



Proceedings of the Principal, Government Autonomous College, Rajahmundry

Present: Dr.R.David Kumar Swamy, M.Sc, M.Phil., Ph.D

Rc. No: Spl./Acad.Cell-GC[A]-RJY/BOS/2018-1, Dated: 17 April 2018

Sub:- Government Autonomous College, Rajahmundry– **Boards of Studies (BoS) –**

Nomination of Members - Orders Issued.

Ref:- UGC Guidelines for Autonomous Colleges - 2018.

ORDER:

The Principal, Government Autonomous College, Rajahmundry is pleased to constitute **Board of studies in GEOLOGY** for framing the syllabi in Geology subject for all semesters duly following the norms of the UGC Autonomous guidelines.

S. No	Name	Designation
1	Lt. D. Rudra, Lecturer In- Charge/HoD, Department of Geology, GC[A], Rajahmundry	Chairman
2	All Faculty members in the department	Member
3	Dr. S.S.K. Chaitanya Lecturer in Geology, CRR College, Eluru	Subject Expert
4	Dr. P. Srinivasulu, O/o Commissioner of Collegiate Education, Vijayawada	Subject Expert
5	Dr.K.V. Swamy Adikavi Nannaya University, Rajahmundry	University Nominee
6	P.R. Bhavana, DGM, ONGC, Rajahmundry	Expert from Industry/Corporate Sector
7	Mr. K. Swamy	Student Nominee

The above members are requested to attend the BOS meetings and share their valuable views, suggestions on the following functionalities:

- Prepare syllabi for the subject keeping in view the objectives of the college, interest of the stake holders and national requirement for consideration and approval of the Academic Council
- Suggest methodologies for innovate teaching and evaluation techniques
- Suggest panel of names to the Academic council for appointment of examiners
- Coordinate research, teaching, extension and other activities in the department of the college.

The term of the members will be Three years from the date of the nomination. The Chairman of the BoS (HoD/lecturer In-Charge of the department) is directed to coordinate with the Principal of the College and conduct BoS meetings as and when necessary, but at least twice a year.


PRINCIPAL
GOVERNMENT COLLEGE [A]
RAJAHMUNDY

Copy to:

- The above individuals
- File



Composition of Board of Studies in Geology

**Government College [Autonomous]
(Affiliated to Adikavi Nannaya University)
Rajahmundry**

S. No	Name	Designation
1.	Lt. D. Rudra, Lecturer In- Charge/HoD, Department of Geology, GC[A], Rajahmundry	Chairman
2.	Dr. M.R. Goutham	Faculty Member
3.	Mr. B. Sai Krishna	Faculty Member
4.	Ms. S. Durga Bhavani	Faculty Member
5.	Ms. K. Maneesha	Faculty Member
6.	Mr.S. Venkatesh	Faculty Member
7.	Dr. R. Anil Kumar	Faculty Member
8.	Dr. S.S.K. Chaitanya HoD, Geology, Sir CRR College, Eluru	Subject Expert
9.	Dr. P. Srinivasulu, O/o Commissioner of Collegiate Education, Vijayawada	Subject Expert
10.	Dr. K.V. Swamy, Dean, CDC, Adikavi Nannaya University, Rajahmundry	University Nominee
11.	P.R. Bhavana, DGM, ONGC, Rajahmundry	Expert from Industry/Corporate Sector
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Department of Geology
Government College [A], Rajahmundry

Allocation of Credits

Course: B.Sc.

Subject: Geology

S. No	Semester	Course Code	Title of the Course	Hrs./week	Max. Marks	Mid Sem. Exam	Credits
3	Semester-III		Petrology (Igneous, Sedimentary and Metamorphic)	4	50	50	3
4	Lab-III		Petrology (Igneous, Sedimentary and Metamorphic)	2	50	--	2
3	Semester-IV		Structural Geology & Stratigraphy	4	50	50	3
4	Lab-IV		Structural Geology	3	50	--	2
5	Semester V		Palaeontology & Indian Geology	4	60	40	3
6	Lab -V		Palaeontology & Indian Geology	2	50	--	2
7	Semester V		Economic Geology	3	60	40	3
8	Lab VI		Economic Geology	2	50	--	2

5	Semester VI		Groundwater : Geology & Exploration (<i>Elective1</i>) (OR) Field Geology (<i>Elective2</i>) (OR) Sedimentology	3	60	40	3
6	Lab VII		Groundwater Geology & Exploration (OR) Field Geology (OR) Sedimentology	3	50	--	2
Cluster Electives*							
7	Semester VI (Cluster 1)		VIIIA -1: Introduction to Mineral Exploration	3	60	40	3
			VIIIA-2: Environmental & Engineering Geology	3	60	40	3
			VIIIA-3: Introduction to Remote Sensing & GIS	3	60	40	3
8	Cluster 1 Lab		VIIIA -1: Mineral Exploration	3	50	--	2
			VIIIA-2: Project work	3	50	--	2
			VIIIA-3: Fieldwork	3	50	--	2
9	Semester VI (Cluster 2)		VIIIB-1: Introduction to Geochemistry	3	60	40	3
			VIIIB-2: Introduction to Geophysics	3	60	40	3
			VIIIB-3: Introduction to Remote Sensing & GIS	3	60	40	3
10	Cluster 2 Lab		VIIIB-1: Geochemistry	3	50	--	2



		VIIIB-2: Field Report	3	50	--	2
		VIIIB-3: Project work	3	50	--	2
11	Semester VI (Cluster 3)	VIIIC-1: Introduction to Mining Geology	3	60	40	3
		VIIIC2: Introduction to Marine Geology	3	60	40	3
		VIIIC3: Introduction to Petroleum Geology	3	60	40	3
12	Cluster 3 lab	VIIIC-1: Mining Geology	3	50	--	2
		VIIIC-2: Field Report	3	50	--	2
		VIIIC-3: Project work	3	50	--	2





The Board of Studies of **GEOLOGY** met on **09 July 2020** at 03:00 PM through Google meet video conferencing under the chairmanship of Capt.(Smt) D. Rudra and the following resolutions were adopted.

Resolutions

1. It is resolved to approve the syllabi for III, IV, V and VI Semesters presented in the following pages (**Page Nos 7, 12 and 18 respectively**).
2. It is resolved to approve the model question papers for the III & IV semesters with 50 marks for Semester End Examination (SEE) and 50 marks for Continual Internal Assessment (CIA) for 2019-20 admitted batch as approved by the Staff Council of the College during previous academic year.

