

BOARD OF STUDIES IN  
GEOLOGY 2023-24

Single Major (I, II SEM) 3 Major (III, V SEM)



GOVERNMENT COLLEGE  
AUTONOMOUS  
RAJAHMUNDRY



**Proceedings of the Principal, Government College (Autonomous), Rajahmundry**  
**Present: Dr. C. Krishna, M.Sc.Tech, NET., Ph.D.**

**Rc. No: Spl./Acad.Cell-GCRJY/BOS/2023-24, Dated: 28 June 2023**

**Sub:-** Government College (Autonomous), Rajahmundry– **Boards of Studies (BoS) –2023-24** Nomination of Members - Orders Issued.

**Ref:-** 1. UGC Guidelines for Autonomous Colleges - 2018.  
2. Proceedings of the Vice-Chancellor, ANUR No. ANUR Government College (A) Rajahmundry, dated 01-06-2023.  
3. UGC, Curriculum and Credit Framework for undergraduate programs dated 7 December 2022.

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**ORDER:**

The Principal, Government College (Autonomous), Rajahmundry is pleased to constitute the **Board of Studies in Geology** for framing the syllabi in Geology subject for all semesters under **single major system** duly following the norms of the UGC Autonomous guidelines 2018 and curriculum framework issued by UGC for single major system vide Ref.3 above.

S. No	Name	Designation
1	Dr. M.R. Goutham	Chairman
2	All Faculty members in the department	Member
3	Sri K. Santosh HoD, DNR College, Bhimavaram	Subject Expert
4	Dr. S.S.K. Chaitanya, HoD, Sir CRR College, EluruBhimavaram	Subject Expert
5	Dr. A. Nukaratnam, Dept. of Geology ANUR	University Nominee
6	Sri Bhavana P.R. General Manager (Retd) ONGC, Rajahmundry	Expert from Industry/Corporate Sector
7	Mr. B. Satya David Raju Central University of Punjab	Student Nominee

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

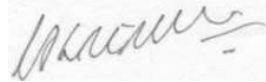
- (a) Prepare syllabi for the subject keeping in view the objectives of the college, the interest of the stakeholders and national requirements for consideration and approval of the Academic Council
- (b) Suggest methodologies for innovative teaching and evaluation techniques

(c) Suggest a panel of names to the Academic Council for the appointment of examiners

(d) Coordinate research, teaching, extension, and other activities in the department of the college.

The term of the members will be Two years from the date of issue of this proceedings. 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.

**Note:** For further information, please go through the guidelines provided by the Academic Cell of the College.



**C. KRISHNA  
PRINCIPAL  
GOVERNMENT COLLEGE [A]  
RAJAHMUNDRY**

Copy to:

1. The above individuals
2. File



Composition of Board of Studies in  
Geology Government College [Autonomous]  
Rajahmundry

**Composition of BoS in Geology (2023-24)**

S.No	Name	Designation
1	Dr. M.R. Goutham Lecturer in Geology, GC[A], Rajahmundry	Chairman
2	Dr. N. Srinivasa Rao	Faculty Member
3	Mr. S. Venkatesh	Faculty Member
4	Dr. R. Anil Kumar	Faculty Member
5	Mr. Ch. Abhishek	Faculty Member
6	Mrs. P. Devi Priya	Faculty Member
7	Mrs.S. Durga Bhavani	Faculty Member
8	Mr. B. Sai krishna	Faculty Member
9	Dr. S.S.K. Chaitanya, HoD, Department of Geology, CRR College, Eluru	Subject Expert
10	Sri K. Santosh HoD, DNR College, Bhimavaram.	Subject Expert
11	Dr. A. Nukaratnam, Dept. of Geology ANUR	University Nominee
12	Sri P.R. Bhavana, DGM (Retd.), ONGC, Rajahmundry	Expert from Industry/Corporate Sector
13	B. Satya David Raju Central University of Punjab	Student Nominee



The Board of Studies of **GEOLOGY** met online at 11:00 A.M on 30 August 2023 through Google Meet under the chairmanship of Dr. M.R. Goutham to discuss the following agenda points.

## Agenda

1. Approval of Proposed Single Major Programs for the Academic Year 2023-24
2. Approval of Program Structure for the Single Major Programs
3. Designing Program Specific Outcomes, Course Outcomes and Course objectives for Proposed Single Major Programs, B.Sc. (Honors) in Geology
4. Curriculum Design for all the Semesters for Proposed Single Major Programs:
5. Curriculum Design for all the Semesters for Minor Programs
6. Approval of Syllabus for the Courses already exists in Three major Programs
7. Designing Model Question Papers and identifying potential paper setters
8. Innovative Teaching - Learning Methodology (Learner-Centric)
9. Proposal of Certificate Courses and its Curriculum design
10. Academic activities of the Department for the Academic year 2023-24
11. Any other proposals with the permission of the chair

The following members attended the BoS meeting on 30 August 2023

- Dr. M.R. Goutham, Lecturer-in-Charge, Department of Geology, Government College (Autonomous) Rajahmundry.
- Dr. A. Nukaratnam, Department of Geology, Adikavi Nannaya University
- Dr. S.S.K. Chaitanya, HoD, Geology, Sir CR Reddy Autonomous College, Eluru
- Sri K. Santosh, HoD, Geology, DNR College (Autonomous), Bhimavaram
- Dr. P. Padmasree, HoD, Geology, Government Arts College, Anantapur (Special Invitee)
- Dr. N. Srinivasa Rao, Faculty member in Geology, GCRJY
- Sri S. Venkatesh, Faculty member in Geology, GCRJY
- Dr. R. Anil Kumar, Faculty member in Geology, GCRJY
- Sri B. Saikrishna, Faculty member in Geology, GCRJY
- Sri CH. Abhishek, Faculty member in Geology, GCRJY
- Ms. S. Durga Bhavani, Faculty member in Geology, GCRJY
- Ms. P. Devi Priya, Faculty member in Geology, GCRJY
- Mr. B. Satya David Raju, Central University of Punjab (Student member)



## Minutes of the Meeting

Before commencing the discussion on the agenda points, the Chairman, Dr. M.R. Goutham welcomed all the members of the board and informed the members about the importance of this particular BoS meeting in view of the introduction of 4-year honours degree program in a single major from the academic year 2023-24 by the Government of Andhra Pradesh. He provided an overview of various programs offered by the department of geology such as UG, PG and Ph.D. levels.

He explained to the members that the existing CBCS in 3 major system is redesigned and rolled out a 4-year UG honours program from the year 2020-21 in consonance with the National Education Policy (NEP)-2020. As per the UGC guidelines released in December 2022, for a new student-centric 'Curriculum and Credit Framework and Undergraduate Programs (CCFUP)', it had to redesign the curricular framework for the 4-year honours program with a single major and one minor to incorporate a flexible choice-based credit system, multi-disciplinary approach and multi-entry and exit options for facilitating students to pursue their career path by choosing the subject/field of their interest.

He added that the honours degree in a single major would give the students an opportunity to pursue an in-depth study of a particular subject or discipline, and equip them with the knowledge required to pursue a Ph.D. that needed independent learning and research. Along with the single major, the students will also study one minor course, which can be done either online (such as Swayam, NPTEL, UGC, or any other Edu Tech company) or offline mode. The minor courses are introduced to enhance the employability skills of students and are offered as an open vertical. Students will be eligible to pursue a postgraduate (PG) course in the minor selected, as the minor courses are **assigned** with 24 credits required for admission 4 into the PG program in a particular subject.

He further added that all the UG students are needed to undergo multidisciplinary courses, intended to broaden their intellectual experience and form part of liberal arts and science education. The three multidisciplinary courses in five disciplines included natural and physical sciences; mathematics, statistics and computer applications, library, information and media sciences; commerce and management; and humanities and social sciences. To enhance students' skills, a pool of skill enhancement courses would be designed by incorporating business skills, technology skills, data science and digital and human skills.





After this brief introduction, Dr. Goutham began the session by presenting the Board of Studies (BoS) document, indicating the start of the discussions, in order to enable a productive discussion on the meeting's agenda topics.

