**ANDHRA UNIVERSITY**

**DEPARTMENT OF GEOLOGY**

**COLLEGE OF SCIENCE AND TECHNOLOGY**

Scheme of Instruction and Examinations

**IV SEMESTER, M.Sc. (TECH) APPLIED GEOLOGY**

(With effect from the admitted batch 2016-2017)

**IV – SEMESTER, M.Sc. (TECH) APPLIED GEOLOGY**

Scheme of Instruction and Examinations

(With effect from the admitted batch of 2016-2017)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| S. No | Course | Teaching/Lab Hours  Per week | Duration of Examination hours | Allotment of Marks | | Total Marks | Subject Credits |
| Final | Mid-Exam |
| 01. | Paper - I  Marine Geology | 4 | 3 | 80 | 20 | 100 | 4 |
| 02. | Paper – II  Geological & Geochemical Exploration | 4 | 3 | 80 | 20 | 100 | 4 |
| 03. | Paper – III  Mineral Economics | 4 | 3 | 80 | 20 | 100 | 4 |
| 04. | Paper – IV  Surface & Under Ground Mining | 4 | 3 | 80 | 20 | 100 | 4 |
| 05. | Paper - I  Marine Geology *(Practical)* | 4 | 3 | 50 | | 50 | 2 |
| 06. | Paper – II  Geological & Geochemical Exploration *(Practical)* | 4 | 3 | 50 | | 50 | 2 |
| 07. | Paper – III  Mineral Economics *(Practical)* | 4 | 3 | 50 | | 50 | 2 |
| 08. | Mining Training Programme | - | - | 75 | | 75 | 3 |
| 09. | Viva-Voice | - | - | 25 | | 25 | 1 |
| **TOTAL** | | | | | | **650** | **26** |

***SYLLABUS***

**IV – SEMESTER, M.Sc. (TECH) APPLIED GEOLOGY**

**PAPER- I, MARINE GEOLOGY**

**(Effective from the Admitted Batch of 2016 - 2017)**

**UNIT-I**

Introduction and Historical development of Marine Geology. Sediment sampling methods; morphology of the ocean; oceanic crust structure, petrology and sources of oceanic crust; and changes after formation.

**UNIT-II**

Continental drift; sea floor spreading; Platetectonics – concept and geometry of plate tectonics; driving mechanism of plates, Island Arcs and back arc basins; Continental margin types: Divergent – convergent and active margins; collision processes on convergent margins. Nearshore geological processes on the continental shelf.

**UNIT-III**

Sea-Coast-Classification, Sea-level changes, Rate of sedimentation. Marine pollution. Law of the Sea.

**UNIT-IV**

Deep sea sediments and classification; Terrigenous deep sea sediments; Biogenic and Authgenic sediments. The geologic record of bottom currents – Method of study; erosion, transportation and deposition of bottom currents. Marine Mineral Resources.

**UNIT-V**

Palaeo-oceanography and sediment history of the ocean basins – Pacific, Atlantic and Indian. Oceanic history of Calcium Carbonate Compensation Depth (CCD), Global palaeo-oceanography and evolution – Critical events in ocean history.

**(P.T.O)**

**PRACTICALS:**

**Beach Profile studies:** Estimation of deposition and erosion. **Interpretation of Echo-profiles** – Continsenenetal Shelf, Slope, rise and Abyssal Plains. **Coarse fraction studies:** Oolites, Glauconite and Phosphorite etc**. Clay mineral analysis** – X- ray diffraction charts.

Estimation of calcium carbonate and Organic matter percentage in the sediments.

**TEXT BOOKS:**

1. James P. Kennett 1982, Marine Geology, Prentice Hall.
2. Shepard, F.P.1948, Sub Marine Geology, Harper and Row.
3. Seibold, E and Berger, W.H. 1982 The Sea Floor, Springs – Verlag.
4. William W.A. Nikovechine and R.W. Strenburg The World Ocean.
5. Pipkin, B.N., Gorsline, D.S., Cassey, R.E. 4 Hammond, D.E., 1972. Laboratory Exercises in oceanography, Freeman.

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**MODEL QUESTION PAPER**

**IV – SEMESTER, M. Sc. (TECH) APPLIED GEOLOGY**

**PAPER – I, MARINE GEOLOGY**

**(Effective from the Admitted Batch of 2016 -2017)**

**Time: 3Hrs Max. Marks: 80**

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

**All questions carry equal marks.**

**UNIT – I**

1. Discuss the history and development of marine Geology in the world.

**OR**

1. Write short notes on any **TWO** of the following.

a) Sources of oceanic crust. b) Core samplers.

c) Morphology of the oceans.

**UNIT – II**

1. What is continental drift? Explain the mechanism of platetectonics.

**OR**

1. Write short notes on any **TWO** of the following.

a) Island Arcs. b) Sea floor spreading.

c) Nearshore geological processes.

