MODIFIED CBCS CURRICULUM OF

GEOLOGY HONOURS PROGRAMME

SUBJECT CODE = 53

FOR UNDER GRADUATE COURSES UNDER RANCHI UNIVERSITY

Implemented from
Academic Session 2019-2022

Members of Board of Studies of CBCS Under- Graduate Syllabus in Geology as per Guidelines of the Ranchi University, Ranchi.

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Head, University Department of Geology, R.U. Ranchi

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Kindly notify the syllabus in R.U. Website.

27.8.18
Dr. Uday Kumar
Head, University Department of Geology

Head
University Department of Geology
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SEMESTER VI

COURSES OF STUDY FOR ABILITY ENHANCEMENT
COMPULSORY COURSE "**AECC**"

MARKS DISTRIBUTION FOR EXAMINATIONS
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COURSE STUCTURE FOR UNDERGRADUATE **'HONOURS'** PROGRAMME

Table AI-1: Distribution of 164 Credits [*wherever there is a Practical there will be no tutorial and vice –versa.]

Course	Papers	Credits Theory + Practical	Credits Theory + Tutorial
I. Core Course	**(CC 1 to 14)**		
Theory	14 Papers	14X4=56	14X5=70
Practical/Tutorial*	14 Papers	14X2=28	14X1=14
II. Elective Course (EC)			
A. Discipline Specific Elective	**(DSE 1 to 4)**		
Theory	4 Papers	4X4=16	4X5=20
Practical/ Tutorial*	4 Papers	4X2=8	4X1=4
B. Generic Elective/ Interdisciplinary	**(GE 1 to 4)**		
Theory	4 Papers	4X4=16	4X5=20
Practical/ Tutorial*	4 papers	4X2=8	4X1=4
III. Ability Enhancement Compulsory Courses (AECC)			
1. English/ Hindi Communication	1 Paper	1X2=2	1X2=2
2. Environmental Science	1 Paper	1x2=2	1x2=2
3. Skill Enhancement Course of the Core Course opted	**(SEC 1 & 2)** 2 Papers	2X2=4	2X2=4
		Total Credit = 140 + 24 =164	**140 + 24 = 164**

Note:

In the Academic Council Meeting of Ranchi University, Ranchi, held on 29.06.2019, it is resolved that Students will be offered **Two Generic Elective Subjects** (GE-A & GE-B) in C.B.C.S. U.G. Honours Courses of all streams, so that their 'Eligibility for Admission' in P.G., Vocational & Technical Courses in various Institutions is not hampered.

Table AI-1.1: Course structure for B.Sc./ B.A./ B.Com./B.Voc. (Hons. Programme)

Semester	Honours (Core Courses) 14 Papers	Allied (Elective Courses) 8 Papers	Ability Enhancement (Compulsory Courses) 4 Papers	Total Credits
Sem-I	C-1, C-2 (6+6=12 Credits)	GE-1A, GE-1B (6+6=12 Credits)	English Comm./ Hindi Comm. (02 Credits)	**26 Credits**
Sem-II	C-3, C-4 (6+6=12 Credits)	GE-2A, GE-2B (06 Credits)	EVS (02 Credits)	**26 Credits**
Sem-III	C-5, C-6, C-7 (6+6+6=18 Credits)	GE-3A, GE-3B (06 Credits)	SEC-1 (02 Credits)	**32 Credits**
Sem-IV	C-8, C-9, C-10 (6+6+6=18 Credits)	GE-4A, GE-4B (06 Credits)	SEC-2 (02 Credits)	**32 Credits**
Sem-V	C-11, C-12 (6+6=12 Credits)	DSE-1, DSE-2 (6+6=12 Credits)		**24 Credits**
Sem-VI	C-13, C-14 (6+6=12 Credits)	DSE-3, DSE-4 (6+6=12 Credits)		**24Credits**
				Total = 164 Credits

COURSES OF STUDY FOR UNDERGRADUATE **'B. Sc. Hons'** PROGRAMME

Table AI-2 Subject Combinations allowed for B. Sc. Hons. Programme (164 Credits)

Honours/Core Subject **CC 14 Papers**	Discipline Specific Elective Subject **DSES 4 Papers**	Skill Enhancement Course **SEC 2 Papers**	Compulsory Course **AECC 1+1=2 Papers**
Geology	Geology Specific	SEC in Geology	Language Communication + EVS

Table AI-2.1 Semester wise Examination Structure for Mid Sem & End Sem Examinations:

Sem	Core Honours, Allied DSE, Compulsory AECC Courses		Examination Structure		
	Code	**Papers**	**Mid Semester Theory (F.M.)**	**End Semester Theory (F.M.)**	**End Semester Practical/ Viva (F.M.)**
I	C1	Earth System science **+Lab**	15	60	50
	C2	Crystallography & Minerology **+Lab**	15	60	
	GE1A	Refer Table AI-2.3 of the Syllabus of Subject opted	---	100/ (75)	0/ (25)
	GE1B	Refer Table AI-2.3 of the Syllabus of Subject opted	---	100/ (75)	0/ (25)
	AECC	Language Communication		100	
II	C3	Elements of Geochemistry **+Lab**	15	60	50
	C4	Structural Geology **+Lab**	15	60	
	GE2A	Refer Table AI-2.3 of the Syllabus of Subject opted	---	100/ (75)	0/ (25)
	GE2B	Refer Table AI-2.3 of the Syllabus of Subject opted	---	100/ (75)	0/ (25)
	AECC	EVS		100	
III	C5	Igneous Petrology **+Lab**	15	60	75
	C6	Sedimentary Petrology **+Lab**	15	60	
	C7	Metamorphic Petrology **+Lab**	15	60	
	GE3A	Refer Table AI-2.3 of the Syllabus of Subject opted	---	100/ (75)	0/ (25)
	GE3B	Refer Table AI-2.3 of the Syllabus of Subject opted	---	100/ (75)	0/ (25)
	SEC 1	Elementary Computer Application Software **+Lab**		100	
IV	C8	Stratigraphic Principles & Indian Stratigraphy **+Lab**	15	60	75
	C9	Paleontology **+Lab**	15	60	
	C10	Geomorphology **+Lab**	15	60	
	GE4A	Refer Table AI-2.3 of the Syllabus of Subject opted	---	100/ (75)	0/ (25)
	GE4B	Refer Table AI-2.3 of the Syllabus of Subject opted	---	100/ (75)	0/ (25)
	SEC 2	Geological Mapping **+Lab**	---	---	100
V	C11	Economic Geology **+Lab**	15	60	50
	C12	Hydrogeology **+Lab**	15	60	
	DSE 1	Fuel Geology **+Lab**	15	60	50
	DSE 2	Exploration Geology **+Lab**	15	60	
VI	C13	Engineering Geology **+Lab**	15	60	50
	C14	Remote Sensing & GIS **+Lab**	15	60	
	DSE 3	Earth & Climate **+Lab**	15	60	50
	DSE 4	Introduction of Geophysics **+Lab**	15	60	

Table AI-2.2 Generic Subject Papers for B. Sc. Hons. Programme (164 Credits);

<u>All Four Papers of Any One Subject</u> to be opted leaving aside the papers of Hons. Subject:

Generic Elective Subject **GE 4 Papers**	Generic Elective Courses for Arts Stream (GE will be other than Core Subject opted			
	Semester I **GE1**	Semester II **GE2**	Semester III **GE3**	Semester IV **GE4**
Physics	Mechanics **+Lab**	Electricity and Magnetism **+Lab**	Thermal & Statistical Physics **+Lab**	Waves and Optics **+Lab**
Chemistry	Atomic Structure, Bonding, General Org Chem & Aliphatic Hydrocarbons **+Lab**	Chemical Energetics, Equilibria & Functional Gp Org Chemistry-I **+Lab**	Chem. of s- and p-block elements, States of matter and Chem. Kinetics **+Lab**	Chem. of d-block elements, Molecules of Life **+Lab**
Mathematics	Differential Calculus And Coordinate Geometry 2D **+T**	Integral Calculus, Vector Calculus & Trigonometry **+T**	Real Analysis-I, Group Theory & Differential Equations **+T**	Real Anaysis-II, Complex Variable, Set Theory & Matrices **+T**
Zoology	Animal Diversity **+Lab**	Human Physiology **+Lab**	Food, Nutrition & Health **+Lab**	Environment & Public Health **+Lab**
Botany	Biodiversity **+Lab**	Plant Ecology & Taxonomy **+Lab**	Plant Anatomy & Embryology **+Lab**	Plant Physiology & Metabolism **+Lab**

Table AI-2.3 Semester wise Structure for End Sem Examinations of Generic Elective in Geology:

Sem	**Core Honours, Allied DSE, Compulsory AECC Courses**		**Examination Structure**		
	Code	**Papers**	**Mid Semester Theory (F.M.)**	**End Semester Theory (F.M.)**	**End Semester Practical/ Viva (F.M.)**
I	GE1	Essentials of Geology **+Lab**		75	25
II	GE2	Rocks & Minerals **+Lab**		75	25
III	GE3	Fossils & their Applications **+Lab**		75	25
IV	GE4	Earth Resources **+Lab**		75	25

SEMESTER I **5 Papers**

Total 100 x 5 = 500 Marks

I. ABILITY ENHANCEMENT COMPULSORY COURSE (AECC)

(Credits: Theory-02)

Any One Compulsory Language Communication Prescribed by Ranchi University:
English Communication/ Hindi Communication / NH + MB Communication
(Refer AECC Curriculum of Ranchi University)

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

All Four Papers (Refer Table AI 2.2) of any One Subject to be opted other than the Honours Subject. Refer Table AI 2.4 for name of papers and for Content in detail refer the Syllabus of Opted Generic Elective Subject.

III. GENERIC ELECTIVE (GE 1B): (Credits: 06)

All Four Papers (Refer Table AI 2.2) of any One Subject to be opted other than the GE1 & Honours Subject. Refer Table AI 2.4 and for Content in detail refer the Syllabus of Opted Generic Elective Subject.

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

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) =75	Pass Marks: Th (MSE +ESE) = 30

Instruction to Question Setter for
Mid Semester Examination (MSE):
*There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.*

End Semester Examination (ESE):
*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

EARTH SYSTEM SCIENCE **Theory: 60 Lectures**

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.

Suggested Readings:

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

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

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) =75	Pass Marks: Th (MSE +ESE) = 30

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.*

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

CRYSTALLOGRAPHY & MINEROLOGY **Theory: 60 Lectures**

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:

- 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.
- Kerr, P. F. (1959). Optical Mineralogy. McGraw-Hill.
- Verma, P. K. (2010). Optical Mineralogy (Four Colour). Ane Books Pvt Ltd.
- Deer, W. A., Howie, R. A., & Zussman, J. (1992). An introduction to the rock-forming minerals (Vol. 696). London: Longman.

GEOLOGY PRACTICALS - Based on C 1 and C 2

60 Lectures

Marks : (ESE: 3Hrs) =50	**Pass Marks: Pr (ESE) = 20**

Instruction to Question Setter for

End Semester Practical Examination (ESE):

Distribution of Marks in Practical Examination:

Total = 50 Marks [Experiment = 30; Record = 10; Viva = 10]

Practicals:

1. Study of major geomorphic features and their relationships with outcrops through physiographic models.
2. Detailed study of topographic sheets and preparation of physiographic description of an area
3. Study of soil profile of any specific area
4. Study of distribution of major lithostratigraphic units on the map of India
5. Study of distribution of major dams on map of India and their impact on river systems
6. Study of major ocean currents of the World
7. Study of seismic profile of a specific area and its interpretation
8. Observation and documentation on symmetry of crystals
9. Study of physical properties of minerals in hand specimen: Silicates: Olivine, Garnet, Andalusite, SilIimanite, 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.
10. Native Metals/non-metals, Sulfides, Oxides- Copper, Sulfur, Graphite, Pyrite, Corundum, Magnetite Hydroxides, Halides, Carbonates, Sulfates, Phosphates: Psilomelane, Fluorite, Calcite, Malachite, Gypsum, Apatite.
11. Study of some key silicate minerals under optical microscope and their characteristic properties

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SEMESTER II **5 Papers**

Total 100 x 5 = 500 Marks

I. ABILITY ENHANCEMENT COMPULSORY COURSE (AECC)

(Credits: Theory-02)

Marks : 100 (ESE: 3Hrs) =100	**Pass Marks Th ESE = 40**

Instruction to Question Setter for

End Semester Examination (ESE):

*There will be **objective type test** consisting of hundred questions of 1 mark each. Examinees are required to mark their answer on **OMR Sheet** provided by the University.*

AECC – ENVIRONMENT STUDIES **Theory: 30 Lectures**

Unit 1 : Introduction to environmental studies

- Multidisciplinary nature of environmental studies;
- Scope and importance; Concept of sustainability and sustainable development.

(2 lectures)

Unit 2 : Ecosystems

- What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems :

  a. Forest ecosystem
  b. Grassland ecosystem
  c. Desert ecosystem
  d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

(2 lectures)

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

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

(5 lectures)

Unit 4 : Biodiversity and Conservation

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

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

(5 lectures)

Unit 5 : Environmental Pollution

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

(5 lectures)

Unit 6 : Environmental Policies & Practices

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

(4 lectures)

Unit 7 : Human Communities and the Environment

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

(3 lectures)

Unit 8 : Field work

- Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.
- Visit to a local polluted site---Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds and basic principles of identification.
- Study of simple ecosystems---pond, river, Delhi Ridge, etc.

(Equal to 4 lectures)

Suggested Readings:

- Raziuddin, M.., Mishra P.K. 2014, *A Handbook of Environmental Studies*, Akanaksha Publications, Ranchi.
- Mukherjee, B. 2011: *Fundamentals of Environmental Biology*. Silverline Publications, Allahabad.
- Carson, R. 2002. *Silent Spring*. Houghton Mifflin Harcourt.
- Gadgil, M., & Guha, R.1993. *This Fissured Land: An Ecological History of India*. Univ. of California Press.
- Gleeson, B. and Low, N. (eds.) 1999.*Global Ethics and Environment*, London, Routledge.
- Gleick, P. H. 1993. *Water in Crisis*. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
- Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. *Principles of Conservation Biology*. Sunderland: Sinauer Associates, 2006.
- Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. *Science,* 339: 36---37.
- McCully, P. 1996. *Rivers no more: the environmental effects of dams*(pp. 29---64). Zed Books.
- McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.
- Odum, E.P., Odum, H.T. & Andrews, J. 1971.*Fundamentals of Ecology*. Philadelphia: Saunders.
- Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
- Rao, M.N. & Datta, A.K. 1987. *Waste Water Treatment*. Oxford and IBH Publishing Co. Pvt. Ltd.
- Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012.*Environment*. 8th edition. John Wiley & Sons.
- Rosencranz, A., Divan, S., & Noble, M. L. 2001. *Environmental law and policy in India*. *Tripathi 1992*.
- Sengupta, R. 2003. *Ecology and economics*: An approach to sustainable development. OUP.
- Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. *Ecology, Environmental Science and Conservation*. S. Chand Publishing, New Delhi.
- Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. *Conservation Biology*: *Voices from the Tropics*. John Wiley & Sons.
- Thapar, V. 1998. *Land of the Tiger*: *A Natural History of the Indian Subcontinent*.
- Warren, C. E. 1971. *Biology and Water Pollution Control*. WB Saunders.
- Wilson, E. O. 2006.*The Creation: An appeal to save life on earth*. New York: Norton.
- World Commission on Environment and Development. 1987. *Our Common Future*. Oxford University

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II. GENERIC ELECTIVE (GE 2A): (Credits: 06)

GE2A paper of First subject selected in Sem-I to be studied. Refer Table AI 2.4 for name of papers and for Content in detail refer the Syllabus of Opted Generic Elective Subject.

