop- relation between true and apparent dips. Width of outcrop, true thickness, vertical thickness and their mutual relationships.

Module- 2:

10 Hrs

Chief structural forms of rocks: Primary structural forms and secondary structural forms. Concept of rock deformation. Forces - tensional, torsional. shearing and compressional stress and strain in rocks. Strain ellipses of different types and their geological significance.

I) Primary structural forms of sedimentary and igneous rocks. Brief study of structures of sedimentary rocks: ripple marks, sun cracks, rain prints, stratification, current bedding and graded bedding and their importance.

II) Secondary structural forms: A. Cohesive Dislocations – Distortion, bending and folds.

B. Disruptive Dislocations – Joints and faults.

Module- 3:

12Hrs

Folds: Definitions - parts of folds. Crest and troughs.

Types of folds- symmetrical and asymmetrical-anticline, syncline, anticlinorium, synclinorium, overturned fold, reclined fold, recumbent fold, isoclinal, chevron, fan folds, monocline and drag folds.

Denudational structures - Outlier and inlier.

Module- 4:

12Hrs

Joints and Faults

Joints: Definition, dip, strike. joint plane, block joint, joint set, joint system.

Classification – I. Geometrical: Dip, strike, oblique and bedding joints

II. Genetic – columnar, mural sheet joints, master joints. Importance of joints.

Faults: Definition - Elements of fault, fault planes, dip, strike, hade, heave and throw. hanging wall and footwall.

I. **Geometric Classification:** i) Based on attitude of faults as compared to the adjacent beds. dip, strike, diagonal and bedding faults ii) Based on apparent movement: normal and reverse faults.

II. **Genetic Classification:** Thrust faults, over thrust and under thrust. Gravity faults - Step fault, Ridge fault and trough fault. Criteria for recognition of faults in the field.

Unconformities – definition – types, significance, criteria for recognition of unconformities in the field . Overlap and off lap.

Module- 5:**06Hrs****Foliation and Lineation**

Description and origin of foliations: axial plane cleavage and its tectonic significance; theory of cleavage formation in deformed rocks.

Description and origin of lineation and their relationships with the major structures.

DSC8B-PRACTICAL- STRUCTURAL GEOLOGY-(L T P-0+0+1)

- 1 Calculation of the thickness of the strata: Geometric & mathematical methods.
- 2 Study and interpretation of topographical maps – Description of the relief features and drawing of profile of contour maps.
- 3 Geological Maps – Drawing of section and interpretation.
Folds, Intrusion-, Faults- and Unconformities.
- 4 Completion of outcrops.
- 5 Dip and Strike problems-Geometric and trigonometric.
- 6 Bore hole problems.

Books Recommended:

- Walls, R. (1962). Field Geology Frederic H. Lahee (McGraw-Hill Book Company, 1961, pp. 926+ xxxi, 83 s. 6 d.).
- Billings, M. P. (1987), Structural Geology, 4th edition, Prentice-Hall.
- Symbols for maps and rocks - Amer. Geol. Inst. Publ.
- Topographic sheets - Survey of India Publ
- Davis, G. R. (1984), Structural Geology of Rocks and Region, John Wiley
- Park, R. G. (2004), Foundations of Structural Geology, Chapman& Hall.
- Pollard, D. D. (2005), Fundamental of Structural Geology, Cambridge University Press.
- Ragan, D. M. (2009), Structural Geology: an introduction to geometrical techniques(4th Ed). Cambridge University Press.

DSC 9A (THEORY): ORE GENESIS (LTP: 4+0+1)

Total Credits: 4

Total Hours: 45

Objectives

- To know about the different ore forming processes.
- To know about the various metallogenic epochs in relation with the plate tectonics.

Learning outcome:

- Able to know the concept different ore forming processes.
- Able to classify the ores based on the metallogenic epochs.

Module-1:

10hrs

Introduction to ore geology in relation to industry, commerce and national economy. Ore minerals. Gangue minerals and tenor of ore. Ore bearing fluids – types and associated processes. Deposition and textures of ores. Paragenesis and zoning in ore deposits.

Module-2:

10hrs

Early magmatic deposits: Dissemination, Segregation and Injection deposits.
Late magmatic deposits: Residual Liquid Segregation, Residual Liquid Injection, Immiscible Liquid Segregation, Immiscible Liquid Injection. Contact metasomatism: Skarn deposits.

Module-3:

10hrs

Hydrothermal Processes: Hydrothermal fluids and their migration and deposition. Cavity filling and replacement type deposits. Sources of solutions and their contents.

Module-4:

10hrs

Sedimentation: Source of materials. Erosion, transportation and deposition. Iron, manganese, copper cycles. Sedimentary Uranium deposits. Submarine exhalative and volcanogenic deposits.

Metamorphism: Formation of mineral deposits by metamorphism.

Weathering processes: Residual and mechanical concentrations (Eluvial, Stream and Marine Deposits). Oxidation and supergene enrichment: Gossans.

Module-5:

05hrs

Classification of ore deposits.

Metallogenic Epochs, Provinces and Plate tectonics.

DSC 9B- PRACTICAL-ORE GENESIS- (L T P: 0 0 1)

1. Study and megascopic identification of the following minerals: Native copper, graphite. **2.5 hrs**

2. Sulphides: chalcopyrite, azurite, malachite, realgar, orpiment, cinnabar, stibnite, galena, sphalerite, pyrite. **2.5hrs**

3. Oxides: hematite, magnetite, limonite, pyrolusite, psilomelane, bauxite and chromite. **2.5hrs**

4. Coal and its varieties. **2.5hrs**

Books Recommended

- Bateman, A. M., & Jensen, M. L. (1950). *Economic mineral deposits* (Vol. 259). New York: Wiley.
- Lindgren, W., 1933. *Mineral Deposits*, 4th ed. New York: McGraw-Hill.
- Park, C. F., Jr., and MacDiarmid, R. A., 1964, *Ore Deposits*, San Francisco: Freeman.
- Gokhale, K. V. G. K. (1978). *Ore deposits of India: their distribution and processing*. Thomson Press (India).
- S. Krishnaswamy, [1972], *Indian Mineral Resources*, New Delhi, Oxford & IBH Pub. Co.
- Lamey, C.A, (1996), *Metallic and Industrial minerals*, McGraw-Hill.
- Chandra D. (2007). *Chandra's Textbook on applied coal petrology*. Jijnasa Publishing House.
- Shelly R. C. (2014). *Elements of Petroleum geology: Third Edition*, Academic Press
- Bjorlykke, K. (1989). *Sedimentology and petroleum geology*. Springer-Verlag.

AECC7 (THEORY): GEMOLOGY AND MEDICAL GEOLOGY (L T P- 3 0 0)

Total Credits: 3

Total Hours: 40

Objectives

- To know about the different Gemstones its properties and its distribution in India.
- To know about the Medical geology and its terminologies.

Learning outcome:

- Able to distinguish different types of gemstones based on their properties.

Module-1: Gemology

08 hrs

Introduction: Gem minerals and Gemstones, Classification of gemstones, Gemstone qualities, Gem testing, Gem measurement unit. Gem Properties: Physical Properties - colour, chromophores, colour centers, luminescence, iridescence, dispersion, inclusions, alexandrite effect, hardness, specific gravity, fractures, cleavage and parting planes.

Optical Properties – pleochroism, colour zoning chatoyancy, asterism, refractive Index.

Flaws in Gemstone – External flaws, zoning, solid inclusions, gas bubbles and fluid inclusions.

Module-2: Synthetic Gemstones

08 hrs

Necessity and growth techniques. Diamond synthesis.

Gem cutting techniques – styles of cutting (cabochon cut and faceted cut), diamond cutting and coloured stone cutting.

Module-3: Properties & Distribution of Gems

08 hrs

A detailed study of important gem minerals, their properties and distribution in India.

Isotropic Gems: a) Diamond b) Garnet.

Uniaxial Gems: a) Corundum, b) Beryl.

Biaxial Gems: a) Chrysoberyl b) Jade.

Organic Gems: a) Pearl b) Amber c) Coral

Module-4: Medical Geology

08 hrs

Introduction

Definitions and terminology of Medical Geology. Natural and Geological Environment: Atmosphere, hydrosphere, lithosphere, animal life and plant life; colour and composition of different rock types and association of elements in relation to medical geology.

Elemental link between different spheres: Litho– hydro– atmo- bio - spheres and its impact on humans. Essential and Non-essential elements with reference to human health. Major, minor and trace elements of human body.

Module 5: Health Effects

08 hrs

Pathways and Exposures: Air (inhalation), absorption, drinking water, food cycles. Metal induced effects: Carcinogenic, teratogenic, mutagenic.

Trace element deficiency and toxicity health effects: Arsenic, Cadmium, Lead, Mercury, Radon, Fluoride and Selenium. Diseases due to deficiency and toxicity of some elements: Arsenic induced effects, cardiovascular diseases, lung diseases, liver, kidney and endemic diseases. Mapping Geological factors for human health.