## **Discussion & Resolutions**

### **Item 1: Approval of Proposed Single Major Programs for the Academic Year 2023-24**

#### ***Discussion:***

The Chairman Dr. M.R. Goutham informed the board about the efforts made to create four-year undergraduate programs in accordance with the National Education Policy (NEP-2020). To improve the quality of undergraduate courses, the department has launched a full reform of the curricular structure for these four-year honours undergraduate programs, emphasising the selection of a single major and one minor subject. He emphasised the new student-centric "Curriculum and Credit Framework for Undergraduate Programs (CCFUP)" developed by UGC. This framework includes a multidisciplinary approach, a flexible choice-based credit system, and many entrance and departure choices.

The Chairman added that, from the current academic year all the undergraduate programs will be arranged with only one major subject rather than the three majors. Students will be able to choose an extra subject as a minor during the second semester of the program. This single major system enables honours students to pursue in-depth study in a particular major, demonstrating their capacity to build work-ready abilities that will be very useful to potential employers.

Dr. Goutham continued that students who complete their undergraduate studies with a minor subject will gain eligibility to pursue postgraduate (PG) studies in that specific minor subject. These minor courses will be allocated 24 credits, a prerequisite for admission into a PG program in the chosen subject area. Following this, he proceeded to present the comprehensive curriculum framework for the proposed single major program to the board.

During the discussion, Dr. Nukaratnam, the University nominee, inquired about the proposed single major programs offered by the department and sought clarification regarding credits and the availability of multiple entry and exit points for these programs.



Dr. Goutham responded that the department is introducing one program under the single major stream starting from the Academic Year 2023-24: B.Sc (Honors) in Geology.

Regarding credits and multiple entry and exit points, he elaborated that students will have the option to exit and re-enter the program after the completion of the first year, second year, and third year.

- Upon exiting after the first year, they will receive a Certificate in Geology.
- Exiting after the second year will result in a Diploma in Geology with a Minor,
- Upon completion of the third year, they will earn a Degree in Geology
- Finally, upon completing the entire program, students will be awarded an Honors Degree in Geology.

The Chairman also provided the total credits required for each milestone as shown below. A Student needs to earn

- 46 Credits to get a Certificate in Geology
- 98 Credits for a Diploma in Geology
- 136 Credits for Degree in Geology
- 180 Credits for Honors Degree in Geology

The Industrial nominee, Sri Bhavana, inquired about the feasibility of the college in adopting the multiple entry and exit system. Dr. Goutham informed that the college is registered with the UGC-Academic Bank of Credits, which streamlines the process and facilitates the seamless implementation of the multiple entry and exit system.

The Board spent a considerable amount of time discussing this agenda point and approved the introduction of a Single Major Program i.e., B.Sc. (Honors) in Geology

**Resolution:** The proposed introduction of two Single Major Programs, namely B.Sc. (Honors) in Computer Science and B.Sc. (Honors) in Artificial Intelligence, is hereby approved.

### **Agenda Point 2: Approval of Program Structure for the Single Major Programs**

#### **Discussion:**

Continuing the discussion on Agenda Point 1, Chairman Goutham elaborated on the structure of the proposed programs. He outlined the number of courses that students will undertake in each semester and the corresponding credits allocated for each course. Additionally, he emphasized the inclusion of mandatory Community





Service Projects between the second and third semesters, as well as compulsory Summer Internships between the fourth and fifth semesters.

He further highlighted a crucial aspect of the program, mentioning that students will have to complete an internship with any industry for one entire semester, either in the fifth or sixth semester. This hands-on experience aims to provide students with valuable research and real-time work experience.

The Chairman further highlighted that, along with the Major and Minor Programs, the curriculum includes Ability Enhancement Courses, Multi-disciplinary Courses, and Skill Enhancement Courses, integrated across various semesters. The main goal of this holistic approach to education is to equip students with a well-rounded and adaptable skill set, preparing them effectively for their academic and professional endeavours.

One of the Subject Experts, Dr. Chaitanya, sought clarification on the Ability Enhancement Courses, Multi-Disciplinary Courses, and Skill Enhancement Courses within the entire curriculum. Dr. Goutham provided a clear clarification by presenting a slide from the curriculum framework, which outlined the specific details and distribution of these courses throughout the program.

The members engaged in an extensive discussion on the proposed comprehensive program structure, and spent substantial time to deliberation.

**Resolution:** It is resolved to Approve the Program Structure for B.Sc (Hons) – Geology

### **Item 3: Designing Program-Specific outcomes and Course outcomes for Proposed Single Major Program**

**Discussion:**

The discussion on this Agenda Point began with a unanimous focus on the importance of clear, industry-aligned, and flexible outcomes for B.Sc. (Honors) in Geology. Dr. Nukaratnam, a University nominee, and Dr. Padmasree, a special invitee, emphasized the necessity of incorporating ethical and societal elements into these objectives, employing varied evaluation methodologies, and cultivating a culture of continuous development via periodic reviews and feedback systems. All participants actively participated in the process of developing Program Specific Outcomes (PSOs) with a focus on Graduate qualities specific to the proposed single major programs.

**Resolution:** It is resolved to Approve the Designed Program Specific Outcomes  
Proposed Single Major Programs: B.Sc (Hons) – Geology



#### **Item No 4: Curriculum Design for all the Semesters for Proposed Single Major Programs**

The Chairman, Dr. Goutham gave a comprehensive review of the complete course curriculum for B.Sc (Hons) - Geology. He thoroughly explained the Course Objectives and Outcomes for each individual subject, emphasizing the program's strong emphasis on student-centred learning. He further emphasized that each unit of the course includes one Co-Curricular activity with evaluation methods in order to provide our students with an active and engaging learning experience.

Dr. Goutham went into further detail on the inclusion of one unit pertaining to Earth Sciences as it is essential to introduce the students to the subject of Geology in the I semester itself. This inclusion is intended to offer students a thorough knowledge of the essential topics they are going to learn in the coming academic years. He added that this unit functions as a bridge course, providing students with better clarity when picking their minor field in Semester II. All the members of the board unanimously supported the inclusion of one unit each on earth sciences in the major 1 and major 2 courses.

**Resolution:** It is resolved to approve All the Courses introduced in the Curriculum for

B.Sc (Hons) - Geology

#### **Item 5: Curriculum Design for all the Semesters for Minor Program**

**Discussion:**

Dr. Goutham informed the Board that the department is planning to offer Geology as a minor subject as well as other Single-major programs offered by the college

The Board held a thorough debate on the curriculum for the Minor Course and approved the proposal of offering Geology as a minor program and the courses provided within the program.

**Resolution:** It is resolved to approve offering Geology as a Minor program for all the other major programs offered by the college.



## **Item No 6: Approval of Syllabus for the Courses already exists in Three major Programs**

### **Discussion:**

The Chairman conveyed to the board that the curriculum for the existing programs under the three-major system for the students admitted during the academic year 2021-22 and 2022-23 will remain unchanged for the upcoming academic year (2023-24), following the same format and structure as approved in the previous Board of Studies (BoS) meeting for the academic year 2022-23.

All the members unanimously agreed and approved the syllabus for the programs offered by the Department of Geology under the three-major system, in alignment with the previously approved curriculum from the previous Board of Studies (BoS) meeting.

**Resolution:** It is resolved to approve the existing curriculum of all the courses for the existing three major programs designed and approved in the previous BoS meeting held for the Academic Year 2022-23.

## **Agenda Point 7: Designing Model Question Papers and identifying potential paper setters**

### **Discussion:**

All members took an active role in choosing subject experts and preparing a list of examiners and paper setters for the Semester End Examinations (SEE). The Board then had an in-depth discussion on the question paper pattern for the Semester End Examinations (SEE) and Practical examinations. All members' valuable comments were carefully reviewed and included in the final layout, creating a comprehensive and well-structured examination format.

Following is the Blueprint for the question papers existing batches, i.e, 2012 and 2022 admitted batches.

