

**ANDHRA UNIVERSITY
DEPARTMENT OF GEOLOGY
COLLEGE OF SCIENCE AND TECHNOLOGY**

**Scheme of Instruction and Examinations
IX SEMESTER, M.S. GEOLOGY (5 YEAR INTEGRATED COURSE
(With effect from the admitted batch 2011-2012)**

IX – SEMESTER, M.S. GEOLOGY (5 YEAR INTEGRATED COURSE)

Scheme of Instruction and Examinations
(With effect from the admitted batch of 2011-2012)

S. No	Course	Teaching/Lab Hours Per week	Duration of Examination hours	Allotment of Marks		Total Marks	Subject Credits
				External	Internal (Sessionals)		
01.	Paper-I Mineral Exploration and Mineral Economics	3	3	85	15	100	4
02.	Paper-II Fuel Geology	3	3	85	15	100	4
03.	Paper-III Geomorphology, Remote Sensing	3	3	85	15	100	4
04.	Paper-IV Sedimentary Basins of India	3	3	85	15	100	4
05.	Paper-I Mineral Exploration and Mineral Economics	4	3	50	-	50	2
06.	Paper-II Fuel Geology	4	3	50	-	50	2
07.	Paper-III Geomorphology, Remote Sensing	4	3	50	-	50	2
08.	Non-Core	4	3	85	15	100	4
09.	Geological Mapping (Two weeks)	-	-	-	-	75	3
10.	Viva Voice	-	-	-	-	25	1
TOTAL						750	30

SYLLABUS

IX – SEMESTER, M. S. GEOLOGY (5 YEAR INTEGRATED COURSE)

PAPER- I, MINERAL EXPLORATION AND MINERAL ECONOMICS

(Effective from the Admitted Batch of 2011 – 2012)

UNIT – I

Reconnaissance survey Geological mapping, guides to ore search. Types of sampling and sampling errors. Average assays.

UNIT –II

Geological prospecting for metallic and non-metallic mineral deposits – Bauxite chromite, coal, copper, Lead and Zine, Manganese phospholites

UNIT – III

Geophysical methods of prospecting of metallic and non metallic mineral deposits Gravity – Electrical – Magnetic, seismic and radioactivity methods. Data generation and interpretation. Exploration of natural gas and oil.

UNIT- IV

Geo-chemical Environment. Geo-chemical dispersion, Geo-chemical mobility. Associations of elements. The pattern of geo-chemical distribution. Principles of interpretation. Primary dispersion, secondary dispersion of elements. Vegetation and the geo-chemical methods in mineral exploration.

ASSIGNMENTS

Demand & Supply of minerals and conservation and substitution of minerals Strategic, critical and essential minerals changing pattern on mineral consumption and economy in India. Mineral based industries in Andhra Pradesh.

(P.T.O)

PRACTICALS:

Problems on average assay values, Problems on ore reserve estimation. Grade maps and lithofacies maps and their interpretation. Plotting of the assay values. Anomaly maps and their interpretation. Use and interpretation of geophysical data.

TEXT BOOKS:

1. Mining Geology by MC kinstry Geochemical Mineral Bachi Viva.
2. Field Geology by latee.
3. Mineral Economics by satirical & Sharma
4. Practical munch of exploration & Prospect by S.K. Babu.
5. Geo-Chemistry in mineral exploration by Hakess / webb.

Model Question Paper

IX – SEMESTER, M. S. GEOLOGY (5 YEAR INTEGRATED COURSE)

PAPER – I, MINERAL EXPLORATION AND MINERAL ECONOMICS,

(Effective from the Admitted Batch of 2011-2012)

Time: 3Hrs

Max. Marks: 85

Answer **FIVE** questions, choosing **ONE** from each Unit.

All questions carry equal marks.

UNIT-I

1. Explain in detail reconnaissance survey.

OR

2. Answer any **TWO** of the following:
 - a) Geological prospecting.
 - b) Sampling.
 - c) Geological mapping.

UNIT-II

3. Write about geological prospecting for coal deposit and add a note on Singareni coal deposits of Andhra Pradesh.

OR

4. Answer any **TWO** of the following:
 - a) Ore reserve estimation.
 - b) Asbestos deposits of India.
 - c) Non-metallic mineral deposits.