Books Recommended:

- Gems and Gem Materials - Kvangs, E.H. & Slawson, S.B.
- Gemstones - Smith, H.
- Gems - Webster, R.
- Gems and Gem Industry in India – R.V. Karanth
- Gemstones-Enchanting Gifts of Nature – R.V. Karanth
- Navarathnagalu - Prasaranga Publication, Mys.Univ.
- Environmental Geology & Conservation, Land use planning and Resource Management – Peter T. Flawn
- Environmental Geography – Savindra Singh
- Manual on Natural Disaster Management in India – NDM Division, Government of India
- Miomir M. Komatina, Effects Of Geological Environments On Human Health, Burgess Publishers-2004
- Olle Selinus, B. J. Alloway, Essentials of medical geology: impacts of the natural environment on public health, Lewis Publishers, USA-2005
- C. B. Dissanayake, Rohana Chandrajith, Introduction to Medical Geology , Lewis Publishers,USA-2009
- Rolf O. Hallberg, Medical geology , Environmental geology–Burgess Publishers, 2007
- Miomir Komatina, Base of medical geology, Lewis Publishers, 2007

AECC8: COMMUNICATIVE SKILLS –I (L T P -3 0 0)

No. of Credits: 03

Total Hours: 40

Objectives:

1. To learn about English communication skills.
2. To improve the vocabulary, learning and listening skills.

Learning Outcomes:

1. To be able to speak effectively in presentations.
2. Able to develop presentation skills along with interview skills.

Module-I

08hrs

The Sentence- Kinds of Sentence- Transformation of Sentence- The Noun- Kinds – Noun-Noun Forms. The pronoun – Kinds – Personal, Reflexive, Lymphatic and Possessive. The Verb- Tense Forms and its Usage.

Module-II

08hrs

Oral Communication Skills- Public Speaking - Group Presentations and Discussions - Participation in Meetings and Interviews – Brainstorming - Designing and Delivering Presentations, Team Presentations-Non-Verbal Communication: Forms of Non-Verbal Communication, Interpreting Non-Verbal Messages, Tips for Effective use of Non-Verbal Communication.

Module-III

06hrs

Skills Development Through Practice - Listening Skills and Barriers; Role Plays, Debates, Elocution, Mock Interviews, etc.; Persuasive Communication, Convincing Skills, Conversations.

Module-IV

08hrs

Spoken English Skills -Vocabulary-Word Power; Grammar-Common Errors and Sentence Building, Phonetics; Reading Comprehension and Vocabulary Building Psychometrics; Aptitude and Personality Assessment and Testing.

Module-V

08 hrs

Presentation Skills and Techniques -Personal Grooming and Business Etiquettes- Corporate Etiquette, Social Etiquette and Telephone Etiquette, Gestures and Body Language, Impression Management-Image Building and Self Awareness- Developing Self Awareness - Projecting a Winning Personality-Attending Interviews.

Books Recommended:

- Kaul, Asha (2005), Effective Business Communication, PHI, New Delhi.
- Urmila Roy (2016), Guide to Managerial Communication: Effective Writing & Speaking, PHI, New Delhi.
- Mandal S.K. (2015), Effective Communication and Public Speaking, Jaico, Mumbai.
- Meenakshi Raman & Prakash Singh (2012), Business Communication, Oxford University Press.
- Bovee, Thill & Schatzman (2003), Business Communication Today, Pearson, New Delhi.

AECC9: DISASTER MANAGEMENT (L T P-2 0 0)

No. of Credits: 02

Total Hours: 25

Objectives:

To familiarize students with the Disaster Management skills to enable them deal with manmade and natural disasters striking mankind

Module-I

07hrs

Introduction to Disasters: Concepts, and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks). Disasters: Classification, Causes, Impacts (including social, economic, political, environmental, health, psychosocial, etc.) Differential impacts- in terms of caste, class, gender, age, location, disability Global trends in disasters, urban disasters, pandemics, complex emergencies, Climate change.

Module-II

07hrs

Approaches to Disaster Risk reduction: Disaster cycle - its analysis, Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural-nonstructural measures, roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, Centre, and other stake-holders.

Module-III

06hrs

Interrelationship between Disasters and Development: Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation. Relevance of indigenous knowledge, appropriate technology and local resources

Module-IV

05hrs

Disaster Risk Management in India Hazard and Vulnerability profile of India Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation)

Books Recommended:

- Gupta Anil K, Sreeja S. Nair.
- 2011 Environmental Knowledge for Disaster Risk Management,
- NIDM, New Delhi Indian Journal of Social Work 2002.
- Special Issue on Psychosocial Aspects of Disasters, Volume 63, Issue 2, April.
- Kapur, Anu & others, 2005: Disasters in India Studies of grim reality, Rawat Publishers, Jaipur
- Kapur Anu 2010: Vulnerable India: A Geographical Study of Disasters, IAS and Sage Publishers, New Delhi.

SEMESTER – IV
DSC 10A (THEORY): INDIAN MINERAL DEPOSITS AND ORE MICROSCOPY

(L T P-4 0 1)

Total Credits: 4

Total Hours: 45

Objective:

- 1) To understand the various metal & non-metal deposits with respect to the Indian context.
- 2) To understand about the coal and petroleum origin and deposits with respect to the Indian context.
- 3) To understand about the various building stones occurring in India.

Outcomes:

1. Able to know the occurrence of various metallic and non metallic mineral present in India.
2. Able to distinguish between the coal types its occurrence and its forming process.
3. Able to know about the different varieties of building stones and their properties that are occurring in India.

Module-1:

12hrs

Metallic Mineral Resources: Introduction, study of the following deposits of India with regard to their mineralogy, origin, occurrence and distribution: Gold, Iron, Manganese, Aluminium, Chromite, Copper, Lead and Zinc.

Module-2:

12hrs

Non-metallic Mineral Resources: Introduction, Study of the following minerals of India with regard to their mineralogy, origin, occurrence and distribution: Cement, refractories, fertilizers, abrasives, ceramic and glass, paint and pigments.

Module-3:

FUEL GEOLOGY

08hrs

A brief introduction on coal, petroleum, gas hydrates and nuclear fuel.

Coal – Definition of coal, origin, stages and periods of coal formation (Gondwana, Tertiary and Cretaceous coals), chemical composition, properties of coal, coal deposits of India with reference to geology, origin and distribution.

Petroleum – Introduction, chemical composition and physical properties of crudes.

Occurrence and origin of hydrocarbons.

Formation of Source Rocks. Migration and accumulation of hydrocarbons.

Petroleum Reservoirs and Traps: Classification and types.

Distribution of On-shore and Off-shore oil fields of India.

Module-4:

04hrs

Nuclear fuels: Mineralogy and geochemistry of atomic minerals. Distribution, origin and occurrence of radioactive minerals in India.

Module-5:**BUILDING AND ORNAMENTAL STONES****8hrs**

Properties and uses of building and ornamental stones. Distribution and Indian occurrence of the following building and ornamental stones: Granites, Felsite, Dolerite, Sandstone, Basalt, Limestone, Marbles, Laterite, Slate, Steatite.

DSC 10B-PRACTICALS- ORE MICROSCOPY (0+0+1)

1. Ore microscopic principles **2.5x1=2.5 hrs**
2. Properties of ore minerals under the microscope **2.5x2=5hrs**
3. Identification of common ore minerals. **2.5x1=2.5 hrs**

Books Recommended:

- N L Sharma; K S V Ram, [1964], Introduction to India's economic minerals, Dhanbad Publications.
- Sinha, R. K. (1967). A treatise on industrial minerals of India. Allied Publishers.
- H.S. Pareek(2004), Progress of Coal Petrology in India. (Bangalore) Geological Society of India. Paperback
- Park, C. F., Jr., and MacDiarmid, R. A., 1964, Ore Deposits, San Francisco: Freeman.
- Gokhale, K. V. G. K. (1978). Ore deposits of India: their distribution and processing. Thomson Press (India).
- S. Krishnaswamy , [1972], Indian Mineral Resources, New Delhi, Oxford & IBH Pub. Co.

DSC 11A (THEORY)

REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM (L T P-3 0 2)

Total Credits: 3

Total Hours: 45

Objective:

- 1) To understand about the various concepts of Remote sensing and GIS.
- 2) To understand about the Aerial photography, satellite images and their interpretation techniques.
- 3) To understand about the Concepts of GIS and its functionalities.

Outcomes:

- 1) Able to know the various concepts of Remote Sensing & GIS.
- 2) Will be having a knowledge of Aerial photography and satellite photography and their interpretation technique.
- 3) Able to know about the various concepts of GIS and its applications.

Module-1:

10hrs

Introduction to Remote Sensing: Concepts, definition, historical development, stages in RS-EMR, EMR spectrum, theories of EMR.

Types of RS and laws of radiation. Interaction of EMR: Interaction with Earth's Atmosphere and Atmospheric window.

Spectral signature: Interaction with soil, water and vegetation.

Platforms, sensors, orbits: Types of platform, types of sensors, cameras and satellite orbits.

Module-2:

05hrs

Aerial Photography: Introduction to aerial photography and basic photogrammetry, Measurements: Geometry of aerial photographs, determination of scale, height on aerial photograph.

Aerial photo and image interpretation: Interpretation of aerial photos: Single, vertical Stereo pairs.

Module-3:

10hrs

Interpretation of Satellite Imagery: Derived From PAN, LISS, Wifs, OCM Sensors. Study and Visual Interpretation of Satellite Images for Physical Features, Urban, Forest and Agricultural Uses.

Geological applications of Remote Sensing.

Module-4:

10hrs

Introduction to GIS: Definitions, Evolution, Components and Objectives.

Hardware Requirements: Basic blocks of computer, processor, memory, secondary storage devices, input/output devices, binary numbers.

Software Requirements: Operating system, application, compilers, editors. overview of GIS software packages.

