SEMESTER-I

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

Theory Credits: 4 5 hrs/week

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 theseareas, 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 principlescan 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 networksecurity 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 ofangles**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. Differentspheres 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.Vasishtha, 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 theirrelations.

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 andinterdependencies 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 theresults.

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,orenvironmental 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 ontheir 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 incolor, 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 bandwidthof
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

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SEMESTER I , COURSE - I

ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICALAND 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 1mark 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. eachlist 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, PHYSICALAND CHEMICALSCIENCES

Theory Credits: 4 5 hrs/week

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 themto the latest developments in these disciplines, fostering critical thinking, research skills, and the abilityto 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 areasofphysics 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 theemerging 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 deliverysystems, 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, andhexadecimal. 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 ofintersection of two straight lines

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

Integration: Integration as a reverse process of differentiation – Basic methods of integrati

Matrices: Types of matrices – Scalar multiple of a matrix – Multiplication of matrices – Transpose ofa 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 perspectiveand 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 ACTIVITIE

UNIT I: ADVANCES IN BASIC MATHEMATICS

1: Straight Lines Exploration

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

Students will explore the properties and characteristics of straight lines, including theirslopes,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,suchasanalyzing rates of change or optimizing functions.

3: Integration Exploration

Students will explore the concept of integration as a reverse process of differentiation andapplybasic 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 ontheir findings.

They will discuss the implications of their experimental results in the context of recentadvancesinthe 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 themwith 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, anddraw conclusions based on their findings.

2. Case Studies and Discussion

Provide students with real-world case studies related to the impact of chemical pollutants onecosystems and human health.
Students will analyze the case studies, identify the sources and effects of chemical pollutants, andpropose 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 andpresent.
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, SolarEnergy, Wind, Wave and Biomass Based power and Energy.

4. Group Discussion - Current Scenario and Future Prospects of Solar Power, Hydrogen Power andFuel 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.

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SEMESTER I , COURSE - II

ADVANCES IN MATHEMATICAL, PHYSICALAND CHEMICAL SCIENCESMODEL

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

III4.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 foreach question

SECTION - C

Answer **All** Questions . Each question carry 1 Mark 2X5=10

MarksMatch the following

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

16.

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

17.

List - A	List - B
6	A
7	B
8	C
9	D
10	E

SEMESTER-II

COURSE 3: GEOLOGY & BRANCHES OF GEOLOGY

Theory Credits: 4 5 hrs/week

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 isan optional under Minor Subject.

Programme outcomes

The paper will give a brief picture of subject Geology and its branches. The student will get acomplete 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 – geomrophological cycle, weathering and erosion, geological workofwind, river, glacier, ocean, underground water – Geodynamics – Definition, continental drift, sea- floor spreading, brief idea of plate techtonics – Environmental Geology – Concept, definitionsof 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 andstructures 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,gangueminerals, 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, Dhilhi 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 DigitalImage processing – Introduction to GIS , components of GIS, tools for map analysis. 15 hours

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I B.Sc., GEOLOGY 2024-25

II SEMESTER

Model Question Paper

Course 3: GEOLOGY AND BRANCHES OF GEOLOGY

Time: $2\,{}^{1}/_{2}$ 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 andbiological 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

Programme Objectives:

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

To give knowledge about the Soil types and their parent material, distribution of various soils inIndia. 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, Ageof earth. Student will get a complete idea about the various physical phenomenon occurringfor 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 andjovian 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 ofcore, 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 anddistribution. Oceanic current system - Land-air-sea interaction. Atmospheric circulation, Weatherand 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 effectof Coriolis force; Concept sofeustasy; Land-air-sea interaction. Atmospheric circulation, Weatherand 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 ofvarious types of soils in India - Soil structure – genesis, types, characterization and managementSoil aggregation, aggregate stability; soil tilth, characteristics of good soil tilth; 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.

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I B.Sc., GEOLOGY 2024-25 II SEMESTER

Model Question Paper

Course 4: PHYSICAL GEOLOGY AND SOIL SCIENCE

Time: $2\,{}^{1}/_{2}$ 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?

