

Project Work Documentation 2024-25

Government College Sanjauli, Shimla

This document presents a comprehensive overview of project-based learning initiatives undertaken across various departments during the academic session 2024-25. For reference, detailed examples from the Department of Economics, Department of Physics, and Department of Botany have been included to demonstrate the scope, methodology, and outcomes of project work conducted at the institution.

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Department of Economics

Interactive Academic Sessions & Social Awareness

24th November 2025

Biology

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Economics Department: Event Overview

An engaging series of interactive sessions designed to enhance students' understanding of economic, social, and development paradigms.

Academic Sessions

Review papers, comparative analysis, and mock budget sessions

Social Impact

Focus on gender equality and economic progress

Global Perspectives

Digital payment trends across different countries



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Academic Sessions

01

Review Paper

Presented by: Srishti & Shivangi

A comprehensive presentation on their review paper, offering a deep dive into contemporary economic literature and theoretical frameworks.

02

Comparative Analysis

Presented by: Jiya & Suhani

An analytical comparison of population growth and pollution trends, highlighting the correlation between demographic shifts and environmental impact.

03

Mock Budget Session

Led by: Student representatives from Finance, Education, and Development committees.

To provide practical exposure to the complexities of budgeting and strategic policy planning.



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Mock Budget Session

Led by: Student representatives from Finance, Education, and Development committees.

Objective: To provide practical exposure to the complexities of budgeting and strategic policy planning.

Outcome: Students engaged in rigorous debate and resource allocation simulations, mirroring real-world economic governance.



"The session was not just an academic exercise, but a stepping stone for future economists to understand their role in shaping society."

Global Digital Payments Trends



China

Widespread adoption of QR-based ecosystems like Alipay and WeChat Pay.



Kenya

Pioneering financial inclusion through mobile money platforms like M-Pesa.



Sweden

Leading the global shift towards a completely cashless society with Swish.



Shimla, Himachal Pradesh, India

Chowk, Govt Degree College, Dhalli, Circular Road, Sanjauli, Shimla, Himachal



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Social Impact: Gender Equality

Crucial Role

This session highlighted that gender equality is not merely a social goal but a fundamental driver of economic progress.

Societal Progress

Discussion focused on how empowering women directly correlates with improved development indices and societal well-being.

Key Takeaway

Inclusive growth is sustainable growth.



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Physics Department: Project Overview

The Department of Physics, Centre of Excellence, Government College Sanjauli, Shimla, organized a **one-day Project Demonstration** under Skill Enhancement Activities on March 10, 2025, in the Physics Lecture Theatre.

All B.Sc. IIIrd year students studying Physics as their Skill Enhancement Course (SEC) subject were divided into **ten groups**, each comprising a maximum of four students, during the month of **September**. Each group was assigned a project on the themes of **Renewable Energy** and **Radiation Safety**.

During the demonstration session, each group was allotted **15 minutes** to present and demonstrate their model-based projects. Dr. Kirti Singha was present as the **observer and evaluator to take viva** for the project and its demonstrations.



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Physics Projects: Student Work



Students presented model-based projects on themes of Renewable Energy and Radiation Safety, demonstrating practical applications of theoretical concepts learned in their coursework.

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Student Experience: Relentless Minds

Our Public Administration department group project was not just an academic task, but a journey full of *learning*, *teamwork* and *discovery*. Through our site visit and group study sessions, we gained insights into public service challenges and solutions, learning not only in the classroom but also beyond it - by observing, interacting and experiencing real-life situations.