Spatial and Non-Spatial Data.

Types of map projections.

Module-5:**10hrs**

GIS Functionality – Introduction, overview of image processing software and GIS softwares (ERDAS, Mapinfo, ArcGIS, Arcview, Google Earth).

Introduction to Global Positioning System (GPS) – fundamental concepts, GPS system elements and signals.

Classification of GPS receivers, GPS measurements and accuracy of GPS.

DSC-11B-PRACTICAL**REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM (0 0 2)****Practical: Remote Sensing**

1. Interpretation of Aerial Photographs. **1x1=1hrs**
2. Remote Sensing: Visual interpretation of different satellite images to create layers (lithology, drainage pattern, lineaments, structures, water bodies and land use/land cover). **3x1=3hrs**
3. Familiarisation with GPS receiver and to know the set up unit. **2x1=2hrs**
4. Initialisation of the system in the field and various functions of the GPS. **2x1=2hrs**
5. Using GPS with map & compass. **2x1=2hrs**

Practical: GIS

1. ERDAS imagine: Introduction to ERDAS, Modules of Viewer, Import, catalog. Data preparation, Geo-referencing, subsetting, mosaic. Supervised and Unsupervised Classification. **2.5x2=5hrs**
2. Image interpreter – Spatial, Radiometric, Spectral enhancement, Digitization and Map composition. **2.5x2=5hrs**

Books Recommended:

- Lueder, D. R. (1959). Aerial photographic interpretation: principles and applications.
- Victor C. Miller(1961),Photogeology, McGraw-Hill Book Co.
- Smith JT Jr, Anson A (eds) (1968) Manual of colour aerial photography. Am Soc Photo-gram, Falls Church, VA.
- Ed Robert G Reeves,(1975),Manual of Remote sensing,American Society of Photogrammetry.
- Siegal, B. S., & Gillespie, A. R. (Eds.). (1980). Remote sensing in geology. Wiley.
- Patel, A. N., & Singh, S. (2013). Remote Sensing: Principles and Applications. Scientific Publishers.
- Nag, P., & Kudrat, M. (1998). Digital remote sensing. Concept Publishing Company.
- Narayan, L. R. A. (1999). Remote sensing and its applications. Universities Press.
- Pandey, S. N. (1987). Principles and applications of photogeology. New Age
- Campbell Jr, J. B. (1978). A geographical analysis of image interpretation methods. The Professional Geographer,
- Thompson, M. M., Eller, R. C., Radlinski, W. A., & Speert, J. L. (Eds.). (1966). Manual of photogrammetry (Vol. 1, p. 61). Falls Church, VA: American Society of Photogrammetry.
- Kaspin, V. (1974). Theory of Pattern Recognition and Modern Forecasting. Air force systems command wright-pattersonafb oh foreign technology division.
- Colwell, R. N. (Ed.). (1960). Manual of photographic interpretation (Vol. 10). American Society of Photogrammetry.

- Burrough, P. A. (1986). Principles of geographical information systems for land resources assessment. Clarendon.
- Campbell, J. L. (1984). Introductory cartography. Prentice-Hall.
- Pieroni, G., & Freeman, H. (Eds.). (1980). Map Data Processing: Proceedings of a NATO Advanced Study Institute on Map Data Processing Held in Maratea, Italy, June 18-29, 1979. Academic Press Incorporated.
- Ian, H. (2010). An introduction to geographical information systems. Pearson Education India.
- Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2005). Geographic information systems and science. John Wiley & Sons.
- M. Anji Reddy,(2012),Fundamentals of remote sensing and Geoinformatics,BS Publications.

DSC-12A (THEORY): PRINCIPLES OF GEOPHYSICS-LTP (L T P- 3 0 1)

Total Credits:3

Total Hours:50

Objective:

- 1) To Understand the Principles of Geophysical techniques.
- 2) To understand about the Gravity, Magnetic, Seismic, & Radio active methods.

Outcomes:

- 1) to know about the various Principles of Geophysical techniques.
- 2) Will be able to apply the techniques of Gravity, Magnetic, Seismic and radio active methods in the field.

Module-1:

10hrs

Introduction-The earth as a planet; different motions of the earth; gravity field of the earth and its shape; seismology and interior of the earth; variation of density, velocity, pressure, temperature, electrical and magnetic properties of the earth. Digital seismographs . Geomagnetic field and fundamentals of paleo-magnetism. Heat flow, upper and lower atmospheric phenomena. Theories of scalar and vector potential fields; Laplace, Maxwell and Helmholtz equations for solution of different types of boundary value problems in Cartesian, cylindrical and spherical polar coordinates.

Module-2:

10hrs

Gravity methods: 'G' and 'g' units of measurement, density of rocks, gravimeters, Bouguer gravity formula, various corrections to gravity data, free air, Bouguer and isostatic anomalies, regional and residual gravity separation, upward and downward continuation, preparation and analysis of gravity maps; gravity anomalies and their interpretation; calculation of mass, airborne, ship-borne and bore-hole gravity surveys.

Module-3:

10hrs

Electrical methods: Conduction of electricity through rocks, electrical conductivities of metals, metallic, non-metallic and rock forming minerals, D.C. resistivity units and methods of measurement, electrode configuration for sounding and profiling, interpretation of resistivity field data and ground-water exploration, S-P methods of investigation of subsurface.

Module-4:

10hrs

Seismic methods of prospecting: Reflection, refraction and CDP surveys; land and marine seismic sources, generation and propagation of elastic waves, velocity increasing with depth, geophones, hydrophones, recording instruments (DFS), digital formats, field layouts, seismic noises and noise profile analysis.

Radioactive methods of prospecting of minerals (radioactive and non radioactive) deposits, half-life, decay constant, radioactive equilibrium, G-M counter, scintillation detector, semiconductor devices, application of radiometric technique for exploration and radioactive waste disposal.

Module-5:

10hrs

Magnetic methods: Earth's magnetic field, units of measurement, magnetic susceptibility of rocks, magnetometers, corrections, preparation of magnetic maps, upward and downward

continuation, magnetic anomalies and their interpretation. Origin of electromagnetic field, electromagnetic profiling, methods of measurement, processing of data and interpretation.

DSC 12B-PRINCIPLES OF GEOPHYSICS PRACTICALS-(0 0 1)

1. Resistivity methods: Field survey and Curve matching techniques and s-line method.

- **2 practicals. 2 x 2.5= 5 hrs**

2. Study of seismic profile of a specific area and its interpretation

- **1 practical 1 x 2.5= 2.5 hrs**

3. Numerical problems on vertical and horizontal components of magnetic method and Numerical problems on vertical component, gravity gradient and gravity curvature.

- **1 practical 1 x 2.5= 2.5 hrs**

Books Recommended:

- Introduction to geophysical prospecting - Milton B, Dobrin Mc Graw Hill Book
- Outlines of geophysical prospecting - A manual for Geologists. M.B.R. Rao. Prasaranga, Mysore University.
- Geophysical Methods in Geology - P.V. Sharma.
- Geophysical Exploration - Heilava. C.H.
- Exploration Geophysics for Geologists and Engineers - Edited by Bhimasankaran, V.L.S. Gaur. V.K. - The Association of Exploration Geophysists - Hyderabad
- Applied Geophysics – W.M.Telford,L.P.Geldart,R.E.Sheriff,D.A.Keys. Cambridge univ., Press,1976, pp 860

DSC13A (THEORY): PRINCIPLES OF GEOCHEMISTRY (L T P-301)

Total Credits: 3

Total Hours: 45

Objective:

- 1) To understand the various principles of Geochemistry.
- 2) To understand about the Isotope Geology and about the Petrogenesis.

Outcomes:

- 1) Will be able to apply the principles of Geochemistry in studying of various rock types.
- 2) Will be able to apply the techniques of Isotope Geology in rock studies.

Module-1:

06hrs

Classification of elements: Periodic Table of Elements, Major-Minor-Trace Elements, Geochemical Classification: Atmophile, Chalcophile, Lithophile and Siderophile elements.

Module-2:

10hrs

Cosmic abundance of elements: Distribution of elements in solar system and in Earth. Chemical differentiation and composition of the Earth, General concepts about geochemical cycles and mass balance. Properties of elements: color, density, melting point, boiling point, and thermal and electrical conductivity of metals, non-metals and metalloids. Geochemical behavior of major, trace and rare earth elements, Mass conservation of elements and isotopic fractionation.

Module-3:

09hrs

Isotope Geology -1: Radioactivity and radioactive decay schemes. Radiometric dating, radiogenic isotope systematics: U-Pb, Rb-Sr, K-Ar and C¹⁴ systematics. Fission track dating.

Module-4:

10hrs

Isotope Geology-2: Preparation of samples for dating. Interpretation of isotope dates. Limitations of isotope dating. Distribution of dates in space and time. Stable isotopes: Carbon, Oxygen, Hydrogen and Sulphur and their geological applications.

Module 5:

10hrs

Petrogenesis: Steady state geotherms. Phase, phase diagram, phase rule, physical properties of magma, critical point and super critical fluids, congruent and incongruent melting, eutectic crystallisation & peritectic point, partial melting, miscibility and immiscibility in solids and liquids, perthites and antiperthites. Exsolution phenomena. Limits of Eh and pH in nature.

