

**CBCS CURRICULUM
NILAMBER-PITAMBER UNIVERSITY
GEOLOGY HONS.**



**NILAMBER-PITAMBER UNIVERSITY, MEDINAGAR
PALAMU, JHARKHAND-822 101**

CBCS B.Sc. Geology Honours Course Structure and Papers

Course Structure and Scheme of Examination of B.A./B.Sc. Hons. Under CBCS (For Subjects with all Practical Papers)

Table No. 18: Scheme of Examination of B.A./B.Sc. Hons. Under CBCS (For Subjects with all Practical Papers)

Sem	Core Course (CC-14) F.M [Mid + End= Total] (Credit)	Ability Enhancement Compulsory Course (AECC-2)	Skill Enhancement Course (SEC-2)	Elective: Discipline Specific (DSE-4)	Elective: Generic (GE-4) Interdisciplinary
I	CC 1= 75 [M T15 +E T60=75] (4) CC 2= 75 [M T15 +E T60=75] (4) Practical on CC1 + CC2 = 50 (4)	English/ Hindi Communication =100 (2) or NH + MB Communication=50+50 (2)			GE 1= T75 (4) +P25 (2) Or Theory 100 (6)
II	CC 3= 75 [M T15 +E T60=75] (4) CC 4= 75 [M T15 +E T60=75] (4) Practical on CC3 + CC4 = 50 (4)	Environmental Science = 100 (2)			GE 2= T75 (4) +P25 (2) Or Theory 100 (6)
III	CC 5= 75 [M T15 +E T60=75] (4) CC 6= 75 [M T15 +E T60=75] (4) CC 7= 75 [M T15 +E T60=75] (4) Practical on CC5 +6 +7 = 75 (6)		SEC 1= 100 (2) Or SEC 1= T75 +P25 = 100 (2)		GE 3= T75 (4) +P25 (2) Or Theory 100 (6)
IV	CC 8= 75 [M T15 +E T60=75] (4) CC 9= 75 [M T15 +E T60=75] (4) CC 10=75 [M T15 +E T60=75] (4) Practical on CC8 +9 +10 = 75 (6)		SEC 2= 100 (2) Or SEC 2= T75 +P25 = 100 (2)		GE 4= T75 (4) +P25 (2) Or Theory 100 (6)
V	CC 11= 75 [M T15 +E T60=75] (4) CC 12= 75 [M T15 +E T60=75] (4) Practical on CC11 +12 = 50 (4)			DSE 1= 75 [M T15 +E T60=75] (4) DSE 2= 75 [M T15 +E T60=75] (4) Practical on DSC 1 +2 = 50 (4)	
VI	CC 13= 75 [M T15 +E T60=75] (4) CC 14= 75 [M T15 +E T60=75] (4) Practical on CC13 +14 = 50 (4)			DSE 3= 75 [M T15 +E T60=75] (4) DSE 4= 75 [M T15 +E T60=75] (4) Practical on DSC 3 + 4 = 50 (4)	

Abbreviations :

CC= Core Course, SEC= Skill Enhancement Course, DSE= Discipline Specific Elective, GE= Generic Elective, M= Mid Semester Examination, E= End Semester Examination, T= Theory Examination, P= Practical Examination

DSE 1, 2, 3 & 4 = Discipline Specific Elective of the subject opted as core subject

SEC 1 & 2 = Skill Enhancement Course of the core course opted.

GE 1, 2, 3 & 4 = Generic Elective of any one interdisciplinary subject of Arts/ Science Stream taught in R.U.

Total Credits in B.A./B.Sc. Hons = 140

Signature
16/01/18

CBCS B.Sc. Geology Honours Course Structure and Papers

Semester I: C 1 Earth System Science	FM:75
C 2 Crystallography and Mineralogy	FM:75
Practical:Based on C 1 and C 2	FM:50
Semester II:C 3 Elements of Geochemistry	FM:75
C 4 Structural Geology	FM:75
Practical: Based on C 3 and C 4	FM:50
Semester III: C 5 Igneous Petrology	FM:75
C 6 Sedimentary Petrology	FM:75
C 7 Metamorphic Petrology	FM:75
Practical :Based on C5,C 6 and C 7	FM:75
Semester IV :C 8 Stratigraphic Principles and Indian stratigraphy	FM:75
C 9 Palaeontology	FM:75
C 10 Geomorphology	FM:75
Practical: Based on C8,C9 and C 10	FM:75
Semester V: C 11 Economic Geology	FM:75
C 12 Hydrogeology	FM:75
DSE1 Fuel Geology	FM:75
DSE 2 Exploration Geology	FM:75
Practical : Based on C11 and C12	FM:50
Practical: Based on DSE 1and DSE 2	FM:50
Semester VI: C 13 Engineering Geology	FM:75
C 14 Remote Sensing and GIS	FM:75
DSE 3 Earth and Climate	FM:75
DSE 4 Introduction to Geophysics	FM:75
Practical: Based on C13 and C14	FM:50
Practical: Based on DSE 3and DSE 4	FM:50

GEOLOGY HONS. CBCS CURRICULUM NILAMBER-PITAMBER UNIVERSITY

SEMESTER I

Total 100 x 4 = 400 Marks

I. ABILITY ENHANCEMENT COMPULSORY COURSE (AECC)

(Credits: Theory-02)

Any One Compulsory Language Communication Prescribed by Nilamber-Pitamber University:
English Communication/ Hindi Communication / NH + MB Communication

(Refer AECC Curriculum of Nilamber-Pitamber University)

II. GENERIC ELECTIVE (GE 1) (Credits: 06)

All Four Papers (One paper to be studied in each semester) of any One Subject to be opted other than the Honours Subject. Refer Content from the Syllabus of Opted Generic Elective Subject.

III. CORE COURSE –C 1: (Credits: Theory-04, Practicals-02)

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100 Pass Marks: Th (MSE +ESE) = 30 + Pr ESE =10

EARTH SYSTEM SCIENCE

Unit 1: Earth as a planet

Holistic understanding of dynamic planet 'Earth' through Geology. Introduction to various branches of Earth Sciences.

General characteristics and origin of the Universe, Solar System and its planets. The terrestrial and jovian planets. Meteorites and Asteroids

Earth in the solar system - origin, size, shape, mass, density, rotational and revolution parameters and its age.

Unit 2: Interior of Earth

Internal Structure of the earth.

Earth's magnetic field: Convection in Earth's core and production of its magnetic field.

Unit 3: Plate Tectonics

Concept of plate tectonics, sea-floor spreading and continental drift

Geodynamic elements of Earth- Mid Oceanic Ridges, trenches, transform faults and island arcs

Origin of oceans, continents, mountains and rift valleys

Earthquake and earthquake belts

Volcanoes- types, products and their distribution.

Unit 4: Hydrosphere and Atmosphere

Introduction to hydrosphere and atmosphere; Oceanic current system and effect of Coriolis force; Wave erosion and beach processes; Atmospheric circulation; Earth's heat budget.

Unit 5: Soil

Soils- processes of formation, soil profile and soil types.

Unit 6: Understanding the past from stratigraphic records

Stratigraphy: introduction and scope; Standard stratigraphic time scale Introduction to geochronological methods and their application in geological studies; Laws of superposition and faunal succession; Concepts of uniformitarianism.

1. Duff, P. M. D., & Duff, D. (Eds.). (1993). *Holmes' principles of physical geology*. Taylor & Francis.
2. Emiliani, C. (1992). *Planet earth: cosmology, geology, and the evolution of life and environment*. Cambridge University Press.
3. Gross, M. G. (1977). *Oceanography: A view of the earth*.