Semester End Exam (60 Marks)		Internal assessment (40 Marks)
PART	Allotted Marks	
PART A: This Part contains 4 Essay type internal choice questions numbering 1 to 4 will be asked from Unit 1 to 5. Student has to answer all the 4 questions. Each question carries 8 marks.	4 x 8 = 32 Marks Question 1 A or B from Unit I Question 2 A or B from Unit II Question 3 A or B from Unit III Question 4 A from Unit IV and or B from Unit V	<ul style="list-style-type: none">• CIE -1 : 20 Marks• CIE -2 (Online Exam) : 10 Marks• Attendance: 5 Marks Pedagogical Strategies <ul style="list-style-type: none">• Assignments: 5 M• Participation or Paper Presentation in Student Seminars/Workshops/Group Discussions/ Quiz/ Student Study Project/Field Visit/Survey : 5 Marks• Viva-Voce: 5 Marks
PART B: This Part contains 8 Short answer questions numbering 5 to 12 will be asked covering all the units. Student has to answer any 6 out of 8 questions. Each question carries 3 marks.	6 x 3 = 18 Marks Questions 5, 6,7,8,9 are from Units I, II, III, IV and V respectively. Questions 10,11, 12 are from all 5 units depending on the weightage of the unit	
Total Marks	50	

3. **Further**, the model question papers for the V & VI semesters with 60 marks for Semester End Examination (SEE) and 40 marks for Continual **Internal Assessment (CIA)** for 2018-19 admitted batch. The split up of the marks is shown below in table 1.



Semester End Exam (60 Marks)		Internal assessment (40 Marks)
PART	Allotted Marks	
PART A: This Part contains 4 Essay type internal choice questions numbering 1 to 4 will be asked from Unit 1 to 5. Student has to answer all the 4 questions. Each question carries 8 marks.	4 x 8 = 32 Marks Question 1 A or B from Unit I Question 2 A or B from Unit II Question 3 A or B from Unit III Question 4 A from Unit IV and or B from Unit V	Written Test : 25 Marks Assignments: 5 Marks Seminar: 5 Marks Viva-Voce: 5 Marks (For the students admitted during 2020-21, new pedagogical strategies will be implemented for Internal assessment)
PART B: This Part contains 8 Short answer questions numbering 5 to 12 will be asked covering all the units. Student has to answer any 5 out of 8 questions. Each question carries 4 marks.	5 x 4 = 20 Marks Questions 5, 6,7,8,9 are from Units I, II, III, IV and V respectively. Questions 10,11, 12 are from all 5 units depending on the weightage of the unit	
PART C: This Part carries 8 marks. 4 very short answer questions numbering 13 to 16 will be asked covering all the units. Student has to answer all the questions Each question carries 2 marks	4 x 2 = 8 Marks	
Total Marks	60	40

4. It is also resolved to continue the pedagogical strategies followed in the last academic year for Teaching- Learning Evaluation
5. It is resolved to conduct online classes to the students for at least 50% of syllabi if the Covid-19 Pandemic situation continues.
6. It is also resolved to prepare video lessons in 4 quadrant approach for all the courses offered for II and III year Geology for placing in the GCRJY LMS.
7. It is resolved to approve the list of examiners & paper setters.
8. It is resolved to make Geological Field Trips compulsory for II and III B.Sc. Students as per the norms in vogue as the Geology is the field based science.
9. It is resolved to strictly follow the Annual Curricular Plan being submitted to the College in the beginning of the academic year.
10. It is resolved to continue the in house news letter "*GeoNews*" which was started during academic year (2014-15).



11. It is resolved to put forth before BOS the proposal of starting a Certificate/Diploma course in “**Groundwater Exploration**” / **Remote Sensing & GIS** depending on the collaboration with A.P. State Groundwater Board/Remote Sensing Agency/any other agency.
12. It is resolved to send the students for internship/training program/field training program to various geological organizations or to GSI under **Bhumi Samvad** Program.
13. It is resolved to conduct one National webinar during 2020-21 in association with various national organizations such as IIRS, GSI, ONGC etc. or in association with State Government organizations such as AP State Groundwater Board, AP Mines & Geology, AP Mineral Development Corporation, APSRAC etc. or any private organizations.
14. It is resolved to organize at least Two Invited talks (One each in even & odd semesters) on the recent trends in the field of Geology/Earth Sciences by inviting eminent scientists/faculty/persons.
15. It is resolved to continue with the organization of **Bhuvana Bodha- 2021**, a **unique student centric activity** for the academic year 2020-21.
16. It is resolved to organize one **special Diamond jubilee event** in view of the completion of 60 years of existence of the department by involving the Alumni of the department.

The following members were present in the Online BOS meeting conducted through Google meet on _____.



S. No	Name	Designation	Signature
1	Lt. D. Rudra, Lecturer In- Charge/HoD, Department of Geology, GC[A], Rajahmundry	Chairman	
2	Dr. M.R. Goutham	Faculty Member	
3	B. Sai Krishna	Faculty Member	
4	S. Durga Bhavani	Faculty Member	
5	Ms. K. Maneesha	Faculty Member	
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8	Dr. K.V. Swamy, HoD, Dept. of Geology Adikavi Nannaya Univrsity, Rajahmundry	University Nominee	
9	P.R. Bhavana, DGM, ONGC, Rajahmundry	Expert from Industry/Corporate Sector	
10	Dr. Sunkara Venkateswara Rao	Special Invitee	
10	Mr. K. Swamy	Student Nominee	

Chairman, BOS
(D. RUDRA)



List of Examiners & Paper Setters

S No	Name of the Examiner/Paper Setter	College	Experience	Paper Taught
1	Dr. S.S.K. Chaitanya	Sir CRR College, Eluru	8 Yrs	Crystallography, Indian Geology
2	Sri A. Surendra	DNR College, Bhimavaram	33 Yrs	All branches of Geology
5	Sri K. Santosh	DNR (A) College Bhimavaram	5 Yrs	All branches of Geology
6	Dr. Ganapathi	M.R College (Autonomous) Vizianagatam	3 Yrs	All branches of Geology

University Nominee:

(K.V.SWAMY)

Industrial Nominee:

(P.R. BHAVANA)

Subject Expert:

(S.S.K. CHAITANYA)

Subject Expert:

(P. SRINIVASULU)

Staff Member:

(M.R. GOUTHAM)

Staff Member:

(B. SAIKRISHNA)

Staff Member:

(S.D. BHAVANI)

Staff Member:

(K. MANEESHA)

Staff Member:

(K. VENKATESH)

Staff Member:

(R. ANIL KUMAR)

Chairman, BOS:

(D.RUDRA)



Government College (Autonomous), Rajahmundry

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GEOLOGY SYLLABUS - (2020-21)

II B.Sc., THIRD SEMESTER

Course: PETROLOGY (Igneous, Sedimentary & Metamorphic)

Unit-I

Nature and scope of petrology - definition of rock, classification of rocks into igneous, sedimentary and metamorphic. Distinguishing features of three types of rocks.

Forms - Lava flows, Intrusions, sills, laccolith, bysmalith, lopolith, dykes, ring Structures - vesicular, amygdaloidal, block lava, ropy lava, pillow, flow, and sheet structures. Columnar and prismatic structures

Textures - Definition of texture, micro-structure, devitrification - Hypidiomorphic, pandiomorphic, porphyritic, poikilitic, ophitic, intergrartular, intersertal, trachytic, graphic and micro-graphic textures.

Unit-II

Classification of igneous rocks - CIPW and Tyrrell tabular classification.

Composition and constitution of magma - Crystallisation of Magma - Uni-component, binary system, eutectic and solid solutions.

Origin of igneous rocks - Bowen's reaction principle, differentiation and assimilation of magma.