**UNIT – III**

1. Write detailed notes on classification of sea coasts.

**OR**

1. Write short notes on any **TWO** of the following.

a) Rate of Sedimentation. b) Marine pollution.

c) Law of the sea bed.

**UNIT – IV**

1. Write detail notes on classification of Deep sea sediments.

**OR**

1. Write short notes on any **TWO** of the following.

a) Beach placers. b) Carbonate sediments.

c) Occurrence of hydrocarbons in the sea.

**UNIT-V**

1. Write an essay on the palaeo-oceanography and sediment history of Indian Ocean.

**OR**

1. Write short notes on any **TWO** of the following.

a) Calcium Carbonate Compensation Depth (CCD).

b) Critical events in ocean history.

c) Sediment history of Pacific Ocean.

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***SYLLABUS***

**IV – SEMESTER, M. Sc. (TECH) APPLIED GEOLOGY**

**PAPER – II, GEOLOGICAL & GEOCHEMICAL EXPLORATION**

**(Effective from the Admitted Batch of 2016 – 2017)**

**UNIT – I**

Introduction –Parameters for exploration, Ore genesis in relation to mineral exploration - Geological mapping: Surface and sub surface mapping, Methods of sampling –Drilling techniques –Controls of mineralization.

**UNIT –II**

Guides to ore search –Physiographic, Mineralogical, Stratigraphic, Lithological and Structural guides.

**UNIT – III**

Regional exploration – Different stages. Planning and operation, mineral reserves estimation, calculation of average of grades. Documentation of exploration data.

**UNIT- IV**

Geochemical cycle, mobility and association of elements, primary and secondary dispersion patterns and their classification.

**UNIT-V**

Methods of Geochemical Exploration: Lithogeochemical, Pedogeochemical, Biogeochemical, Atmogeochemical and Geobotanical surveys.

**(P.T.O)**

**PRACTICALS:**

1. Mining Geology, H. E. McKnistry, Asia Publishing House.
2. An Introduction to Mineral Economics, Kaulir Kisor Chatterjee, Publishing for one world.
3. Principles of Geochemistry, Brian Mason & Carleton B. Moore, Willey Eastern Limited.
4. Applied Geochemistry, Frederic R. Siegel, A wiley - Interscience Publication.

**TEXT BOOKS:**

1. Measures of reserves estimation

2. Average grade calculation

3. Preparation of geochemical maps

4. Interpretation of Geochemical data

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**MODEL QUESTION PAPER**

**IV – SEMESTER, M. Sc. (TECH) APPLIED GEOLOGY**

**PAPER – II, GEOLOGICAL & GEOCHEMICAL EXPLORATION**

**(Effective from the Admitted Batch of 2016-2017)**

**Time: 3Hrs Max. Marks: 80**

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

**All questions carry equal marks.**

**UNIT-I**

1. Describe in detail about Geological mapping?

**OR**

1. Answer any **TWO** of the following:
   1. Channel Sampling. b) Core drilling.

c) Parameters for exploration.

**UNIT-II**

1. What are different structural guiders for mineral search?

**OR**

1. Answer any **TWO** of the following:
   1. Physiographic guides – for placer minerals. b)Stretigraphic guides – Coal.

c) Oxidation products – guiders.

**UNIT-III**

1. Write an essay on different stages of Mineral exploration.

**OR**

1. Answer any **TWO** of the following:
   1. Weighted average Grade.
   2. Geometrical Methods of Mineral reserves estimation.
   3. Documentation of exploration data.

**UNIT-IV**

1. Give detail classification on secondary dispersapal palterns of geochemical elements.

**OR**

1. Answer any **TWO** of the following:
   1. Geochemical cycle. b) Mobility of elements.

c) Association of elements.

**UNIT-V**

1. Write in detail about lethogeochemical Method of exploration.

**OR**

1. Answer any **TWO** of the following:
   1. Universal indicators.
   2. Sample collection for Biogeochemical survey.
   3. Principle in Atmogeochemical Method.

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***SYLLABUS***

**IV – SEMESTER, M. Sc. (TECH) APPLIED GEOLOGY**

**PAPER – III, MINERAL ECONOMICS**

**(Effective from the Admitted Batch of 2016 – 2017)**

**UNIT – I**

Concept of mineral economics – Significance of minerals in the nation’s economy – Identification of the problems – Peculiarities inherent in mineral industry – International aspects of mineral industry and geopolitics – Mines and mineral legislation in India – Mineral taxation – National Mineral Policy.

**UNIT –II**

Classification of minerals – major, minor and fuels, Industrial – Strategic, critical and essential minerals – Present and future mineral supplies of the world.

**UNIT – III**

Reserves, production and distribution of various minerals in the world – Indian position in the reserves, production and consumption of various minerals – Exports and imports of minerals – Tenor, grade and specification of important minerals with examples.