IV. CORE COURSE- C 2: (Credits: Theory-04, Practicals-02)

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100 Pass Marks: Th (MSE +ESE) = 30 + Pr ESE =10

CRYSTALLOGRAPHY AND MINERALOGY

(CREDITS: THEORY-4, PRACTICALS-2)

Unit 1: Crystallography

Elementary ideas about crystal morphology in relation to internal structures

Crystal parameters and indices

Crystal symmetry and classification of crystals into six systems and 32 point groups

Unit 2: Crystal symmetry and projections

Elements of crystal chemistry and aspects of crystal structures

Stereographic projections of symmetry elements and forms

Unit 3: Rock forming minerals

Minerals - definition and classification, physical and chemical properties

Composition of common rock-forming minerals

Silicate and non-silicate structures; CCP and HCP structures

Unit 4: Properties of light and optical microscopy

Nature of light and principles of optical mineralogy

Introduction to the petrological microscope and identification of common rock-forming minerals

SUGGESTED READINGS:

1. Klein, C., Dutrow, B., Dwight, J., & Klein, C. (2007). The 23rd Edition of the Manual of Mineral Science (after James D. Dana). J. Wiley & Sons.
2. Kerr, P. F. (1959). *Optical Mineralogy*. McGraw-Hill.
3. Verma, P. K. (2010). *Optical Mineralogy (Four Colour)*. Ane Books Pvt Ltd.
4. Deer, W. A., Howie, R. A., & Zussman, J. (1992). *An introduction to the rock-forming minerals* (Vol. 696). London: Longman.

PRACTICALS: Based on C 1 and C 2

FM:50

Study of major geomorphic features and their relationships with outcrops through physiographic models.

Detailed study of topographic sheets and preparation of physiographic description of an area

Study of soil profile of any specific area

Study of distribution of major lithostratigraphic units on the map of India

Study of distribution of major dams on map of India and their impact on river systems

Study of major ocean currents of the World

Study of seismic profile of a specific area and its interpretation

Observation and documentation on symmetry of crystals

Study of physical properties of minerals in hand specimen: Silicates: Olivine, Garnet, Andalusite, Sillimanite, Kyanite, Staurolite, Beryl, Tourmaline, Augite, Actinolite, Tremolite, Hornblende, Serpentine, Talc, Muscovite, Biotite, Phlogopite, Quartz, Orthoclase, Plagioclase, Microcline, Nepheline, Sodalite, Zeolite, Quartz varieties: Chert, Flint, Chalcedony, Agate, Jasper, Amethyst, Rose quartz, Smoky quartz, Rock crystal.

Native Metals/non-metals, Sulfides, Oxides- Copper, Sulfur, Graphite, Pyrite, Corundum, Magnetite Hydroxides, Halides, Carbonates, Sulfates, Phosphates: Psilomelane, Fluorite, Calcite, Malachite, Gypsum, Apatite.

Study of some key silicate minerals under optical microscope and their characteristic properties

SEMESTER II**CORE COURSE: GEOLOGY****Paper –C3****ELEMENTS OF GEOCHEMISTRY**

(CREDITS: THEORY-4, PRACTICALS-2)

THEORY**LECTURES:****Unit 1: Concepts of geochemistry**

Introduction to properties of elements: The periodic table

Chemical bonding, states of matter and atomic environment of elements

Geochemical classification of elements

Unit 2: Layered structure of Earth and geochemistry

Composition of different Earth reservoirs and the nuclides and radioactivity

Conservation of mass, isotopic and elemental fractionation

Concept of radiogenic isotopes in geochronology and isotopic tracers

Unit 3: Element transport

Advection and diffusion

Chromatography

Aqueous geochemistry- basic concepts and speciation in solutions, Eh, pH relations

Unit 4: Geochemistry of solid Earth

The solid Earth – geochemical variability of magma and its products.

The Earth in the solar system, the formation of solar system

Composition of the bulk silicate Earth

Meteorites

Unit 5: 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
Geochemical behavior of major elements
Mass conservation of elements and isotopic fractionation.

SUGGESTED READINGS:

1. Mason, B. (1986) Principles of Geochemistry. 3rd Edition, Wiley New York.
2. Rollinson, H. (2007) Using geochemical data – evaluation, presentation and interpretation. 2nd Edition. Publisher Longman Scientific & Technical.
3. Walther, J. V. (2009). Essentials of geochemistry. Jones & Bartlett Publishers.
4. Albarède, F. (2003). Geochemistry: an introduction. Cambridge University Press.
5. Faure, Gunter and Teresa M. Mensing (2004). Isotopes: Principles and Applications, Wiley India Pvt. Ltd

CORE COURSE: GEOLOGY

Paper –C4

STRUCTURAL GEOLOGY

(CREDITS: THEORY-4, PRACTICALS-2)

THEORY

LECTURES:

Unit 1: Structure and Topography

Effects of topography on structural features, Topographic and structural maps; Importance representative factors of the map

Unit 2: Stress and strain in rocks

Concept of rock deformation: Stress and Strain in rocks, Strain ellipses of different types and their geological significance.

Planar and linear structures; Concept of dip and strike; Outcrop patterns of different structures.

Unit 3: Folds

Fold morphology; Geometric and genetic classification of folds; Introduction to the mechanics of folding:

Buckling, Bending, Flexural slip and flow folding

Unit 4: Foliation and lineation

Description and origin of foliations: axial plane cleavage and its tectonic significance

Description and origin of lineation and relationship with the major structures

Unit 5: Fractures and faults

Geometric and genetic classification of fractures and faults

Effects of faulting on the outcrops

Geologic/geomorphic criteria for recognition of faults and fault plane solutions

PRACTICALS: Based on C 3 and C 4

FM:50

Types of geochemical data analysis and interpretation; of common geochemical plots.

Geochemical analysis of geological materials.

Geochemical variation diagrams and its interpretations.

Basic idea of topographic contours, Topographic sheets of various scales.

Introduction to Geological maps: Lithological and Structural maps

Structural contouring and 3-point problems of dip and strike

Drawing profile sections and interpretation of geological maps of different complexities
Exercises of stereographic projections of mesoscopic structural data (planar, linear, folded etc.)

SUGGESTED READINGS:

1. Davis, G. R. (1984) Structural Geology of Rocks and Region. John Wiley
2. Billings, M. P. (1987) Structural Geology, 4th edition, Prentice-Hall.
3. Park, R. G. (2004) Foundations of Structural Geology. Chapman & Hall.
4. Pollard, D. D. (2005) Fundamental of Structural Geology. Cambridge University Press.
5. Ragan, D. M. (2009) Structural Geology: an introduction to geometrical techniques (4th Ed). Cambridge University Press (For Practical)
6. Lahee F. H. (1962) Field Geology. McGraw Hill

SEMESTER III

CORE COURSE: GEOLOGY

Paper –C5

IGNEOUS PETROLOGY

(CREDITS: THEORY-4, PRACTICALS-2)

THEORY

LECTURES:

Unit 1: Concepts of Igneous petrology

Introduction to petrology: Heat flow, geothermal gradients through time, origin and nature of magma

Unit 2: Forms

Classification of igneous rocks

Textures and structures of igneous rocks

Mode of occurrence of Igneous rocks

Unit 3: Phase diagrams and petrogenesis

Binary Phase diagrams in understanding crystal-melt equilibrium –An-Ab,Or-Ab,Di-An

Magma generation in crust and mantle, their emplacement and evolution

Unit 4: Magmatism in different tectonic settings

Magmatism in the oceanic domains (MORB, OIB)

Magmatism along the plate margins (Island arcs/continental arcs)

Unit 5: Petrogenesis of Igneous rocks

Petrogenesis of Felsic and Mafic igneous rocks

Komatiites, Granitoides, Basalt, Gabbros,Alkaline rocks, Kimberlites and Lamproites.