Descriptive study of following rock types: Granite, Syenite, Diorite porphyry, Pegmatite, Gabbro, Pyroxenite, Dunite, Dolerite, Rhyolite, Trachyte, and Basalt

Unit-III

Sources of sediments - mechanical and chemical weathering, modes of transportation, stratification. Sedimentary structures, Types of bedding, surface marks, deformed bedding, solution structures

Classification of sedimentary rocks; clastic - rudaceous, arenaceous, argillaceous, non-clastic - calcareous, carbonaceous, evaporities

Descriptive study of the following sedimentary rocks - conglomerate, Breccia, Sandstone, Gritt, Arkose, Shale and limeston.



Unit – IV

Definition of metamorphism, agents of metamorphism, types of metamorphism, grades and Zones, of metamorphism. Metamorphic minerals - stress and antistress minerals. Structures of metamorphic rocks - Cataclastic, maculosc, schistose, granulose and gneissose. Textures of metamorphic rocks- crystalloblastic, xenoblastic.

Unit-V

Classification of metamorphic rocks Cataclastic metamorphism of argillaceous and arenaceous rocks. Thermal metamorphism of argillaceous, arenaceous and calcareous rocks. Dynamo thermal metamorphism of argillaceous, arenaceous and igneous rocks. Plutonic metamorphism, metasomatism. Descriptive study of the following metamorphic rock- Gneiss, schist, slate, phyllite, quartzite, marble, Cliranockite and khondalite.

Text books

1. Principles of petrology - G.W. Tyrrell
2. Petrology - W. T. Huang
3. Metamorphic petrology - B Bhaskar Rao

References

1. Petrology for students- S.R.Ndckolds Knox, Chinnar
2. A Text book of sedimentary petrology - Verma & Prasad
3. Petrology of the sedimentary rocks - J.T. Greehsmith
4. Petrology of the sedimentary rocks - F.H;Hatch, Wells and Wells.
5. Petrology of the igneous rocks - F.KHatch, Wells and Wells.
6. Petrology - J.D. Winter



Government College (Autonomous), Rajahmundry.

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LAB-III (Practicals)

50 Marks

At the end of Third semester

**Lab- III- PETROLOGY
(Igneous, Sedimentary & Metamorphic)**

Megascope and microscopic study of the following igneous rocks:

Dunite, peridotite, granite, Syenite, Diorite, Gabbro, Dolerite, Rhyolite, Basalt, Pegmatite,

Megascope and microscopic study of the following sedimentary rocks:

Conglomerate, Breccia, Sandstone, Shale, Limestone and its varieties

Megascope and microscopic study of the following rocks:

Schist, Gneiss, Quartzite, Marble, Charnockite and Khondolite.



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II B.Sc., GEOLOGY 2020-21

THIRD SEMESTER

Model Question Paper

Course : PETROLOGY (Igneous, Sedimentary & Metamorphic)

Time:3 Hours

Max.Marks:50

SECTION- A

Answer all the Questions. *Each Question carries 10 marks*

4 x 8 = 32M

- 1) Describe the mode of formation of three major types of rocks and give their distinguishing characters.

OR

Describe the forms of Igneous rocks with neat diagrams.

- 2) Write an Essay on the Tyrrel's Classification of Igneous Rocks

OR

Describe the Mechanical Structures of Sedimentary rocks

- 3) Write an essay on the Classification of Sedimentary Rocks.

OR

- 4) Define Metamorphism. Describe the Zones of Metamorphism.

OR

Enumerate various types of Metamorphism

SECTION- B

Answer any Six Questions. *Each Question carries 3 marks*

6 x 3 = 18M

1. What are scoraceous and cellulose structures?
2. What are reaction rims and corona structures?
3. Define Fractional crystallization.
4. Define lithification and diagenesis.
5. Graded bedding.
6. Bauxite and laterite.
7. Palingenesis
8. Foliation and Lineation



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II B.Sc., GEOLOGY 2020-21

THIRD SEMESTER

Practical Model Question Paper

Course: PETROLOGY (Igneous, Sedimentary & Metamorphic)

Megascopic study of rocks (Igneous 2 + Sedimentary 2 + Metamorphic2) _____ 6 X 4=24

Microscopic study of rocks _____ 3 X 5=15

Record _____ 11

50 Marks



Government College (Autonomous), Rajamahendravaram

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GEOLOGY SYLLABUS - (2019-20)

II B.Sc., IV-SEMESTER

Course : Structural Geology & Stratigraphy (50 Marks)

Unit-I

Definition of structural geology, aim and objectives of the structural Geology; Importance of study of structures, primary and secondary structures; outcrop, attitude of beds - strike, dip and apparent dip. Use of clinometer and Brunton compass. **Folds** -description, nomenclature of folds - Geometrical and genetic classification. Recognition of folds in the field.

Unit-II

Joints- Classification of Joints- geometrical and genetic classification. **Faults** – geometrical and Genetic Classification of faults, recognition of faults in the field, effects of faults on the outcrops.

Unit-III

Unconformities- Definition of unconformity- types of unconformities. Recognition of unconformities in the field. Distinguishing the faults from unconformities. Definitions of overlap, outlier, cleavage, schistosity, foliation and lineation

Unit-IV

Stratigraphy: Definition and Principles of Stratigraphy. Nomenclature of Stratigraphy (Lithostratigraphy, Biostratigraphy, Chronostratigraphy, magnetostratigraphy etc.)

Unit- V

Standard geological time scale, Physiographic divisions of India with stratigraphic and structural characteristics.

Text books

- | | | |
|---|---|------------------------|
| 1. Structural Geology | - | Marlarid. P. Billings. |
| 2 An outline of structural Geology | - | E.S. Hills |
| 1.Principals of stratigraphiy | - | Dunbars & Rodgers. |
| 2. Fundamentals of Historical Geology and Stratigraphiy | - | Ravindra Kumar |

References

- | | | |
|-------------------------------------|---|----------------------------------|
| 1. Structural Geology | - | L.U. De Setter |
| 2. An outline of structural Geology | - | E.S. Hills |
| 3. Geology of India (Vol. 1 & 2) | - | R. Vydyanadhan & M. Ramakrishnan |



Government College (Autonomous), Rajamahendravaram

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LAB-IV (Practicals)

50 Marks

At the end of Fourth semester

Structural Geology

1. Study of topographical maps.
2. Interpretation of simple geological maps with horizontal and inclined beds, Unconformity, folds and faults with reference to the topography and structure, geological succession and history. Section drawing (at least 10 maps)
3. Problems dealing with true dip and apparent dip. Bore-hole data thickness and width of the outcrop and dip of the beds (At least 10 problems).