SEMESTER - III

COURSE 5: CRYSTALLOGRAPHY & MINERALOGY

Theory Credits: 4 5 hrs/week

Programme Objectives:

To study crystal systems, 32 crystal classes and their consecutive minerals. To study the Physical and chemical and optical properties of minerals for their identification. It is an optional under Minor Subject.

Programme outcomes:

After completion of the paper, students will be acquainted with the knowledge of identification of Minerals through their physical, chemical and optical properties and the crystal system which they have developed during their origin.

Unit 1

Elements of Crystallography – Derivation of 32 Crystal classes and Herman-Maughn Symbols, twin laws and twin crystals, X-ray crystallography and irregularities in crystals, Etch figures. **15 hours**

Unit 2

Structures of silicates, isomorphism and polymorphism. Physical, chemical and optical properties, mode of occurrence of the following mineral groups: Quartz, Feldspars , Feldspathoids and Zeolites. **15 hours**

Unit 3

Physical, chemical and optical characters and mode of occurrence of the following mineral groups -- olivine, pyroxene, amphibole, mica, Garnet and Aluminum silicates. **15 hours**

Unit 4

Nature of light rays and their propagation, internal reflection, double refraction, interference and polarization. Nicol Prism and polaroids. Petrological microscope - parts and their functions.Preparation of thin section of minerals and rocks. **15 hours**

Unit 5

Snell's Law – Critical angle – Total Reflection, Pleochroism, Extinction, Determination of retardation with Berek compensator, optic axial angle, Uniaxial and biaxial minerals, Gypsum plate, Quartz wedge and mica plate **15 hours**

Reference Books

1. A Text Book of Mineralogy by E.S.Dana
2. Elements of Crystallography by F.A.Wade and R.B.Matrox.
3. Elements of Mineralogy by Rutleys
4. Optical mineralogy by Paul F.F. Kerr
5. Mineral Optics by Philips W.R.
6. Elements of Optical Mineralogy by Winchell A.N.

Government College (Autonomous), Rajahmundry

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II B.Sc., GEOLOGY 2024-25

III SEMESTER

Model Question Paper

Course 5: CRYSTALLOGRAPHY & MINERALOGY

Time: $2\,{}^{1}/_{2}$ Hours **Max.Marks: 50**

SECTION - A

Answer any **FIVE** the following questions. Each question carries **7 Marks** 5X7=35M

1. Define Herman-Maughn symbol. Write an essay on 32 Crystal classes and Herman-Maughn Symbols?
2. Compare different structures of silicates?
3. Write about the Physical, chemical, optical properties and mode of occurrence of the Quartz group of minerals?
4. Which properties are useful for the identification of olivine group of minerals?
5. How you identify a Garnet group of minerals in the field?
6. What are the properties of Light?
7. Describe the different parts of petrological microscope from Base to Ocular lens?
8. Write about
   a) Pleochroism b) Extinction c) optic axial angle

SECTION - B

Answer any **FIVE** of the following questions. Each question carries **3 Marks** 5X3=15M

9. Describe Twinning?
10. Isomorphism?
11. Polymorphism?
12. Etch figures?
13. Feldspathoids?
14. Nicol Prism?
15. Gypsum, Quartz wedge, mica plates?
16. Thin section preparation?

SEMESTER-III

COURSE 6: PALAEONTOLOGY

Theory Credits: 4 5 hrs/week

Programme Objectives:

To inculcate knowledge of fossils, process of fossilization, their identification and uses.

Programme Outcomes:

Students will get a complete knowledge about fossils, fossilization process, types, distribution and uses of fossils

Unit 1

Fossilization and fossil record - Nature and importance of fossil record; Fossilization processes - and modes of preservation - Species concept with special reference to paleontology, Taxonomic hierarchy Theory of organic evolution interpreted from fossil record. 15 hours

Unit 2

Brief introduction to important invertebrate groups (Bivalvia, Gastropoda, Brachiopoda) andtheir biostratigraphic Significance of ammonites in Mesozoic biostratigraphy andtheir paleobiogeographic implications. Functional adaptation in trilobites and ammonoids.
15 hours