III. GENERIC ELECTIVE (GE 2B): (Credits: 06)

GE2B paper of Second subject selected in Sem-I to be studied. Refer Table AI 2.4 for name of papers and for Content in detail refer the Syllabus of Opted Generic Elective Subject.

II. CORE COURSE -C 3: (Credits: Theory-04, Practicals-02)

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) =75	Pass Marks: Th (MSE +ESE) = 30

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.*

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

ELEMENTS OF GEOCHEMISTRY **Theory: 60 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:

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

III. CORE COURSE -C 4: (Credits: Theory-04, Practicals-02)

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) =75	Pass Marks: Th (MSE +ESE) = 30

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.*

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

STRUCTURAL GEOLOGY **Theory: 60 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

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GEOLOGY PRACTICALS - Based on C 3 and C 4 60 Lectures

Marks : (ESE: 3Hrs) =50	Pass Marks: Pr (ESE) = 20

Instruction to Question Setter for

End Semester Practical Examination (ESE):

Distribution of Marks in Practical Examination:

Total = 50 Marks [Experiment = 30; Record = 10; Viva = 10]

Practicals:

1. Types of geochemical data analysis and interpretation; of common geochemical plots.
2. Geochemical analysis of geological materials.
3. Geochemical variation diagrams and its interpretations.
4. Basic idea of topographic contours, Topographic sheets of various scales.
5. Introduction to Geological maps: Lithological and Structural maps
6. Structural contouring and 3-point problems of dip and strike
7. 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:

- Davis, G. R. (1984) Structural Geology of Rocks and Region. John Wiley
- Billings, M. P. (1987) Structural Geology, 4th edition, Prentice-Hall.
- 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 (For Practical)
- Lahee F. H. (1962) Field Geology. McGraw Hill

SEMESTER III **6 Papers**

Total 100 x 6 = 600 Marks

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

Marks : 100 (ESE: 3Hrs) =100	**Pass Marks Th ESE = 40**

Instruction to Question Setter for

End Semester Examination (ESE):

*There will be **objective type test** consisting of hundred questions of 1 mark each. Students are required to mark their answer on **OMR Sheet** provided by the University.*

ELEMENTARY COMPUTER APPLICATION SOFTWARES:

A Common Syllabus Prescribed by Ranchi 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: Severs, 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 Plateform (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. Heilight TCP/IP in red color
iii. Replace protocol into protocols
iv. Find the word "Public"

B. MICROSOFT EXCEL LAB ASSİGNMENT

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)

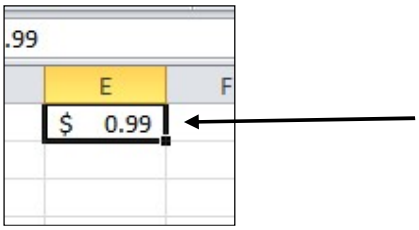
Assignment

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
Name	**Male/Female**	**Genre**	**Number of Songs**
J Smith	F	Blues	50
B Doe	M	Country	110
S Spade	F	Country	200
F Zappa	M	Blues	1400
F Zappa	M	Alternative	2300
J Smith	F	Alternative	150
S Spade	F	Blues	1000
B Doe	M	Blues	75
yourname	M	Blues	800

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.



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 ∑ 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

Create a sample table given below in Excel

- Using formula find Total
- Find the maximum value using MAX function from the **Units** column
- Find minimum value from **Total** column

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 alls 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”

Suggested Readings:

- 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)

II. GENERIC ELECTIVE (GE 3A): (Credits: 06)

GE3A paper of First subject selected in Sem-I to be studied. Refer Table AI 2.4 for name of papers and for Content in detail refer the Syllabus of Opted Generic Elective Subject.

III. GENERIC ELECTIVE (GE 3B): (Credits: 06)

GE3B paper of Second subject selected in Sem-I to be studied. Refer Table AI 2.4 for name of papers and for Content in detail refer the Syllabus of Opted Generic Elective Subject.

IV. CORE COURSE -C 5: (Credits: Theory-04, Practicals-02)

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) =75 **Pass Marks: Th (MSE +ESE) = 30**

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.*

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

IGNEOUS PETROLOGY **Theory: 60 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:

- Philpotts, A., & Ague, J. (2009). Principles of igneous and metamorphic petrology. Cambridge University Press.
- Winter, J. D. (2014). Principles of igneous and metamorphic petrology. Pearson.
- Rollinson, H. R. (2014). Using geochemical data: evaluation, presentation, interpretation. Routledge.
- Raymond, L. A. (2002). Petrology: the study of igneous, sedimentary, and metamorphic rocks. McGraw-Hill Science Engineering.
- McBirney, A. R. (1984). Igneous Petrology. San Francisco (Freeman, Cooper & Company) and Oxford (Oxford Univ. Press),
- Myron G. Best (2001). Igneous and Metamorphic Petrology, K. G. Cox, J. D. Bell. (1979). The Interpretation of Igneous Rocks. Springer/Chapman & Hall.
- Bose M.K. (1997). Igneous Petrology. G W Tyrrell. (1926). Principles of Petrology. Springer

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V. CORE COURSE -C 6: (Credits: Theory-04, Practicals-02)

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) =75	Pass Marks: Th (MSE +ESE) = 30

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.*

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

SEDIMENTARY PETROLOGY Theory: 60 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:

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

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VI. CORE COURSE -C 7: (Credits: Theory-04, Practicals-02)

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) =75	Pass Marks: Th (MSE +ESE) = 30

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.*

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

METAMORPHIC PETROLOGY **Theory: 60 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 isograde.
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:

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

GEOLOGY PRACTICALS - Based on C 5, C 6 and C 7 60 Lectures

Marks : (ESE: 3Hrs) =75	Pass Marks: Pr (ESE) = 30

Instruction to Question Setter for

End Semester Practical Examination (ESE):

Distribution of Marks in Practical Examination:

Total = 75 Marks [Experiment = 45; Record = 15; Viva = 15]

Practicals:

1. Study of important igneous rocks in hand specimens and thin sections
2. Megascopic study of sedimentary structures, Particle size distribution and statistical treatment,
3. Paleocurrent analysis, Petrography of clastic and non-clastic rocks through hand specimens and thin sections
4. Megascopic and microscopic study (textural and mineralogical) of the following metamorphic rocks, Graphic plots for petrochemistry and interpretation of assemblages: ACF and AKF diagrams.