SUGGESTED READINGS:

1. Philpotts, A., & Ague, J. (2009). Principles of igneous and metamorphic petrology. Cambridge University Press.
2. Winter, J. D. (2014). Principles of igneous and metamorphic petrology. Pearson.
3. Rollinson, H. R. (2014). Using geochemical data: evaluation, presentation, interpretation. Routledge.
4. Raymond, L. A. (2002). Petrology: the study of igneous, sedimentary, and metamorphic rocks. McGraw-Hill Science Engineering.
5. McBirney, A. R. (1984). Igneous Petrology. San Francisco (Freeman, Cooper & Company) and Oxford (Oxford Univ. Press),
6. Myron G. Best (2001). Igneous and Metamorphic Petrology,

7. K. G. Cox, J. D. Bell. (1979). The Interpretation of Igneous Rocks. Springer/Chapman & Hall.
8. Bose M.K. (1997). Igneous Petrology.
9. G W Tyrrell. (1926). Principles of Petrology. Springer

CORE COURSE: GEOLOGY

Paper –C6

SEDIMENTARY PETROLOGY

(CREDITS: THEORY-4, PRACTICALS-2)

THEORY

LECTURES:

Unit 1: Origin of sediments

Weathering and sedimentary flux: Physical and chemical weathering, soils and paleosols.

Unit 2: Sediment granulometry

Grain size scale, particle size distribution, Environmental connotation; particle shape and fabric

Unit 3: Sedimentary textures, structures and environment

Fluid flow, sediment transport and sedimentary structures: Types of fluids, Laminar vs. turbulent flow,

Particle entrainment, transport and deposition.

Paleocurrent analysis- Paleocurrents for different sedimentary environments

Sedimentary structure- Primary and syn-sedimentary structures

Unit 4: Varieties of sedimentary rocks

Siliciclastic rocks: Conglomerates, sandstones, mudrocks.

Carbonate rocks, controls of carbonate deposition, components and classification of limestone, dolomite and dolomitisation

Unit 5: Diagenesis

Concepts of diagenesis, Stages of diagenesis, Compaction and cementation.

SUGGESTED READINGS:

1. Prothero, D. R., & Schwab, F. (2004). Sedimentary geology. Macmillan.
2. Tucker, M. E. (2006) Sedimentary Petrology, Blackwell Publishing.
3. Collinson, J. D. & Thompson, D. B. (1988) Sedimentary structures, Unwin- Hyman, London.
4. Nichols, G. (2009) Sedimentology and Stratigraphy Second Edition. Wiley Blackwell

CORE COURSE: GEOLOGY

Paper –C7

METAMORPHIC PETROLOGY

(CREDITS: THEORY-4, PRACTICALS-2)

THEORY

LECTURES:

Unit 1: Metamorphism: controls and types.

Definition of metamorphism. Factors controlling metamorphism Types of metamorphism - contact,

regional, fault zone metamorphism, impact metamorphism.

Unit 2: Metamorphic facies and grades

Index minerals, Chemographic projections

Metamorphic zones and isogrades.

Concept of metamorphic facies and grade

Mineralogical phase rule of closed and open system

Structure and textures of metamorphic rocks

Unit 3: Metamorphism and Tectonism

Relationship between metamorphism and deformation

Metamorphic mineral reactions (prograde and retrograde)

Unit 4: Migmatites and their origin

Metasomatism and role of fluids in metamorphism

Unit 5: Metamorphic rock associations- Schists, Gneisses, Khondalites, Charnockites, Blue schists and Eclogites

SUGGESTED READINGS:

1. Philpotts, A., & Ague, J. (2009). *Principles of igneous and metamorphic petrology*. Cambridge University Press.
2. Winter, J. D. (2014). *Principles of igneous and metamorphic petrology*. Pearson.
3. Rollinson, H. R. (2014). *Using geochemical data: evaluation, presentation, interpretation*. Routledge.
4. Raymond, L. A. (2002). *Petrology: the study of igneous, sedimentary, and metamorphic rocks*. McGraw-Hill Science Engineering.
5. Yardley, B. W., & Yardley, B. W. D. (1989). *An introduction to metamorphic petrology*. Longman Earth Science Series.

PRACTICALS: Based on C5, C 6 and C 7

FM:75

Study of important igneous rocks in hand specimens and thin sections

Megascopic study of sedimentary structures, Particle size distribution and statistical treatment, Paleocurrent analysis, Petrography of clastic and non-clastic rocks through hand specimens and thin sections

Megascopic and microscopic study (textural and mineralogical) of the following metamorphic rocks, Graphic plots for petrochemistry and interpretation of assemblages: ACF and AKF diagrams.

I. SKILL ENHANCEMENT COURSE SEC 1: (Credits: Theory-02)

Marks : 100 (ESE: 3Hrs) =100

Pass Marks Th ESE = 40

ELEMENTARY COMPUTER APPLICATION SOFTWARES

A Common Syllabus Prescribed by Nilamber-Pitamber University **Theory: 30 Lectures**

Objective of the Course

The objective of the course is to generate qualified manpower in the area of Information Technology (IT) and Graphic designing which will enable such person to work seamlessly at any Offices, whether Govt. or Private or for future entrepreneurs in the field of IT.

A. INTRODUCTION TO COMPUTER SYSTEM

Basic Computer Concept

Computer Appreciation - Characteristics of Computers, Input, Output, Storage units, CPU, Computer System. **(1 Lecture)**

Input and Output Devices

Input Devices - Keyboard, Mouse, joystick, Scanner, web cam,

Output Devices- Soft copy devices, monitors, projectors, speakers, Hard copy devices, Printers – Dot matrix, inkjet, laser, Plotters. **(4 lectures)**

Computer Memory and Processors

Memory hierarchy, Processor registers, Cache memory, Primary memory- RAM, ROM, Secondary storage devices, Magnetic tapes, Floppy disks, hard disks, Optical Drives- CD-ROM, DVD-ROM, CD-R, CD-RW, USB Flash drive, Mass storage devices: USB thumb drive.

Managing disk Partitions, File System. Basic Processor Architecture, Processor speed, Types of processor.

(5 lectures)

Numbers Systems and Logic Gates

Decimal number system, Binary number system, Octal number system, Hexadecimal number system, Inter-conversion between the number systems. Basic Logic gates-AND, OR, NOT, Universal logic gates- NAND, NOR

(3 lectures)

Computer Software

Computer Software- Relationship between Hardware and Software, System Software, Application Software, Compiler, Names of some high level languages, Free domain software.

(2 Lectures)

Internet & its uses

History of Internet, WWW and Web Browsers: Web Browsing software, Surfing the Internet, Chatting on Internet, Basic of electronic mail, Using Emails, Document handling, Network definition, Common terminologies: LAN, WAN, MAN, Node, Host, Workstation, Bandwidth, Network Components: Servers, Clients, Communication Media. Wireless network

(3 Lectures)

Operating system-Windows

Operating system and basics of Windows, The User Interface, Using Mouse and Moving Icons on the screen, The My Computer Icon, The Recycle Bin, Status Bar, Start and Menu & Menu-selection, Running an Application, Windows Explorer Viewing of File, Folders and Directories, Creating and Renaming of files and folders, Opening and closing of different Windows, Windows Setting, Control Panels, Wall paper and Screen Savers, Setting the date and Sound, Concept of menu Using Help, Advanced Windows, Using right Button of the Mouse, Creating Short cuts, Basics of Window Setup, Notepad, Window Accessories

(2 Lectures)

B. MICROSOFT OFFICE 2007 AND LATEST VERSIONS

Word Processing

Word processing concepts: saving, closing, Opening an existing document, Selecting text, Editing text, Finding and replacing text, printing documents, Creating and Printing Merged Documents, Character and Paragraph Formatting, Page Design and Layout. Editing and Checking. Correcting spellings. Handling Graphics, Creating Tables and Charts, Document Templates and Wizards, Mail merge and Macros.