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II B.Sc., GEOLOGY 2018-19

IV SEMESTER

Model Question Paper

Course: Structural Geology & Palaeontology

Time:3 Hours

Max.Marks:50

SECTION- A

Answer all the Questions. *Each Question carries 10 marks*

4 x 8 = 32M

- 1) What are faults? How do you classify them? Describe with neat sketches.
OR
Classify and describe different types of folds and describe the criteria for their recognition in the field
- 2) Describe different types of unconformities and discuss the criteria for their recognition
OR
Write an essay on joints.
- 3) Define Stratigraphy. What are different Principles of Stratigraphy
OR
Write an essay on Standard Geological Time Scale
- 4) Describe different Physiographic Features of India with their structural Characteristics.
OR
Write an essay on geological timescale of India

SECTION- B

Answer any **Six** Questions. *Each Question carries 3 marks*

6 x 3 = 18M

- 5) Define Hinge and axis of folds
- 6) Inlier and Outlier
- 7) Columar Joints
- 8) Fault scrap
- 9) Graben & Horst
- 10) Recognition of faults in the field
- 11) Order of superposition
- 12) Lithostratigraphy



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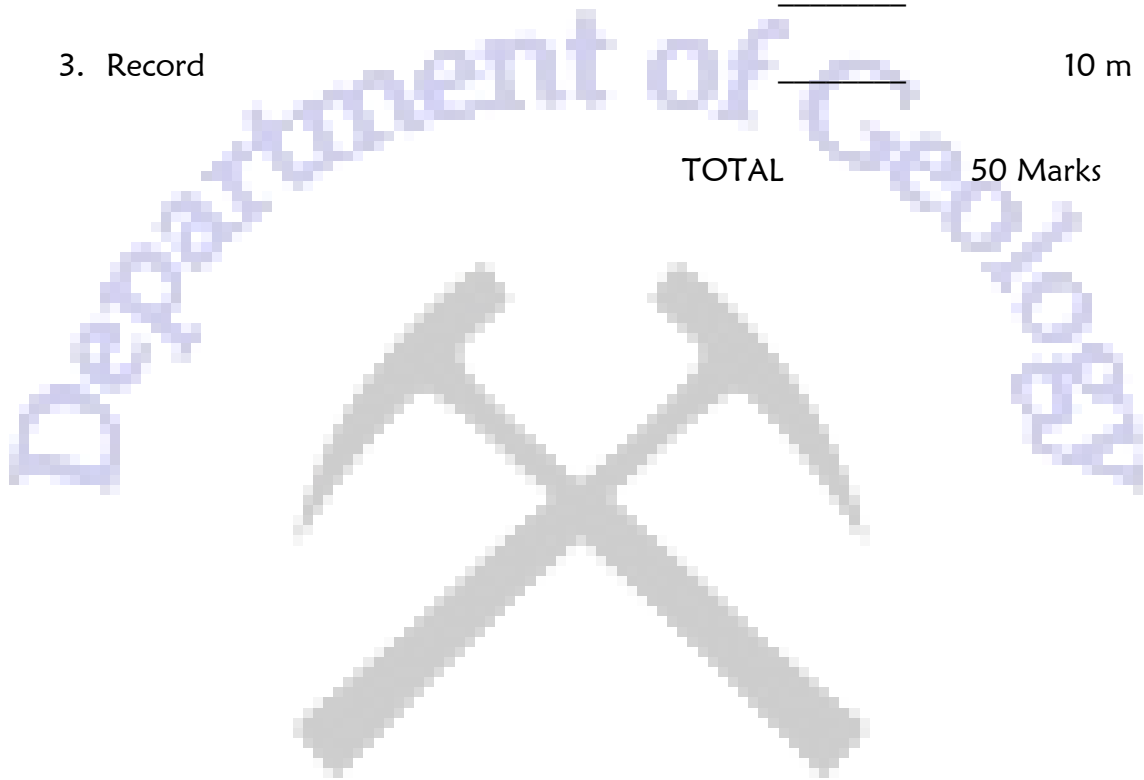
II B.Sc., GEOLOGY 2018-19

IV SEMESTER

Practical Model Question Paper

Lab IV: Structural Geology

1. Interpretation of Geological Maps	_____	1 X 12=24
2. Problems	_____	2X 8= 16
3. Record	_____	10 m
TOTAL		50 Marks





Government College (Autonomous), Rajahmundry

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GEOLOGY SYLLABUS - (2020-21)

III B.Sc., V-SEMESTER

Course- Palaeontology & Indian Geology (60 Marks)

Palaeontology

Unit I: Definition of Palaeontology and fossils, conditions for preservation, mode of preservation, uses of fossils. Zone Fossil, Index Fossil

Study of taxonomy, classification, morphology, geological and geographical distribution of the following invertebrate fossils

Phylum Echinodermata
Phylum Brachiopoda

Study of the following fossils: Cidaris, Micraster, Holaster, Hemiaster, Spirifer, Productus, Terebratulina,

Unit II: Study of taxonomy, classification, morphology, geological and geographical distribution of the following invertebrate fossils.

Phylum Hemichordata,
Phylum Coelenterata
Phylum Mollusca
Phylum Arthropoda

Study of the following fossils:

Monograptus, Diplograptus, Calceola, pecten, Gryphea, Nautilus, Belemnites, Calymene, Paradoxides, Glossipteris, Gangamopteris, Ptyllophyllum.

Indian Geology

Unit III

Brief study of type area, distribution in India, lithology, fossil content and economic importance of the following:

Dharwar Supergroup

Puranas:

Cuddapah Supergroup
Vindhyan Supergroup

Unit-IV

Brief study of type area, distribution in India, lithology, fossil content and economic importance of the following



Kurnool Group.
Gondwana Supergroup.
Triassic of Spiti,
Jurassic of Kutch,

Unit V

Brief study of type area, distribution in India, lithology, fossil content and economic importance of the following
Cretaceous of Trichinopoly,
Deccan Traps and their Age
Siwaliks with vertebrate fossils.

Geology of Andhra Pradesh

Additional Module: Eastern Ghats

Text books:

Palaeontology

1. Palaeontology _ Invertebrate by Henry Woods
2. Invertebrate palaeontology and Evolution by ENK Clark
3. Fossil Invertebrates by U Lemmann and G Millmer
4. An introduction to Palaeobotany by C A Arnold
5. Invertebrate Fossils by Moore, Lockett, Fischer
6. Principles of Invertebrate Palaeontology by Shrock De Twenhofel
7. Principles of Palaeontology by D M Rapu and S M Stenkey

Indian Geology

8. Geology of India and Burma – M S Krishnan
9. Fundamentals of Historical Geology and stratigraphy of India –Ravindra Kumar
10. Geology of India – D N Wadia
11. Stratigraphic principles and practice - Weller
12. Geology of India Vol 1 & 2 by R. Vaidyanadhan & M. Ramakrishnan.



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Practical Syllabus

LAB-V (Practicals)

50 Marks

At the end of Fifth semester

Lab V-Palaeontology

1. Drawing and description of invertebrate and plant fossils as per the list mentioned in the theory syllabus.
2. Classification, morphology and geological distribution of Fossils:

Phylum Arthropoda:

Calymene,
Paradoxide.

Phylum Brachipoda:

Terebratula,
spirifer,
Rhynchonella,
Products,

Phylum Mollusca:

Class Pelecepoda

Pecten,
Gryphaea,

Class Gastropoda

Turritella,
Nautica,
Murex

Class Cephalopoda

Nautilus,
Bellemnites,

Phylum Echinodermata:

Cidaris,
Micraster,
Hemiaster.
Holaster



Phylum Hemichordata:

Monograptus

Diplograptus

Phylum Ceolenterata

Calceola

Zaphrentis

Plant fossils:

glossopeteris,

gangamopteris and

ptylophyllum.