UNIT-III

5. Describe the various geophysical methods of prospecting for metallic deposits.

OR

6. Answer any **TWO** of the following:
 - a) Data generation and interpretation.
 - b) Radioactivity method.
 - c) Exploration of gas and oil.

(P.T.O)

UNIT-IV

7. Write an essay on geochemical mobility and its importance in mineral exploration.

OR

8. Answer any **TWO** of the following:
- a) Primary dispersion
 - b) Geochemical environment.
 - c) Geobotanical methods in mineral exploration.
 - d)

SYLLABUS

IX – SEMESTER, M. S. GEOLOGY (5 YEAR INTEGRATED COURSE)

PAPER- II, FUEL GEOLOGY

(Effective from the Admitted Batch of 2011 – 2012)

UNIT-I

Surface and subsurface occurrences of petroleum, pools, fields and provinces. Classification and Nomenclature of Reservoir rocks, fragmental and chemical. Origin and classification of porosity and permeability. Type and nature of source rocks. Origin of petroleum – Organic origin – Nature of organic source. Maturation of Kerogen, Biogenic and thermal effect.

UNIT-II

Migration and accumulation of petroleum, primary and secondary migration. Geological factors controlling hydrocarbon migration routes and stratigraphic barriers. Reservoir traps – Classification of hydrocarbon traps, structural, stratigraphic and combination. Reservoir fluids – Water, oil and gas and their physical and chemical characters.

UNIT-III

Methods of petroleum exploration – Well logging. Petroliferous basins of India – Assam, Bengal, Krishna, Godavari, Cauvery, Cambay and Bombay offshore basins. Occurrence of gas hydrates in the Eastern continental margin of India.

UNIT-IV

Geological conditions of coal formation. Origin of peat, bitumen, lignite and anthracite. Development of coal facies. Types of deposition, peat forming plants, nutrient supply, bacterial activity, temperature, redox potential and diagenesis. Classification, ranking and grading of coal.

ASSIGNMENTS

Coal petrology and Evaluation, Microscopic constituents of Coal, Vitrinite, Exinite and Intertinite group. Classification of Gondwana coals, their conditions of deposition and distribution in India. Microlithotypes. Applied coal petrology, petrography of Gondwana coals and Coal bed Methane.

(P.TO)

PRACTICALS:

Preparation of Stratigraphic cross sections, Development of stratigraphic panel (Fench) diagrams. Intertounging diagrams. Structure contour map, location of oil and gas. Isopach and Isolith maps. Identification of Megascopic coal samples, different macerals and microlithotypes. Coal rank measurements based on reflectance. Exercises on well-logging - Electrical, Sp. and Sonic etc for petroleum and coal.

TEXT BOOKS:

- 1) Selly, R.C; 1998: Elements of petroleum geology. Academic press.
- 2) Levenson, A.I, 1985, Geology of petroleum, C.B.S. Publishers and Distributors.
- 3) Chandra, D. Singh, R.M and Sing M.P: 2000: Text book of Coal (Indian Context). Tara Book agency, Varanasi.
- 4) Sing, M.P. (Ed), 1998: Coal and organic petrology, Hindustan pub. Corp. New Delhi.
- 5) P.K. Bhowmick, Phanerozoic petroliferous Basins of India. KDMIPE, ONGC, Dehradun.
- 6) Kotur S. Narasimhan and A.K. Mukherjee; Gondwana coals of India; Allied publishers limited.

Model Question Paper

IX - SEMESTER, M.S. GEOLOGY (5 YEAR INTEGRATED COURSE)

PAPER-II: FUEL GEOLOGY

(Effective from the Admitted Batch of 2011 – 2012)

Time: 3 hours

Max. Marks: 85

Answer any **FIVE** questions, choosing **ONE** from each Unit.
All questions carry equal marks.

UNIT-I

- 1) Write an essay on classification of petroleum Reservoir rocks.

OR

- 2) Write short notes on any **TWO** of the following :
- a) Surface occurrence of oil and gas.
 - b) Porosity.
 - c) Nature of Organic source for hydrocarbons.

UNIT-II

- 3) Discuss about the various geological factors controlling the hydrocarbon migration.