(3 Lectures)

Microsoft Excel (Spreadsheet)

Spreadsheet Concepts, Creating, Saving and Editing a Workbook, Inserting, Deleting Work Sheets, entering data in a cell / formula Copying and Moving from selected cells, handling operators in Formulae, Functions: Mathematical, Logical, statistical, text, financial, Date and Time functions, Using Function Wizard. Formatting a Worksheet: Formatting Cells changing data alignment, changing date, number, character or currency format, changing font, adding borders and colors, Printing worksheets, Charts and Graphs – Creating, Previewing, Modifying Charts. Integrating word processor, spread sheets, web pages. Pivot table, goal seek, Data filter and scenario manager

(4 Lectures)

Microsoft Power Point (Presentation Package)

Creating, Opening and Saving Presentations, Creating the Look of Your Presentation, Working in Different Views, Working with Slides, Adding and Formatting Text, Formatting Paragraphs, Drawing and Working with Objects, Adding Clip Art and other pictures, Designing Slide Shows, Running and Controlling a Slide Show, Printing Presentations. Creating photo album, Rehearse timing and record narration. Master slides. **(3 Lectures)**

Reference Books

Nishit Mathur, Fundamentals of Computer , Aph publishing corporation(2010)

Misty E. Vermaat,.Microsoft word 2013 1st Edition (2013).

Satish Jain, M.Geeta, MS- Office 2010 Training Guide, BPB publication (2010)

Joan Preppernau, Microsoft PowerPoint 2016 step by step, Microsoft press(2015)

Douglas E Corner, The Internet Book 4th Edition, prentice –Hall(2009)

Faithe wempen, word 2016 in depth 1st edition, que publishing(2015)

Steven welkler, Office 2016 for beginners, Create Space Independent publishing Platform (2016)

SKILL ENHANCEMENT LAB- SEC 1 LAB

A. MS-WORD LAB ASSIGNMENT

1. Write down the following Paragraph OR any one provided by your teacher;

Without a doubt, the Internet is one of the most important inventions of modern times. The Internet is a global interconnected computer networks which allow each connected computer to share and exchange information with each other. The origins of the Internet can be traced to the creation of Advanced Research Projects Agency Network (ARPANET) as a network of computers under the auspices of the U.S. Department of Defense in 1969.

Apply following effects on The paragraph:

- i. Paragraph **font-size** and **font-type** must be 12 Verdana.
- ii. Paragraph **alignment** must be justified and double line spacing.
- iii. **Highlight** the “(ARPANET)” with green color.
- iv. Make the “Internet” keywords **Bold and Italic**.
- v. Insert any “**WordArt**” and a **symbol** to your document.
- vi. Insert a **clipart** to your document.
- vii. Add following lines to your document:

Internet, Intranet, Extranet, URL, WWW, Networking, Protocols, HTTP, TCP/IP

2. Create a Table of following fields:

Name, Surname, Age, Gender, Job and apply the following effects

- i. Insert 10 records
- ii. Font size should be 12
- iii. Title size should be 14
- iv. Font type should be Times new Roman
- v. Title color should be blue
- vi. Text color should be black
- vii. Table border should be 2

3. Write a letter on 'Road Safety' and send to 'Multiple Recipients' using mail merge.

4. Type the paragraph given below:

Today, the Internet is a public, cooperative and self-sustaining facility accessible to hundreds of millions of people worldwide. Physically, the Internet uses a portion of the total resources of the currently existing public telecommunication networks. Technically, what distinguishes the Internet is its use of a set of protocols called TCP/IP (for Transmission Control Protocol/Internet Protocol). Two recent adaptations of Internet technology, the intranet and the extranet, also make use of the TCP/IP protocol. Today, the Internet is a public, cooperative and self-sustaining facility accessible to hundreds of millions of people worldwide. Physically, the Internet uses a portion of the total resources of the currently existing public telecommunication networks. Technically, what distinguishes the Internet is its use of a set of protocols called TCP/IP (for Transmission Control Protocol/ Internet Protocol). Two recent adaptations of Internet technology, the intranet and the extranet, also make use of the TCP/IP protocol.

Apply the following:

- i. Change Internet into Internets at a time
- ii. Highlight TCP/IP in red color
- iii. Replace protocol into protocols
- iv. Find the word "Public"

B. MICROSOFT EXCEL LAB ASSIGNMENT

Basic Formatting and Spreadsheet Manipulation

1. Add rows and columns to an existing spreadsheet
2. Reformat data (center, comma and currency styles, bold, text color)
3. Work with a simple formula (product) and function (sum)

Assignment

1. Create a workbook as shown below.
2. To enter new rows or columns, simply click on the row or column header to select the whole row or column. Then right click with the mouse and choose insert.
3. Add the new row for S Spade with the data that's shown below (between the original rows 7 and 8).

4. Add a column for gender and the data as shown below (between the original columns A and B). Enter the appropriate gender for yourself in the last row.

A	B	C	D
1	Name	Male/Female	Genre
2	J Smith	F	Blues
3	B Doe	M	Country
4	S Spade	F	Country
5	F Zappa	M	Blues
6	F Zappa	M	Alternative
7	J Smith	F	Alternative
8	S Spade	F	Blues
9	B Doe	M	Blues
9	yourname	M	Blues

5. Center the data in columns B and C. Do this by selecting the whole column and click the center icon on the ribbon.

6. Bold the data in row 1, the column headings (ensure that the data all remains visible within the column boundaries).

7. Change the font color for row 1 to Blue.

8. Change the format of the data in column D to comma style (no decimal places showing). There is an icon on the home tab that sets it to comma style easily.

9. Add two new column labels to the right of the current columns; **Unit Price** and **Total Cost**. (They will be in columns E and F.) These two columns of data should be currency type so that the dollar sign is shown. There is an icon to quickly format the selected column as currency type.

10. All tunes are \$.99, so enter that value for all rows in Column E. You can copy quickly by using the **Auto Fill** handle and drag that amount down. When you over your mouse over the tiny square in the bottom right hand corner of the active cell, your mouse shape will become a skinny plus sign, and you can click and drag that cell to make a copy.

	E	F
	\$ 0.99	

11. Calculate Total Cost (column F) as *column D times Column E*. You will type in a formula like this into cell F2: **=D2*E2** (Be sure to begin the formula with an equal sign)

12. Use the AutoFill (skinny plus sign) again to copy the formula down column F; down to F10. Double check the picture below to make sure yours has the correct values

13. Add a border to all of the cells (A1-f10) using the Borders tool in the Fonts group on the Home Tab.

14. Change the page layout to landscape. Do this by clicking the Page Layout tab on the ribbon and then to Orientation to Landscape.

15. Save the file.

16. Click in cell F11 and Use the sum function or the shortcut icon that looks like Σ to get the total of the Total Cost column.

17. Ensure that the data is all visible within the column boundaries. Make the columns wider if needed.

18. Save the workbook. Your final spreadsheet should look like the following when printed.

Name	Male/Female	Genre	Number of Songs	Unit Price	Total Cost
J Smith	F	Blues	50	\$ 0.99	\$ 49.50
B Doe	M	Country	110	\$ 0.99	\$ 108.90
S Spade	F	Country	200	\$ 0.99	\$ 198.00
F Zappa	M	Blues	1,400	\$ 0.99	\$ 1,386.00
F Zappa	M	Alternative	2,300	\$ 0.99	\$ 2,277.00
S Spade	F	Blues	1,000	\$ 0.99	\$ 990.00
J Smith	F	Alternative	150	\$ 0.99	\$ 148.50
B Doe	M	Blues	75	\$ 0.99	\$ 74.25
yourname	M	Blues	800	\$ 0.99	\$ 792.00
					\$ 6,024.15

Order Date	Region	Rep	Item	Units	Unit Cost	Total
1/6/2016	East	Jones	Pencil	95	1.99	189.05
1/23/2016	Central	Kivell	Binder	50	19.99	999.50
2/9/2016	Central	Jardine	Pencil	36	4.99	179.64
2/26/2016	Central	Gill	Pen	27	19.99	539.73
3/15/2016	West	Sorvino	Pencil	56	2.99	167.44
4/1/2016	East	Jones	Binder	60	4.99	299.40
4/18/2016	Central	Andrews	Pencil	75	1.99	149.25
5/5/2016	Central	Jardine	Pencil	90	4.99	449.10
5/22/2016	West	Thompson	Pencil	32	1.99	63.68
6/8/2016	East	Jones	Binder	60	8.99	539.40
6/25/2016	Central	Morgan	Pencil	90	4.99	449.10
7/12/2016	East	Howard	Binder	29	1.99	57.71
7/29/2016	East	Parent	Binder	81	19.99	1,619.19
8/15/2016	East	Jones	Pencil	35	4.99	174.65
9/1/2016	Central	Smith	Desk	2	125.00	250.00
9/18/2016	East	Jones	Pen Set	16	15.99	255.84
10/5/2016	Central	Morgan	Binder	28	8.99	251.72
10/22/2016	East	Jones	Pen	64	8.99	575.36
11/8/2016	East	Parent	Pen	15	19.99	299.85
11/25/2016	Central	Kivell	Pen Set	96	4.99	479.04
12/12/2016	Central	Smith	Pencil	67	1.29	86.43
12/29/2016	East	Parent	Pen Set	74	15.99	1,183.26

C. MS-POWERPOINT LAB ASSIGNMENT

Activity 1 : Using Text & Background/Themes

- i. Create one new slide and insert any text.
- ii. To make your slide more attractive, use the themes or background.
- iii. Make sure it apply for every slide not only one slide.