DSC13B- PRINCIPLES OF GEOCHEMISTRY-PRACTICALS- (L T P – 0 0 1)

1. Petrochemical calculations- Niggli verte and Niggli base -1Practicals 1x2.5= 2.5 hrs
2. Discrimination and Variation Diagrams: Geochemical criteria for discriminating between tectonic environments - - 1Practicals 1x 2.5= 2.5 hrs
3. Laboratory exercises in graphic plots for petrochemistry and interpretation of assemblages. -1 Practical 1x 2.5=2.5 hrs
4. Geochemical analyses of Iron ore. -1 Practical 1 x 2.5=2.5 hrs

Books Recommended:

- Geochemistry- William.M.White-Wiley black well publications
Mason, Brian, Moore and Carleton, B. (1982), Principles of geochemistry, John Wiley&Sons, New York, 344 p.
- Introduction to carbon capture and sequestration- Berend Smit, Jeffrey.A. Reimer, CurtisM. Oldenburg and Ian.C.Bourg.
- Rare earth element Geochemistry by Henderson
- Petrologic Phase equilibria – W.G.Ernst
- The Interpretation of Geological Phase diagrams - Ernest G Ehlers
- Petrogenesis – Wilson
- Solutions, Minerals and Equilibria – Garrels and Christ, 1966
- Simulating the Earth- J.R. Holloway and B.J. Wood,1988
- Basic analytical Petrography – Ragland, 1989
- Principles of Igneous and Metamorphic Petrology by Antony R Philpotts, 1979.1.
- Geochemical Thermodynamics by Darrell Kirk Nordstrom and James L. Munoz
- Chemical Thermodynamics for earth scientists by Philip Fletcher, 1993
- Chemical Fundamentals of Geology by Robin Gill.
- Elementary Thermodynamics by B.J. Wood and D.G. Fraser, 1976
- Equilibrium Thermodynamics by Roger Powell
- Geochemistry by Anderson
- Chemical Thermodynamics by Bruce H Mahan
- Chemical Fundamentals of Geology -Gill, R. , HarperCollins Publishers Ltd, UK, 292p.
- Geochemistry -Holt, K.H.W, Rinehart and Winston Inc, USA.
- Geochemistry- Rankama, K. and Sahama, T.H.G. , Univ. Chicago press, 911p.
- Essentials of Geochemistry- Walther. J.V, Jones and Barlett Publishers, New Delhi. 797p.
- Geochemistry- Albarede F. - An introduction, Cambridge university press.
- Geochemistry- Brownlow, A.N., Prentice Hall
- Chemical fundamentals of geology -Gill, R. Unwin Hyman, London
- Principles of Isotope Geology -Faure, G., : -John Wiley
- Stable isotope Geochemistry -Hoefs, J, –Springer Verlag
- Encyclopaedia of Geochemistry- Marshal, C.P. and Fairbridge, R.W.,: -Kluwer Academic
- Handbook of Exploration Geochemistry -Govett, G.J.S. (Ed.), : -Elsevier
- Introduction to Geochemistry- Mason, B. and Moore, C.B., : -Wiley Eastern
- Geochemical Thermodynamics- Nordstrom, D.K. and Munoz, J.L.,: -Blackwell
- Inorganic Geochemistry -Henderson, P.,: -Pergamon Press
- Introduction to Geochemistry- Krauskopf, E.B. , McGraw Hill Book Company, New Delhi.
- Inorganic Geochemistry- Paul Henderson, , Pergamon Press.
- Geochemistry -Rankama, K. &Sahama, T.H.C., University of Chicago Press.
- Progress in Isotope Geology -Rankama, K., Interscience
Using geochemical data: Evaluation, presentation, interpretation -Rollinson, H.R.. Longman scientific and Technical, New York.

AECC 10 SAMPLING AND ANALYTICAL TECHNIQUES IN GEOLOGY

(L T P- 3 0 0)

Total Credits: 3

Total Hours: 45

Objectives:

1. To understand the method of sampling and preparation of samples for analysis.
2. To understand the classical and instrumental methods of analysis of geological samples.

Outcomes:

1. Will be able to collect representative samples and prepare them for analysis.
2. Will be able to quantitatively and qualitatively evaluate geological samples.

Module – I :

10hrs

Sampling for geochemical studies: Rock, sediment and water sample collection. Collection of samples from outcrops, drilling operations and at bottom of water bodies. Sampling apparatus. Sample preparation for chemical analysis.

Module – II :

8hrs

Sample preparation for thin section of hard rocks and sediments. Preparation of Polished ore section. Sample etching, staining and modal count techniques. Techniques of photomicrography. Thin section preparation of heavy minerals.

Module –III

7hrs

Separation of minerals- Magnetic separation-Dielectric separation of mineral particles. Electrostatic separation-Separation; panning- rolling, sieving and hand picking. Heavy mineral separation technique.

Module-IV

10hrs

Introduction to analytical chemistry: Qualitative and quantitative analysis. Classical methods of analysis of rocks- wet chemical methods.

Laboratory techniques: Laboratory operation and practices. Units of measurements. Laboratory notes. Errors and evaluation. Determination of accuracy. Statistical evaluation of data.

Module-V

10hrs

Determination of major, trace(minor), rare earth elements. Principles of geological application of cathodoluminescence, atomic absorption spectrophotometry, inductively coupled plasma-atomic emission spectrometry.

X-ray fluorescence spectrometry, Scanning and Transmission electron microscopy, Micro probe analysis. X-ray diffractometry, Thermal analytical techniques. FTIR & chromatography.

Books Recommended

• Galen.W.Ewing, 1975, Instrumental methods of chemical analysis, , 4 th Ed. International student Ed. Mc Graw Hill, Book Co.,

• Manual of Mineralogy, John Wiley, Klein, C and Hurlbut,Jr. C.S. John Wiley, 1983.

Laboratory Handbook of Hutchinson, C.S. , 1974, Petrographic techniques, John Wiley,

• Sharma, B.K.1998, Instrumental methods of chemical analysis, GOEL, Publishing House, Meerus.

• Deer, W.A., Howie, R.A., Zussman. 1996.The Rock forming minerals, Longman, London.

• A handbook of Silicate rock analysis, by P.J. Potts.Chapman & Hall publication 1987.

AECC11: COMMUNICATIVE SKILLS -II (L T P -3 0 0)

Total Credits: 03

Total Hours: 40 hrs

Objectives:

1. To understand English communication skills.
2. To study and develop professional writing skills required to write job application and letters.

Learning Outcomes:

1. To able to draft formal letters.
2. To be able to know the skills required for group discussions, interviews and meetings.

Module-I 08 hrs

Imaginary Writing with an Emphasis on Exploring Multiple Genres, Developing Critical Awareness.

Module-II 08 hrs

Drafting Message – Letter Writing (Formal and Informal) Greetings – Condolence and Congratulations.

Module-III 10 hrs

Business Letters, Tenders and Memorandum, Consumer Grievance, Reservation, Enquiry, Professional Brochures – Meetings, Notice, Minutes, Agenda, Quotations.

Module-IV 06 hrs

Job Application- Curriculum Vitae, Job Offering Letter- Job Acceptance Letter.

Module-V 08 hrs

Precise- Writing and Report Writing (Graph Sales Report/ Field Survey Report). Advertisement. Kinds – Interview Techniques. Preparing Situational Questionnaire. Speeches (General / Business) Analysis Of Inter Personal Problems – Writing Proposals.

Activities:

1. Group Discussion
2. Interview
3. Extempore
4. Mock meetings
5. Role-play – Telephonic conversation
6. Facial / Body Gestures (language) Voice clarity
7. Listening and Observing

Books Recommended:

- Communication and English, Bill VanPatten, 2015
- Pursue English Through Communication- Communicative English, Bibi Anohar, Anohar John, 2018
- High School English Grammars and Composition – Wren & Martin
- Living English Structure – W. Standard Allen (Orient Longman)
- Composition Exercises in Elementary English (Macmillan)- A.S. Mornby

SEMESTER – V
DSC 14A (THEORY): EXPLORATION GEOLOGY (L T P-4 0 1)

Total Credits: 3

Total Hours: 45

Objective:

- 1) To understand the principles of prospecting.
- 2) To understand the various prospecting methods.

Outcomes:

- 1) Will be able to employ the appropriate method of exploration for various types of economic mineral deposits.
- 2) Will be able to evaluate the economic implications of exploitation of economic mineral deposits.

Module-1:

05hrs

Introduction to Prospecting and Exploration: Classification of Prospecting methods. Principles of Exploration: Geological, Geophysical and Geochemical Methods.

Module-2:

05hrs

Geological Exploration - Mode of occurrence of commercial-grade deposits of Fe, Mn, Au-Ag-W, Cu,Pb-Zn,Ti,Ni,Mo,Sn,Al,Pt - group. U-Th.

Geological criteria for mineral prospecting - Stratigraphic, lithological, structural, magmatogenic, metamorphogenic, geomorphological, palaeogeographic, palaeoclimatic and historic criteria.

Module-3:

05hrs

Geological prospecting methods and indications of ore.

Phases of geological prospecting. Small and large scale geological mapping. Methods of geological exploration - exploratory grids, location and documentation of exploratory workings (pits, trenches underground workings), drilling, core logging. Sampling techniques and evaluation of grade.

Methods of geological sampling – Chemical, mineralogical, technological. Preparation of samples for chemical analysis.

Geological documentation of mineral deposits.

Ore reserves calculation methods.

Module-4:

15hrs

Geochemical Exploration and Bio-Geochemical Exploration

Introduction and basic principles of geochemical exploration.