SEMESTER IV 6 Papers

Total 100 x 6 = 600 Marks

I. SKILL ENHANCEMENT COURSE SEC 2: (Credits: Theory-02)

Marks : 100 (ESE 3Hrs) =100	**Pass Marks Th ESE = 40**

Guidelines to Examiners for

End Semester Examination (ESE):
Evaluation of project dissertation work may be as per the following guidelines:

Project model (if any) and the Project record notebook = 50 marks
Project presentation/ Practical based on Field work = 25 marks
Viva-voce = 25 marks

Overall project dissertation may be evaluated under the following heads:

- *Motivation for the choice of topic*
- *Project dissertation design*
- *Methodology and Content depth*
- *Results and Discussion*
- *Future Scope & References*
- *Presentation style*
- *Viva-voce*

GEOLOGICAL MAPPING **Theory: 60 Lectures**

1. 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.
2. Identification of rock types in field; structures and texture of rocks,
3. Sampling and oriented sample and its significance; Geological mapping of igneous, sedimentary and metamorphic terrains.

Practical:

1. 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.

II. GENERIC ELECTIVE (GE 4A): (Credits: 06)

GE4A paper of First subject selected in Sem-I to be studied. Refer Table AI 2.4 for name of papers and for Content in detail refer the Syllabus of Opted Generic Elective Subject.

III. GENERIC ELECTIVE (GE 4B): (Credits: 06)

GE4B paper of Second subject selected in Sem-I to be studied. Refer Table AI 2.4 for name of papers and for Content in detail refer the Syllabus of Opted Generic Elective Subject.

IV. CORE COURSE -C 8: (Credits: Theory-04, Practicals-02)

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) =75	Pass Marks: Th (MSE +ESE) = 30

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.*

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

STRATIGRAPHIC PRINCIPLES & INDIAN STRATIGRAPHY

Theory: 60 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:

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

V. CORE COURSE -C 9: (Credits: Theory-04, Practicals-02)

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) =75	Pass Marks: Th (MSE +ESE) = 30

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.*

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

PALEONTOLOGY **Theory: 60 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

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

VI. CORE COURSE -C 10: (Credits: Theory-04, Practicals-02)

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) =75	Pass Marks: Th (MSE +ESE) = 30

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.*

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

GEOMORPHOLOGY **Theory: 60 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:

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

GEOLOGY PRACTICALS - Based on C 8, C 9 and C 10 60 Lectures

Marks : (ESE: 3Hrs) =75	Pass Marks: Pr (ESE) = 30

Instruction to Question Setter for

End Semester Practical Examination (ESE):

Distribution of Marks in Practical Examination:

Total = 75 Marks [Experiment = 45; Record = 15; Viva = 15]

Practicals:

1. 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.
2. 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
3. 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

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SEMESTER V 4 Papers

Total 100 x 4 = 400 Marks

I. GEOLOGY SPECIFIC (DSE 1): (Credits: Theory-04, Practicals-02)

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) =75	**Pass Marks: Th (MSE +ESE) = 30**

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** six questions of five marks each, out of which any four are to answer.*

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** six questions of fifteen marks each, out of which any four are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

FUEL GEOLOGY **Theory: 75 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:

- 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.
- Bastia, R., & Radhakrishna, M. (2012). Basin evolution and petroleum prospectivity of the continental margins of India (Vol. 59). Newnes

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II. GEOLOGY SPECIFIC (DSE 2): (Credits: Theory-04, Tutorials-02)

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) =75	Pass Marks: Th (MSE +ESE) = 30

Instruction to Question Setter for
Mid Semester Examination (MSE):

*There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** six questions of five marks each, out of which any four are to answer.*

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** six questions of fifteen marks each, out of which any four are to answer.*
***Note:** There may be subdivisions in each question asked in Theory Examinations.*

EXPLORATION GEOLOGY Theory: 75 Lectures

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:

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

GEOLOGY PRACTICALS - Based on DSE 1 and DSE 2 60 Lectures

Marks : (ESE: 3Hrs) =50	Pass Marks: Pr (ESE) = 20

Instruction to Question Setter for

End Semester Practical Examination (ESE):

Distribution of Marks in Practical Examination:

Total = 50 Marks [Experiment = 30; Record = 10; Viva = 10]

Practicals:

1. Study of hand specimens of coal
2. Reserve estimation of coal and economic mineral deposits
3. Study of Geological Section Coal and Petroleum fields and identification of hydrocarbon prospect
4. Identification of anomaly
5. Concept of weighted average in anomaly detection
6. Study of Geological cross-section of important mineral deposits

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III. CORE COURSE -C 11: (Credits: Theory-04, Practicals-02)

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) =75 **Pass Marks: Th (MSE +ESE) = 30**

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.*

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

ECONOMIC GEOLOGY **Theory: 60 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:

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

IV. CORE COURSE -C 12: (Credits: Theory-04, Practicals-02)

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) =75	Pass Marks: Th (MSE +ESE) = 30

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.*

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

HYDROGEOLOGY **Theory: 60 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:

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

GEOLOGY PRACTICALS - Based on C 11 and C 12

60 Lectures

Marks : (ESE: 3Hrs) =50	**Pass Marks: Pr (ESE) = 20**

Instruction to Question Setter for

End Semester Practical Examination (ESE):

Distribution of Marks in Practical Examination:

Total = 50 Marks [Experiment = 30; Record = 10; Viva = 10]

Practicals:

1. Megascopic identification
2. Study of microscopic properties of ore forming minerals (Oxides and sulphides).
3. Preparation of maps: Distribution of important ores and other economic minerals in India.
4. Preparation and interpretation of water level contour maps and depth to water level maps
5. Study, preparation and analysis of hydrographs for differing groundwater conditions
6. Water potential zones of India (map study).
7. Graphical representation of chemical quality data and water classification (C-S and Trilinear diagrams)
8. Simple numerical problems related to: determination of permeability in field and laboratory, Groundwater flow, Well hydraulics etc.

SEMESTER VI 4 Papers

Total 100 x 4 = 400 Marks

I. GEOLOGY SPECIFIC (DSE 3): (Credits: Theory-04, Practicals-02)

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) =75	**Pass Marks: Th (MSE +ESE) = 30**

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.*

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

EARTH & CLIMATE **Theory: 60 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 Geen 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:

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

II. GEOLOGY SPECIFIC (DSE 4): (Credits: Theory-04, Practicals-02)

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) =75	**Pass Marks: Th (MSE +ESE) = 30**

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.*

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

INTRODUCTION OF GEOPHYSICS **Theory: 60 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:

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

GEOLOGY PRACTICALS - Based on DSE 3 and DSE 4 60 Lectures

Marks : (ESE: 3Hrs) =50	Pass Marks: Pr (ESE) = 20

Instruction to Question Setter for

End Semester Practical Examination (ESE):

Distribution of Marks in Practical Examination:

Total = 50 Marks [Experiment = 30; Record = 10; Viva = 10]

Practicals:

1. Study of distribution of major climatic regimes of India on map
2. Distribution of major wind patterns on World map
3. Study of paleogeographic maps (distribution of land and sea) of India during specific geological time intervals
4. Study of various surface and subsurface geophysical data.
5. Identification of anomalies by Graphical methods : (a)Data obtained from equipotential method(b)Data obtained from self-potential method
6. Geophysical calculation based on seismic method: refraction, reflection
7. Problems based on electrical resistivity methods:
   (a) Wenner's array (b) Schlumberger's array

III. CORE COURSE -C 13: (Credits: Theory-04, Practicals-02)

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) =75 **Pass Marks: Th (MSE +ESE) = 30**

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.*

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

ENGINEERING GEOLOGY **Theory: 60 Lectures**

Unit 1:
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 2:
Basic concept of-Rock Quality Designation (RQD), Rock Structure Rating (RSR), Rock Mass Rating (RMR), Tunneling Quality Index (Q)

Unit 3: Dams and reservoirs: Types of Dams-masonary 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 4: 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 5: 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:

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

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IV. CORE COURSE -C 14: (Credits: Theory-04, Practicals-02)