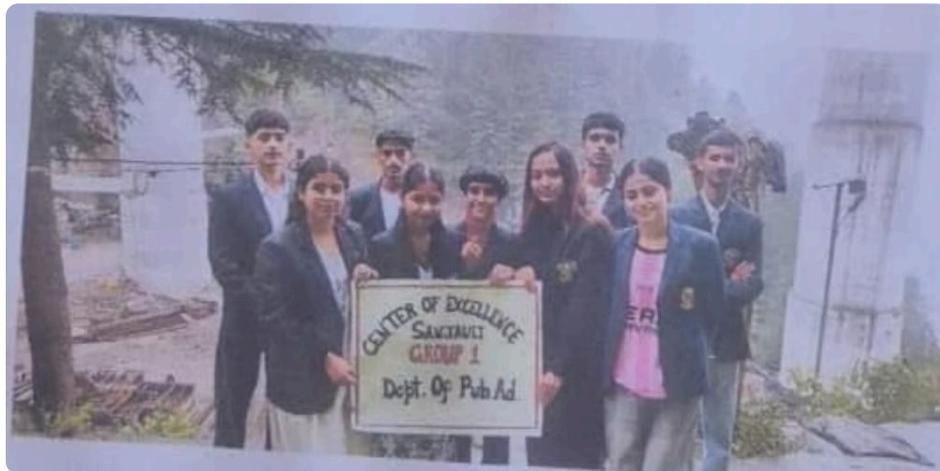
Each member contributed with enthusiasm and cooperation, turning this project into a meaningful and memorable experience.



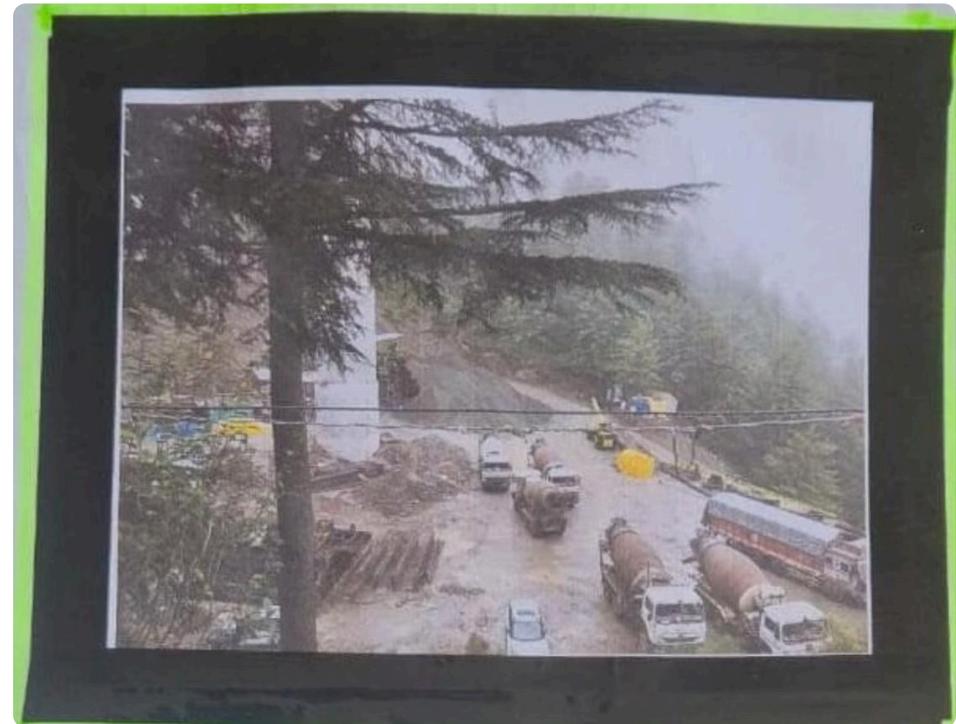
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Case Study: Himachal Pradesh Development

As a part of our case study on "HIMACHAL PRADESH: A wake up call for sustainable development", our group conducted a field visit to **Chalonthi** and **Battakufar**, areas that are currently involved in 4-lane project. Our purpose was to explore development projects taking place in nearby regions and to understand their impact on both people and the environment.



During our research, we found several potential sites, but the most significant and relevant were **Battakufar** and **Chalonthi**, as both locations are directly affected by the ongoing four lane (4-Lane) construction and Dhalitunnel expansion project.