Activity 2 : Apply Custom Animation On Text

- i. Use the custom animation to add effects on your text. Set the text move after

you click the mouse.

ii. If you have more than one text, add effects for each of text.

Activity 3 : Insert Image & WordArt

i. Insert one new blank slide.

ii. Choose one pictures or clip art from any source and insert in your new slide.

iii. Using the WordArt, make a note or title on your picture.

iv. Use the custom animation again to add effects on your picture and WordArt.

Activity 4 : Insert Text Box

i. Insert one new blank slide.

ii. Use the text box to insert one paragraph of text and adjust your text.

Activity 5 : Insert Smart Art

i. Insert one new blank slide.

ii. Insert the Smart Art and put your text on the Smart Art.



Activity 6 : Insert Audio

- i. Back to your first slide and insert one audio on that slide. The audio must play automatically when you show your slide.
- ii. Make sure the speaker also not appear when you show your slide. (the icon).
- iii. The audio must play when you show all your slide, not only one slide.

Activity 7 : inserting Video

- i. Insert one new slide and insert one short video

Activity 8 : Save File

- i. Save your file

Activity 9 : Create Photo Album & Hyperlink

- i. Insert one new slide and put a text ex: “My Photo Album”
- ii. Create one photo album and adjust your text and your photos
- iii. Save your photo album with a new file
- iv. Make a hyperlink to your photo using the text “My Photo Album”

Reference Books:

- Faithe wempen, word 2016 in depth 1st edition, que publishing(2015)
steven welkler, Office 2016 for bignners, Create Space Independent publishing plateform(2016)
Elaine Marmel, office 2016 simplified, 1st Edition, John wiley and sons Inc(2016)
Patrice-Anne Rutledge, Easy office 2016 1st edition, Que publishing(2016)



SEMESTER IV

CORE COURSE: GEOLOGY

Paper C8

STRATIGRAPHIC PRINCIPLES AND INDIAN STRATIGRAPHY

(CREDITS: THEORY-4, PRACTICALS-2)

THEORY

LECTURES:

Unit 1: Principles of stratigraphy, Introduction to the concepts of lithostratigraphy, biostratigraphy, chronostratigraphy, seismic stratigraphy, chemostratigraphy, Magnetostratigraphy; International Stratigraphic Code – development of a standardized stratigraphic nomenclature., Concepts of Stratotypes. Global Stratotype Section and Point (GSSP).

Unit 2: Principles of stratigraphic analysis and Physiographic and tectonic subdivisions of India

Walther's Law of Facies. Concept of paleogeographic reconstruction; Sequence stratigraphy and their subdivisions with Indian examples. Introduction to the physiographic and tectonic subdivisions of India., Introduction to Indian Shield

Unit 3: Pre Cambrian Stratigraphy of India

PreCambrian geology of Singhbhum and Karnataka; Introduction to Proterozoic basins of India; Geology of Vindhyan and Cudappah basins of India

Unit 4: Phanerozoic Stratigraphy of India

Geology, Structure and hydrocarbon potential of Gondwana basins.

Mesozoic stratigraphy of India:

- a. Triassic successions of Spiti,
- b. Jurassic of Kutch,
- c. Cretaceous successions of Cauvery basins

Cenozoic stratigraphy of India:

- a. Siwalik successions,
- b. Assam basins.

Stratigraphy and structure of Krishna-Godavari basin, Cauvery basin, Bombay offshore basin, Kutch and Saurashtra basins and their potential for hydrocarbon exploration

Unit 5: Volcanic provinces of India and Stratigraphic boundaries

- a. Deccan,
- b. Rajmahal,

Important Stratigraphic boundaries in India - a. Precambrian-Cambrian boundary, b. Permian-Triassic boundary, and c. Cretaceous-Tertiary boundary

SUGGESTED READINGS:

1. Krishnan, M. S. (1982) Geology of India and Burma, CBS Publishers, Delhi
2. Doyle, P. & Bennett, M. R. (1996) Unlocking the Stratigraphic Record. John Wiley
3. Ramakrishnan, M. & Vaidyanadhan, R. (2008) Geology of India Volumes 1 & 2, Geological society of India, Bangalore.
4. Valdiya, K. S. (2010) The making of India, Macmillan India Pvt. Ltd.

CORE COURSE: GEOLOGY

Paper –C9

PALEONTOLOGY

(CREDITS: THEORY-4, PRACTICALS-2)

THEORY

LECTURES:

Unit 1: Fossilization and fossil record

Nature and importance of fossil record; Fossilization processes and modes of preservation

Unit 2: Taxonomy and Species concept

Species concept with special reference to paleontology, Theory of organic evolution .

Unit 3: Invertebrates

Brief introduction of important fossils groups: morphology and geological history of Trilobita, Brachiopoda, Gastropoda, Cephalopoda and Lamellibranchia

Unit 4: Vertebrates and other fossils

Evolution of horse and intercontinental migrations., Human evolution. Gondwana Flora
Introduction to Ichnology.

Unit 5. Application of fossils in Stratigraphy

Biozones, index fossils, correlation

Fossils and paleoenvironmental analysis

Fossils and paleobiogeography, biogeographic provinces

Paleoecology – fossils as a window to the evolution of ecosystems

SUGGESTED READINGS

1. Raup, D. M., Stanley, S. M., Freeman, W. H. (1971) Principles of Paleontology
2. Clarkson, E. N. K. (2012) Invertebrate paleontology and evolution 4th Edition by Blackwell Publishing.
3. Benton, M. (2009). Vertebrate paleontology. John Wiley & Sons.
4. Shukla, A. C., & Misra, S. P. (1975). Essentials of paleobotany. Vikas Publisher
5. Armstrong, H. A., & Brasier, M.D. (2005) Microfossils. Blackwell Publishing.

CORE COURSE: GEOLOGY

Paper C10

GEOMORPHOLOGY

(CREDITS: THEORY-4, PRACTICALS-2)

THEORY

LECTURES:

Unit 1: Introduction to Geomorphology, Endogenic and Exogenic processes

Unit 2: Geoid, Topography, Hypsometry, Global Hypsometry; Major Morphological features Large Scale Topography - Ocean basins, Large scale mountain ranges (with emphasis on Himalaya).

Unit 3: Surficial Processes and geomorphology: Weathering and associated landforms, Glacial, Periglacial processes and landforms, Fluvial processes and landforms, Aeolian Processes and landforms, Coastal Processes and landforms, Landforms associated with igneous activities

Unit 4: Endogenic- Exogenic interactions, Rates of uplift and denudation, Tectonics and drainage development, Sea-level change, Long-term landscape development

Unit 5: Overview of Indian Geomorphology.

SUGGESTED READINGS:

1. Robert S. Anderson and Suzanne P. Anderson (2010): Geomorphology - The Mechanics and Chemistry of Landscapes. Cambridge University Press.
2. M.A. Summerfield (1991) Global Geomorphology. Wiley & Sons.