OR

- 4) Write short notes on any **TWO** of the following:
- a) Primary migration.
 - b) Stratigraphic traps.
 - c) Reservoir fluids.

UNIT-III

- 5) Write an essay on methods of petroleum Exploration.

OR

- 6) Write short notes on any **TWO** of the following:
- a) Electrical method of well logging.
 - b) Stratigraphy & Tectonics of Cauvery basin.
 - c) Occurrence of Gas hydrates.

(P.T.O)

UNIT-IV

7) Write an essay on favourable geological conditions of Coal formation.

OR

8) Write short notes on any **TWO** of the following :

- a) Development of Coal facies.
- b) Temperature and redox potential.
- c) Grade of Coal.

SYLLABUS

IX - SEMESTER, M. S. GEOLOGY (5 YEAR INTEGRATED COURE)

PAPER – III, GEOMORPHOLOGY & REMOTE SENSING

(Effective from the Admitted Batch of 2011-2012)

UNIT-I

Photo geology: Introduction. Aerial Photographs: types of Aerial Photographs, classification and geometry. Photogrammetry. Stereo grams, stereo scopes. Stereo scopy and scale in aerial photographs. Aerial mosaics. Aerial mosaics vs toposheet. Principles and fundamentals of aerial photo interpretation and Basic recognition elements in aerial photographs.

UNIT-II

Principles of Remote Sensing: Electromagnetic spectrum. Interaction of EMR with atmosphere and earth surface features. Spectral characteristics of vegetation, water and soil. Remote sensing observation flat forms, resolutions and orbits. Global and Indian space missions i.e. LANDSAT, METEOSAT, SEASAT, SPOT, RADARSAT & IRS Series of satellites.

UNIT-III

Image interpretation: Introduction to Digital Image Processing. Fundamentals of image interpretation. Basic recognition elements in satellite image interpretation. False colour composite (FCC), Aerial photo vs satellite image. Application of remote sensing in geology, geomorphology, mineral exploration and hydro geological studies. Fundamentals of Geographic information system (GIS), Global positioning system (GPS) and their applications.

UNIT-IV

Basic concepts of geomorphology, weathering, mass wasting and soils. Geomorphic cycle. Geomorphic process and resulting land forms. Concept of drainage basin, drainage patterns and slopes.

ASSIGNMENTS

Topographical maps. Geomorphology of India. Morphology and it's relation to structure and lithology. Application of geomorphology in mineral prospecting, civil engineering studies, hydrogeological studies.

(P.T.O)

PRACTICALS:

Study of Topographical maps. Stereo tests and study of different types of aerial photographs. Identification of land forms on oblique/ vertical aerial photographs using stereo scopes. Interpretation of satellite images for lithology, geomorphology and structural features.

TEXT BOOKS:

1. Miller, V.C., 1961: Photogeolgy, Mc Graw H, 11.
2. Sabins F.F., 1985: Remote Sensing – Principles and applications, Freeman.
3. Ray R.G., 1969: Aerial photographs in Geologic interpretations. USGS Prof. Paper 373.
4. Thornbury, W.S.: Principles of Geomorphology, Wiley Eastern New Delhi.
5. Garner H.F., 1974: Origin of Landscapes, oxford University Press.
6. Leopold L.B., 1964: Fluvial processes in geomorphology, Euresia Publishing House.

Model Question Paper

IX – SEMESTER, M. S. GEOLOGY (5 YEAR INTEGRATED COURSE)

PAPER – III, GEOMORPHOLOGY & REMOTE SENSING

(Effective from the Admitted Batch of 2011-2012)

Time: 3Hrs

Max. Marks: 85

Answer FIVE questions, choosing ONE from each Unit.

All questions carry equal marks.

UNIT-I

- 1) What are different types of aerial photographs? Add a note on their geometry

OR

- 2) Write short notes on any **THREE** of the following:

- a) Controlled mosaic.
- b) Nadir point.
- c) Vertical and inclined photograph.
- d) Stereoscope usage.

UNIT-II

- 3) What is electromagnetic spectrum? Discuss its interaction with earth surface features.

OR

- 4) Briefly write about the Indian space programmes.

UNIT-III

- 5) Describe in detail the elements of visual image interpretation for geology.