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) =75 **Pass Marks: Th (MSE +ESE) = 30**

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.*

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

REMOTE SENSING & GIS **Theory: 60 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:

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

GEOLOGY PRACTICALS - Based on C 13 and C 14

60 Lectures

Marks : (ESE: 3Hrs) =50	**Pass Marks: Pr (ESE) = 20**

Instruction to Question Setter for

End Semester Practical Examination (ESE):

Distribution of Marks in Practical Examination:

Total = 50 Marks [Experiment = 30; Record = 10; Viva = 10]

Practicals:

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

Reference Books:

- Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, Asia Publishing House

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COURSES OF STUDY FOR **GENERIC ELECTIVE 'B. Sc. Hons'** PROGRAMME IN

"GEOLOGY"

SEMESTER I **GENERIC ELECTIVE** **1 Paper**

Total 100 x 1 = 100 Marks

I. GENERIC ELECTIVE (GE 1): (Credits: Theory-04, Practicals-02)

- All Four Generic Papers (One paper to be studied in each semester) of Physics to be studied by the Students of **Other than Geology Honours.**
- Students of **Geology Honours** must Refer Content from the **Syllabus of Opted Generic Elective Subject**.

Marks : 75 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100	**Pass Marks: Th ESE = 30 + Pr ESE =10**

Instruction to Question Setter for

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** six questions of fifteen marks each, out of which any four are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

ESSENTIALS OF GEOLOGY **Theory: 60 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:

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

GE 1 LAB: ESSENTIALS OF GEOLOGY

60 Lectures

Marks : 25 (Pr 3Hrs)=25	**Pass Marks: Pr ESE =10**

Instruction to Question Setter for

End Semester Practical Examination (ESE):

Distribution of Marks in Practical Examination:

Total = 25 Marks [Experiment = 15; Record = 5; Viva = 5]

Practicals:

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

SEMESTER II **GENERIC ELECTIVE** **1 Paper**

Total 100 x 1 = 100 Marks

II. GENERIC ELECTIVE (GE 2)

(Credits: Theory-04, Practicals-02)

Marks : 75 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100	**Pass Marks: Th ESE = 30 + Pr ESE =10**

Instruction to Question Setter for

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** six questions of fifteen marks each, out of which any four are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

ROCKS & MINERALS

Theory: 60 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:

- Earth Materials- Introduction to Mineralogy and Petrology, Cornelis Klein and Anthony Philpotts, Cambridge University Press, 2013.
- Understanding Earth (Sixth Edition), John Grotzinger and Thomas H. Jordan, 2010, W.H. Freeman and company, New York.

GE 2 LAB: ROCKS & MINERALS

60 Lectures

Marks : 25 (Pr 3Hrs)=25	**Pass Marks: Pr ESE =10**

Instruction to Question Setter for

End Semester Practical Examination (ESE):

Distribution of Marks in Practical Examination:

Total = 25 Marks [Experiment = 15; Record = 5; Viva = 5]

Practicals:

1. Observation and documentation of important structures of sedimentary and metamorphic rocks.
2. Observation and documentation of forms of igneous rocks.
3. Study of optical properties of minerals.
4. Study of rocks in hand specimen.

SEMESTER III **GENERIC ELECTIVE** **1 Paper**

Total 100 x 1 = 100 Marks

III. GENERIC ELECTIVE (GE 3)

(Credits: Theory-04, Practicals-02)

Marks : 75 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100	**Pass Marks: Th ESE = 30 + Pr ESE =10**

Instruction to Question Setter for

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** six questions of fifteen marks each, out of which any four are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

FOSSILS & THEIR APPLICATIONS

Theory: 60 Lectures

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:

- Schoch, R.M. 1989. Stratigraphy, Principles and Methods. VanNostrand Reinhold.
- Clarkson, E.N.K.1998. Invertebrate Palaeontology and Evolution George AlIen & Unwin
- Prothero, D.R. 1998. Bringing fossils to life - An introduction to Palaeobiology, McGraw Hill.
- Benton, M.J. 2005. Vertebrate palaeontology (3rd edition). Blackwell Scientific, Oxford.
- 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.

GE 3 LAB: FOSSILS & THEIR APPLICATIONS 60 Lectures

Marks : 25 (Pr 3Hrs)=25	Pass Marks: Pr ESE =10

Instruction to Question Setter for

End Semester Practical Examination (ESE):

Distribution of Marks in Practical Examination:

Total = 25 Marks [Experiment = 15; Record = 5; Viva = 5]

Practicals:

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

SEMESTER IV **GENERIC ELECTIVE** **1 Paper**

Total 100 x 1 = 100 Marks

IV. GENERIC ELECTIVE (GE 4))

(Credits: Theory-04, Practicals-02)

Marks : 75 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100	**Pass Marks: Th ESE = 30 + Pr ESE =10**

Instruction to Question Setter for

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** six questions of fifteen marks each, out of which any four are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

EARTH RESOURCES

Theory: 60 Lectures

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:

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

GE 4 LAB: ESSENTIALS OF GEOLOGY

60 Lectures

Marks : 25 (Pr 3Hrs)=25	**Pass Marks: Pr ESE =10**

Instruction to Question Setter for

End Semester Practical Examination (ESE):

Distribution of Marks in Practical Examination:

Total = 25 Marks [Experiment = 15; Record = 5; Viva = 5]

Practicals:

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

COURSES OF STUDY FOR **ABILITY ENHANCEMENT COMPULSORY COURSE** IN **"ENGLISH"**

SEMESTER I **ENGLISH COMMUNICATION** **1 Paper**

I. ENGLISH COMMUNICATION

Theory: 30 Lectures

Marks : 100 (ESE 3Hrs) =100	**Pass Marks Th ESE = 40**

Instruction to Question Setter for

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain three questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 & 3 will be short answer type** of 5 marks. **Group B will contain descriptive type** six questions of 20 marks each, out of which any four are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

OBJECTIVE: To equip students effectively to acquire skills in reading, writing, comprehension and communication, as also to use electronic media for English Communication.

Unit I: Communication – Definition, stages, barriers, types: verbal and non-verbal, Listening-Meaning, Nature and importance, Principles of Good Listening.

Unit II: Class-presentation (Oral for five minutes) on any of the above-mentioned topics:
Descriptive writing, expansion of an idea.

Unit III: Writing skills –, notice writing, advertisement writing, précis writing, essay writing, letter writing (applications), Business letter formats (letters of enquiry, replies and complaints), resume writing, covering letter

Unit IV: Vocabulary building: One word substitution, synonyms and antonyms, idioms and phrases

Suggested Reading:

- *Technical Communication*, M.H. Rizvi, Tata McGrawhill
- *Effective Business Communication*, Asha Kaul
- *Developing Communication Skills*, Krishnamohan
- *Functional Grammar and Spoken and Written Communication in English*, Bikram K. Das, Orient Blackswan
- *Precis, Paraphrase and Summary,*P.N. Gopalkrishnan, Authors Press
- *Communication Skills,* Sanjay Kumar and Pushplata, Oxford Publication

Note: Latest edition of text books may be used.