Geochemical environment, dispersion and mobility of elements. Geochemical Cycle – Deep seated & surficial. Pathfinder elements. Threshold values and geochemical anomaly.

Elemental analysis: Mode of occurrence of elements in minerals and geochemical analysis of samples.

Geochemical anomalies- patterns of deep-seated and epigenetic origin.

Weathering and soil formation related to geochemical anomalies.

Chemical equilibrium in the surficial environment-factors controlling mobility of elements in the surficial environment.

Mechanical and biological dispersion in the surficial environment.

Geochemical anomalies in residual soil, transported soil, natural waters and drainage sediments.

Biogeochemical and geobotanical anomalies and exploration.

Module-5:

15hrs

Geophysical Exploration

Geophysical exploration: Introduction, definition, physical properties of rocks and minerals, physical fields, geophysical anomalies and applications.

Application of Geophysical methods in mineral exploration: Electrical method, Magnetic method, Gravity method, Seismic method and Radioactive method.

DSC 14B- EXPLORATION GEOLOGY- PRACTICALS-(0 0 1)

1. Ore reserves, Estimation of ore reserves. **2.5x1=2.5hrs**
2. Geochemical methods of exploration and maps. **2.5x1=2.5hrs**
3. Geophysical methods: problems.**2.5x2=5hrs**

Books Recommended:

1. Geochemistry in mineral exploration Hawkes. H & Wobb J.S. Harper & Row New York.
2. Principles of Geochemical prospecting. Ginzburg. I.I. Petgaon Press, N.Y. London.
3. Biochemical methods of Prospecting - Malyuga, D.P.
4. Principles of Mining Geology, Arogya Swamy.
5. Introduction to geophysical prospecting - Milton B, Dobrin Mc Graw Hill Book
6. Outlines of geophysical prospecting - A manual for Geologists. M.B.R. Rao. Prasaranga, Mysore University.
7. Geophysical Methods in Geology - P.V. Sharma.
8. Geophysical Exploration - Heilava. C.H.
9. Exploration Geophysics for Geologists and Engineers - Edited by Bhimasanakaran, V.L.S. Gour. V.K. - The Association of Exploration Geophysists - Hyderabad
10. Applied Geophysics – W.M.Telford,L.P.Geldart,R.E.Sheriff,D.A.Keys. Cambridge univ., Press,1976, pp 860.
12. Principles of Geochemical prospecting. Ginzburg. I.I. Petgamon Press, N.Y. london.
13. Geochemistry of rare & dispersed chemical elements in society Vinogradev.
14. Biochemical methods of Prospecting - Malyuga, D.P.
15. Geochemistry of epigenesis - Faibidge.
16. Principles of Mining Geology, Arcokiaswamy..
17. Introduction to geophysical prospecting - Milton B, Dobrin Mc Graw Hill Book Company, Inc
18. Exploraion geophysics -Jakaosku, J.J.
19. Outlines of geophysical prospecting - A manual for Geologists. M.B.R. Rao. Prasaranga, MysoreUniversity
20. Geophysical Methods in Geology - P.V. Sharma.
21. Applied Geophysics in the search for minerals - Eve. A.S.Keys.
22. Geophysical Exploration -Heilava. C.H.
23. Exploration Geophysics for Geologists and Engineers - Edited by Bhimasanakaran, V.L.S. Gour. V.K. - The Association of Exploration Geophysists-Hyderabad
24. Mining Geophysics - D.S. Parasnis.
25. Principles of Applied Geophysics - D.S. Parasnis
26. Introduction to Geophysics -C.H.Howel.

DSC 15A (THEORY): GEOTECHNICAL ENGINEERING AND HYDROGEOLOGY
(L T P-3 0 2)

Total Credits: 3

Total Hours: 45

Objective:

- 1) To understand the role & importance of geology in civil engineering.
- 2) To know about the groundwater, its properties and occurrence

Outcomes:

- 1) Will be able to apply the knowledge of geology in constructing various engineering structures.
- 2) Will be able to apply the knowledge of hydrogeology in exploring the groundwater.

Module 1:

10 Hrs

Engineering Geology: Introduction: The role of geology in civil engineering.

Engineering properties of rocks –Building stones and road materials. Building stones of India- Granite, basalt, sandstone, shale, marble, charnockite, and laterite.

Soil: Soil profiles. Structure and texture of soils. Physical and chemical properties of soils.

Classification of soil particle size.

Gravitation sloping processes: Classification and description of modern gravitational processes based on type of movement-Slides, falls and flows. Causes of landslides.

Stability of Slope: Classification of slopes- stable and unstable slopes- Geological parameters. Measures for stabilization of slopes.

Module 2:

10 Hrs

Geoengineering Studies-I: Building sites: Requirements, foundation problems, ground conditions, building foundations in bedrock ground, soil and sloping ground.

Bridge sites: Bridge structure, types, bridge problems and geological parameters. Geology of bridge sites.

Tunnels: Terminology, definitions, types- hard rock and soft rock tunnels. Geological considerations- Lithology and structure. Ground failures in tunnels. Concrete aggregate sources, alkali-aggregate sources, alkali-aggregate reaction. Geological site investigations for engineering projects. Aseismic designing and earthquake resistant structures. Building construction code (BCC).

Module 3:

07Hrs

Geoengineering Studies-II: Dams and reservoirs: Types of Dams: 1. Masonary and concrete dams- gravity, arch and buttress. 2. Earth Dams and 3.composite dams. Location of dams. Geological considerations- topography, structure and lithology. Foundation and seepage problems in dams and their treatment. Foundation treatment; Grouting, Rock Bolting and other support mechanisms. Reservoir: Problems of seepage and silting.

Module 4:

10 Hrs

Hydrogeology: Hydrologic cycle. Ground Water – Introduction, origin, types, occurrence, movement of ground water, Hydrologic properties of rocks: Porosity; permeability; specific yield; specific retention, hydraulic conductivity, transmissivity, storage coefficient. Water bearing geologic formations– Aquifers (confined, unconfined & perched), aquiclude, aquifuge, aquitard.

Well hydraulics: Steady, unsteady and radial flow, Darcy's Law and its applications. Water table and its fluctuations; causative factors and their measurements; methods of pumping test and analysis of data. Hydrographs, water table contour maps, hydrostratigraphic units.

Module 5:

08 Hrs

Groundwater Chemistry - Physical, chemical and biological properties of groundwater. Water quality, drinking water standards, groundwater quality map of India. Artificial recharge of groundwater; problem of over exploitation of groundwater; sea water intrusion in coastal aquifers; remedial measures. Interpretation of hydrogeomorphic units using satellite imageries. Radio isotopes in hydrogeological studies. Water budget equation and Groundwater management

Books Recommended:

- Field Geology - Lahee, W.
- Structural Geology - Billings, M.P.
- Symbols for maps and rocks - Amer. Geol. Inst. Publ.
- Topographic sheets - Survey of India Publ.
- Groundwater Hydrology - D. K. Todd
- Hydrology - S. N. Davis and R.J.M. Dewiest
- Groundwater - C. L. Tolman
- Groundwater studies - R. H. Brown and Ahers
- Groundwater Hydrology - Hermann Bouver
- Hydrology - C. W. Fetter
- Hand book and applied Hydrology - Ven Te Chew
- Hydrology - Raghunath
- Hydrology – Karanth
- Parbin Singh, "A Text Book of Engineering and General Geology"- Sixth revised Edition- 2001. S K Kataria and Sons, Delhi.
- B S Sathyanarayana Swamy, "A Text Book of Engineering Geology" – 2000 Edition, Dhanpat Rai & Co (P) Ltd. Delhi.
- K M Bangar, "Principles of Engineering Geology" - First Edition -1995, Standard Publishers, Delhi.
- S K Garg, "Physical and Engineering Geology" – Third Edition 1999- Khanna Publishers, Delhi 111006
- K V G K Gokhale, "Principles of Engineering Geology" – Revised Edition 2005, B S Publications Hyderabad.
- D S Arora, "Geology for Engineers" – Second Edition, 1982 Mahendra Capital Publishers, Chandigarh.
- D Venkata Reddy, "Engineering Geology" - 2011 Edition, Vikas Publishing house Pvt. Ltd New Delhi.
- Robert F Legget, "Geology and Engineers" – Third Edition McGraw Hill International edition, Civil Engineering series.

**DSC15B- GEOTECHNICAL ENGINEERING AND HYDROGEOLOGY-
PRACTICALS (002)**

1. Simple numerical problems related to: determination of porosity, permeability and transmissibility of geological formations, groundwater flow, Well hydraulics, water budget. Preparation and interpretation of water table maps. .
2Practical=2.5x2=5.0hrs
2. Study, preparation and analysis of hydrographs for differing groundwater conditions
1Practical=2.5x1=2.5hrs
3. Introduction to methods of interpreting groundwater quality data using standard graphical plots: Facies – Piper trilinear diagram, Gibbs diagram, drinking water (TDS,fluoride, nitrate, WQI zonation maps).
3 Practical=2.5x3=7.5.hrs
4. Preparation of engineering geological maps: Tunnel, road, rail and dams – 1 map each
2 Practical=2.5x2=5.0hrs

DSC 16: MINING GEOLOGY AND MINERAL PROCESSING (L T P: 4 0 0)

Total Credits: 4

Total Hours: 45

Objective:

- 1) To understand the scope of and importance of mining geology.
- 2) To understand the Environmental practices to be followed in mining geology.