Unit 3

Origin of vertebrates and major steps in vertebrate evolution. Mesozoic reptiles with special reference to origin diversity and extinction of dinosaurs. Evolution of horse and intercontinentalmigrations. Human evolution. 15 hours

Unit 4

Scope of paleobotany, taxonomy of plants, Gondwana flora and their significance. Separation ofspores and pollens and mounting for study. Utility of palynological studies in different fields.
15 hours

Unit 5

Application of fossils in Stratigraphy - Biozones, index fossils, correlation - Role of fossils in sequence stratigraphy - Fossils and paleoenvironmental analysis - Fossils and paleobiogeography, biogeographic provinces, dispersals and barriers - Paleoecology – fossils as a window to the evolution of ecosystems. 15 hours

Suggested readings

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

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II B.Sc., GEOLOGY 2024-25 III SEMESTER

Model Question Paper

Course 6: PALAEONTOLOGY

Time: $2\,{}^{1}/_{2}$ Hours **Max.Marks: 50**

SECTION - A

Answer any **FIVE** the following questions. Each question carries **7 Marks** **5X7=35M**

1. Define Fossil. Write an essay on Fossilization processes -and modes of preservation?

2. Write a brief note on important invertebrate groups - Bivalvia, Gastropoda, Brachiopoda?

3. Identify the causes of extinction of dinosaurs?

4. Discuss the Evolution of horse and intercontinental migration?

5. How you identify a Gondwana flora and their mention their significance?

6. What are the Application of fossils in Stratigraphy ?

7. How you Separate the spores and pollens and mounting them for study?

8. Write about
b) Paleobotany b) Paleoecology c) Paleobiogeography

SECTION - B

Answer any **FIVE** of the following questions. Each question carries **3 Marks** **5X3=15M**

9. Human evolution?
10. Taxonomy of plants?
11. index fossil?
12. Zone fossil?
13. Trilobites?
14. Vertebrates vs Invertebrates with examples?
15. Biozones?
16. Species?

SEMESTER-III

COURSE 7: FOSSIL FUELS

Theory Credits: 4 5 hrs/week

Programme objectives:

The paper defines the fossil fuels, types of fossil fuels, physical and chemical properties of fossil fuels, host rocks, host rock properties, advantages and disadvantages of extraction, utilization of fossil fuels to the man kind and environmental impacts.

Programme outcomes:

Student will get a complete knowledge about fossil fuels, their origin, occurrence, physical and chemical composition, advantages and disadvantages, host rock properties, and distribution of fossil fuels.

Unit 1

Introduction – History, Definition, Importance, types of fossil fuels – Types of Fossil Fuels – Coal, Crude Oil, Natural Gas – Advantages and Disadvantages – Types of Host rocks – Host rock properties. 15 hours

Unit 2

Petroleum – Origin- inorganic and organic theories – migration and accumulation of oil, Composition of Oil – Geological age of reservoir rocks – Classification of traps. Petroliferous basins of India. Geology of the productive oil fields of India. Status of Oil and Natural Gas in India- Gas Hydrates. 15 hours

Unit 3

Coal – Origin and classification – Chemical characterization – Proximate and ultimate analysis – Gelogical and Geographical distribution of coal deposits in India. Detailed Geology for important coal fields of India. 15 hours

Unit 4

Natural Gas – Origin – biogenic and thermogenic theories – chemical characterization – Reservoir rocks – Process of formation of natural gas - Types of natural gas based on host rock –shale gas, Tight gas, Coal Seam gas – Composition of Natural Gas – Important occurrences in India. 15 hours

Unit 5

Oil & Natural Gas Exploration Techniques – Surveying and Mapping, Determination of Formation, Drilling, Logging – Role of Seismology – Onshore Seismology, Offshore Seismology – Role of Microfossils – Exploratory wells and Logging – Brief idea of Extraction methods of Oil, Natural gas and Coal. 15 hours

Suggested Readings

1. Fossil fuel". ScienceDaily. Retrieved 29 October 2021.
2. Fossil fuels". Geological Survey Ireland. Retrieved 29 October 2021.
5. Jump up to:[a] [b] "thermochemistry of fossil fuel formation" (PDF). Archived (PDF) from theoriginal on 20 September 2015.