PRACTICALS: - Based on C8,C9 and C 10

FM:75

Study of geological map of India and identification of major stratigraphic units; Study of rocks in hand specimens from known Indian stratigraphic horizons; Drawing various paleogeographic maps of Precambrian time; Study of different Proterozoic supercontinent reconstructions.

Study of fossils showing various modes of preservation; Study of diagnostic morphological characters, systematic position, stratigraphic position and age of various invertebrate, vertebrate and plant fossils

Reading topographic maps ,Concept of scale Preparation of a topographic profile , Preparation of longitudinal profile of a river; Preparing Hack Profile; Calculating Stream length gradient index, Morphometry of a drainage basin, Calculating different morphometric parameters , Preparation of geomorphic map , Interpretation of geomorphic processes from the geomorphology of the area

SKILL ENHANCEMENT COURSE II

GEOLOGICAL MAPPING (CREDITS: 2) Theory

FM 75

Toposheets:—definition, scale, reading various components of a toposheet. Geological map - definition, various components of a geological map including scale, legend, structures etc. Geological Field work instruments, Use of clinometer compass, Brunton compass, strike and dip measurements; Basic field measurement techniques: Bedding dip and strike, Reading contours and topography, Trend, plunge, Rake/Pitch; Stereoplots of linear and planar structures, Identification of rock types in field; structures and texture of rocks, Sampling and oriented sample and its significance; Geological mapping of igneous , sedimentary and metamorphic terrains.

SKILL ENHANCEMENT COURSE LAB

FM 25

Students will be required to carry out Field Work for a week in a suitable geological terrain to study the basic aspect of geological mapping and submit a report thereon.

SEMESTER V

CORE COURSE: GEOLOGY

Paper –C11

ECONOMIC GEOLOGY

(CREDITS: THEORY-4, PRACTICALS-2)

THEORY

LECTURES:

Unit 1 Ores and gangues:Ores, gangue minerals, tenor, grade and lodes

Resources and reserves- definitions; classification of economic deposits. Structure and texture of ore deposits

Unit 2: Mineral deposits and concepts of Ore formation:

Endogenous processes: Magmatic concentration, skarns, greisens, and hydrothermal deposits

Exogenous processes: weathering products and residual deposits, oxidation and supergene enrichment, placer deposits,

Unit 3: Mineral exploration

Exploration techniques:Geological, Geophysical and Geochemical Explorations techniques

Unit 4: Metallic and Nonmetallic ores

Mode of Occurrence, chemical composition, uses and distribution in India of following: Metallic deposits: Ores of Iron, Aluminium, Copper, Manganese, Lead and Zinc.

Non-metallic deposits: Mica, Asbestos and Limestone.

Unit 5: Metallogenic provinces and epochs;

An introduction to atomic minerals and gemstones.

Introduction to gemstones.

SUGGESTED READINGS:

1. Guilbert, J.M. and Park Jr., C.F. (1986) The Geology of Ore deposits. Freeman & Co.
2. Bateman, A.M. and Jensen, M.L. (1990) Economic Mineral Deposits. John Wiley.
3. Evans, A.M. (1993) Ore Geology and Industrial minerals. Wiley
4. Laurence Robb. (2005) Introduction to ore forming processes. Wiley.
5. Gokhale, K.V.G.K. and Rao, T.C. (1978) Ore deposits of India their distribution and processing, Tata-McGraw Hill, New Delhi.
6. Deb, S. (1980) Industrial minerals and rocks of India. Allied Publishers.
7. Sarkar, S.C. and Gupta, A. (2014) Crustal Evolution and Metallogeny in India. Cambridge Publications.

CORE COURSE: GEOLOGY

Paper –C12

HYDROGEOLOGY

(CREDITS: THEORY-4, PRACTICALS-2)

THEORY

LECTURES:

Unit 1: Introduction and basic concepts

Scope of hydrogeology and its societal relevance

Hydrologic cycle: precipitation, evapo-transpiration, run-off, infiltration and subsurface movement of water.

Rock properties affecting groundwater, Vertical distribution of subsurface water

Types of aquifer, aquifer parameters.

Unit 2: Groundwater flow:

Darcy's law and its validity

Intrinsic permeability and hydraulic conductivity, Laminar and turbulent groundwater flow

Unit 3: Well hydraulics and Groundwater exploration

Basic Concepts (drawdown; specific capacity etc)

Surface-based groundwater exploration methods

Introduction to subsurface borehole logging methods.

Unit 4: Groundwater chemistry

Physical and chemical properties of water and water quality

Introduction to methods of interpreting groundwater quality data using standard graphical plots

Sea water intrusion in coastal aquifers

Unit 5: Groundwater management

Surface and subsurface water interaction, Groundwater level fluctuations

Basic concepts of water balance studies, issues related to groundwater resources development and management, Rainwater harvesting and artificial recharge of groundwater

SUGGESTED READINGS:

1. Todd, D. K. 2006. Groundwater hydrology, 2nd Ed., John Wiley & Sons, N.Y.
2. Davis, S. N. and De Weist, R.J.M. 1966. Hydrogeology, John Wiley & Sons Inc., N.Y.
3. Karanth K.R., 1987, Groundwater: Assessment, Development and management, Tata McGraw-Hill Pub. Co. Ltd.

PRACTICALS:

Based on C11 and C12

FM 50

Megascopic identification

Study of microscopic properties of ore forming minerals (Oxides and sulphides).

Preparation of maps: Distribution of important ores and other economic minerals in India.

Preparation and interpretation of water level contour maps and depth to water level maps

Study, preparation and analysis of hydrographs for differing groundwater conditions

Water potential zones of India (map study).

Graphical representation of chemical quality data and water classification (C-S and Trilinear diagrams)

Simple numerical problems related to: determination of permeability in field and laboratory, Groundwater flow, Well hydraulics etc.

DISCIPLINE SPECIFIC ELECTIVE

Paper DSE 1

FUEL GEOLOGY

(CREDITS: THEORY-4, PRACTICALS-2)

THEORY

LECTURES:

Unit 1: Coal: Definition and origin of Coal; Basic classification of coal;

Fundamentals of Coal Petrology - Introduction to lithotypes, microlithotypes and macerals in coal. Proximate and Ultimate analysis

Unit 2: Coal as a fuel

Coal Bed Methane (CBM): global and Indian scenario.

Underground coal gasification, Coal liquefaction

Unit 3: Petroleum

Chemical composition and physical properties of crudes in nature

Origin of petroleum.

Unit 4: Petroleum Reservoirs and Traps

Reservoir rocks: general attributes, Classification of reservoir rocks

Cap rocks - definition and general properties.

Hydrocarbon traps: definition, Classification of hydrocarbon traps - structural, stratigraphic and combination

Plate tectonics and global distribution of hydrocarbon reserves

Unit 5: Indian Occurrences:

Coalfields of India with special reference to Jharkhand

SUGGESTED READINGS:

1. Chandra D. (2007). Chandra's Textbook on applied coal petrology. Jijnasa Publishing House.
2. Shelly R. C. (2014). Elements of Petroleum geology: Third Edition, Academic Press
3. Bjorlykke, K. (1989). Sedimentology and petroleum geology. Springer-Verlag.
4. Bastia, R., & Radhakrishna, M. (2012). Basin evolution and petroleum prospectivity of the continental margins of India (Vol. 59). Newnes

DISCIPLINE SPECIFIC ELECTIVE

Paper –DSE 2

EXPLORATION GEOLOGY

(CREDITS: THEORY-4, PRACTICALS-2)

THEORY

Unit 1: Mineral Resources

Resource reserve definitions, Mineral resources in industries – historical perspective and present.

Unit 2: Prospecting and Exploration,

Principles of mineral exploration, Prospecting and exploration- conceptualization, methodology and stages; Sampling and sampling techniques; Geochemical exploration.