Outcomes:

- 1) To apply the knowledge of suitable mining method.
- 2) To follow the suitable environmental practice at the mining areas.

Module-1:

04hrs

Terms used in open pit and underground mining.

Module-2:

12hrs

Mining Geology: Introduction to mining. Methods of mining, surface and sub-surface mining.

Surface mining – alluvial and open cast/pit mining and related equipment.

Subsurface mining – stoping and cavity methods, mine safety, mine ventilation.

Impact of mining on environment and human health.

Module-3:

12hrs

Introduction, Scope, objectives and limitations of mineral processing, liberation and beneficiation characteristics of minerals and coal.

Comminution: Theory and practices of crushing and grinding; different types of crushing and grinding equipments – their applications and limitations.

Froth Flotation: Physico-chemical principles, reagents, machines, flotation of sulphides, oxides and coal. Electrical Methods of Concentration: Principles, fields of applications and limitations.

Magnetic methods of concentration: Principles, Fields of Application and Limitation

Module-4:

12hrs

Overall understanding of environmental practices in mining including; waste rock and tailings disposal systems; prediction/prevention/treatment/control of acid rock drainage; control of dust/noise/gaseous emissions.

Module-5:

05hrs

Environmental effects monitoring (surface water and groundwater); reclamation and decommissioning; government regulations relating to environmental protection in design/operation/closure of mines; sustainable development principles and application to mining; risk assessment and management principles with respect to the environment.

Books Recommended:

1. Wills' Mineral Processing Technology, Elsevier Publications
2. Wills, Barry and Tim Napier-Munn, Mineral Processing Technology, 7th edition, Butterworth Heinmann, 2006, 456 p.
3. Hartman, H. L. (Editor), SME Mining Engineering Handbook, Vol I & II, 2nd edition, SME Littleton, CO., 1992, 2394p
4. Canadian Milling Practice, Special Volume 49, CIM, Montreal, 2000.
5. Hartman, H. L., Introductory Mining Engineering, 2nd Edition, J. Wiley, New York, N.Y., 2003.
6. Hustrulid, W.A. and Richard L. Bullock (ed.), Underground Mining Methods: Engineering Fundamentals and International Case Studies, SME, Littleton, CO, 2001.
7. Gertsch, R.E. and R.L. Bullock (Ed.), Techniques in Underground Mining, SME, Littleton, CO, 1998.
8. Kennedy, B.A. (Editor), Surface Mining, 2nd edition, SME Littleton, CO., 1990, 1206p.
9. Elements of Mining Geology - Young
10. Elements of Mining - Lewis
11. Mining of mineral deposits - Shevyekov 4. Introduction of mining - stoces
12. Principles of mineral dressing -0 Gaudin-Tata Mc. Graw Hill Publishing co., Ltd .
13. Text books of ore dressing - Richards and LookeMc.Graw Hill Pub.Co. Inc.
14. Elements of ore dressing Roberts.
15. Mineral processing - Pryor
16. Handbook of Mineral dressing - Taggart
17. Elements of dressing - Taggarat.

DSE 1 & DSE 2 (Choose Any Two)

A. SURVEYING AND FIELD GEOLOGY (L T P- 5 0 0)

Total Credits: 5

Total Hours: 50 Hrs

Objectives:

- 1) To understand the different surveying techniques
- 2) To understand the concepts of field examining techniques.

Outcomes:

- 1) Will be having a knowledge of using suitable surveying technique.
- 2) Will be able to apply proper concept and derive the proper result in examining the lithology of a given area.

Module 1:

10 hrs

Surveying-1: Principles and practices of Chain survey, Compass survey, Plane table survey.

Module 2:

10 hrs

Surveying-2: Principles and practices of Dumpy level survey, GPS survey, Total Station Survey

FIELD GEOLOGY

Module 3:

10 hrs

Introduction, field equipments, a brief note on taking geologic notes in the field, collection of samples, numbering and marking specimens. Determination of dip and strike using compass clinometer and Brunton compass.

Module 4:

10 hrs

Types of maps- topographic, geologic and aerial photographs. Study of toposheets.. General survey procedures. Locating points in the field. Measurement and recording of field data.

Module 5:

10 hrs

Selection and preparation of a base map, detailed mapping and sampling and their types. Preparing of geological reports. Finding and tracing the contacts between rock units, correlating geologic units, mapping geologic structures, outcrop maps, —locating field data and geologic features on the map.

Books Recommended:

1. Surveying and Levelling – Late T.P. Kanetkar and S.V.Kulkarni.
2. Surveying – Punmia.
3. Field Geology- Compton
4. Field Geology-Lahee
5. A guide to Field Geology-Gokhale

B. MARINE GEOLOGY (L T P- 5 0 0)

Total Credits: 5

Total Hours: 50

Objective:

- 1) To understand the morphology of ocean floor.
- 2) To understand about the different marine mineral resource.

Outcomes:

- 1) Will be able to describe different marine mineral resource and its occurrence.
- 2) Will be able to distinguish between the various ocean water circulation phenomena.

Module- 1:

10 hrs

Introduction-Morphology and physiographic features of the ocean floor. Classification of sub marine topography. Structure, composition and mechanism of the formation of oceanic crust. Seawater-basalt interactions.

Module- 2:

10 hrs

Physico-chemical characteristics of sea water – distribution of temperature, salinity and density of sea water. Waves, Tides, Currents and their significance.

Module-3:

10 hrs

Ocean deposits- source, nature and distribution of marine sediments. Ocean margins and their significance.

Module-4:

10 hrs

Marine resources- types of marine resources and their distribution and utilization. Marine energy resources. Hydrothermal vents- chemical and biological significance of hydrothermal vents systems.

Module-5:

10 hrs

Ocean Circulation, El Nino and Ekman spiral, convergence, divergence and upwelling. Opening and closing of ocean gateways and their effect on circulation and climate during the Cenozoic. Sea level changes.

Books Recommended:

1. Maohotra, A K, Ocean Science and Technology
2. Tchernia, P, Descriptive regional oceanography
3. K.Siddhartha, Oceanography- A brief Introduction
4. Willam A Anikouchine and Richard W Stenberg, The world Ocean- An Introduction to oceanography
5. Cuchlaine A M King, Oceanography for Geographers
6. H V.Thurman, Introduction to oceanography
7. Willam A Anikouchine and Richard W Stenberg, The world Ocean- An Introduction to oceanography
8. Cuchlaine A M King, Oceanography for Geographers
9. H V.Thurman, Introduction to oceanography

C. ENVIRONMENTAL GEOLOGY (LT P-5 0 0)

Total Credits: 5

Total Hours: 50Hrs

Objective:

1. To understand the interaction of human with the geological environment,
2. To familiarize student of challenges of environmental geology in urban environment.
3. To teach practical contribution that geologists can make in managing human interaction with the physical environment.

Learning outcome:

1. Concepts of environmental geology
2. Managing Geological resources
3. Appropriate use of the geological environment for waste disposal, and
4. Recognition of natural hazards and mitigation of their human impact

Module-1:

10Hrs

Fundamental concepts of environmental geology- scope, objectives and aims. Earth's environment and climates.

Global warming. Greenhouse effect. Ozone depletion- Ice sheets and fluctuation in sea levels. Concepts of ecosystem, Earth's major ecosystems –terrestrial and aquatic.

Module-2:

10 Hrs

Natural Hazards. Disasters, and Nature Processes – Evaluating Hazards: History, Linkages, Disaster Prediction and Risk Assessment – Fundamental Principles concerning Nature Hazards- Human response to Hazards – Global Climate and Hazards. Land –use change and Nature Hazards.

Module-3:

10 Hrs

Natural disasters in India: Types of Environmental Hazards and Disasters - Global context, regional context and the Indian context. Hazard prone areas, risk evaluation, mitigation.

Earthquakes and Volcanoes: Magnitude and intensity. Plate boundary related to Earthquake – Earthquake processes (Faulting, Tectonic group). Seismic waves, seismograph. Earthquake cycle – Earthquake caused by human activity – Effects of Earthquakes – Tsunami - Earthquake risk and Earthquake prediction –Earthquake warning system. Mitigation and management. Volcanic activity, Volcanic Hazards. And forecasting volcanic activity.

Module-4:

10Hrs

River flooding and Coastal Hazards

Floods – Introduction, causes, the nature of flood problem in various river basins, types of floods– Prediction of flooding. Identification of hazard prone areas, risk evaluation and mitigation.

Coastal Processes: Erosion – Coastal hazards & engineering structure.

Human activity and Coastal erosion – Prediction and mitigation of coastal hazards.

Deep sea mining: Impact on marine life and coastal marine environment, risk assessment and mitigation.

Water Resources: A brief global perspective of surface water and ground water. Interactions between surface water and ground water. Desalination. Water management. Water and eco system.

Water Pollution: Types of water pollution. Surface & Ground water pollution and Treatment– Point source and Non- Point Source. Pollution studies on Fluoride, Lead, Arsenic and Mercury.

Module-5:

10Hrs

Impact of Mining: Environmental Impact of mineral development –Recycling Mineral Resource. Environmental Impact Assessment (EIA). Environmental management in mining (EMP), Environmental impact due to oil exploration and oil spills, dumping of ores; mine waste and fly ash.

Sand mining impacts on ecosystem.

Soil: Sources and nature of soil pollution and its harmful effects.