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II B.Sc., GEOLOGY 2024-25

III SEMESTER

Model Question Paper

Course 7: FOSSIL FUELS

Time: $2\,{}^{1}/_{2}$ Hours **Max.Marks: 50**

SECTION - A

Answer any **FIVE** the following questions. Each question carries **7 Marks** **5X7=35M**

1. Define fossil fuels. Write an essay on importance and types of Fossil Fuels ?
2. Discuss Petroleum Origin- inorganic and organic theories?
3. Write Advantages and Disadvantages of fosil fuels?
4. Explain the Geology of the productive oil fields of India?
5. Elaborate Origin and classification of Coal?
6. What are Gelogical and Geographical distribution of coal deposits in India?
7. Types of natural gas based on host rock –shale gas, Tight gas, Coal Seam gas?
8. Write about Process of formation of natural gas?

SECTION - B

Answer any **FIVE** of the following questions. Each question carries **3 Marks** **5X3=15M**

9. Role of Seismology – Onshore Seismology, Offshore Seismology?
10. Microfossils?
11. Brief idea of Extraction methods of Oil, Natural gas and Coal.?
12. Geological age of reservoir rocks?
13. Types of Host rocks?
14. Petroliferous basins of India?
15. Status of Oil and Natural Gas in India?
16. Migration and accumulation of oil?

SEMESTER-III

COURSE 8: FIELD GEOLOGY

Theory Credits: 4 5 hrs/week

Programme objectives:

Geology in general is a kind of subject, which has an equal part of study in the field on par with the class room learning. The paper Field Geology is designed to provide complete knowledge of field study starting from the equipment required in the field, up to the criteria of mapping variousfeatures in the field.

Programme outcomes:

Student will get a complete real time knowledge what he learned in the class room. He will getan idea about the field equipment, technique of sampling, locating himself in the field, use of Toposeet in the field, Field mapping etc.

Unit 1

Introduction – Importance of Field Geology – Basic Field equipment – Compass & Clinometer –principle and uses, Magnetic declination, Bearing and reading directions, measuring attitude, Finding directions without compass. 15 hours

Unit 2

Topographic Maps – Survey of India Maps, Scale of Maps, Numbering the Toposheets – Conventional, Advanced numbering - Depiction of Relief – Latitudes and Longitudes – Map Grids – Measurement of Mapped areas – Mounting and Folding of Field Maps – Marking onMaps. 15 hours

Unit 3

Field guides - Preliminary observations – Status of the area, Topography of the terrain – Regional Geology – Structures of the terrain – Strike & Dip – Contacts & Boundaries –Correlation – Geological Cross sections – Marking the map. 15 hours

Unit 4

Specimens and Samples – Significance – Trimming of hand specimens – Fossil Specimens, Mineral Specimens – Samples and Sampling – Numbering and labeling of specimens, Packing and storage of samples – Field identification of Rocks – Basic Field Observation, Documentation 15 hours

Unit 5

Basic Field Procedures – Location – Outcrops, Soil colour, rock type – Measuring distances – Compass and Tape Traversing – Determination of Slopes and Gradients – Measuring Difference in Elevation – Triangulation Method –– Field Sketches and Drawings – Field Photographs. 15 hours

Suggested Readings

Field Geology – F.H.Lahee

Guide to Field Geology – S.M.Mathur

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II B.Sc., GEOLOGY 2024-25 III SEMESTER

Model Question Paper

Course 8: FIELD GEOLOGY

Time: $2\,^{1}/_{2}$ Hours **Max.Marks: 50**

SECTION - A

Answer any **FIVE** the following questions. Each question carries **7 Marks** **5X7=35M**

1. Define Field Geology. Write an essay on Importance of Field Geology?

2. Compare Clinometer compass and Brunton compass?

3. Write about the Topographic Maps and Survey of India?

4. Which properties are useful for the identification of Field guides?

5. What is the Significance of Specimens and Samples and how to trimming of hand specimens – Fossil Specimens, Mineral Specimens?