OR

SEMESTER I **HINDI COMMUNICATION** **1 Paper**

Total 100 x 1 = 100 Marks

II. HINDI COMMUNICATION

Theory: 30 Lectures

Marks : 100 (ESE 3Hrs) =100	**Pass Marks Th ESE = 40**

प्रश्न पत्र के लिए निर्देश

छमाही परीक्षा :

*प्रश्नों के दो समूह होंगे। **खण्ड 'A' अनिवार्य है** जिसमें तीन प्रश्न होंगे। **प्रश्न संख्या 1** में दस **अत्यंत लघु उत्तरीय** 1 अंक के प्रश्न होंगे। **प्रश्न संख्या 2 व 3 लघु उत्तरीय** 5 अंक का प्रश्न होगा। **खण्ड 'B'** में छः में से किन्हीं चार 20 अंको के **वर्णनात्मक प्रश्नों** के उत्तर देने होंगे।*

***नोट** : थ्योरी परीक्षा में पूछे गए प्रत्येक प्रश्न में उप–विभाजन हो सकते हैं।*

हिन्दी व्याकरण एवं संप्रेषण

(क्रेडिट: सैद्धान्तिक -02)

सैद्धान्तिक: 30 व्याख्यान

इकाई–1 हिन्दी व्याकरण और रचना,

संज्ञा, सर्वनाम, वि ोशण, क्रिया, अव्यय, कारक, वचन, संधि,उपसर्ग, प्रत्यय तथा समास, लिंग निर्णय, पर्यायवाची भाब्द, विलोम भाब्द, अनेक भाब्दों के लिए एक भाब्द, भाब्द भाुद्धि, वाक्य भाुद्धि, मुहावरे और लोकोक्तियां, पल्लवन एवं संक्षेपण।

इकाई –2 निबंध कला तथा समसामयिक एवं राष्ट्रीय विषयों पर निबंध लेखन

इकाई –3 संप्रेषण (संचार)

–संप्रेशण की अवधारण और महत्व, संप्रेशण के लिए आव यक भार्तें, संप्रेशण के प्रकार, संप्रेशण का माध्यम, संप्रेशण कला, संप्रेशण की तकनीक, वाचन कला, समाचार वाचन, साक्षात्कार कला, रचनात्मक लेखन का लक्ष्य, रचनात्मक लेखन का आधार, भाव और विचारों की प्रस्तुति, वाक् कला की उपयोगिता।

अनुशंसित पुस्तकें :–

- वृहत व्याकरण भास्कर : डॉ0 वचनदेव कुमार
- वृहत निबंध भास्कर : डॉ0 वचनदेव कुमार
- आधुनिक हिन्दी व्याकरण और रचना : डॉ0 वासुदेव नन्दन प्रसाद
- रचना मानस : प्रो0 रामेश्वर नाथ तिवारी
- व्यवहारिक हिन्दी : डॉ0 जंग बहादुर पाण्डेय
- रचनात्मक लेखन : डॉ0 रमेश गौतम
- राजहंस हिन्दी निबंध : प्रो0 आर0 एन0 गौड़
- सफल हिन्दी निबंध : रत्नेश्वर
- निबंध सहचर : डॉ0 लक्ष्मण प्रसाद
- उपकार मुहावरे और लोकोक्तियाँ : प्रो0 राजेश्वर प्रसाद चतुर्वेदी
- कहानियों कहावतों की : प्रताप अनम
- सम्प्रेषणपरक हिन्दी भाषा शिक्षण : डॉ0 वैश्ना नारंग
- शैली विज्ञान : डॉ0 सुरेश कुमार
- शैली विज्ञान प्रतिमान और विश्लेषण : डॉ0 पांडेय शशिभूषण 'शीतांशु'
- भौली विज्ञान का इतिहास : डॉ0 पांडेय शशिभूषण 'शीतांशु'

OR

SEMESTER I **AECC NH + ENGLISH** **1 Paper**

Total 50 x 2 = 100 Marks

III. AECC NH + MB COMMUNICATION
(NON-HINDI + MATRI BHASHA)
अहिन्दी + मातृभषा (क्रेडिट: सैद्धान्तिक 01 + 01 = 02)

[A] NON-HINDI
अहिन्दी

Theory: 15 Lectures
(क्रेडिट: सैद्धान्तिक -01)

Marks : 50 (ESE 1.5 Hrs) = 50	**Pass Marks Th ESE = 20**

प्रश्न पत्र के लिए निर्देश
छमाही परीक्षा :

*प्रश्नों के दो समूह होंगे। **खण्ड 'A' अनिवार्य है** जिसमें **लघु उत्तरीय** 5 अंक का दो प्रश्न होगा। **खण्ड 'B'** में तीन में से किन्हीं दो 20 अंको के **वि□□यनि□□ठ / वर्णनात्मक प्रश्नों** के उत्तर देने होंगे।*

***नोट** : सैद्धान्तिक परीक्षा में पूछे गए प्रत्येक प्रश्न में उप–विभाजन हो सकते हैं।*

हिन्दी व्याकरण एवं संप्रेषण
सैद्धान्तिक: 15 व्याख्यान

इकाई–1 **हिन्दी व्याकरण और रचना,**
संज्ञा, सर्वनाम, वि ोशण, क्रिया, अव्यय, कारक, वचन, संधि,उपसर्ग, प्रत्यय तथा समास, लिंग निर्णय, पर्यायवाची भाब्द, विलोम भाब्द, अनेक भाब्दों के लिए एक भाब्द, भाब्द भाुद्धि, वाक्य भाुद्धि, मुहावरे और लोकोक्तियां, पल्लवन एवं संक्षेपण।

इकाई –2 **संप्रेषण (संचार)**
–संप्रेशण की अवधारण और महत्व, संप्रेशण के लिए आव यक भार्तें, संप्रेशण के प्रकार, संप्रेशण का माध्यम, संप्रेशण कला, संप्रेशण की तकनीक, वाचन कला, समाचार वाचन, साक्षात्कार कला, रचनात्मक लेखन का लक्ष्य, रचनात्मक लेखन का आधार, भाव और विचारों की प्रस्तुति, वाक् कला की उपयोगिता।

अनुशंसित पुस्तकें :–

- □ वृहत व्याकरण भास्कर : डॉ0 वचनदेव कुमार
- □ वृहत निबंध भास्कर : डॉ0 वचनदेव कुमार
- □ आधुनिक हिन्दी व्याकरण और रचना : डॉ0 वासुदेव नन्दन प्रसाद
- □ रचना मानस : प्रो0 रामेश्वर नाथ तिवारी
- □ व्यवहारिक हिन्दी : डॉ0 जंग बहादुर पाण्डेय
- □ रचनात्मक लेखन : डॉ0 रमेश गौतम
- □ राजहंस हिन्दी निबंध : प्रो0 आर0 एन0 गौड़
- □ सफल हिन्दी निबंध : रत्नेश्वर
- □ निबंध सहचर : डॉ0 लक्ष्मण प्रसाद
- □ उपकार मुहावरे और लोकोक्तियाँ : प्रो0 राजेश्वर प्रसाद चतुर्वेदी
- □ कहानियों कहावतों की : प्रताप अनम
- □ सम्प्रेषणपरक हिन्दी भाषा शिक्षण : डॉ0 वैश्ना नारंग
- □ शैली विज्ञान : डॉ0 सुरेश कुमार
- □ शैली विज्ञान प्रतिमान और विश्लेषण : डॉ0 पांडेय शशिभूषण 'शीतांशु'
- □ भौली विज्ञान का इतिहास : डॉ0 पांडेय शशिभूषण 'शीतांशु'

[B] MATRI BHASHA COMMUNICATION

Theory: 15 Lectures

मातृभषा संप्रेषण (संचार) **Marks : 50 (ESE 1.5 Hrs) = 50** (क्रेडिट: सैद्धान्तिक -01)