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III B.Sc., GEOLOGY 2020-21

V SEMESTER

Model Question Paper

Course V: Palaeontology & Indian geology

Time:3 Hours

Max.Marks:60

SECTION- A

Answer all the Questions. *Each Question carries 10 marks*

4 x10 = 40M

- 1) Define Fossil? Describe various methods of preservation, conditions and uses of fossils

OR

Describe the morphological features of Echinoids with neat sketches

- 2) Describe the morphological features of Phylum Brachiopoda with neat sketches.

OR

Write an essay on Phylum Arthropoda

- 3) Write an essay on the structure, lithology and economic importance of the Cuddapah Supergroup of rocks

OR

Describe the lithology and Stratigraphy of Cretaceous rocks of Trichy.

OR

- 4) Write an essay on Deccan Traps

OR

Write an essay on Gondwana Supergroup.

SECTION- B

Answer any Five Questions. *Each Question carries 4 marks*

5 x 4 = 20M

- 5) Calceola
- 6) Monograptus
- 7) Ptylophyllum
- 8) Index Fossil
- 9) Mineral wealth of Vindhyan Supergroup
- 10) Succession of Siwaliks
- 11) Closepet Granite
- 12) Kaimur Group



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II B.Sc., GEOLOGY 2020-21

V SEMESTER

Practical Model Question Paper

Paper V: PALAEONTOLOGY

Time: 3 hours

Max. Marks: 50

Describe and identify the following:

- | | | | |
|------------------------------|--------|-------|------------|
| 1. Identification of Fossils | 8 Nos. | 8 x 4 | = 32 Marks |
| 2. Fossil Drawing | 1 | 1 x 8 | = 8 Marks |

Record

10 Marks

Total Marks

50 Marks



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SEMESTER-V - Elective Course-VI

Elective Course-VI : Economic Geology (60 Marks)

Unit-I

Definition of Economic geology, mineral resources and mineral deposits, importance of economic minerals and rocks, ore minerals, gangue minerals (gangue). Ore and industrial minerals.

Classification of mineral deposits - Bateman's classification modified by Jensen. Processes of formation of mineral deposits; endogenetic and exogenetic processes.

Unit-II

Study of ore deposits of gold, copper, lead, zinc, aluminium, with respect to their mineralogy, uses, mode of occurrence, origin and distribution in India.

Unit-III

Iron, manganese, chromium, uranium and thorium, with respect to their mineralogy, uses mode of occurrence, origin and distribution in India.

Unit-IV

Distribution of industrial minerals in India for the following industries: Abrasives, cement and Ceramic, insulators.

Fossil fuels: Coal - origin and types of coal - coal deposits of India, Petroleum

Unit-V

Atomic minerals: Uranite, Pitchblende, Beach sands: Monazite, limonite; Rutile and Zircon and their use.

Mineral resources of Andhra Pradesh.

Additional Module: Economic importance of Eastern Ghats

Text Books:

- | | | |
|--|---|-------------------------|
| 1. Indian mineral resources | - | S. Krishnaswamy |
| 2. Introduction of India's economic Minerals | - | N.Lisharrna, K.S.V. Ram |
| 3. Geology & mineral resources of Andhra Pradesh | - | N.V.B.S. Dutt |
| 4. Mineral Resources of Andhra Pradesh | - | Dr. P.K Ramam |

References:

- | | | |
|------------------------------------|---|------------------------|
| 1. Indian mineral year book (1997) | - | Indian Bureau of Mines |
| 2. Fuel minerals | - | A.K.Brown & Dey |



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Lab VI- Economic Geology (50 Marks)

Megascopic study, mode of occurrence, distribution in India and uses of the following economic minerals:

Iron Ores:	Haematite, Magnetite, Pyrite,
Manganese Ores:	Pyrolustie, Psilomelane,
Copper Ores:	Chalcopyrite, malachite, Azurite,
Bauxite,	
Chromite:	
Galena, Sphalerite,	
Magnesite,	
Gypsum,	
Asbestos,	
Steatite,	
Graphite,	
Monazite, illmenite, Zircon,	
Fluorite,	
Barytes,	
Corundum,	
Topaz,	
Calcite,	
Kaolinite,	
Kyanite,	
Sillimanite,	
Garnet and	
Mica.	



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**III B.Sc., GEOLOGY
ECONOMIC GEOLOGY
Model Question Paper**

Time: 3 Hours

Max.Marks: 60

SECTION- I

Answer any FOUR questions

4x10=40M

1. Write an essay on the classification of minerals deposits.

OR

Explain the mechanical concentration process of mineral deposits? Give Indian examples.

2. Explain the formation of ore deposits through magmatic concentration.

OR

Write an essay on the Origin, Occurrence and distribution of coal deposits in India.

3. Write an essay on the Mineral resource of A.P.

OR

Write an essay on the Origin, Occurrence and distribution of Manganese deposits in India.

4. Write an essay on the Origin, Occurrence and distribution of Copper deposits in India

OR

Write an essay on the Origin, Occurrence and distribution of Radioactive Mineral deposits in India

SECTION- II

Answer any Five Questions. *Each Question carries 4 marks*

5 x 4 = 20M

5. Write short notes on
- Ankaleswar oil fields
 - Cavity filling.
 - Ore & Gangue Minerals
 - Abrasives
 - Bauxite
 - Refractoris



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SEMESTER-VI- Elective Paper

**PRACTICAL Model Paper
(Economic Geology)**

Max.Marks: 50

1. Economic Minerals _____ 8 X 5 = 40

2. Record _____ 10

Total Marks _____ 50



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SEMESTER-VI- Elective Paper

Course-VI-: Ground Water: Geology & Exploration

Unit-I

Introduction: Definition of Hydrology, Hydrogeology, Scope and application of Hydrogeology. Hydrological Evaporation, Condensation, Precipitation, Infiltration, Transpiration. Evapotranspiration. runoff, connate water.

Ground Water: Origin, Occurrence, and age of groundwater, Vertical distribution of sub-surface water, zone of aeration-soil water, vadose water, capillary fringe. Zone of saturation - water table. Perched water table. Recharge and discharge areas.

UNIT-II

Aquifers: Definition of aquifer, Aquitard, Aquiclude, Aquifuge. Properties of Aquifer - porosity, retention of water in rocks, yield of water from rocks (specific yield and specific retention), Darcy's law, permeability, hydraulic conductivity, velocity of groundwater flow, storage coefficient. Types of aquifers: confined, semi-confined, unconfined. Homogeneous, Heterogeneous. Isotropic and Anisotropic aquifers. Igneous, sedimentary and metamorphic rocks as aquifers.

UNIT-III

Quality of Ground Water: Physical, chemical and Biological characteristics of groundwater. Suitability of groundwater for drinking, Irrigation and industrial purposes. Pollution of Ground Water; Pollution in relation to urban, industrial and Agricultural sources. Brief account of saline water intrusion.

UNIT – IV

Ground Water Investigations: Scope of investigations, Methods of groundwater explorations, Brief account of Geologic, hydrogeologic, Geobotanical investigations, Introduction to Remote Sensing techniques. Geophysical Exploration: Basic principles of Geophysical exploration methods; Electrical methods - Schlumberger and Wenner configuration, Resistivity profiling and Vertical Electrical Sounding.