6. Discuss about Numbering and labeling of specimens, Packing and storage of samples?

7. Procedures to identification of rocks in the field?

8. What are the Basic Field Procedures ?

SECTION - B

Answer any **FIVE** of the following questions. Each question carries **3 Marks** **5X3=15M**

9. Triangulation Method?
10. Field Photographs?
11. Geological Cross sections?
12. Latitudes and Longitudes?
13. Strike & Dip?
14. Finding directions without compass.?
15. Magnetic declination?
16. Outcrop?

SEMESTER-IV
COURSE 9: ELEMENTS OF PETROLOGY

Theory Credits: 4 5 hrs/week

Programme objectives:

The paper is designed to provide a brief knowledge about petrology and its three divisions viz., Igneous Petrology, Sedimentary Petrology and Metamorphic Petrology and description of rocks belonging to each branch. It is an optional under Minor Subject.

Programme outcomes:

Student will get a brief knowledge about

Unit 1

Introduction – Scope of Study of rocks – Composition and Constitution of Magma - Differentiation, Assimilation – Rock Definition - Rock Cycle – Process of formation of Rocks – Brief outline of Bowens Reaction principle. 15 hours

Unit 2

Igneous Rocks – General Characters, Main Igneous rock groups, composition, colour, texture, grain size and crystallanity – Flows – Dykes and Sills – Pipes – Pegmatites – Pyroclastic rocks. 15 hours

Unit 3

Metamorphic Rocks – Definition – Conditions for the formation of Metamorphic rocks – Main Metamorphic rock groups – cleavage, texture, foliation, lineation – Metamorphic folding, grain size – Definition of Metamorphic Facies. 15 hours

Unit 4

Sedimentary Rocks – Definition – Processes of Formation – Classification – Bedding – Particle size – Sorting – Shape of the particles – Matrix and Cement – Sedimentary structures – Sedimentary Facies – Cyclic Sedinentation – Rudaceous Rocks – Arenites, Argillites, Lutites, Turbidites, Calcareous rocks, Organic deposits. 15 hours

Unit 5

Physical Properties of Igneous rocks - Granites, granodiorites, gabbro, phorphories, Dolerites, Rhyolites, Basalts – Metamorphic Rocks - Schist, Gneiss, Amphibolite, Quartzite, Marble, Slate, Phyllite – Sedimentary Rocks - Breccia, Conglomerate, Lime Stone, Sand Stone, Shale, Silt, Shell Lime Stone. 15 hours

Suggested Readings

1. Igneous and Metamorphic Petrology – Turner and Verhoogen
2. Petrology of Igneous and Metamorphic rocks – Hyndman
3. The petrography of Igneous and Metamorphic rocks in India – S.C.Chatterjee.
4. Metamorphic petrology- B. Bhaskara Rao
5. Sedimentary Rocks – Pettijohn, F.J.
6. Origin of Sedimentary Rocks – Blottt, H., Middleton, G. and Murray, R.
7. Introduction to Sedimentology – Sengupta, S.M.
8. An Introduction to Sedimentology – Shelly, R.C.

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IV SEMESTER
Model Question Paper
Course 9: ELEMENTS OF PETROLOGY

Time: $2\,^{1}/_{2}$ Hours **Max.Marks: 50**

SECTION - A

Answer any **FIVE** the following questions. Each question carries **7 Marks** **5X7=35M**

1. Question 1 from Unit I
2. Question 2 from Unit I
3. Question 3 from Unit II
4. Question 4 from Unit II
5. Question 5 from Unit III
6. Question 6 from Unit III
7. Question 7 from Unit IV
8. Question 8 from Unit V

SECTION - B

Answer any **FIVE** of the following questions. Each question carries **3 Marks** **5X3=15M**

9. Question 1 from Unit I
10. Question 2 from Unit I
11. Question 3 from Unit II
12. Question 4 from Unit II
13. Question 5 from Unit III
14. Question 6 from Unit III
15. Question 7 from Unit IV
16. Question 8 from Unit V

SEMESTER-IV

COURSE 10: IGNEOUS, SEDIMENTARY AND METAMORPHIC PETROLOGY

Theory Credits: 4 5 hrs/week

Programme objectives:

To give a complete knowledge on Igneous, Sedimentary and Metamorphic rocks. To provide information on classification, textures, structures, origin, forms of Igneous, Sedimentary and Metamorphic Rocks.