<b>Semester End Exam (50 Marks)</b>		<b>Internal assessment (50 Marks)</b>
<b>PART</b>	<b>Allotted Marks</b>	
<b>PART A:</b> This Part contains 5 Essay type internal choice questions numbering 1 to 10 will be asked Unit 1 to 5. Student has to answer all the 5 questions. Each question carries 7 marks.	<b>5 x 7 = 35 Marks</b> Question 1 or 2 from Unit I Question 3 or 4 from Unit II Question 5 or 6 from Unit III Question 7 or 8 from Unit IV Question 9 or 10 from Unit V	As per the concept



<b>PART B:</b> This Part contains 8 Short answer questions numbering 11 to 18 will be asked covering all the units. Student has to answer any 5 out of 8 questions. Each question carries 3 marks.	<b>5 x 3 = 15 Marks</b> Questions 11 to 18 are from Units I, II, III, IV and V respectively.	document provided by the college
<b>Totalmarks</b>	<b>50</b>	<b>50</b>

For 2023 admitted batch

Semester End Exam (50 Marks)		Internal assessment (50 Marks)
PART	Allotted Marks	
<b>PART A:</b> This Part contains 5 Essay type questions covering all units. Student has to answer any 3. Each question carry 10 marks	<b>3 x 10 =30 Marks</b>	As per the concept document provided by the college
<b>PART B:</b> This Part contains 10 one word answer questions numbering 6 to 16 will be asked covering all the units. Student has to answer all 10. Each question carries 1 mark.  Further, this section also contains 2 matching question with 5 key words in each question. Student has to answer both the questions. Each question carries 5 marks provided student match all the 5. Otherwise marks will be awarded depending on the number of correct matching, i.e. 1 mark for one correct maching	<b>10 x 1 = 10 Marks</b>  <b>10 x 1 = 10 Marks</b>	
<b>Totalmarks</b>	<b>50</b>	<b>50</b>

Split if Internal marks (50)

S.No	Component	Distributio nof Marks	
1	CIE I (after completion of 50% of the syllabus)	20	
2	CIE II (Online Exam)	10	
3	ATTENDANCE	Above 95%	5
		91% to 95%	4
		86% to 90%	3
		81% to 85%	2
		75% to 80%	1
		Below 75%	0
<b>Pedagogical Strategies</b>			
4	ASSIGNMENT	5	



5	Participation or Paper Presentation in Student Seminars/Workshops/Group Discussions/ Quiz/ Student Study Project/Field Visit/Survey	5
6	Viva-voce	5
<b>CIA TOTAL</b>		<b>50</b>
<b>SEE</b>		<b>50</b>
<b>Grand Total</b>		<b>100</b>

**Resolution:**

1. It is resolved to approve the list of examiners and paper setters for the Academic Year 2023-24
2. It is resolved to approve the blueprint of the Question papers of SEE and Practical Examinations

**Item 8: Innovative Teaching - Learning Methodology (Learner-Centric)**

**Discussion:**

The Chairman proposed a range of creative ways aimed at improving the educational experience under the agenda point of creative Teaching - teaching-learning methodology (Learner-Centric). To begin, he suggested including Virtual Labs, wherever available, which would offer students essential hands-on experience in a virtual setting. This addition seeks to provide students with a one-of-a-kind opportunity to play with and study complicated subjects outside of the limits of physical laboratories.

Further, in order to extend students' educational exposure, it was recommended that at least one course from the available offerings in a year be mapped to platforms such as SWAYAM/NPTEL if they are available.

During the discussion, one of the subject experts Dr. Chaitanya sought clarification on the financial burden placed on students who use SWAYAM services, as well as the efficacy of professors in monitoring student progress. In terms of finances, the Chairman stated that because the institution is a local branch of SWAYAM and fee waivers for students may be sought. To address concerns regarding student progress tracking, the Chairman proposed that mentors be included in SWAYAM. These mentors would be critical in improving the online monitoring process, offering students direction and assistance as they progress through their courses. All of the members appreciated and supported these recommendations.

**Resolution:** It is resolved to approve the proposed Innovative Teaching - Learning Methodology (Learner-Centric).



### **Item 9: Initiation of Certificate Course and its curriculum design**

The Chairman informed the Board that the College is offering 36 value-added certificate/diploma programs across various departments in a calendar year. He added that the certificate/ diploma courses are being run during a calendar year instead of an academic year. In this connection, he put forth to the Board that the department wanted to introduce one certificate course in the department from the ensuing calendar year, i.e., 2024. He proposed to offer the following certificate courses, provided the department gets intellectual support from concerned subject experts/organizations. The proposed certificate courses are:

1. Certificate course in Groundwater Exploration
2. Certificate course in Remote Sensing & GIS

The board appreciated the proposal. The members sought clarification from the Chairman on whether the department had the required infrastructure and subject expertise to run the said certificate courses.

The Chairman informed the members that a proposal is being submitted to the college to provide the necessary infrastructural facilities such as

- 1) establishment of a Remote Sensing Lab with 5 computers and required software and
- 2) establishment of a Hydrogeochemical lab with the necessary equipment.

He further added that the department would contact GSI/APSRAC/NRSA and State Groundwater Board/Central Groundwater Board and seek their help in sharing their expertise in training the faculty and students of the department.

The members felt that it is a very good proposal which will provide self-employability for the students who would take up the proposed certificate courses. They also suggested upgrading the certificate courses into diploma courses if necessary facilities are available.

#### **Resolution:**

1. It is resolved to initiate a certificate/diploma course in Groundwater Exploration/Remote Sensing & GIS in 2024.
2. It is resolved to request the College to provide financial assistance in establishing the required infrastructure/labs pertaining to the proposed certificate/diploma courses





**Agenda Point 10: Academic activities of the Department for the Academic year 2023-24**

**Discussion:**

The Chairman presented a comprehensive list of activities planned by the department for the academic year 2023-24. After a thorough discussion, the Board members approved the following departmental activities.

Date	Event	Activities	In collaboration with
13 October 2023	National Fossil Day	Lectures on palaeontology and Earth's history.	Department of Zoology & Botany
15-16 December 2023	2 Day National Seminar on "Digital Earth: Integrating Remote Sensing and GIS for Geological Insights"		Department of Computer Science
Feb 2024	One-week Geological Fieldtrip in and around Cuddaph Supergroup		
	Bhuvana Bodha 2024- A student-centred activity		
21 March 2024	International Day of Forests	1. Wild forest tree plantation on Campus 2. Spreading of seed balls in local forests	Botany department
22 March 2024	World Water Day	1. Seminar/Invited lectures on water conservation and the role of Geology in sustainable water development 2. Water-themed competitions, quizzes, and contests.	Central Groundwater Board/State Groundwater Department
22 April 2024	Earth Day	Invited Lectures on <i>environmental sustainability</i> .	
18 May 2024	International Museum Day	Display of Museum articles to other departments and local school children/ Exhibition.	
5 June 2024	World Environment Day	Guest lecture on " <i>Application of geological knowledge to the investigation of processes occurring at or near Earth's surface in order to mitigate natural hazards and minimize environmental degradation</i> "	

**Resolution:** It is resolved to approve the proposed departmental action plan for the academic year 2023-24.



The following members were present.

S.No	Name	Designation
1	Dr. M.R. Goutham Lecturer in Geology, GC[A], Rajahmundry	Chairman
2	Dr. N. Srinivasa Rao	Faculty Member
3	Mr. S. Venkatesh	Faculty Member
4	Dr. R. Anil Kumar	Faculty Member
5	Mr. Ch. Abhishek	Faculty Member
6	Mrs. P. Devi Priya	Faculty Member
7	Mrs.S. Durga Bhavani	Faculty Member
8	Mr. B. Sai krishna	Faculty Member
9	Dr. S.S.K. Chaitanya, HoD, Department of Geology, CRR College, Eluru	Subject Expert
10	Sri K. Santosh HoD, DNR College, Bhimavaram.	Subject Expert
11	Dr. A. Nukaratnam, Dept. of Geology ANUR	University Nominee
12	Sri P.R. Bhavana, DGM (Retd.), ONGC, Rajahmundry	Expert from Industry/Corporate Sector
13	B. Satya David Raju Central University of Punjab	Student Nominee

Chairman, BOS

(M.R.GOUTHAM)

## 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 (WG Dist)	15	Economic Geology, Structural Geology, Petrology
2	Sri K. Santhosh	HoD, Geology, DNR College Bhimavaram (WG Dist)	4	All branches of Geology
3	Dr. K.V. Swamy	Assoc. Professor Dept. of Geology ANUR, Rajahmundry	11	Mineral Exploration, Geophysics
4	Sri Dr. Ganapathi	Maharaja College (A), Vizianagaram	5	All branches of Geology

University Nominee:

(K.V. SWAMY)

Industrial Nominee:

(P.R. BHAVANA)

Subject Expert:

(S.S.K. CHAITANYA)

Subject Expert:

( K. Santosh)

Staff Members:

**Chairman, BOS**

**(M.R. GOUTHAM)**



**Department of Geology Government College [A],  
Rajahmundry**

**Programme: B.Sc. Honours in Geology (Major)**

**Program: B.Sc**

**subject:Geology**

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	I	1	Essentials and Applications of Mathematical, Physical and Chemical Sciences	3+2	4
	I	2	Advances in Mathematical, Physical and Chemical Sciences	3+2	4
	II	3	Geology and Branches of Geology	3	3
			Geology and Branches of Geology Practical Course	2	1
	II	4	Physical Geology and Soil Science	3	3
			Physical Geology and Soil Science Practical Course	2	1
II	III	5	Crystallography & Mineralogy	3	3
			Crystallography & Mineralogy Practical Course	2	1
		6	Palaeontology	3	3
			Palaeontology Practical Course	2	1
		7	Fossil Fuels	3	3
			Fossil Fuels Practical Course	2	1
	8	Field Geology	3	3	
		Field Geology Practical Course	2	1	
	IV	9	Elements of Petrology	3	3
			Elements of Petrology Practical Course	2	1
		10	Igneous, Metamorphic & Sedimentary Petrology	3	3
			Igneous, Metamorphic & Sedimentary Petrology Practical Course	2	1
		11	Structural Geology	3	3
			Structural Geology Practical Course	2	1

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits		
III	V	12	Economic Geology	3	3		
			Economic Geology Practical Course	2	1		
		13	Indian Geology & Stratigraphy	3	3		
			Indian Geology & Stratigraphy Practical Course	2	1		
		14 A	Geodynamics & Geochronology	3	3		
			Geodynamics & Geochronology Practical Course	2	1		
		<b>OR</b>					
		14 B	Drilling & Sampling methods	3	3		
			Drilling & Sampling methods Practical Course	2	1		
		15 A	Hydrogeology	3	3		
			Hydrogeology Practical Course	2	1		
		<b>OR</b>					
		15 B	Groundwater Exploration	3	3		
			Groundwater Exploration Practical Course	2	1		
		IV	VII	16 A	Atmospheric Science	3	3
					Atmospheric Science Practical Course	2	1
<b>OR</b>							
16 B	Fundamentals of Geophysics			3	3		
	Fundamentals of Geophysics Practical Course			2	1		
17 A	Geochemistry			3	3		
	Geochemistry Practical Course			2	1		
<b>OR</b>							
17 B	Geotectonics			3	3		
	Geotectonics Practical Course			2	1		
18 A	Marine Geology			3	3		
	Marine Geology Practical Course			2	1		
<b>OR</b>							
18 B	Mineral Economics			3	3		
	Mineral Economics Practical Course			2	1		
<b>SEC</b>							
19 A	Mining Methods & Mine Planning	2	1				
	Mining Methods & Mine Planning Practical Course	3	3				
<b>OR</b>							
19 B	Introduction to Remote Sensing and Digital Image Processing	2	1				
	Introduction to Remote Sensing and Digital Image Processing Practical Course	3	3				

VIII	20 A	Basics of Geographical Information System	2	1
		Basics of Geographical Information System Practical Course	3	3
	<b>OR</b>			
	20 B	Sampling and Geological Mapping	2	1
		Sampling and Geological Mapping Practical Course	3	3
	21 A	Micropalaeontology	2	1
		Micropalaeontology Practical Course	3	3
	<b>OR</b>			
	21 B	Energy Resources	2	1
		Energy Resources Practical Course	3	3
	22 A	Natural Hazards and Management	2	1
		Natural Hazards and Management Practical Course	3	3
	<b>OR</b>			
	22 B	Mineral Exploration	2	1
		Mineral Exploration Practical Course	3	3
	23 A	Ore Beneficiation	2	1
		Ore Beneficiation Practical Course	3	3
	<b>OR</b>			
	23 B	Engineering Geology	2	1
		Engineering Geology Practical Course	3	3
	<b>SEC</b>			
	24 A	GIS & GPS Applications	3	3
		GIS & GPS Applications Practical Course	2	1
	<b>OR</b>			
	24 B	Petroleum Geology	3	3
		Petroleum Geology Practical Course	2	1
	25 A	Remote Sensing Applications in Natural Resource Exploration	3	3
		Remote Sensing Applications in Natural Resource Exploration Practical Course	2	1
	<b>OR</b>			
	25 B	Visual & Digital Interpretation	3	3
		Visual & Digital Interpretation Practical Course	2	1



## Programme: B.Sc Geology (Minor)

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	II	1	Geology and Branches of Geology	3	3
			Geology and Branches of Geology Practical Course	2	1
II	III	2	Crystallography & Mineralogy	3	3
			Crystallography & Mineralogy Practical Course	2	1
	IV	3	Elements of Petrology	3	3
			Elements of Petrology Practical Course	2	1
		4	Structural Geology	3	3
			Structural Geology Practical Course	2	1
III	V	5	Economic Geology	3	3
			Economic Geology Practical Course	2	1
		6	Indian Geology & Stratigraphy	3	3
			Indian Geology & Stratigraphy Practical Course	2	1

## Programme: 3 Major

Course: B.Sc.

Subject: Geology

S. No	Semester	Title of the Paper	Hrs./ week	Max. Marks	Mid Sem. Exam	Credits
3	Semester-III	Paper -III- Petrology (Igneous, Sedimentary and Metamorphic)	4	50	50	3
4	Lab-III	Petrology (Igneous, Sedimentary and Metamorphic)	2	50	--	2
5	Semester V	Paper-VI - Palaeontology & Indian Geology	4	50	50	3
6	Lab –VI	Palaeontology & Indian Geology	2	50	--	2
7	Semester V	Paper VII – Groundwater Geology & Exploration	4	50	50	3
8	Lab VII	Groundwater Geology & Exploration	2	50	--	2

Chairman, BOS

(M.R. GOUTHAM)

# LIST OF COURSES

## Single Major

S.No	Year	Semester	Course	Title of the Course
1	I	I	1	Essentials and Applications of Mathematical, Physical and Chemical Sciences
		I	2	Advances in Mathematical, Physical and Chemical Sciences
		II	3	Geology and Branches of Geology
				Geology and Branches of Geology Practical Course
		II	4	Physical Geology and Soil Science
Physical Geology and Soil Science Practical Course				
2	II	III	5	Crystallography & Mineralogy
				Crystallography & Mineralogy Practical Course
			6	Palaeontology
				Palaeontology Practical Course
			7	Fossil Fuels
		Fossil Fuels Practical Course		
		8	Field Geology	
			Field Geology Practical Course	
		IV	9	Elements of Petrology
				Elements of Petrology Practical Course
			10	Igneous, Metamorphic & Sedimentary Petrology
Igneous, Metamorphic & Sedimentary Petrology Practical Course				
11	Structural Geology			
	Structural Geology Practical Course			

S.No	Year	Semester	Course	Title of the Course		
3	III	V	12	Economic Geology		
				Economic Geology Practical Course		
			13	Indian Geology & Stratigraphy		
				Indian Geology & Stratigraphy Practical Course		
			14 A	Geodynamics & Geochronology		
				Geodynamics & Geochronology Practical Course		
			<b>OR</b>			
			14 B	Drilling & Sampling methods		
				Drilling & Sampling methods Practical Course		
			15 A	Hydrogeology		
				Hydrogeology Practical Course		
			<b>OR</b>			
			15 B	Groundwater Exploration		
				Groundwater Exploration Practical Course		
4	IV	VII	16 A	Atmospheric Science		
				Atmospheric Science Practical Course		
			<b>OR</b>			
			16 B	Fundamentals of Geophysics		
				Fundamentals of Geophysics Practical Course		
			17 A	Geochemistry		
				Geochemistry Practical Course		
			<b>OR</b>			
			17 B	Geotectonics		
				Geotectonics Practical Course		
			18 A	Marine Geology		
				Marine Geology Practical Course		
			<b>OR</b>			
			18 B	Mineral Economics		
				Mineral Economics Practical Course		
			<b>SEC</b>			
			19 A	Mining Methods & Mine Planning		
				Mining Methods & Mine Planning Practical Course		
			<b>OR</b>			
B	Introduction to Remote Sensing and Digital Image Processing					
	Introduction to Remote Sensing and Digital Image Processing Practical Course					