**UNIT- IV**

Conservation and substitution of minerals – Low grade ores – Use of scrap – New technologies, synthetics, Changing pattern of mineral consumption.

**UNIT-V**

Growth of mineral industry and economy in India– Minerals and mineral based industries in Andhra Pradesh. Economic minerals of Andhra Pradesh, Captive mining.

**PRACTICALS:**

Problems of ore Economic calculations.

**TEXT BOOKS:**

1. An introduction to mineral economics by K.K. Chatterjee, Wiley Eastern Ltd.
2. Mineral economics by R.K. Sinha and N.S. Sharma.
3. Minerals in the World Industry by Vosknil, W.H.

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**MODEL QUESTION PAPER**

**IV – SEMESTER, M. Sc. (TECH) APPLIED GEOLOGY**

**PAPER – III, MINERAL ECONOMICS**

**(Effective from the Admitted Batch of 2016-2017)**

**Time: 3Hrs Max. Marks: 80**

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

**All questions carry equal marks.**

**UNIT-I**

1. Concept and scope of mineral economics.

**OR**

1. Write short notes on any **TWO** of the following:
2. Mineral legislation in India. b) National mineral policy.

c) Geopolitics.

**UNIT-II**

1. Write on classification of minerals in economic point of View.

**OR**

1. Write short notes on any **TWO** of the following:
2. Strategic minerals. b) Industrial minerals.

c) Future mineral supplies of the world.

**UNIT-III**

1. Write on Indias various mineral positions in the world.

**OR**

1. Write short notes on any **TWO** of the following:
2. Tenor.
3. Specification of important minerals for various industries.
4. Export and Import of minerals.

**UNIT-IV**

1. Write a detailed account on conservation and substitution for various minerals.

**OR**

1. Write short notes on any **TWO** of the following:
2. Changing pattern of mineral consumption in India.
3. Low grade ores.
4. Use of scraps.

**UNIT-V**

1. Write a detailed account on mineral based industries in Andhra Pradesh.

**OR**

1. Write short notes on any **TWO** of the following:
2. Growth of mineral industry.
3. Mineral based economy in India.
4. Economic minerals of Andhra Pradesh.

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***SYLLABUS***

**IV – SEMESTER, M. Sc. (TECH) APPLIED GEOLOGY**

**PAPER- IV, SURFACE & UNDERGROUND MINING**

**(Effective from the Admitted Batch of 2016-2017)**

**UNIT – I**

Introduction – Terminology – Basic Concepts, Factors influencing for selection of Surface/Underground Mining. Development of Benches, Disposal of waste Mine Development– Choice of site for shaft development.

**UNIT –II**

Alluvial mining methods, Development of tunnels, Adits, levels etc. Open cast and Underground Mining methods.

**UNIT – III**

Coal Mining Methods. Mine transportation, Mine drainage, Mine Supports.

**UNIT- IV**

Explosives, - Classification, Methods of charging explosives effects of blasting – Mine – Ventilation – Mine rescue operations.

**UNIT-V**

Mining legislation, Mining Plans, - Mining Organisation management principles – Writing reports, Mine valuation, Mine safety.

**TEXT BOOKS:**

1. Shevyako, 1 – Mining of mineral deposits. Foreignanwages publishing.
2. Boky, B-Mining MIR publishers, Moscw.
3. Mc Kinstry, H.E – Mining geology, Prentic Hall.
4. Arogyaswamy, R.N.P. – Courses in mining geology. Exford & IBH, Delhi.
5. Young – Mining.
6. Hooven- Practicals of Mining.

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**MODEL QUESTION PAPER**

**IV – SEMESTER, M. Sc. (TECH) APPLIED GEOLOGY**

**PAPER – IV, SURFACE & UNDER GROUND MINING**

**(Effective from the Admitted Batch of 2016-2017)**

**Time: 3Hrs Max. Marks: 80**

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

**All questions carry equal marks.**

**UNIT-I**

1. What are different advantages and disvantages of open cast Mining.

**OR**

1. Answer any **TWO** of the following:
   1. Dumping of Mine waste. b) Shaft sinking Methods.

c) Factors influencing for bench development.

**UNIT-II**

1. Write an essay on alluvial Mining methods.

**OR**

1. Answer any **TWO** of the following:
   1. Kaolin mining b) Dragline.

c) Direct haulage

**UNIT-III**

1. Write an essay on Mine supports.

**OR**

1. Answer any **TWO** of the following:
   1. Acid mine drainage. b) Board and Pillar method.

c) Mine transportation.

**UNIT-IV**

1. Write an essay on various types of explosives.

**OR**

1. Answer any **TWO** of the following:
   1. Efficiency of blasting. b) Problems in blasting.

c) Mine lighting.

**UNIT-V**

1. Write an essay on Mine legislation in India.

**OR**

1. Answer any **TWO** of the following:
   1. Flow Chart for Mine organisation. b) Mine Safety.
   2. Importance of Mine valuation.

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