Unit 3: Evaluation of data

Evaluation of sampling data

Mean, mode, median, standard deviation and variance

Unit 4: Drilling and Logging

Core and non-core drilling

Planning of bore holes and location of boreholes on ground

Core-logging

Unit 5: Reserve estimations and Errors

Principles of reserve estimation, density and bulk density

Factors affecting reliability of reserve estimation

Reserve estimation based on geometrical models (square, rectangular, triangular and polygon blocks)

SUGGESTED READINGS:

1. Clark, G.B. 1967. Elements of Mining. 3rd Ed. John Wiley & Sons.
2. Arogyaswami, R.P.N. 1996 Courses in Mining Geology. 4th Ed. Oxford-IBH.
3. Moon, C.J., Whateley, M.K.G., Evans, A.M., 2006, Introduction to Mineral Exploration, Blackwell Publishing.

PRACTICALS: Based on DSE 1 and DSE 2

FM 50

Study of hand specimens of coal

Reserve estimation of coal and economic mineral deposits

Study of Geological Section Coal and Petroleum fields and identification of hydrocarbon prospect

Identification of anomaly

Concept of weighted average in anomaly detection

Study of Geological cross-section of important mineral deposits

SEMESTER VI

CORE COURSE: GEOLOGY

Paper –C 13

ENGINEERING GEOLOGY

(CREDITS: THEORY-4, PRACTICALS-2)

THEORY

LECTURES:

Unit I:

Engineering Geology and its applications, Scope of Engineering Geology;

Elementary concepts of rock mechanics - Strength and Elastic properties. Engineering properties and characteristics of soils. Properties of building stones.

Unit II

Basic concept of-Rock Quality Designation (RQD), Rock Structure Rating (RSR), Rock

Mass Rating (RMR), Tunneling Quality Index (Q)

Unit III

Dams and reservoirs: Types of Dams-masonry or concrete dams- gravity, arch and butress.

,Earth Dams and composite dams. Geological considerations- topography, structure and lithology. Foundation and seepage problems in dams and their treatment.

Reservoir: Reservoir problems- seepage and silting.

Unit IV

Tunnels: terminology, definition, types- hard rock and soft rock tunnels. Geological considerations- topography, structure and lithology

Bridge sites: Terminology, Bridge structure, types, bridge problems, and stability of bridges. Geology of bridge sites.

Unit V

Stability of rock slopes and cutting in rocks: Classification of slopes- stable and unstable slopes- Geological parameters. Measures for stabilization of slopes. Foundation treatment; Grouting, Rock Bolting and other support mechanisms; soil stabilization.

SUGGESTED READINGS:

1. Krynin, D.P. and Judd W.R. 1957. Principles of Engineering Geology and Geotechnique, McGraw Hill (CBS Publ).
2. Johnson, R.B. and De Graf, J.V. 1988. Principles of Engineering Geology, John Wiley.
3. Goodman, R.E., 1993. Engineering Geology: Rock in Engineering constructions. John Wiley & Sons, N.Y.
4. Waltham, T., 2009. Foundations of Engineering Geology (3rd Edn.) Taylor & Francis.
5. Bell: F.G-, 2006. Basic Environmental and Engineering Geology Whittles Publishing.
6. Bell, .F.G, 2007. *Engineering Geology*, Butterworth-Heineman

CORE COURSE: GEOLOGY

Paper –C14

REMOTE SENSING AND GIS

(CREDITS: THEORY-4, PRACTICALS-2)

THEORY

LECTURES:

Unit 1: Photogeology

Types and acquisition of aerial photograph, Scale and resolution., Elements of air photo interpretation. Identification of sedimentary, igneous and metamorphic rocks and various aeolian, glacial, fluvial and marine landforms.

Unit 2: Remote Sensing

Concepts in remote sensing, Sensors and scanners, Satellites and their characteristics, Data formats- Raster and Vector.

Unit 3: Digital Image Processing

Fundamentals of Image processing, Image Correction, Image enhancement, Image classification, FCC and Image Ratioing,

Unit 4: GIS

Datum, Coordinate systems and Projection systems, Introduction to DEM analysis; GIS integration and Case studies-Indian Examples

Unit 5: GPS

Concepts of GPS and DGPS ,Applications in earth system sciences.
Applications in earth system sciences

SUGGESTED READINGS:

1. Demers, M.N., 1997. *Fundamentals of Geographic Information System*, John Wiley & sons. Inc.
2. Hoffmann-Wellenhof, B., Lichtenegger, H. and Collins, J., 2001. *GPS: Theory & Practice*, Springer Wien New York.
3. Jensen, J.R., 1996. *Introductory Digital Image Processing: A Remote Sensing Perspective*, Springer- Verlag.
4. Lillesand, T. M. & Kiefer, R.W., 2007. *Remote Sensing and Image Interpretation*, Wiley.
5. Richards, J.A. and Jia, X., 1999. *Remote Sensing Digital Image Analysis*, Springer-Verlag.

PRACTICALS: Based on C13 and C14

FM 50

- Computation of reservoir area, catchment area, reservoir capacity and reservoir life.
- Merits, demerits & remedial measures based upon geological cross sections of project sites.
- Computation of index properties of rocks.
- Computation of RQD, RSR, RMR and 'Q'
- Plotting of Major Dams/ Tunnels on the outline map of India.
- Study of Seismic / landslide zones of India.
- Aerial Photo/ imagery interpretation, identification of sedimentary, igneous and metamorphic rocks
- Identification of structural features in Aerial Photo/Satellite imagery
- Identification of geomorphic features in Aerial Photo/Satellite imagery



DISCIPLINE SPECIFIC ELECTIVE

Paper –DSE 3

EARTH AND CLIMATE

(CREDITS: THEORY-4, PRACTICALS-2)

THEORY

LECTURES:

Unit 1: Climate system: Components of the climate system

Climate controlling factors and interactions with climate system

Unit 2: Heat budget of Earth

Incoming solar radiation and Green House Effect

Heat transformation

Earth's heat budget.

Unit 3: Atmosphere - Hydrosphere

Layering of atmosphere and atmospheric Circulation

Atmosphere and ocean interaction and its effect on climate

Global oceanic conveyor belt and its control on earth's climate

Unit 4: Response of biosphere to Earth's climate

Climate Change: natural vs. anthropogenic effects

Impacts of climate change; Pleistocene Glaciation.

Unit 5: Monsoon

Mechanism of monsoon, Monsoonal variation through time, Factors associated with monsoonal intensity, Effects of monsoon

SUGGESTED READINGS:

1. Rudiman, W.F., 2001. Earth's climate: past and future. Edition 2, Freeman Publisher.
2. Rohli, R.V., and Vega, A.J., 2007. Climatology. Jones and Barlett
3. Lutgens, F., Tarbuck, E., and Tasa, D., 2009. The Atmosphere: An Introduction to Meteorology. Pearson Publisher
4. Aguado, E., and Burt, J., 2009. Understanding weather

DISCIPLINE SPECIFIC ELECTIVE

Paper –DSE 4

INTRODUCTION TO GEOPHYSICS

(CREDITS: THEORY-4, PRACTICALS-2)

THEORY

LECTURES:

Unit 1: Geology and Geophysics

Interrelationship between geology and geophysics, Role of geological and geophysical data in explaining internal structure of the earth.

Unit 2: General and Exploration geophysics

Different types of geophysical methods - gravity, magnetic, electrical and seismic; their principles and applications

Unit 3: Basics of subsurface geophysical logging: Basic principles of SP log, Resistivity log, Sonic log, Gamma log, Neutron log etc. and their applications

Unit 4: Geophysical field operations

Different types of surveys, grid and route surveys, profiling and sounding techniques

Scales of survey, Presentation of geophysical data

Unit 5: Applications:

Application of Geophysical methods in oil and gas, ore and groundwater investigations;

SUGGESTED READINGS:

1. Outlines of Geophysical Prospecting - A manual for geologists by Ramachandra Rao, M.B., Prasaranga, University of Mysore, Mysore, 1975.
2. Exploration Geophysics - An Outline by Bhimasarikaram V.L.S., Association of Exploration Geophysicists, Osmania University, Hyderabad, 1990.
3. Dobrin, M.B. (1984) An introduction to Geophysical Prospecting. McGraw-Hill, New Delhi.
4. Telford, W. M., Geldart, L. P., & Sheriff, R. E. (1990). *Applied geophysics* (Vol. 1). Cambridge university press.
5. Lowrie, W. (2007). Fundamentals of geophysics. Cambridge University Press.