S.No	Year	Semester	Course	Title of the Course	
5			20 A	Basics of Geographical Information System	
				Basics of Geographical Information System Practical Course	
			<b>OR</b>		
			20 B	Sampling and Geological Mapping	
				Sampling and Geological Mapping Practical Course	
			VIII	21 A	Micropalaeontology
					Micropalaeontology Practical Course
				<b>OR</b>	
		21 B		Energy Resources	
				Energy Resources Practical Course	
		22 A		Natural Hazards and Management	
				Natural Hazards and Management Practical Course	
		<b>OR</b>			
		22 B		Mineral Exploration	
				Mineral Exploration Practical Course	
		23 A		Ore Beneficiation	
				Ore Beneficiation Practical Course	
		<b>OR</b>			
		23 B		Engineering Geology	
				Engineering Geology Practical Course	
		<b>SEC</b>			
		24 A	GIS & GPS Applications		
			GIS & GPS Applications Practical Course		
		<b>OR</b>			
		24 B	Petroleum Geology		
			Petroleum Geology Practical Course		
		25 A	Remote Sensing Applications in Natural Resource Exploration		
			Remote Sensing Applications in Natural Resource Exploration Practical Course		
<b>OR</b>					
25 B	Visual & Digital Interpretation				
	Visual & Digital Interpretation Practical Course				

## Programme: 3 Major

Course: B.Sc.

Subject: Geology

S. No	Semester	Title of the Paper
3	Semester-III	Paper -III- Petrology (Igneous, Sedimentary and Metamorphic)
4	Lab-III	Petrology (Igneous, Sedimentary and Metamorphic)
5	Semester V	Paper-VI - Palaeontology & Indian Geology
6	Lab –VI	Palaeontology & Indian Geology
7	Semester V	Paper VII – Groundwater Geology & Exploration
8	Lab VII	Groundwater Geology & Exploration

## SEMESTER-I

# COURSE 1: ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES

Theory

Credits: 4

5 hrs/week

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### Course Objective:

The objective of this course is to provide students with a comprehensive understanding of the essential concepts and applications of mathematical, physical, and chemical sciences. The course aims to develop students' critical thinking, problem-solving, and analytical skills in these areas, enabling them to apply scientific principles to real-world situations.

### Learning outcomes:

1. Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures.
2. To Explain the basic principles and concepts underlying a broad range of fundamental areas of physics and to Connect their knowledge of physics to everyday situations
3. To Explain the basic principles and concepts underlying a broad range of fundamental areas of chemistry and to Connect their knowledge of chemistry to daily life.
4. Understand the interplay and connections between mathematics, physics, and chemistry in various applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.
5. To explore the history and evolution of the Internet and to gain an understanding of network security concepts, including threats, vulnerabilities, and countermeasures.

### UNIT I: ESSENTIALS OF MATHEMATICS:

**Complex Numbers:** Introduction of the new symbol  $i$  – General form of a complex number – Modulus-Amplitude form and conversions

**Trigonometric Ratios:** Trigonometric Ratios and their relations – Problems on calculation of angles

**Vectors:** Definition of vector addition – Cartesian form – Scalar and vector product and problems

**Statistical Measures:** Mean, Median, Mode of a data and problems

### UNIT II: ESSENTIALS OF PHYSICS:

Definition and Scope of Physics- Measurements and Units - Motion of objects: Newtonian Mechanics and relativistic mechanics perspective - Laws of Thermodynamics and Significance- Acoustic waves and electromagnetic waves- Electric and Magnetic fields and their interactions- Behaviour of atomic and nuclear particles- Wave-particle duality, the uncertainty principle- Theories and understanding of universe



### **UNIT III: ESSENTIALS OF CHEMISTRY: :**

Definition and Scope of Chemistry- Importance of Chemistry in daily life -Branches of chemistry and significance- Periodic Table- Electronic Configuration, chemical changes, classification of matter, Biomolecules- carbohydrates, proteins, fats and vitamins.

### **UNIT IV: ESSENTIALS OF EARTH SYSTEM SCIENCES:**

Introduction to geology, scope, sub-disciplines and relationship with other branches of sciences. Earth as a planet. Earth's size, shape, mass, density, rotational and evolutionary parameters. Different spheres of the earth. Distribution of elements in solar system and in Earth

### **UNIT V: ESSENTIALS OF COMPUTER SCIENCE:**

Milestones of computer evolution - Internet, history, Internet Service Providers, Types of Networks, IP, Domain Name Services, applications.

**Ethical and social implications:** Network and security concepts- Information Assurance Fundamentals, Cryptography-Symmetric and Asymmetric, Malware, Firewalls, Fraud Techniques- Privacy and Data Protection

### **Recommended books:**

1. Functions of one complex variable by John.B.Conway, Springer- Verlag.
2. Elementary Trigonometry by H.S.Hall and S.R.Knight
3. Vector Algebra by A.R.Vasishta, Krishna Prakashan Media(P)Ltd.
4. Basic Statistics by B.L.Agarwal, New age international Publishers
5. University Physics with Modern Physics by Hugh D. Young and Roger A. Freedman
6. Fundamentals of Physics by David Halliday, Robert Resnick, and Jearl Walker
7. Physics for Scientists and Engineers with Modern Physics" by Raymond A. Serway and John W. Jewett Jr.
8. Physics for Technology and Engineering" by John Bird
9. Chemistry in daily life by Kirpal Singh
10. Chemistry of bio molecules by S. P. Bhutan
11. Fundamentals of Computers by V. Raja Raman
12. Cyber Security Essentials by James Graham, Richard Howard, Ryan Olson

# **STUDENT ACTIVITIES**

## **UNIT I: ESSENTIALS OF MATHEMATICS:**

### 1: Complex Number Exploration

Provide students with a set of complex numbers in both rectangular and polar forms.

They will plot the complex numbers on the complex plane and identify their properties2:

### Trigonometric Ratios Problem Solving

Give students a set of problems that require the calculation of trigonometric ratios and their relations.

Students will solve the problems using the appropriate trigonometric functions (sine, cosine, tangent, etc.) and trigonometric identities.

### 3: Vector Operations and Applications

Provide students with a set of vectors in Cartesian form.

Students will perform vector addition and subtraction operations to find the resultant vectors.

They will also calculate the scalar and vector products of given vectors.

### 4: Statistical Measures and Data Analysis

Give students a dataset containing numerical values.

Students will calculate the mean, median, and mode of the data, as well as other statistical measures if appropriate (e.g., range, standard deviation).

They will interpret the results and analyze the central tendencies and distribution of the data.

## **UNIT II: ESSENTIALS OF PHYSICS:**

### 1. Concept Mapping

Divide students into groups and assign each group one of the topics.

Students will create a concept map illustrating the key concepts, relationships, and applications related to their assigned topic.

Encourage students to use visual elements, arrows, and labels to represent connections and interdependencies between concepts.

### 2. Laboratory Experiment

Select a laboratory experiment related to one of the topics, such as motion of objects or electric and magnetic fields.

Provide the necessary materials, instructions, and safety guidelines for conducting the experiment.

Students will work in small groups to carry out the experiment, collect data, and analyze the results.

After the experiment, students will write a lab report summarizing their findings, observations, and conclusions.

## **UNIT III: ESSENTIALS OF CHEMISTRY**

### **1: Chemistry in Daily Life Presentation**

Divide students into groups and assign each group a specific aspect of daily life where chemistry plays a significant role, such as food and nutrition, household products, medicine, or environmental issues.

Students will research and create a presentation (e.g., PowerPoint, poster, or video) that showcases the importance of chemistry in their assigned aspect.

### **2: Periodic Table Exploration**

Provide students with a copy of the periodic table.

Students will explore the periodic table and its significance in organizing elements based on their properties.

They will identify and analyze trends in atomic structure, such as electronic configuration, atomic size, and ionization energy.

### **3: Chemical Changes and Classification of Matter**

Provide students with various substances and chemical reactions, such as mixing acids and bases or observing a combustion reaction.

Students will observe and describe the chemical changes that occur, including changes in color, temperature, or the formation of new substances.

### **4: Biomolecules Investigation**

Assign each student or group a specific biomolecule category, such as carbohydrates, proteins, fats, or vitamins.

Students will research and gather information about their assigned biomolecule category, including its structure, functions, sources, and importance in the human body.

They can create informative posters or presentations to present their findings to the class.