Unit-V

Management Of Groundwater: Groundwater balance, recharge, (natural and artificial) and discharge. Safe, yields and over draft. Cojunctive use of surface and groundwater. Utilization of groundwater. Groundwater resource evaluation-water table fluctuation method and rainfall infiltration method. Ground water provinces of India. Concept of water shed management.



Text Books:

- | | | |
|--|---|-------------------|
| 1. Groundwater hydrology | - | Todd |
| 2. Hydrogeology | - | Davis and Dewiest |
| 3. Hydrogeology | - | Karanth |
| 4. Groundwater Assessment - Development and Management | - | Karanth |
| 5. Applied Hydrogeology | - | Fetter. |
| 6. Applied principles of Hydrogeology | - | Mannings. |

Lab VII- Ground Water: Geology & Exploration (50 Marks)

- Study of hydro-geological models,
- Estimation of porosity and permeability from the given data;
- Preparation and interpretation of water table maps.



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**SEMESTER-VI- Elective Paper
Ground Water: Geology & Exploration
Model Question Paper**

Time: 3 Hours

Max.Marks: 60

Note: Answer any Four Questions All questions carry equal marks.

4 X 10=40

PART- A

- 1). Define Hydrology and Hydrogeology. Explain the scope and applications of Hydrogeology.
- 2). Define Hydrologic Cycle and describe the different process involved with the help of a neat diagram,
- 3). Give an account of vertical distribution of Ground water.
- 5). What is an aquifer? Describe various types of aquifer.
- 6). Explain the rock properties of an aquifer of ground water.

PART – B

4 x 5 = 20

Answer any Four Questions. Each question carry 5 marks

7. What are the Forms Of Ground Water
8. Define Porosity And Permeability?
9. What are standards For Domestic water by WHO?
10. What is the Role of Geologist in Hydrogeology?
11. Difference between the consolidated and unconsolidated deposits?
12. Describe Recharge pit method



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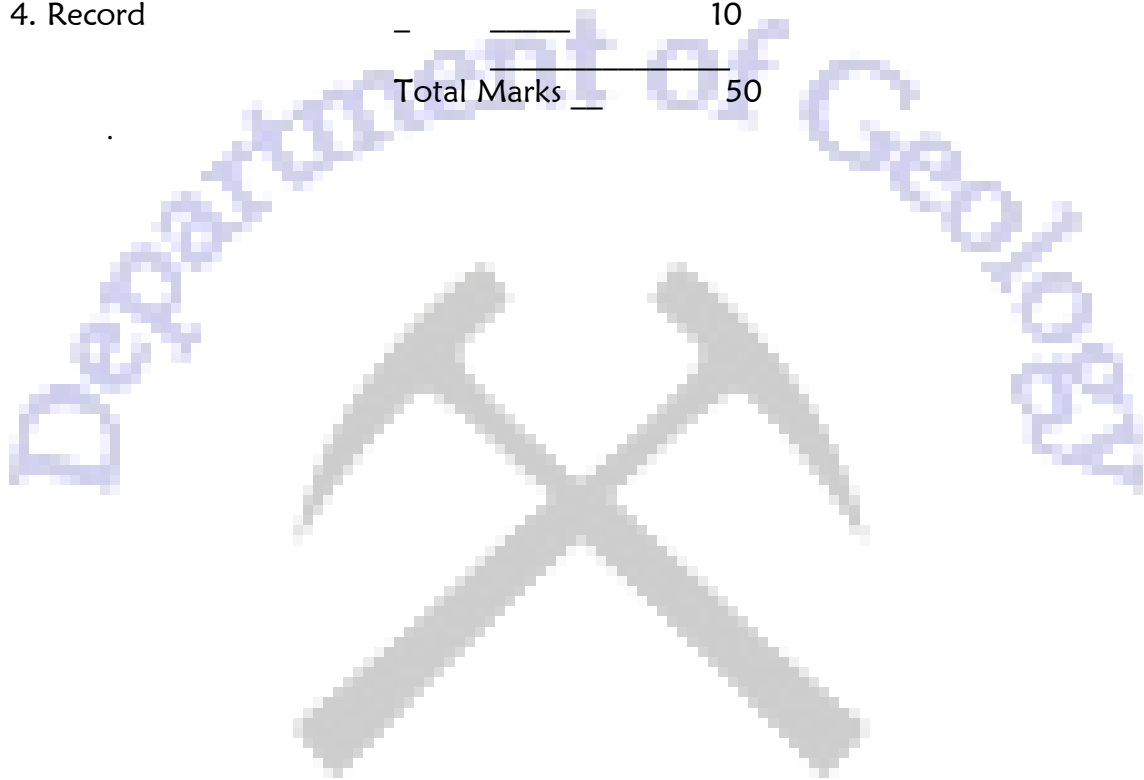
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**SEMESTER-VI- Elective Paper
PRACTICAL MODEL PAPER**

Paper-VII-: Ground Water: Geology & Exploration

Max.Marks: 50

1. Experiment	-----	1 X 10 = 10
2. Problems	_____	2 X 10 = 20
3. Field work	_____	10
4. Record	- _____	10
	<hr/>	
	Total Marks	50





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SEMESTER-VI- Elective Paper

Course VII: Field Geology

Unit-I

Toposheet and map. Toposheet and map reading. Various methods of locating a point on toposheet and map.

Unit-II

Basic field procedure – Basic field equipments, methods of field work, drawing of geological field sections.

Determination of slopes and gradient, measuring differences in elevation. Basic field observations at a point or out crop.

Unit-III

Geological mapping – General considerations, reconnaissance study of surface features and rocks.

Unit-IV

Transfer of field data collected on to a base map, finalization of map, preparation of geological cross section.

Unit-V

Contouring- Definition, internal characteristic, direct and indirect methods of contouring and uses.

References:

1 Principles of Engineering Geology - K.V.G.K Gokhale.

Lab VII: Field Geology (50 Marks)

Field work: Submission of Dissertation / Field Report.

Note: Field training camp: Ten days during vacation/ Working Days (Compulsory)

Study of toposheets and field work in the neighbouring areas and also other places of geological importance.



CLUSTER PAPERS

Cluster A VIIIA -1: Introduction to Mineral Exploration (Theory)

UNIT - I

Definitions of Prospecting and Exploration. Reconnaissance, Preliminary and Detailed survey. Geological prospecting: Guides and Criteria. Structural, Lithological and Stratigraphic Guides.

UNIT- II

Geophysical Exploration - brief description and application of gravity methods - instruments in gravity method: gravimeters. Brief description and application of magnetic methods – instruments in magnetic method: magnetometers. Brief description and application of seismic methods - instruments in seismic method: geophones.

UNIT- III

Brief description and application of electrical methods - instruments in electrical method: Resistivity meter. Brief description and application of radioactive methods - instruments in radioactive method: G-M Counter, Scintillometer, ionisation chamber.

UNIT – IV

Geochemical prospecting – primary and secondary dispersion – Geochemical association and path finders. Sampling Methods – Channel, Chip, Grab, Car, groove, Wagon, Pitting and trenching and drill hole sampling. Coning and quartering. Average Assay

UNIT-V

Mining: Alluvial, Quarrying (Open cast mining) and Underground mining. Drilling Methods – Rotary drilling and Percussion drilling. Remote sensing techniques in mineral exploration.