Programme outcomes:

Student will get a complete knowledge on origin, classification, textures, structures, forms of Igneous, Sedimentary and Metamorphic rocks and their physical, chemical characteristics.

Unit 1

Introduction to Igneous Petrology – Formation of igneous rocks – Crystallization ofunicomponent, Bicomponent and ternary magmas. Origin, composition and constitution of magmas. 15 hours

Unit 2

Bowen's reaction principle – Magmatic Differentiation – Fractional crystallization and assimilation - Forms, structures and textures of igneous rocks. Classification of Igneous rocks. 15 hours

Unit 3

Metamorphism, metamorphic processes, Agents of metamorphism, kinds of metamorphism, classification and nomenclature of metamorphic rocks, structures and textures of metamorphic rocks - Grades and zones of metamorphism – Concept and types of metamorphic facies – ACF, AKF and AFM diagrams.

15 hours

Unit 4

Sedimentology – Origin of Sedimentary of rocks. Structures and textures of Sedimentary rocks. Provenance, lithification and digenesis of Sedimentary rocks - Classification of sedimentary environments – Non-marine environments – Glacial, Aeolian, Lacustrine and Fluvial environments. 15 hours

Unit 5

Marine environments – Shelf and Deep sea sediments – Classification and origin of Clastic and Non-clastic rocks. Clastic – Rudaceous , Arenaceous and argillaceous rocks. Non-Clastic – Chemical and Organic deposits. 15 hours

Suggested Readings

1. Igneous and Metamorphic Petrology – Turner and Verhoogen
2. Petrology of Igneous and Metamorphic rocks – Hyndman
3. The petrography of Igneous and Metamorphic rocks in India – S.C.Chatterjee.
4. Metamorphic petrology- B. Bhaskara Rao
5. Sedimentary Rocks – Pettijohn, F.J.
6. Origin of Sedimentary Rocks – Blottt, H., Middleton, G. and Murray, R.
7. Introduction to Sedimentology – Sengupta, S.M.
8. An Introduction to Sedimentology – Shelly, R.C.

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Model Question Paper

Course 10: IGNEOUS, SEDIMENTARY AND METAMORPHIC PETROLOGY

Time: $2\,^{1}/_{2}$ Hours **Max.Marks: 50**

SECTION - A

Answer any **FIVE** the following questions. Each question carries **7 Marks** **5X7=35M**

1. Question 1 from Unit I
2. Question 2 from Unit I
3. Question 3 from Unit II
4. Question 4 from Unit II
5. Question 5 from Unit III
6. Question 6 from Unit III
7. Question 7 from Unit IV
8. Question 8 from Unit V

SECTION - B

Answer any **FIVE** of the following questions. Each question carries **3 Marks** **5X3=15M**

9. Question 1 from Unit I
10. Question 2 from Unit I
11. Question 3 from Unit II
12. Question 4 from Unit II
13. Question 5 from Unit III
14. Question 6 from Unit III
15. Question 7 from Unit IV
16. Question 8 from Unit V

SEMESTER-IV

COURSE 11: STRUCTURAL GEOLOGY

Theory Credits: 4 5 hrs/week

Programme objectives:

To inculcate knowledge on principles and mechanics of structural deformation of rocks, types of structural deformations, their advantages, disadvantages. It is an optional under Minor Subject.

Programme outcomes:

Student will get a complete knowledge on principles and mechanics of structural deformations of rocks, types of deformations, their advantages and disadvantages.

Unit 1

Mechanical principles and properties of rocks and their controlling factors – Concept of stress and strain – two dimensional stress and strain analyses – Concept of Dip and Strike - Geometric classification of Folds - Mechanics of folding and buckling and recognition of folds.