[B 1] BENGALI COMMUNICATION OR

[B 2] SANSKRIT COMMUNICATION OR

[B 3] URDU COMMUNICATION OR

[B 4] TRL COMMUNICATION OR

[B 5] AECC ENGLISH

Theory: 15 Lectures

Marks : 50 (ESE 1.5 Hrs) = 50	**Pass Marks Th ESE = 20**

Instruction to Question Setter for

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions of 5 marks each. **Group B will contain descriptive type** three questions of 20 marks each, out of which any two are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

Unit I: Novel

1. The English Teacher (R.K. Narayan)

Unit II: Poetry

1. Stopping by words on a Snowy Evening (Robert Frost)
2. A slumber did My Sprit Seal (William Woodworth)
3. My Native Land (H.L.V. Derozio)
4. The Night of Scorpion (Nissim Ezekiel)
5. Break, Break, Break (A.L. Tennyson)
6. Starlit Night (G.M. Hopkins)

Unit III: Grammer

1. Common Errors
2. Fill up the blanks with prepositions.
3. One word substitution.

Suggested Reading:

- A String of Poems (Edited by: S.M.P.N. Singh Sashi and A.B.Sharan)
- The Winged Word (Edited by: David Green)

SAMPLE CALCULATION FOR SGPA & CGPA FOR UNDERGRADUATE
'B.Sc./B.A./B.Com/B.Voc. Honours' PROGRAMME

Distribution of Credits Semester wise for Undergraduate Honours Courses

Table B-1: UG (B.A./ B.Sc./B.Com. /B.Voc Hons. Programme)

Semester wise distribution of 164 Credits

	CC	AECC	GE-A	GE-B	SEC	DSE	Total credits
Semester I	12	02	06	06			20
Semester II	12	02	06	06			20
Semester III	18		06	06	02		26
Semester IV	18		06	06	02		26
Semester V	12					12	24
Semester VI	12					12	24
	84	**04**	**24**	**24**	**04**	**24**	**140 + 24 = 164**

CC=Core Course; AECC=Ability Enhancement Compulsory Course; GE=Generic Elective; SEC=Skill Enhancement Course; DSE=Discipline Specific Elective

Table B-2: Sample calculation for SGPA for B.Sc./B.A./B.Com/B.Voc. Honours Programme

Course	Credit	Grade Letter	Grade Point	Credit Point (Credit X Grade)	SGPA (Credit Point/Credit)
Semester I					
C-1	06	A	8	48	
C-2	06	B+	7	42	
AECC-1	02	B	6	12	
GE-1A	06	B	6	36	
GE-1B	06	B+	7	42	
Total	**26**			**180**	**6.92 (180 / 26)**
Semester II					
C-3	06	B	6	36	
C-4	06	C	5	30	
AECC-2	02	B+	7	14	
GE-2A	06	A+	9	54	
GE-2B	06	B+	7	42	
Total	**26**			**176**	**6.76 (176 / 26)**
Semester III					
C-5	06	A+	9	54	
C-6	06	0	10	60	
C-7	06	A	8	48	
SEC-1	02	A	8	16	
GE-3A	06	0	10	60	
GE-3B	06	B+	7	42	
Total	**32**			**280**	**8.75 (280 / 32)**
Semester IV					
C-8	06	B	6	36	
C-9	06	A+	9	54	
C-10	06	B	6	36	
SEC-2	02	A+	9	18	
GE-4A	06	A	8	48	
GE-4B	06	B+	7	42	
Total	**32**			**234**	**7.31 (234 / 32)**
Semester V					
C-11	06	B	6	36	
C-12	06	B+	7	42	
DSE-1	06	0	10	60	
DSE-2	06	A	8	48	
Total	**24**			**186**	**7.75 (186 / 24)**
Semester VI					
C-13	06	A+	9	54	
C-14	06	A	8	48	
DSE-3	06	B+	7	42	
DSE-4	06	A	8	48	
Total	**24**			**192**	**8.0 (192 / 24)**
CGPA					
Grand Total	**140+24=164**			**1248**	**7.61 (1248 / 164)**

Table B-3: Sample calculation for CGPA for B.Sc./B.A./B.Com/B.Voc. Honours Programme

Semester I	Semester II	Semester III	Semester IV	Semester V	Semester VI
Credit:26; SGPA:6.92	Credit:26; SGPA: 6.76	Credit:32; SGPA: 8.75	Credit:32; SGPA: 7.31	Credit:24; SGPA: 7.75	Credit:24; SGPA: 8.0

Thus CGPA= (26x6.92+26x6.76+32x8.75+32x7.31+24x7.75+24x8.0)/164**=7.61**

MARKS DISTRIBUTION FOR EXAMINATIONS AND FORMAT OF QUESTION PAPERS

Marks Distribution of Mid Semester Theory Examinations:

Table No. C1: Marks distribution of Theory Examinations of Mid Semester

Topic	Code	Full Marks	Pass Marks	Time	Group-A (Very short answer type Compulsory Questions) No. of Questions x Marks = F.M.	Group-B (Descriptive Questions with Choices) No. of Questions x Marks = F.M.	Total No. of Questions to Set	
							Group A	Group B
Mid Sem*	T15	15	---	1 Hr	5 x1 =5	2 (out of 3) x5 =10	5	3
	T25	25	---	1 Hr	5 x1 =5	4 (out of 6) x5 =20	5	6

Marks Distribution of End Semester Theory Examinations:

Table No. C2: Marks distribution of Theory Examinations of End Semester

Topic	Code	Full Marks	Pass Marks including Mid Sem	Time	Group-A# (Very short answer type Compulsory Questions) No. of Questions x Marks = F.M.	Group-B (Descriptive Questions with Choices) No. of Questions x Marks = F.M.	Total No. of Questions to Set	
							Group A#	Group B
End Sem	T60	60	30	3 Hrs	Q.No.1 (10x1) + 1x5 =15	3 (out of 5) x15 =45	2	5
	T75	75	40	3 Hrs	Q.No.1 (10x1) + 1x5 =15	4 (out of 6) x15 =60	2	6
	T100	100	40	3 Hrs	Q.No.1 (10x1) + 2x5 =20	4 (out of 6) x20 =80	3	6
	T50 +T50	50X2=100	20	3 Hrs	2 x5 =10	2 (out of 3) x20 =40	2	3

 # Question No.1 in Group-A carries 10 very short answer type 1 Mark Questions.

Marks Distribution of Mid/End Semester Practical Examinations:

Table No. C3: Marks distribution of Practical Examinations of End Semester

Topic	Code	Full Marks	Pass Marks	Time	Distribution of Marks			Total No. of Questions to Set
					Experiment	Record	Viva	
End Sem	P25	25	10	3 Hrs	15	5	5	
	P50	50	20	3 Hrs	30	10	10	Pr. with components of both papers
	P75	75	30	3 Hrs	45	15	15	Pr. with components of all three papers
	P100	100	40	3 Hrs	60	20	20	Pr. with components of all four papers

Abbreviations : **T**= Theory Examination, **P**= Practical Examination.

Mid Sem* **:** There will be 15 Marks Theory Examination in Practical Subjects and 25 Marks Theory Examination in Non-Practical Subjects/ Papers. 25 Marks Theory Examination may include 10 Marks questions from Assignment/ Project/ Tutorial where ever applicable.

Note **:** There may be subdivisions in each question asked in Theory Examinations.

FORMAT OF QUESTION PAPER FOR MID SEM EXAMINATION

OF

SUBJECTS WITH PRACTICAL

Ranchi University, Ranchi

Mid Sem No. Exam Year

Subject/ Code

F.M. =15 **Time**=1Hr.