## **UNIT IV: ESSENTIALS OF EARTH SYSTEM SCIENCES:**

- 1. Chart preparation** - relationship with other branches of sciences.
- 2. Calculate/find** - Earth's size, shape, mass, density, rotational and evolutionary parameters.
- 3. Student Seminar** - Different spheres of the earth.
- 4. Project** - Distribution of elements in solar system and in Earth

## **UNIT V: ESSENTIALS OF COMPUTER SCIENCE:**

1. Identifying the attributes of network (Topology, service provider, IP address and bandwidth of
2. your college network) and prepare a report covering network architecture.
3. Identify the types of malwares and required firewalls to provide security.
4. Latest Fraud techniques used by hackers.

**Government College (Autonomous), Rajahmundry**  
**(Affiliated to Adikavi Nannaya University)**  
**SEMESTER I , COURSE - I**  
**ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICAL AND CHEMICAL**  
**SCIENCES**

**MODEL PAPER**

Time: 2 1/2 Hours

Max.Marks: 50

**SECTION - A**

Answer any **Three** Questions . Each question carry 10 Marks

3X10=30 Marks

1. Question from Unit I
2. Question from Unit II
3. Question from Unit III
4. Question from Unit IV
5. Question from Unit V

**SECTION - B**

Answer **All** Questions . Each question carry 1 Mark

1X10=10 Marks

This section consists 10 Questions covering all the units, numbering 6 to 15 which carry 1 mark for each question

**SECTION - C**

Answer **All** Questions . Each question carry 1 Mark

2X5=10 Marks

Match the following

This section consists 2 matching Questions covering all the units, numbering 16 and 17. each list contains 5 words and each matching will gain 1 mark.

16.	List - A	List - B	17.	List - A	List - B
	1	A		1	A
	2	B		2	B
	3	C		3	C
	4	D		4	D
	5	E		5	E

## SEMESTER-I

### COURSE 2: ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES

Theory

Credits: 4

5 hrs/week

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#### Course Objective:

The objective of this course is to provide students with an in-depth understanding of the recent advances and cutting-edge research in mathematical, physical, and chemical sciences. The course aims to broaden students' knowledge beyond the foundational concepts and expose them to the latest developments in these disciplines, fostering critical thinking, research skills, and the ability to contribute to scientific advancements.

#### Learning outcomes:

1. Explore the applications of mathematics in various fields of physics and chemistry, to understand how mathematical concepts are used to model and solve real-world problems.
2. To Explain the basic principles and concepts underlying a broad range of fundamental areas of physics and to Connect their knowledge of physics to everyday situations.
3. Understand the different sources of renewable energy and their generation processes and advances in nanomaterials and their properties, with a focus on quantum dots. To study the emerging field of quantum communication and its potential applications. To gain an understanding of the principles of biophysics in studying biological systems. Explore the properties and applications of shape memory materials.
4. Understand the principles and techniques used in computer-aided drug design and drug delivery systems, to understand the fabrication techniques and working principles of nanosensors. Explore the effects of chemical pollutants on ecosystems and human health.
5. Understand the interplay and connections between mathematics, physics, and chemistry in various advanced applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.
6. Understand and convert between different number systems, such as binary, octal, decimal, and hexadecimal. Differentiate between analog and digital signals and understand their characteristics. Gain knowledge of different types of transmission media, such as wired (e.g., copper cables, fiber optics) and wireless (e.g., radio waves, microwave, satellite)..

#### UNIT I: ADVANCES IN BASICS MATHEMATICS

**Straight Lines:** Different forms – Reduction of general equation into various forms – Point of intersection of two straight lines

**Limits and Differentiation:** Standard limits – Derivative of a function – Problems on product rule and quotient rule

**Integration:** Integration as a reverse process of differentiation – Basic methods of integration

**Matrices:** Types of matrices – Scalar multiple of a matrix – Multiplication of matrices – Transpose of a matrix and determinants

## **UNIT II: ADVANCES IN PHYSICS:**

**Renewable energy:** Generation, energy storage, and energy-efficient materials and devices.  
**Recent advances in the field of nanotechnology:** Quantum dots, Quantum Communication- recent advances in biophysics- recent advances in medical physics- Shape Memory Materials.

## **UNIT III: ADVANCES IN CHEMISTRY:**

Computer aided drug design and delivery, nano sensors, Chemical Biology, impact of chemical pollutants on ecosystems and human health, Dye removal - Catalysis method

## **UNIT IV: CURRENT SCENARIO AND FUTURE PROSPECTS OF EARTH RESOURCES**

Resource reserve definitions; mineral, energy and water resources in industries Historical perspective and present. Renewable and Non-Renewable Sources of Energy. Major Types and Sources of Energy Resources of Natural Oil and Gas Coal and Nuclear Minerals Potential of Hydroelectric Power, Solar Energy, Wind, Wave and Biomass Based power and Energy. Current Scenario and Future Prospects of Solar Power, Hydrogen Power and Fuel Cells.

## **UNIT V: Advanced Applications of computer Science**

Number System-Binary, Octal, decimal, and Hexadecimal, Signals-Analog, Digital, Modem, Codec, Multiplexing, Transmission media, error detection and correction- Parity check and CRC, Networking devices- Repeater, hub, bridge, switch, router, gateway.

### **Recommended books:**

1. Coordinate Geometry by S.L.Lony, Arihant Publications
2. Calculus by Thomas and Finny, Pearson Publications
3. Matrices by A.R.Vasishtha and A.K.Vasishtha, Krishna Prakashan Media(P)Ltd.
4. "Renewable Energy: Power for a Sustainable Future" by Godfrey Boyle
5. "Energy Storage: A Nontechnical Guide" by Richard Baxter
6. "Nanotechnology: Principles and Applications" by Sulabha K. Kulkarni and Raghvendra A. Bohara
7. "Biophysics: An Introduction" by Rodney Cotterill
8. "Medical Physics: Imaging" by James G. Webster
9. "Shape Memory Alloys: Properties and Applications" by Dimitris C. Lagoudas
10. Nano materials and applications by M.N.Borah
11. Environmental Chemistry by Anil.K.D.E.
12. Digital Logic Design by Morris Mano
13. Data Communication & Networking by Bahrouz Forouzan.

## **STUDENT ACTIVITIES**

### **UNIT I: ADVANCES IN BASIC MATHEMATICS**

#### **1: Straight Lines Exploration**

Provide students with a set of equations representing straight lines in different forms, such as slope-intercept form, point-slope form, or general form.

Students will explore the properties and characteristics of straight lines, including their slopes, intercepts, and point of intersection.

#### **2: Limits and Differentiation Problem Solving**

Students will apply the concept of limits to solve various problems using standard limits.

Encourage students to interpret the results and make connections to real-world applications, such as analyzing rates of change or optimizing functions.

#### **3: Integration Exploration**

Students will explore the concept of integration as a reverse process of differentiation and apply basic methods of integration, such as the product rule, substitution method, or integration by parts.

Students can discuss the significance of integration in various fields, such as physics and chemistry

#### **4: Matrices Manipulation**

Students will perform operations on matrices, including scalar multiplication, matrix multiplication, and matrix transpose.

Students can apply their knowledge of matrices to real-world applications, such as solving systems of equations or representing transformations in geometry.

### **UNIT II: ADVANCES IN PHYSICS:**

#### **1: Case Studies**

Provide students with real-world case studies related to renewable energy, nanotechnology, biophysics, medical physics, or shape memory materials.

Students will analyze the case studies, identify the challenges or problems presented, and propose innovative solutions based on the recent advances in the respective field.

They will consider factors such as energy generation, energy storage, efficiency, sustainability, materials design, biomedical applications, or technological advancements.

#### **2: Experimental Design**

Assign students to design and conduct experiments related to one of the topics: renewable energy, nanotechnology, biophysics, medical physics, or shape memory materials. They will identify a specific research question or problem to investigate and design an experiment accordingly.

Students will collect and analyze data, interpret the results, and draw conclusions based on their findings.

They will discuss the implications of their experimental results in the context of recent advances in the field.

#### **3: Group Discussion and Debate**

Organize a group discussion or debate session where students will discuss the ethical, social, and environmental implications of the recent advances in renewable energy, nanotechnology, biophysics, medical physics, and shape memory materials.

Assign students specific roles, such as proponent, opponent, or moderator, and provide them with key points and arguments to support their positions.