15 hours

Unit 2

Joints Classification and their importance in Construction projects. Mechanics of faulting. Classification and recognition of faults. Strike slip faults, normal faults. 15 hours

Unit 3

Unconformities – types of unconformities, criteria for recognition and significance of unconformities. Lineation – problem of lineation indicating extension parallel to fold axis, small scale folds. 15 hours

Unit 4

Structural association, salt domes, diapers, nappe, tectonic mélanges. Tectonic aspects of Igneous rocks. Geometric classification of plutonic igneous rocks, tectonic setting of plutons.

15 hours

Unit 5

Structures in metamorphic rocks, Foliation, Axial plane foliation, transported foliation, other metamorphic foliations. 15 hours

Suggested Readings

1. Structural and Tectonic principles - Badgley, P.C.
2. Mechanics in Structural geology, Bayly, B.
3. Structural geology – Billings M.P.
4. Structural geology of rocks and region – Davis G.R.
5. Understanding the Earth – Gass I.B., Peter J.Smith and Smith PGL
6. An outline of Structural geology
7. Global tectonics – Keary. P., and Vine F.J.
8. Modres. E., and Twiss., R.J.
9. Folding and fracturing of rocks : Ramsy, J.G.

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II B.Sc., GEOLOGY 2024-25

IV SEMESTER

Model Question Paper

Course 11: STRUCTURAL GEOLOGY

Time: 2 $^{1}/_{2}$ Hours **Max.Marks: 50**

SECTION - A

Answer any **FIVE** the following questions. Each question carries **7 Marks** **5X7=35M**

1. Question 1 from Unit I
2. Question 2 from Unit I
3. Question 3 from Unit II
4. Question 4 from Unit II
5. Question 5 from Unit III
6. Question 6 from Unit III
7. Question 7 from Unit IV
8. Question 8 from Unit V

SECTION - B

Answer any **FIVE** of the following questions. Each question carries **3 Marks** **5X3=15M**

9. Question 1 from Unit I
10. Question 2 from Unit I
11. Question 3 from Unit II
12. Question 4 from Unit II
13. Question 5 from Unit III
14. Question 6 from Unit III
15. Question 7 from Unit IV
16. Question 8 from Unit V

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GEOLOGY SYLLABUS - (2024-25)
III B.Sc V-SEMESTER
Paper- VI- Palaeontology & Indian Geology (50 Marks)

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

Phyllum Echinodermata
Phyllum 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
Physum Mollusca Phylum
Arthropoda

Study of the following fossils:
Monograputs, Diplograptus, Calceola, pectin, Gryphea, Nautilus, Belemnites, Calymene, Paradoxides, Glossipteris, Gangamopteris, Ptyllophyllum.

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 andeconomic importance of the following
KurnoolGroup. 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 clarkshon
3. Fossil Invertebrates by U Lemmann and G Millmer
4. An introduction to Palaeobotony by C A Armold
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 –RavindraKumar
10. Geology of India – D N Wadia
11. Stratigraphic principler and practice - Weller
12. Geology of India Vol 1 & 2 by R. Vaidyanadhan & M. Ramakrishnan.

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Practical SyllabusLAB-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, morophology 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 2024-25 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 ***4x8=32M***

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

OR

2. Describe the morphological features of Echinoids with neat sketches

3. Describe the morphological features of Phylum Brachiopoda with neatsketches.

OR

4. Write an essay on Phylum Arthropoda

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

OR

6. Describe the lithology and Stratigraphy of Cretaccous 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 ***6x3=18M***

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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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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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, capillaryfringe. Zone of saturation - water table. Perched water table. Recharge and dischargeareas.

UNIT-II

Aquifers: Definition of aquifer, Aquitard, Aquclude, Aquifuge. Properties of Aquifer - porosity, retension of water in rocks, yield of water from rocks (specific yield and specific retension), Darcy's law, permeability, hydraulic conductivity, velocity of groundwater flow, storage co-efficient. Types of aquifers: confined, semiconfined, 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 ofgroundwater. 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 - Schluntberger and Wenner configuration, Resistivity profiling and Vertical ElectricalSounding.

Unit-V

Management Of Groundwater: Groundwater balance, recharge, (natural andartificial) 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 &
ExplorationModel 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 helpof 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