Text Books:

1. Geological Prospecting & Exploration - V. M. Kneiter
2. Mineral Economics - R.K.Sinha & N.L.Sarma.
3. Mining Geology – McKinnstry

Lab: Mineral Exploration – Syllabus (Practical)

1. Estimation of Ore reserves: Bedded type and vein type (Extended area and included area methods)
2. Field work in neighboring areas of geological importance: submission of dissertation/ field report (10 Marks). Study and interpretation of topographic maps



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SEMESTER-VI- Cluster Paper VIII A1

Introduction to Mineral Exploration

Model Question Paper

Time: 3 hrs

Max.Marks: 60

Part - A

Answer any Four of the following questions.

4 x 10 = 40

1. What is Geological mapping? Describe the Geological methods in mineral exploration.
2. Describe the Geochemical dispersion and geochemical methods in exploration. Add a note on path finders.
3. What are proved, probable and possible reserves? Describe the reserve estimation methods.
4. What is resistivity? Describe electrical resistivity methods in mineral exploration.
5. What is sampling? Describe different types of sampling methods.
6. What is mining? Describe different mining methods.
7. What is Geological mapping? Describe the Geological methods in mineral exploration.
8. Write notes on the following
 - a.) Gravity method
 - b.) Magnetic method.

Part – B

Answer any Four of the following questions.

4 x 5 = 20

9. Average Assay
10. Geological prospecting
11. Geological mapping
12. Seismic method
13. Radio activity method.
14. Drilling methods
15. Alluvial Mining
16. Ore Dressing



PRACTICAL
(AT THE END OF VI SEMESTER)
SEMESTER-VI- Cluster Paper VIII A1
Introduction to Mineral Exploration

- 1) Estimation of Ore reserves: Bedded type and vein type (Extended area and included area methods)
- 2) Sampling Techniques – Preparation of composite sample of sediment by coning and quartering methods





VIIIA-2: Environmental Geology

Unit-I

Introduction, Concepts of environmental geology – History of environmental geology, environmental awareness, Role of Geologist in environmental Protection and Planning, Management. Environmental problems- natural and manmade problems. Earth system science: atmosphere, hydrosphere and lithosphere.

Unit-II:

Definition of soil, soil formation, soil profile, Types of soils, Classification of soils and its properties, Soil distribution in India. soil degradation and contamination. Pollution: definition, types (air, water, land, soil). Global warming, ozone depletion

Unit-III

Natural disasters: earthquake and tsunamis- Earthquake terminology, seismic zones of India, history of earthquakes & tsunamis of India and major earthquakes & tsunamis in the world. Volcanoes: volcanic hazards its effects on human beings and environment. Indian volcanoes Landslides: Types, causes and mitigation methods.

Unit-IV

Coastal hazards: definition of coasts. waves and currents, types of coastal hazards, sediment supply and erosion. coastal zone protection and management. Introduction to coastal zones, Indian coast lines. Floods and cyclones: types, causes & mitigation.

Unit-V

Mining impact on environment and health hazards, Environmental considerations in location and construction of dams, reservoirs and tunnels. Types of wastes and its disposal with special reference to hazardous chemical wastes and radioactive waste. Oil leakages in ocean and its impact on marine life.

Practicals:

1. Grain size analysis.
2. Soil profile,
3. Identification of historical events of earthquake and tsunamis in India and world.
4. Identification of locations of volcanoes in world and India in the map.
5. Line drawings of Landslides, Types of dams
6. Line drawings of Coastal features, coastal profile.

Text Books:.

1. Environmental Geology - K S Valdiya
2. Environmental Geology - Sudarshan V, Ravi C and Krishna Ch
3. Living with Earth: An introduction to Environmental Geology - Travis Hudson
4. Environmental Geology - Strainer & Strahier
5. Environmental Geology - Landgreen 6. Environmental Geology – Keller



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**SEMESTER-VI- Cluster Paper VIII A2
Environmental Geology**

Model Question Paper

Time: 3 hrs

Max.Marks: 60

Part - A

Answer any Four of the following questions.

4 x 10 = 40

1. Describe Environmental concept.
2. Write about Fundamentals of Earth system.
3. Describe the types of soils and classification of soils.
4. Describe the applications of remote sensing in Environmental Geology.
5. Write about the mining impact on the Environment.
6. What are the measures taken for the site selection for dams?
7. Write about the Geological hazards in Environmental Geology.
8. Describe Beach Erosion and sedimentation.

Part – B

Answer any Four of the following questions.

4 x 5 = 20

9. Role of Geologist in Environment.
10. Environmental awareness.
11. Waste Disposal
12. Surface Water Reservoirs
13. Mineral resource depletion
14. Geological hazards
15. Coastal zone protection
16. Mass wasting

Lab : Environmental Geology – Project work



VIIIA-3: Introduction to Remote sensing & GIS

UNIT – I : Remote Sensing

Definition - Components of Remote Sensing - Energy, Sensor, Interacting Body - Active and Passive Remote Sensing - Platforms - Aerial and Space Platforms - Balloons -Helicopters, Aircraft and Satellites- Synoptivity and Repetivity - Electro Magnetic Radiation (EMR) - EMR spectrum - Visible, Infra Red (IR), Near IR, Middle IR, Thermal IR and Microwave - Black Body Radiation-Planck's law - Stefan Boltzman law.

UNIT - II : EMR Interaction with Atmosphere and Earth Materials

Atmospheric characteristics - Scattering of EMR - Raleigh, Mie, Non-selective and Raman Scattering - EMR Interaction with Water vapour and ozone - Atmospheric Windows -Significance of Atmospheric windows - EMR interaction with Earth Surface Materials Radiance, Irradiance, Incident, Reflected, Absorbed and Transmitted Energy - Reflectance - Specular and Diffuse Reflection Surfaces - Spectral Signature - Spectral Signature curves. EMR interaction with water, soil and Earth Surface.

UNIT - III : Optical and Micro-wave Remote Sensing

Satellites - Classification- Based on Orbits- Sun Synchronous and Geo Synchronous- Based On Purpose, Earth Resources Satellites, Communication Satellites, Weather Satellites, Spy Satellites - Satellite Sensors-Resolution - Spectral, Spatial Radiometric and Temporal Resolution, Description of Multi Spectral Scanning, Along and Across Track Scanners - Description of Sensors in Landsat, SPOT, IRS series - Current Satellites-Radar - Speckle- Back Scattering - Side Looking Airborne Radar - Synthetic Aperture Radar - Radiometer - Geometrical characteristics.

UNIT – IV: Geographical Information System (GIS)

GIS- Components of GIS - Hardware, Software and Organizational Context Data -Spatial and Non-Spatial, Maps - Types of Maps, Projection - Types of Projection-Data Input - Digitizer, Scanner - Editing - Raster and Vector data structures - Comparison Of Raster and Vector data structure, Analysis using Raster and Vector data - Retrieval Reclassification, Overlaying, Buffering- Data Output- Printers and Plotters.