General Instructions:
समान्य निर्दे□ा :

i. **Group A** carries very short answer type compulsory questions.
(खंड 'A' में अत्यंत लघु उत्तरीय अनिवार्य प्र न हैं।)
ii. **Answer 2 out of 3** subjective/ descriptive questions given in **Group B**.
(खंड 'B' के तीन में से किन्हीं दो वि ायनि ठ/ वर्णनात्मक प्र नों के उत्तर दें।)
iii. Answer in your own words as far as practicable.
(यथासंभव अपने भाब्दों में उत्तर दें।)
iv. Answer all sub parts of a question at one place.
(एक प्र न के सभी भागों के उत्तर एक साथ लिखें।)
v. Numbers in right indicate full marks of the question.
(पूर्णांक दायीं ओर लिखे गये हैं।)

Group A

1. ..... [5x1=5]
2. .....
3. .....
4. .....
5. .....

Group B

6. ..... [5]
7. ..... [5]
8. ..... [5]

Note: There may be subdivisions in each question asked in Theory Examination.

FORMAT OF QUESTION PAPER FOR MID SEM EXAMINATION

OF

SUBJECTS WITHOUT PRACTICAL

Ranchi University, Ranchi

Mid Sem No. Exam Year

Subject/ Code

F.M. =25 **Time**=1Hr.

General Instructions:
समान्य निर्दे□ा :

i. **Group A** carries very short answer type compulsory questions.
(खंड 'A' में अत्यंत लघु उत्तरीय अनिवार्य प्र न हैं।)
ii. **Answer 4 out of 6** subjective/ descriptive questions given in **Group B**.
(खंड 'B' के छः में से किन्हीं चार वि ायनि ठ/ वर्णनात्मक प्र नों के उत्तर दें।)
iii. Answer in your own words as far as practicable.
(यथासंभव अपने भाब्दों में उत्तर दें।)
iv. Answer all sub parts of a question at one place.
(एक प्र न के सभी भागों के उत्तर एक साथ लिखें।)
v. Numbers in right indicate full marks of the question.
(पूर्णांक दायीं ओर लिखे गये हैं।)

Group A

1. ..... [5x1=5]
2. .....
3. .....
4. .....
5. .....

Group B

6. ..... [5]
7. ..... [5]
8. ..... [5]
9. ..... [5]
10. ..... [5]
11. ..... [5]

Note: There may be subdivisions in each question asked in Theory Examination.

FORMAT OF QUESTION PAPER FOR END SEM EXAMINATION

OF

AECC NH + MB COMMUNICATION

Ranchi University, Ranchi

End Sem No. Exam Year

Subject/ Code

F.M. =50 **P.M.**=20 **Time**=1.5Hrs.

General Instructions:

i. **Group A** carries short answer type **compulsory** questions.
(खंड 'A' में लघु उत्तरीय अनिवार्य प्र न हैं।)

ii. **Answer 2 out of 3** subjective/ descriptive questions given **in Group B**.
(खंड 'B' के तीन में से किन्हीं दो वि ायनि ठ/ वर्णनात्मक प्र नों के उत्तर दें।)

iii. Answer in your own words as far as practicable.
(यथासंभव अपने भाब्दों में उत्तर दें।)

iv. Answer all sub parts of a question at one place.
(एक प्र न के सभी भागों के उत्तर एक साथ लिखें।)

v. Numbers in right indicate full marks of the question.
(पूर्णांक दायीं ओर लिखे गये हैं।)

Group A

1. ..... [5]
2. ..... [5]

Group B

3. ..... [20]
4. ..... [20]
5. ..... [20]

Note: There may be subdivisions in each question asked in Theory Examination.

FORMAT OF QUESTION PAPER FOR END SEM EXAMINATION

OF

SUBJECTS WITH PRACTICAL

Ranchi University, Ranchi

End Sem No. Exam Year

Subject/ Code

F.M. =60 **P.M.**=30 (Including Mid Sem) **Time**=3Hrs.

General Instructions:

i. **Group A** carries very short answer type **compulsory** questions.
ii. **Answer 3 out of 5** subjective/ descriptive questions given in **Group B**.
(खंड 'B' के पाँच में से किन्हीं तीन वि ायनि ठ/ वर्णनात्मक प्र नों के उत्तर दें।)
iii. Answer in your own words as far as practicable.
(यथासंभव अपने भाब्दों में उत्तर दें।)
iv. Answer all sub parts of a question at one place.
(एक प्र न के सभी भागों के उत्तर एक साथ लिखें।)
v. Numbers in right indicate full marks of the question.
(पूर्णांक दायीं ओर लिखे गये हैं।)

Group A

1. [10x1=10]

i. ..... [10x1=10]
ii. .....
iii. .....
iv. .....
v. .....
vi. .....
vii. .....
viii. .....
ix. .....
x. .....

2. ..... [5]

Group B

3. ..... [15]

4. ..... [15]

5. ..... [15]

6. ..... [15]

7. ..... [15]

Note: There may be subdivisions in each question asked in Theory Examination.

FORMAT OF QUESTION PAPER FOR END SEM EXAMINATION

OF

SUBJECTS WITHOUT PRACTICAL

Ranchi University, Ranchi

End Sem No. Exam Year

Subject/ Code

F.M. =75 **P.M.**=40 (Including Mid Sem) **Time**=3Hrs.

General Instructions:

i. **Group A** carries very short answer type **compulsory** questions.
ii. **Answer 4 out of 6** subjective/ descriptive questions given in **Group B**.
(खंड 'B' के छः में से किन्हीं चार वि ायनि ठ/ वर्णनात्मक प्र नों के उत्तर दें।)
iii. Answer in your own words as far as practicable.
(यथासंभव अपने भाब्दों में उत्तर दें।)
iv. Answer all sub parts of a question at one place.
(एक प्र न के सभी भागों के उत्तर एक साथ लिखें।)
v. Numbers in right indicate full marks of the question.
(पूर्णांक दायीं ओर लिखे गये हैं।)

Group A

1. [10x1=10]

i. .....
ii. .....
iii. .....
iv. .....
v. .....
vi. .....
vii. .....
viii. .....
ix. .....
x. .....

2. ..... [5]

Group B

3. ..... [15]
4. ..... [15]
5. ..... [15]
6. ..... [15]
7. ..... [15]
8. ..... [15]

Note: There may be subdivisions in each question asked in Theory Examination.

FORMAT OF QUESTION PAPER FOR END SEM EXAMINATION

OF

GE, SEC, GENERAL & AECC HINDI/ ENGLISH COMMUNICATION

Ranchi University, Ranchi

End Sem No. Exam Year

Subject/ Code

F.M. =100 **P.M.**=40 **Time**=3Hrs.

General Instructions:

i. **Group A** carries very short answer type **compulsory** questions.
ii. **Answer 4 out of 6** subjective/ descriptive questions given in **Group B**.
(खंड 'B' के छः में से किन्हीं चार वि ायनि ठ/ वर्णनात्मक प्र नों के उत्तर दें।)
iii. Answer in your own words as far as practicable.
(यथासंभव अपने भाब्दों में उत्तर दें।)
iv. Answer all sub parts of a question at one place.
(एक प्र न के सभी भागों के उत्तर एक साथ लिखें।)
v. Numbers in right indicate full marks of the question.
(पूर्णांक दायीं ओर लिखे गये हैं।)

Group A

1. [10x1=10]
   i. .....
   ii. .....
   iii. .....
   iv. .....
   v. .....
   vi. .....
   vii. .....
   viii. .....
   ix. .....
   x. .....
2. ..... [5]
3. ..... [5]

Group B

4. ..... [20]
5. ..... [20]
6. ..... [20]
7. ..... [20]
8. ..... [20]
9. ..... [20]

Note: There may be subdivisions in each question asked in Theory Examination.