OR

- 6) Write short notes on any **THREE** of the following:

- a) Global resource satellites.
- b) Remote sensing Platforms.
- c) Aerial photo Vs Satellite image.
- d) Elements of GIS.

(P.T.O)

UNIT-IV

7) Write essay on Fundamental concepts in Geomorphology.

OR

8) Write short notes on any **THREE** of the following:

- a) Weathering agents.
- b) Explain the drainage patterns.
- c) Types of soils.
- d) Geomorphic cycle.

SYLLABUS

IX – SEMESTER, M. S. GEOLOGY (5 YEAR INTEGRATED COURSE)

PAPER- IV, SEDIMENTARY BASINS OF INDIA

(Effective from the Admitted Batch of 2011-2012)

UNIT-I

Basins Classification and Depositional Environments: Tectonic Basin Classification, Tectonics and Basin Filling, Basin Morphology and Depositional Environments.

Basin Evolution and Sediments: Rift basins, Continental Margin and Slope Basins, Intracontinental Sag Basins. Deep-Sea Trenches, Foreland, Back arc and Retro arc Basins, Remnant and Foreland Basins, Collision – Related Basins, Pull-Apart Basins, Basin- Type Transitions (Polyphase Basins)

UNIT-II

Basin mapping methods: Structure and isopach contouring, Lithofacies maps, Geophysical techniques, Clastic petrographic data, Computer mapping methods, Stratigraphic cross sections, Paleocurrent analysis, Remote sensing.

Depositional systems and sequence stratigraphy: Stratigraphic architecture, Nonmarine depositional systems, Coastal depositional system. Clastic shelves and associated depositional systems, Carbonate and evaporate depositional systems, Clastic depositional systems of the continental slope, rise and basin plain, Sequence stratigraphy.

UNIT-III

Stratigraphy, Structure and Tectonics of Onshore and Offshore Sedimentary basins of East Coast of India with special reference to – Bengal Basin – Mahanadi - Krishna - Godavari and Cauvery Basins.

UNIT-IV

Stratigraphy, Structure and Tectonics of Onshore and Offshore Sedimentary basins of West Coast of India with special reference to Kutch – Saurashtra – Narmada – Cambay Bombay high, Kerala – Konkan Offshore Basins.

ASSIGNMENTS

Stratigraphy, Structure and Tectonics of other Sedimentary basins of India with special reference to Cuddapah - Vindhyan – Rajasthan - Assam shelf – and Himalayan foot hill Basins.

TEXT BOOKS:

- 1) Einsele G 1992 Sedimentary Basins. Springer Verlag.
- 2) Miall A 2000 Principles of Sedimentary Basin analysis.
- 3) Sengupta S 1997. Introduction to Sedimentology oxford – IBH.
- 4) Petrol ferrous Basins of India, ONGC, Petroleum Asia Journal.

Model Question Paper

IX-Semester, M. S. GEOLOGY (5 YEAR INTEGRATED COURSE)

PAPER – IV, SEDIMENTARY BASINS OF INDIA

(Effective from the Admitted Batch of 2011-2012)

Time: 3hours

Max. Marks: 85

**Answer one question from each Unit
All questions carry equal marks.**

UNIT – I

- 1) Write in detail the Tectonic classification of Sedimentary Basins.

OR

- 2) Write short notes on any **TWO** of the following:
- a) Rift basins
 - b) Intercontinental Sag Basins
 - c) Foreland Basins.

UNIT – II

- 3) Explain different mapping methods of Sedimentary Basins.

OR

- 4) Write short notes on any **TWO** of the following:
- a) Sequence stratigraphy.
 - b) Carbonate and evaporate depositional systems.
 - c) Nonmarine depositional systems.

UNIT – III

- 5) Write on the Stratigraphy, Structure and Tectonics of Krishna -Godavari Basin.

OR

- 6) Write short notes on any **TWO** of the following:
- a) Mahanadi Basin.
 - b) Bengal Basin.
 - c) Cauvery Basin.

(P.T.O)

UNIT – IV

- 7) Write on the Stratigraphy, Structure and Tectonics of Bombay high Offshore Basin.

OR

- 8) Write short notes on any **TWO** of the following:
- a) Cambay Basin.
 - b) Narmada Basin.
 - c) Konkan Offshore Basin.