UNIT – V

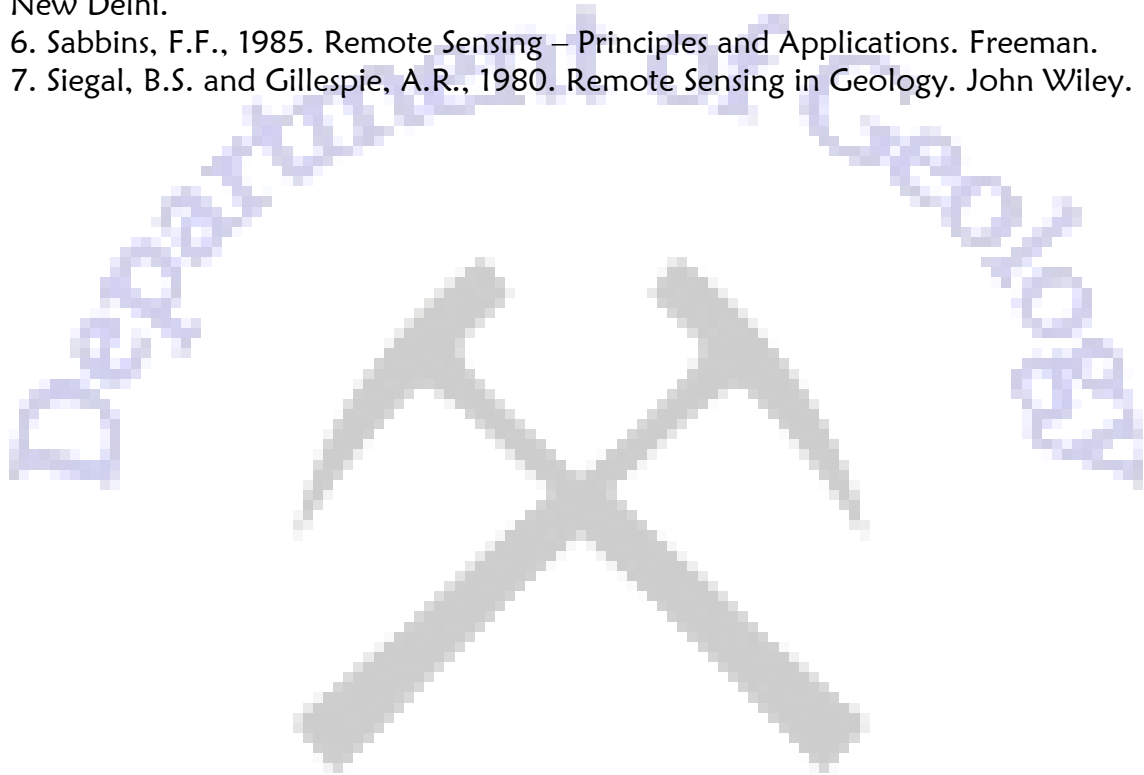
Visual Interpretation of Satellite Images - Elements of Interpretation - Interpretation Keys Characteristics of Digital Satellite Image, Image enhancement, Filtering, Classification - Integration of GIS and Remote Sensing - Application of Remote Sensing And GIS, Urban Applications- Integration



of GIS and Remote Sensing - Application of Remote Sensing and GIS - Water resources - Urban Analysis - Watershed Management - Resources Information Systems.

Books Recommended:

1. S. Kumar., 2016. Basics of Remote Sensing & GIS, University Science Press, New Delhi
2. Bhatta, B., 2008. Remote Sensing and GIS. Oxford, New Delhi.
3. Gupta, R.P., 1990. Remote Sensing Geology. Springer Verlag.
4. Lilleasand, T.M. and Kiffer, R.W., 1987. Remote Sensing and Image Interpretation. John Wiley.
5. Pandey, S.N., 1987. Principles and Application of Photogeology. Wiley Eastern, New Delhi.
6. Sabbins, F.F., 1985. Remote Sensing – Principles and Applications. Freeman.
7. Siegal, B.S. and Gillespie, A.R., 1980. Remote Sensing in Geology. John Wiley.





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**SEMESTER-VI- Cluster Paper VIII A3
Introduction to Remote Sensing & GIS**

Model Question Paper

Time: 3 hrs

Max.Marks: 60

Part - A

Answer any Four of the following questions.

4 x 8m = 32

1. What is remote sensing? Write about fundamental elements of remote sensing?
2. What is EMR and what do you understand by EMR? With neat sketch?
3. Advantages and Disadvantages of Remote sensing data?
4. How does Electromagnetic radiation interact with water?
5. Define scattering and what are the types of scattering?
6. Write an essay on applications of Remote sensing in mineral exploration?

Part – B

Answer any Five of the following questions.

5 x 4m = 20

7. What is a RADAR and write down the RADAR equation?
8. What are applications of remote sensing and GIS in water resources management?
9. What are maps ? what are different types of maps?
10. What is a satellite and what are the different types of satellites used in remote sensing?
11. What are characteristics of EMR interaction with soil particles?
12. What are atmospheric windows and what significance of atmospheric windows?
13. What re spectral signature curves and what do you understand by spectral signature?
14. What are basic interactions that take place on the earth surface?

Lab: VIII A-3: Fieldwork



Cluster - B VIII B-1: Introduction to Geochemistry

Unit 1:

Concepts of geochemistry Introduction to properties of elements: crystal chemistry
Chemical bonding, Geochemical classification of elements

Unit 2 :

Geochemistry of solid Earth: The Earth in relation to the solar system, Cosmic abundance of elements. Composition of different planets. Layered structure of Earth and their chemistry

Unit 3:

Classification of Meteorites and their chemistry, Geochemical dispersion. Distribution of major, minor and trace elements in igneous, metamorphic and sedimentary rocks.

Unit 4:

Geochemical cycle. Introduction to isotope geochemistry., Stable isotopes and unstable isotopes and its applications, Half life. Isomorphism and polymorphism

Unit 5:

Geochemistry and principles of evolution of atmosphere, hydrosphere and biosphere

SUGGESTED READINGS:

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

Lab: Elements of Geochemistry - (Practical)

1. Identification of rocks based on the geochemical data given.
2. Geochemical classification of water.



VIIIB-2: Introduction to Mining Geology

UNIT-I

Mining Geology: Introduction: Definition, basic concepts, terminology, broad classification of mining methods, planning, Mines & Minerals Regulation & Development Act,

UNIT-II

Exploration and exploratory mining of surface and underground mineral deposits; Geological factors considered for the selection of mining method viz.- Alluvial/Surface mining, Quarrying, Open-cast mining, and Underground mining methods;

UNIT-III

Geological conditions for- Types of openings, their position, shape and size -adits, inclines, shafts, levels, cross-cuts, winzes and raises. Types of drilling methods. Hydraulic drilling, dredging.

UNIT-IV

Opencast/open pit/pit mining – Methods – bench cut, glory hole, strip mining. Factors considered for mechanization and transportation. Advantages and disadvantages

UNIT-V

Underground mining methods: Board and pillar, room and pillar, long wall mining. Mine supports-factors considered for types of supports used. Mine ventilation-planning, its significance and effects; Drainage planning, its significance and its effect. Mining hazards: mine inundation, fire and rock burst

SUGGESTED READINGS:

1. Mining geology. Mckcnistry.
2. Mining Geology: R. N. P. Arogya Swamy
3. Principles of Mine Planning By Jayanth Bhattacharya. Allied Publ.

Practical: Field report on nearest mines.

VIIIB-3: Project work