Nuclear energy resources: Energy use pattern in different parts of the world and its impact on the environment. Radioactivity from nuclear reactors, fuel processing and radioactive waste.

Hazards related to hydropower and geothermal energy.

Mass Wasting: Introduction, Classification of Mass movements. Types of landslides, causes of landslides, Physical, morphological and human causes. Factors influencing landslide.

Avalanche: Cause and mitigation.

Books Recommended:

1. Valdia K.S (1987), Environmental Geology Indian context. TMH Tata McGraw-Hill Publ.
2. Valdia K.S (1987), Environmental Geology – Indian context. Tata McGraw-Hill., Delhi
3. Valdia (2013), Environmental Geology McGraw-Hill
4. Keller. E.A 1979, Environmental Geology, CBS (1976)
5. Keller. E.A 1979, Environmental Geology, Charles, Merrill Publishing Co. Ohio
6. Edward A. Keller Introduction to Environmental Geology Pearson Education Fifth Ed 2017
7. Lundgren. I. 1986 Environmental Geology, Prentice Hall.
8. Prisco: Earthquake engineering for large dams CBS
9. Blyth and De Freitas: Geology for Engineers, ELBS Arnold
10. Bennet, M.R.B., and Doyle, P. 1997, Environmental Geology. John Willey and Sons, NY.
11. Bennet, M.R.B., and Doyle, P. 2016, Environmental Geology: Geology and The Human Environment John Willey and Sons, NY.
12. Environmental Assessment Source book, 1991, Vol. I, II, III. Environment Department. The World Bank, Washington DC.
13. Carla W Montgomery 2015 Environmental Geology McGraw-Hill

14. Alan.E.Kehew (2016) *Geology for Engineers, Environmental Scientists* Pearson Education.
15. *Basic Environmental and Engineering Geology* Bell: F.G - 2006. Whittles Publishing
16. Strahler, A.N. and Strahler, A.H. (1973) *Environmental Geoscience – Interaction between Natural Systems and Man*. Hamilton Publishing Co., Santa Barbara, California.

D. GEOSTATISTICS (L T P-5 0 0)

Total Credits: 5

Total Hours: 50 Hrs

Objective:

- 1) To understand about the various statistical methods that are used in geology.

Outcomes:

- 1) Will be able to apply various statistical methods in geological data interpretation.

Module-1:

10 hrs

Introduction to Statistics: Sampling, data collection, random variables, probability, frequency function; Applications of statistical methods in earth sciences – quantification and prediction.

Module-2:

10 hrs

Univariate statistical methods, frequency analysis, simulation; Statistical distributions. Stochastic modelling and forecasting – introduction, modelling, applications, spectral analysis.

Module-3:

10 hrs

Concepts of regionalized variables and variogram modelling; Concepts of dispersion, extension and estimation variances.

Module-4:

10 hrs

Kriging variance and procedure, simple kriging; Testing of Hypothesis – t-test, F- test, and Chi square test with examples from geological populations and discussing their significance.

Module-5:

10 hrs

Introduction to advanced geostatistics- applications of computer programs for statistical calculations – open source statistical programs.

Books Recommended:

- Sarma D.D., Geostatistics with applications in Earth Sciences, Springer Publ., pp.205.
- J.-P. Chiles and P. Delfiner, Geostatistics; Modeling spatial uncertainty, Wiley Publ., pp.731.
- H. Wackernagel, Multivariate Geostatistics, Springer Publ., pp.257.
- Kitanidis, P.K., Introduction to Geostatistics, Cambridge University Press., pp.271.
- C. Lantuejoul, Geostatistical Simulation, Springer Publ., pp.262.
- J. Awange, B. Palancz, R.H. Lewis, L. Volgyesi, Mathematical Geosciences, Springer Publ., pp.615.
- Olea, R.A., Geostatistics for Engineers and Earth Scientists, Springer Publ., pp.309.

SEC1 SKILL DEVELOPMENT – I

Total Credits (L + T + P): 4 + 0 + 0

Total Hours: 45

Objective:

- a. The importance of interpersonal communication.
- b. The role of soft skills in contemporary world.

Learning Outcomes:

- a. The decision making and problem solving skills.
- b. The stress and stress management techniques.

Module: I

05hrs

Soft Skills: Introduction – Definition and Significance of Soft Skills; Process, Importance and Measurement of Soft Skill Development.

Module: II

10hrs

Interpersonal Communication: Interpersonal relations; communication models, process and barriers; team communication; developing interpersonal relationships through effective communication; listening skills; essential formal writing skills; corporate communication styles – assertion, persuasion, negotiation.

Module: III

05hrs

Decision-Making and Problem-Solving Skills: Meaning, Types and Models, Group and Ethical Decision-Making, Problems and Dilemmas in application of these skills.

Conflict Management: Conflict - Definition, Nature, Types and Causes; Methods of Conflict Resolution.

Module: IV

10 hrs

Stress and Stress Management: Definition, Nature, Types, Symptoms and Causes; Stress Analysis Models and Impact of Stress; Measurement and coping with stress - techniques.

Module: V

15hrs

Tutorials: Seminar/ Group Discussion/Assignment.

Reference Books:

1. Managing Soft Skills for Personality Development – edited by B.N.Ghosh, McGraw Hill India, 2012.
2. English and Soft Skills – S.P.Dhanavel, Orient Blackswan India, 2010

SEMESTER – VI
DSC 17 and DSC 18 - TRAINING COMPONENTS

DSC17- Industrial Training (IT)

No. of Credits: 5

DSC18 - Training Report Evaluation (TRE)

No. of Credits: 5

The training period shall be of 6 weeks and only 200 marks are to be awarded. Any student who is not able to complete these training components will not be awarded degree.

Once the student has been selected / deputed for industrial training by the institute, he/ she shall not undergo IT elsewhere. In case students make direct arrangements with the industrial training, these will necessarily have to be approved by the institute.

SCHEME OF EVALUATION TOTAL MARKS: 200
(DSC 17 and DSC 18)

DSC 17: Industrial Training (IT):

The total mark allotted for DSC 17 is 100. (Training completion report and attendance certificate - 50 marks & Job Training Performance Appraisal-50 marks)

Students have to submit training completion report and attendance certificate issued by the host organization along with Job Training Performance Appraisal Form (The form has to be filled by the departmental head or sectional heads. - Model enclosed)

JOB TRAINING PERFORMANCE APPRAISAL FORM - SAMPLE
(Similar Criteria can be followed)

Name of Student: _____

Name of the Org.: _____

Name of Department: _____

From: _____ To _____

1. ATTENDANCE /PUNCTUALITY: 20 marks
2. PRESENTABILITY: 20 marks
3. SUPERVISORS REPORT: 20 marks
4. WORK ATTITUDES: 20 marks
5. COMMUNICATION SKILLS: 20 marks

Name of Appraiser: _____ Signature _____

Designation of Appraiser: _____ Date: _____

Signature of Student: _____ Date: _____

Note: Sample report format any suitable format can be followed

DSC 18: Training Report Evaluation:

The total mark allotted for DSC 18 is 100.

Students should prepare the detailed training report which carries 50 marks and Presentation on Training 25 marks, Viva Voce 25 marks.

A PowerPoint presentation on training program (based on the report) should be made. This will be presented in front of examiners.

**DSC 19A & DSC 19 B: INFORMATION TECHNOLOGY FOR GEOLOGISTS
(L T P 2 0 2)**

Total Credits: 02

Total Hours: 35

Objective:

- 1) To know about the concepts of Information Technology (IT), components and security aspects.
- 2) To learn the application of IT in the field of Geology and its related software.

Outcomes:

- 1) Learns the basic concepts, implementation and components of IT for application in Geology field.

Module 1:

07hrs

Introduction: Concepts of Information Technology (IT), benefits & limitations of ITs - implementations of ITs in the field of Geology, stakeholders and interfaces – challenges in the Geology field induced by ITs.

Module 2:

07hrs

IT Components: Computer hardware and software – Telecommunications - networking components, operating system (OS), and data storage - Databases and data warehouses - Human resources and procedures – network connectivity.

Module 3:

07hrs

Introduction to information security, Need for Information security, Threats to Information Systems, Information Security Investigations. Security threats - Sources of security threats- Information Technology Act 2000: Scope, jurisdiction, offense and contraventions, powers of police, adjudication, Intellectual property issues in cyberspace, ISO, Copyright Act, Patent Law, Cyber Laws in India.

Module 4:

07hrs

Applications of IT related to Geophysics, Geochemistry, Remote Sensing, Hydrogeology and Environmental Geology, Mining Geology, Applications to modeling in Geology.

Module 5:

07hrs

Computer applications for calculation of mineral formula using Microsoft excel program, Generation of graphs – line graph, histogram, pie chart, and trilinear plots. Petrochemical calculations using IGPET / GDP-Pet programs. Geological Report generation using softwares.

Practical (0 0 2)

1. Computer applications for calculation of mineral formula using Microsoft excel program, Generation of graphs – line graph, histogram, pie chart, and trilinear plots.
2. Petrochemical calculations using IGPET / GDP-Pet programs.
3. Flinchor

Books Recommended:

- Robson Wendy, Strategic Management and Information Systems Pitman Publishers
- Elmansic/Navathe, Fundamentals of Database Systems
- Joseph M Kizza, “Computer Network Security”, Springer Verlag.
- S.K Basandra , “Computers today”
- Richard Fox, “Information Technology: An Introduction for today’s digital world”

DSE 3 & DSE 4 (CHOOSE ANY TWO)

A. PROJECT REPORT

Total Credits: 05

The Content

1. Outer cover
2. Attestation and Certificate from the Guide
3. Acknowledgment
4. Index / Chapter page
5. Introduction
6. Review of Literature
7. Research Methodology
8. Survey Report / Result & Analysis
9. Conclusion and Suggestions
10. Scope for Future Research
11. Appendix
12. Bibliography

C1 and C2 to be awarded (each 10 marks) by respective project guides based on Periodic Progress and Reporting of the Student.