### **UNIT III: ADVANCES IN CHEMISTRY:**

#### **1. Experimental Design and Simulation**

In small groups, students will design experiments or simulations related to the assigned topic.

For example, in the context of computer-aided drug design, students could design a virtual screening experiment to identify potential drug candidates for a specific disease target.

For nano sensors, students could design an experiment to demonstrate the sensitivity and selectivity of nano sensors in detecting specific analytes.

Chemical biology-related activities could involve designing experiments to study enzyme-substrate interactions or molecular interactions in biological systems.

Students will perform their experiments or simulations, collect data, analyze the results, and draw conclusions based on their findings.

#### **2. Case Studies and Discussion**

Provide students with real-world case studies related to the impact of chemical pollutants on ecosystems and human health.

Students will analyze the case studies, identify the sources and effects of chemical pollutants, and propose mitigation strategies to minimize their impact.

Encourage discussions on the ethical and environmental considerations when dealing with chemical pollutants.

For the dye removal using the catalysis method, students can explore case studies where catalytic processes are used to degrade or remove dyes from wastewater.

Students will discuss the principles of catalysis, the advantages and limitations of the catalysis method, and its applications in environmental remediation.

#### **3: Group Project**

Assign students to work in groups to develop a project related to one of the topics.

The project could involve designing a computer-aided drug delivery system, developing ananosensor for a specific application, or proposing strategies to mitigate the impact of chemical pollutants on ecosystems.

Students will develop a detailed project plan, conduct experiments or simulations, analyze data, and present their findings and recommendations.

Encourage creativity, critical thinking, and collaboration throughout the project.

### **UNIT IV:**

**1. Group Project** - mineral, energy and water resources in industries Historical perspective and present.

**2. Student Seminar** - Renewable and Non-Renewable Sources of Energy.

**3. Chart Preparation** - Major Types and Sources of Energy.



Resources of Natural Oil and Gas Coal and Nuclear Minerals Potential of Hydroelectric Power, Solar Energy, Wind, Wave and Biomass Based power and Energy.

**4. Group Discussion** - Current Scenario and Future Prospects of Solar Power, Hydrogen Power and Fuel Cells.

#### **UNIT V: Advanced Applications of computer Science**

Students must be able to convert numbers from other number system to binary numbersystems

1. Identify the networking media used for your college network
2. Identify all the networking devices used in your college premises.

Government College (Autonomous), Rajahmundry  
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**SEMESTER I, COURSE - II**  
**ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES**

**MODEL PAPER**

Time: 2 1/2 Hours

**Max.Marks: 50**

**SECTION - A**

Answer any **Three** Questions . Each question carry 10 Marks

3X10=30 Marks

1. Question from Unit I
2. Question from Unit II
3. Question from Unit III
4. Question from Unit IV
5. Question from Unit V

**SECTION - B**

Answer **All** Questions . Each question carry 1 Mark

1X10=10 Marks

This section consists 10 Questions covering all the units, numbering 6 to 15 which carry 1 mark for each question

**SECTION - C**

Answer **All** Questions . Each question carry 1 Mark

2X5=10 Marks

Match the following

This section consists 2 matching Questions covering all the units, numbering 16 and 17. each list contains 5 words and each matching will gain 1 mark.

16.	List - A	Lis	17.	List - A	List - B
	6	A		6	A
	7	B		7	B
	8	C		8	C
	9	D		9	D
	10	E		10	E

**SEMESTER-II**  
**COURSE 3: GEOLOGY & BRANCHES OF GEOLOGY**

Theory

Credits: 4

5 hrs/week

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**Programme Objectives**

The paper is designed to learn about the subject Geology and various branches of geology. In every unit all the branches of Geology were briefly discussed and a gist of complete geology is given. It is an optional under Minor Subject.

**Programme outcomes**

The paper will give a brief picture of subject Geology and its branches. The student will get a complete knowledge of what are the different branches that make the subject Geology.

**Unit 1**

Introduction – Scope of Geology – Physical Geology & Geomorphology – Definition, origin and age of earth, interior of earth – geomorphological cycle, weathering and erosion, geological work of wind, river, glacier, ocean, underground water – Geodynamics – Definition, continental drift, sea-floor spreading, brief idea of plate tectonics – Environmental Geology – Concept, definitions of atmosphere, hydrosphere, lithosphere, biosphere. 15 hours

**Unit 2**

Crystallography – Definition, Crystal parameters, symmetry elements, description of crystal classes, systems – Mineralogy – Definition and characters of mineral, chemical composition and diagnostic physical properties of minerals – Petrology – Definition, Igneous Petrology, types, origin, forms textures, structures of igneous rocks – Sedimentary rocks – origin, classification, textures, structures – Metamorphic rocks – process and products of metamorphism, factors, zones, grades, textures and structures of Metamorphic rocks. 15 hours

**Unit 3**

Structural Geology – Definition, Elementary idea of types of deformation, Folds, Faults, Joints, unconformity, outcrop, dip, strike – Economic geology – Definition, ore and ore deposits, gangue minerals, classification of economic minerals, brief outline of process of formation of mineral deposits – Stratigraphy & Indian Geology – Principles, Geological Time Scale, Physiographic divisions of India, out line of Precambrian successions, Dharwar, Cuddapah, Vindhyan, Dhilli Supergroups. 15 hours

**Unit 4**

Palaeontology – Definition, Fossils, mode of preservation, significance of fossils, definition and geological distribution of brachiopods, pelecypods, cephalopods, trilobite, echinoidea -Hydrology – Definition, Hydrological cycle, precipitation, evaporation, transpiration, infiltration, porosity, permeability, vertical distribution of groundwater, aquifers, types of aquifers. 15 hours

**Unit 5**

Geochemistry – Introduction, idea of periodic table, cosmic abundance of elements, Geochemical cycle, Gold Schmidt's geochemical classification of elements, major, minor and trace elements in igneous, metamorphic and sedimentary rocks, isomorphism, polymorphism – Mineral Exploration – Brief idea on geological, geochemical and geophysical prospecting – Remote Sensing and GIS – Fundamentals of Remote Sensing, Sensors, brief idea of Digital Image processing – Introduction to GIS, components of GIS, tools for map analysis. 15 hours

15 hours

**Suggested Readings**

Text Book of Geology – G.B.Mahapatra ; Engineering and General Geology – Parbin Singh

**Government College (Autonomous), Rajahmundry**  
(Affiliated to Adikavi Nannaya University)  
**I B.Sc., GEOLOGY 2023-2024**  
**II SEMESTER**  
**Model Question Paper**  
**Course 3: GEOLOGY AND BRANCHES OF GEOLOGY**

Time: 2 ½ Hours

**Max.Marks: 50**

**SECTION - A**

Answer any **FIVE** the following questions. Each question carries **7 Marks**

5X7=35M

1. Define Weathering? Distinguish between Physical weathering, Chemical Weathering and biological Weathering.
2. What is the significance of the Fluvial cycle of erosion?
3. What evidence support the theory of Continental Drifting?
4. What is the difference between silica saturated and silica under saturated Igneous rocks?
5. Explain types of Folds with neat sketches
6. Explain various ways to replenish the underground water
7. Explain various types of modes of preservation of fossils
8. Describe Geochemical classification of elements?

**SECTION - B**

Answer any **FIVE** of the following questions. Each question carries **3 Marks**

5X3=15M

9. Describe physical weathering?
10. Explain different types of depositional landforms by Underground water?
11. Describe zones of metamorphism?
12. Write about symmetry elements of Cubic system?
13. Give a brief notes on Pegmatitic deposits?
14. Draw a neat sketch of Pelecypoda and represent their bodyparts?
15. Give an account of Moh's scale of Hardness?
16. Write a short notes on components of GIS?

**SEMESTER-II**  
**COURSE 4: PHYSICAL GEOLOGY AND SOIL SCIENCE**

Theory

Credits: 4

5 hrs/week

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**Programme Objectives:**

To give knowledge about the solar system, origin of the earth, age of the earth and various physical phenomenon occurring on the planet earth.

To give knowledge about the Soil types and their parent material, distribution of various soils in India. Physical and chemical characteristics different soil types.

**Programme Outcomes:**

The student will learn how the solar system originated and about the planet earth in particular, Age of earth. Student will get a complete idea about the various physical phenomenon occurring for shaping the planet earth.