PRACTICALS:

Study of distribution of major climatic regimes of India on map

Distribution of major wind patterns on World map

Study of paleogeographic maps (distribution of land and sea) of India during specific geological time intervals

Study of various surface and subsurface geophysical data.

Identification of anomalies by Graphical methods : (a)Data obtained from equipotential method(b)Data obtained from self potential method

Geophysical calculation based on seismic method: refraction, reflection

Problems based on electrical resistivity methods:

(a)Wenner's array (b)Schlumberger's array



SEMESTER I

GENERIC ELECTIVE -I ESSENTIALS OF GEOLOGY (CREDITS: THEORY-4, PRACTICAL-2)

THEORY

F.M.: 75

LECTURES:

Unit 1:

Introduction to Geology, scope, sub-disciplines and relationship with other branches of sciences

Unit 2:

Earth in the solar system: origin., Solar System- Introduction to Various planets- Terrestrial and Jovian Planets, Internal constitution of the earth: core, mantle and crust.

Unit 3:

Convections in the earth's core and production of magnetic field; Earthquake: causes, effects and distribution; Volcanoes: types, products and distribution.

Unit 4:

Introduction to hydrosphere, biosphere and atmosphere; Origin of mountains.; Elementary idea about Plate Tectonics.

Unit 5:

Age of the earth: Radioactivity and its application in determining the age of the Earth.

Basic concept of

- Rocks: types with examples
- Minerals: Definition and classification.
- Fossils: mode of preservation and uses

SUGGESTED READINGS:

1. Holme's Principles of Physical Geology. 1992. Chapman & Hall.
2. Emiliani, C, 1992. Planet Earth, Cosmology, Geology and the Evolution of Life and Environment. Cambridge University Press.
3. Gross, M.G., 1977. *Oceanography: A view of the Earth*, Prentice Hall.

Generic Elective I: GEOLOGY

PRACTICAL:

F.M. : 25

- Contour maps : profile drawing, identification and description of important topographical features.
- Physical properties of minerals: Study and Documentation.
- Study of physical properties of important rock forming minerals in hand specimen:
- Plotting of major Dams on the outline map of India, mention name of the river and utility of the dam.
- Study of Seismic Zones of India.



SEMESTER II

GENERIC ELECTIVE -II ROCKS AND MINERALS (CREDITS: THEORY-4, PRACTICAL-2)

THEORY

F.M. : 75

LECTURES:

Unit 1: Minerals

Definitions, Classification and Physical properties of minerals.

Unit 2: Mineral structures

Silicate Structure.

Unit 3: Nature of light and principles of optical mineralogy

Classification of minerals based on optical properties; Petrological Microscope.; Optical properties of minerals.

Unit 4: Rocks- Definitions and types, Basics of rock formation.

Igneous rock- texture and Structure, magma: origin and composition, Bowen's reaction series and magmatic differentiation.

Sedimentary rocks- process of formation, texture and Structure.

Metamorphic rocks- Agents and types of metamorphism, texture and Structure.

SUGGESTED READINGS:

1. Earth Materials- Introduction to Mineralogy and Petrology, Cornelis Klein and Anthony Philpotts, Cambridge University Press, 2013.

2. Understanding Earth (Sixth Edition), John Grotzinger and Thomas H. Jordan, 2010, W.H. Freeman and company, New York.

Generic Elective II: GEOLOGY

PRACTICAL:

FM 25

- Observation and documentation of important structures of sedimentary and metamorphic rocks.
- Observation and documentation of forms of igneous rocks.
- Study of optical properties of minerals.
- Study of rocks in hand specimen.

SEMESTER III

GENERIC ELECTIVE- III FOSSILS AND THEIR APPLICATIONS (CREDITS: THEORY-4, PRACTICALS-2)

THEORY: LECTURES:

F.M. : 75

Unit 1: Introduction to fossils

- Definition of fossil, fossilization processes, modes of fossil preservation and uses.

Unit 2: Species concept

- Definition of species, methods of description and naming of fossils.

Unit 3: Introduction to various fossils groups

- Brief introduction of important fossils groups: morphology and geological history of Brachiopoda, Gastropoda and lamellibranchia
- Important age diagnostic fossiliferous horizons of India.

Unit 4: Application of fossils

- Application of fossils in the study of paleoecology, paleobiogeography and paleoclimate.

Unit 5: Societal importance of fossils

- Implication of larger benthic and micropaleontology in hydrocarbon exploration: identification of reservoirs and their correlation.
- Application of spore and pollens in correlation of coal seams.
- Fossils as an indicator of pollution

SUGGESTED READINGS:

1. Schoch, R.M. 1989. Stratigraphy, Principles and Methods. VanNostrand Reinhold.
2. Clarkson, E.N.K. 1998. Invertebrate Palaeontology and Evolution George Allen & Unwin
3. Prothero, D.R. 1998. Bringing fossils to life - An introduction to Palaeobiology, McGraw Hill.
4. Benton, M.J. 2005. Vertebrate palaeontology (3rd edition). Blackwell Scientific, Oxford.
5. Colbert's Evolution of the Vertebrates: A History of the Backboned Animals Through Time, Edwin H. Colbert, Michael Morales, Eli C. Minkoff, John Wiley & Sons, 1991.

Generic Elective III: GEOLOGY

PRACTICAL:

F.M. : 25

- Study of fossils showing various modes of fossilization.
- Distribution of diagnostic fossils in India.
- Study of morphological characters of important Invertebrate fossils.
- Drawing and labelling of important invertebrate fossils.

SEMESTER IV

GENERIC ELECTIVE -IV EARTH RESOURCES (CREDITS: THEORY-4, PRACTICAL-2)

THEORY

F.M. : 75

Unit 1: Earth Resources

- Definition: Mineral, Ore and Gangue, Tenor, Grade.
- Introduction to Essential, Critical and Strategic minerals.
- A brief overview of Classification of Mineral deposits with respect to processes of formation and mode of occurrences.

Unit 2: Definition of Energy

- Primary and Secondary Energy.
- Renewable and Non-Renewable Sources of Energy.
- Environmental Dimension of Energy.

Unit 3: Major Types and Sources of Energy

- Resources of Natural Oil and Gas.
- Coal and Nuclear Minerals: Types and distribution.
- Introduction to Hydroelectric Power, Solar Energy, Wind, Wave and Biomass based power and Energy

Unit 4: Groundwater resources and its management

- Groundwater resources and its role in economic development of a country.
- Rainwater harvesting and artificial recharge to groundwater.
- Watershed management.

SUGGESTED READINGS:

1. Energy and the Environment by Fowler, J.M 1984. McGraw-Hill
2. Global Energy Perspectives by Nebojsa Nakicenovic 1998, Cambridge University Press.
3. Energy Resources and Systems: Fundamentals and Non-Renewable Resources by Tushar K. Ghosh and M. A. Prelas. 2009, Springer
4. Introduction to Wind Energy Systems: Hermann-Josef Wagner and Jyotirmay Mathur. 2009, Springer.
5. Renewable Energy Conversion, Transmission and Storage. Bent Sorensen, 2007, Springer.

Generic Elective IV: GEOLOGY

PRACTICAL:

F.M.: 25

- Plotting of major Indian oil fields on map of India.
- Plotting of major Indian coalfields on the map of India / Jharkhand.
- Plotting of natural hazards on the map of India.
- Megascopic study of important ore forming minerals.