C1	
Synopsis	5
Presentation	5
Total	10

C2	
Draft Report	5
Presentation	5
Total	10

C3 Components of the Project (Report Evaluation and Viva) will be assessed for 80 marks.

1. 50 Marks for the Project Report
2. 20 Marks for Evaluation
3. 10 Marks for Viva-Voce

B. GEO-TOURISM (L T P- 5 0 0)

Total Credits: 5

Total Hours: 50

Objective:

- 1) To understand the concept of Geo-Tourism.
- 2) To know about the important Geo heritage site in India and in Karnataka.

Outcomes:

- 1) Will be able to implement the concept of geo tourism in conserving the geosites.

Module-1:

10 hrs

Introduction to Tourism: Meaning-Definitions-Visitors-Excursionist-Tourist-Traveller-Hospitality- Nature- Forms –Types of tourism-Tourism System-Purpose of Travel-Travel Motivators-Five ‘A’S of Tourism-Historical development of Tourism-Tourism in India.Impacts of Tourism-Significance of Tourism-Multipliers Effect-Economic-Social-Cultural-Environmental impacts of Tourism.

Module-2:

10 hrs

Geo-tourism: Geo-diversity, Geo-conservation, Geo-site, Geo-heritage and Geo-park and their role in geo-tourism development.

Module-3:

10 hrs

Natural and cultural landscapes, A geoconservation plan for geosites and the development of UNESCO’s Global Geopark. Geotourism- impacts and other types of tourism

Module-4:

10 hrs

Geo-diversity values and threats, Geo-tour guides, Important Geo-sites of India with special reference to Karnataka, Interpretation in Geotourism.

Module-5:

10 hrs

Geotourism: Development, Sustainable Management and Education.
Geoparks: Regional, national & global policy & criteria.

Books Recommended:

1. Gray, M., 2004. Geodiversity: Valuing and conserving abiotic nature. John Wiley & Sons Ltd. 434 p. (or later edition),
2. Dowling, R.K., and Newsome, D., 2006. Geotourism. Elsevier, 260p
3. Tourism development – Principles and practices – AK Bhatia
4. Tourism in India – A.K. Bhatia
5. Tourism in India – V.K. Goswamy

C. MINERAL ECONOMICS (L T P-5 0 0)

Total Credits: 5

Total Hours: 50 Hrs

Objectives:

1. To understand the complexities involved in economic evaluation of mineral deposits.
2. To understand the marketing strategies of minerals.

Outcomes:

1. Will be able to assess the factors of production and processing of minerals for consumption.
2. Will be conversant with the regulations governing mining and marketing of minerals and mineral products.

Module- 1:

10hrs

Introduction and concepts of mineral economics. Meaning and specialties of mineral deposits.

Mineral legislation in India: major and minor minerals. Mineral concession, royalty, dead rent, surface rent and cess.

Module 2:

10hrs

Economic consideration in Mineral exploration: Cost of exploration, selection of mineral deposit for mining, organization and management.

Concept of mineral resource and its estimation. Classification of Indian mineral resources: Strategic, critical and essential minerals. Resource base, mineral endowment and role of mineral industry in national economy.

Module 3:

10hrs

Mineral production: Guiding factors, sectors of production, economics of production.

Mineral inventory. Mineral processing, products and byproducts, Mineral pricing.

India's status in mineral production. Changing patterns of mineral consumption.

Module 4:

10hrs

Mineral conservation and substitution. Consumption and substitution of minerals. Demand Analysis and market survey.

Module-5:

10hrs

Mineral Concession Rules. Mineral legislation in India. Mineral information system. National mineral policy. Growth of Mineral industry and the economy.

Marine mineral resources and Law of Sea.

Books Recommended:-

1. Mineral Economics & Policy by John E. Tilton.
2. Mineral Resources, Economy and the Environment, 2nd Edition: Stephen E. Kesler.
3. An introduction to Mineral Economics by Chatterjee K. K.
4. Mineral Economics by R. K. Sinha and N.L. Sharma.

D. Land and Resources Management (L T P – 5 0 0)

Total Credits: 5

Total Hours: 50 Hrs

Objectives:

1. Identification of various natural resources and their classification.
2. Understand the aspects of exploration and exploitation of the resources.

Outcomes:

1. Will be able to evaluate the natural resources.
2. Will be able to adopt appropriate methods for exploitation of the natural resources as per regulations governing their harness.

Module 1:

10hrs

Natural resources: Definition, classification based on utility potential.

Land: Land as a resource, types of lands, conservation of land forms, deforestation, effect of land use changes. Land use patterns and agricultural practices in India.

Soil erosion by water and wind - impacts and control measures. Impacts of exploration of oil and natural gas.

Soil health, ecological and economic importance of soil, impact of soil degradation on agriculture and food security, need for soil conservation, sustainable land use planning.

Module 2:

10hrs

Water: Global water resources, Indian water resources, Resources system planning. Water use sectors- domestic, industrial, agriculture. Water deficit and water surplus basins in India, equitable distribution. Water budget of India.

Water conservation strategies in India –watershed management, rain water harvesting, Inter-linking of rivers. Inter-basin water transfers, Interlinking of rivers - Himalayan component, peninsular component issues involved. Ground water, its potential in India, conjunctive use, recharge of ground water.

Contamination of ground water, sea water ingress, problems and solutions.

Module 3:

10hrs

Air: Introduction, composition, sources and classification of air pollutants, National Ambient Air quality standards (HAAQS), Air quality index, effects of air pollution on human health. Economic effects of air pollution. Control of air pollution by equipment, smoke and its control Ozone depletion-impacts, photochemical changes.

Module 4:

10hrs

Mineral Resources: Prospecting criteria and guides to mineral/ ore search. Methods of data acquisition and RS techniques in Mineral Exploration, Statistical methods and mineral/ore deposit modelling for prospecting and exploration. Methods of resource evaluation and reserve calculation, property valuation. Treatment and marketing of ores. Demand, supply and substitute. Conservation of strategic mineral resources with special reference to India, Monitoring of land degradation due to mining and natural process.

Module 5:

10hrs

Biodiversity: Introduction, Flora and Fauna. importance of biodiversity, Economic values- medicinal plants, drugs, fisheries biogeochemical cycling. Conservation of biodiversity.

Ecosystem: Definition, Types: forest, grass land, marine, desert, wetlands, estuarine, lotic. lentic. Abiotic & biotic components of eco system.

Books Recommended:

1. SK bandooni .Land Resource Management and Development in Hill Areas, Research India Press (1 January 2004)
2. Suraj Kumar Singh (Editor), Gowhar Meraj (Editor), MajidFarooq(Editor), Sudhanshu Sudhanshu (Editor).Geographic Information Science for Land Resource Management
3. G. P. Obi Reddy, S. K. Singh. Geospatial Technologies in Land Resources Mapping, Monitoring and Management.
4. Maria C. Hernandez Soriano. Soil Health and Land Use Management.
5. G.P. Obi Reddy, N.G. Patil, Arun Chaturved . Sustainable Management of Land Resources: An Indian Perspective.

SEC2 - SKILL DEVELOPMENT-II

Total Credits (L + T + P): 4 + 0 + 0

Total Hours: 45 Hrs

Objective:

- a. The importance of beliefs and values.
- b. The significance of time management.

Learning Outcomes:

- a. The leadership skills.
- b. The positive thinking and attitude.

Module: I

5hrs

Self-Discovery: Discovering the Self; Setting Goals; Beliefs, Values, Attitude, Virtue.

Module: II

10hrs

Non-Verbal Communication: Importance and Elements; Body Language.

Teamwork and Leadership Skills: Concept of Teams; Building effective teams; Concept of Leadership and honing Leadership skills.

Positivity and Motivation: Developing Positive Thinking and Attitude; Driving out Negativity; Meaning and Theories of Motivation; Enhancing Motivation Levels.

Module: III

10hrs

Etiquette and Manners – Social and Business, **Time Management** – Concept, Essentials, Tips, **Personality Development** – Meaning, Nature, Features, Stages, Models; Learning Skills; Adaptability Skills.

Module: IV

12hrs

Group Discussion: Importance, Planning, Elements, Skills assessed; effectively disagreeing, Initiating, Summarizing and Attaining the Objective.

Leadership and Assertiveness Skills: A Good Leader; Leaders and Managers; Leadership Theories; Types of Leaders; Leadership Behaviour; Assertive Skills.

Emotional Intelligence: Meaning, History, Features, Components, Intrapersonal and Management Excellence; Strategies to enhance Emotional Intelligence.

Module: V

08hrs

Tutorials: Seminar/ Group Discussion/Assignment.

References:

1. Barun K. Mitra, "Personality Development & Soft Skills", Oxford Publishers, Third impression, 2017.
2. ICT Academy of Kerala, "Life Skills for Engineers", McGraw Hill Education (India) Private Ltd., 2016.
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