Student also get the complete picture of soils and their parent material, physical and chemical properties of the soils, their distribution in India.

**Unit 1**

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, age of the Earth. Seismology and internal structure of the earth; Formation of core, mantle, crust; Convection in Earth's core and its magnetic field.

15 Hours

**Unit 2**

Volcanoes: Types, products and distribution. Earthquakes - intensity, causes, earthquake belts and distribution. Oceanic current system - Land-air-sea interaction. Atmospheric circulation, Weather and climatic changes; Earth's heat budget. Volcanoes: Types, products and distribution.

15 hours

**Unit 3**

Earthquakes - intensity, causes, earthquake belts and distribution. Oceanic current system and effect of Coriolis force; Concept of eustasy; Land-air-sea interaction. Atmospheric circulation, Weather and climatic changes; Earth's heat budget. - Weathering and Erosion, Mass wasting; Geological works of river, glacier, wind, underground water, ocean and landforms produced by them. Wave erosion and beach processes.

15 hours

**Unit 4**

Soil – Introduction origin of various types of soils with emphasis on parent rocks, distribution of various types of soils in India - Soil structure – genesis, types, characterization and management Soil aggregation, aggregate stability; soil till, characteristics of good soil till; soil crusting – mechanism – Soil Physical Properties.

15 hours

**Unit 5**

Water flow in saturated and unsaturated soils, Poiseuille's law, Darcy's law; hydraulic conductivity, permeability and fluidity, hydraulic diffusivity; measurement of hydraulic conductivity in saturated and unsaturated soils. Soil suitability analysis for various land use patterns.

15 hours

**Suggested Readings**

Baver LD, Gardner WH & Gardner WR. 1972. Soil Physics. John Wiley & Sons.

Ghildyal BP & Tripathi RP. 2001. Soil Physics. New Age International.

Hanks JR & Ashcroft GL. 1980. Applied Soil Physics. Springer Verlag.

**Government College (Autonomous), Rajahmundry**  
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**I B.Sc., GEOLOGY 2023-2024**  
**II SEMESTER**  
**Model Question Paper**  
**Course 4: PHYSICAL GEOLOGY AND SOIL SCIENCE**

Time: 2 ½ Hours

**Max.Marks: 50**

**SECTION - A**

Answer any **FIVE** the following questions. Each question carries **7 Marks**

5X7=35M

1. Describe origin and age of the Earth?
2. Explain different types of Volcanoes with neat diagrams?
3. What are the distribution of earthquake zones in India?
4. Describe the geological work of Wind along with diagrams?
5. Explain the distribution of various soils in India?
6. What are the physical properties of Soils?
7. Define Specific Yield and Specific Retention? And expand Darcy's law?
8. Write about Soil suitability analysis for various land use patterns?

**SECTION - B**

Answer any **FIVE** of the following questions. Each question carries **3 Marks**

5X3=15M

9. Describe physical weathering?
10. Explain different types of depositional landforms by Underground water?
11. Describe zones of metamorphism?
12. Write about symmetry elements of Cubic system?
13. Give a brief notes on Pegmatitic deposits?
14. Draw a neat sketch of Pelecypoda and represent their bodyparts?
15. Give an account of Moh's scale of Hardness?
16. Write a short notes on components of GIS?



## **Government College (Autonomous), Rajamahendravaram**

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**GEOLOGY SYLLABUS - (2023-24)**

**II B.Sc., THIRD SEMESTER**

### **Module III: 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, Clirianockite 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





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LAB-III (Practicals)

50 Marks

At the end of Third semester

**Practical- 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 2023-24**

**THIRD SEMESTER**

**Model Question Paper**

**Module III : PETROLOGY (Igneous, Sedimentary & Metamorphic)**

Time: 2 1/2 Hours

Max.Marks:50

**SECTION- A**

Answer all the Questions. *Each Question carries 8 marks*

*4 x8 = 32M*

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

OR

2. Describe the forms of Igneous rocks with neat diagrams.

3. Write an Essay on the Tyrrel's Classification of Igneous Rocks

OR

4. Describe the Mechanical Structures of Sedimentary rocks

5. Write an essay on the Classification of Sedimentary Rocks.

OR

6. Define Metamorphism. Describe the Zones of Metamorphism.

7. Enumerate various types of Metamorphism

OR

8. Explain classification of Metamorphism

**SECTION- B**

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

*6x3=18 M*

9. What are scoriaceous and cellulose structures?

10. What are reaction rims and corona structures?

11. Define Fractional crystallization.

12. Define lithification and diagenesis.

13. Graded bedding.

14. Bauxite and laterite.

15. Palingenesis

16. Foliation and Lineation



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**II B.Sc., GEOLOGY 2023-24**

**THIRD SEMESTER**

**Practical Model Question Paper**

**Module III : PETROLOGY (Igneous, Sedimentary & Metamorphic)**

Megascopic study of rocks (Igneous 2 + Sedimentary 2 + Metamorphic2) \_\_\_\_\_ 6 X 5=30

Microscopic study of rocks \_\_\_\_\_ 2 X 5=10

Record \_\_\_\_\_ 10

\_\_\_\_\_  
50 Marks  
\_\_\_\_\_



## **Government College (Autonomous), Rajamahendravaram**

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### **GEOLOGY SYLLABUS - (2023-24)**

**III B.Sc., V-SEMESTER**

#### **Paper- VI- Palaeontology & Indian Geology (50 Marks)**

### ***Palaeontology***

**Unit I:** Definition of Palaeontology and fossils, conditions for preservation, modes 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, Terebratulla,

**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 Lalicket, 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-VI (Practicals)**

**50 Marks**

**At the end of V semester**

#### **Practical VI-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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**II B.Sc., GEOLOGY 2023-24 V SEMESTER**

**Model Question Paper**

**Paper VI : Palaeontology & Indian geology**

Time: 2 1/2 Hours

Max.Marks:50

**SECTION- A**

Answer all the Questions. *Each Question carries 8 marks*

*4 x 8 = 32M*

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

OR

2. Describe the morphological features of Echinoids with neat sketches

3. Describe the morphological features of Phylum Brachiopoda with neat sketches.

OR

4. Write an essay on Phylum Arthropoda

5. Write an essay on the structure, lithology and economic importance of the Cuddapah Supergroup of rocks

OR

6. Describe the lithology and Stratigraphy of Cretaceous rocks of Trichy.

OR

7. Write an essay on Deccan Traps

OR

8. Write an essay on Gondwana Supergroup.

**SECTION- B**

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

*6 x 3 = 18 M*

9. Calceola

10. Monograptus

11. Ptylophyllum

12. Index Fossil

13. Mineral wealth of Vindhyan Supergroup

14. Succession of Siwaliks

15. Closepet Granite

16. Kaimur Group





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**II B.Sc., GEOLOGY 2023-24**

**V SEMESTER**

**Practical Model Question Paper**

**Paper VI : 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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## **Government College (Autonomous), Rajamahendravaram**

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### **SEMESTER-V - Paper-VII**

#### **Paper-VII : Introduction to Groundwater Geology & Exploration (50 Marks)**

##### **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 co-efficient. 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 - Karancth and Management
5. Apphed 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-V PAPER: VII**

**Ground Water: Geology & Exploration**

**Model Question Paper**

Time: 2 1/2 Hours

Max.Marks: 50

Note: Answer any Four Questions All questions carry equal marks. **4 X 8=32 M**

**PART- A**

1. Define Hydrology and Hydrogeology. Explain the scope and applications of Hydrogeology.

OR

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.

OR

4. What is an aquifer? Describe various types of aquifer.

5. Explain the rock properties of an aquifer of ground water.

OR

6. Explain Darcys law and its applications.

7. Describe briefly about Quality of Groundwater and various parameters.

OR

8. Explain the concept of Watershed management.

**PART – B**

Answer any **SIX** Questions. Each question carry **3** marks

**6 x 3 = 18 M**

9. What are the Forms Of Ground Water

10. Define Porosity And Permeability?

11. Define Specific yeild & Specific Retention

12. What is the Role of Geologist in Hydrogeology?

13. Describe about suitability of Groundwater for drinking purpose

14. What is Perched aquifer

15. Groundwater provinces of India

16. List the methods of Groundwater investigations



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**SEMESTER V- PAPER - VII**

**PRACTICAL MODEL PAPER**

**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
	-----
	Total Marks __ 50