We interacted with the local residents to understand their opinions, experiences and challenges related to this development.

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Community Engagement & Field Research

Interaction with local people of Chalonthi

His name: Ureender Singh Thakur.

Most of them shared a common view - they support development but believe that **public opinion should be considered before the implementation** of such large project.

We also captured **interview photographs** to include these photographs in our project work.

These **above** photograph depicts our conversation with the local people of Chalonthi.

Community Conversations

These real-life interactions helped us connect theoretical knowledge with ground realities.



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Department of Chemistry

Soil Analysis Project

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Chemistry Project: Soil Analysis Overview

Project conducted by students Gagan, Sneha Bhardwaj, and Uday Prakash (Roll Numbers: 2221730049, 2221730168, 2221730183) from COE, G.C. Sanjauli.

This comprehensive soil analysis project examined the chemical and physical properties of soil samples to determine nutrient content and potential for plant growth. The study focused on:

pH Level Analysis

Measuring acidity and alkalinity of different soil samples

Turbidity Testing

Assessing water clarity and suspended particles

Soil Type Classification

Identifying sandy, clay, silt, and loamy soils

Fertility Assessment

Understanding soil suitability for agriculture

The project helps farmers and land managers understand soil fertility status and make informed decisions about fertilizer utility and crop suitability.

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Soil Sample Collection Sites

Five soil samples were collected from different locations across Himachal Pradesh:

1

Sample 1: Village Talwara, District Bilaspur

Located near Kuthera city, 20 km from Ghumarwin city

2

Sample 2: Kandroul City, District Bilaspur

Urban soil sample from city area

3

Sample 3: Village Narola, District Mandi

Situated near Jahu city

4

Sample 4: Village Jukala, District Bilaspur

Located near Bilaspur city

5

Sample 5: Kothipura, AIIMS Hospital, District Bilaspur

Hospital area soil sample

pH Analysis Results

Soil pH is the negative logarithm of hydrogen ion concentration ($\text{pH} = -\log[\text{H}^+]$). It ranges from 0 to 14, with 7 being neutral. pH is crucial for plant growth as it affects nutrient availability and soil microorganism activity.

pH Classification:

- 6.5 to 7.5 – Neutral
- Over 7.5 – Alkaline
- Less than 6.5 – Acidic
- 8.5-9.0 – Strongly alkaline
- Greater than 9.0 – Very strong alkaline



Results from Five Soil Samples:

Sample 1 (Talwara)

pH 8.89 - Strongly Alkaline

Sample 2 (Kandrour)

pH 6.0 - Slightly Acidic

Sample 3 (Narola, Mandi)

pH 9.4 - Most Alkaline

Sample 4 (Jukala)

pH 7.8 - Slightly Alkaline

Sample 5 (Kothipura, AIIMS)

pH 7.5 - Neutral

Key Finding: Sample 3 from Mandi District (pH 9.4) showed the highest alkalinity, while Sample 2 from Kandrour was slightly acidic. Sample 5 from AIIMS Kothipura was neutral, ideal for most plant growth.

Turbidity Analysis Results

Turbidity measures the level of particles such as sediment, plankton, or organic by-products in water. As turbidity increases, water becomes denser and less clear due to higher concentrations of light-blocking particles.

Causes of Turbidity:

- Soil erosion from rainfall
- Algae and organic matter decay
- Industrial or agricultural runoff
- Human activities like construction

Impacts:

- Reduces oxygen levels
- Increases water temperature
- Reduces sunlight penetration

Measurement: Turbidity was measured using a Nephelometer (Turbidity Meter) in NTU (Nephelometric Turbidity Units).

Results Table

Sample 1 (Talwara)	1st reading (5 min): 8.6 NTU 2nd reading (2 min): 5.5 NTU 3rd reading (1 min): 3.2 NTU
Sample 2 (Charla)	1st reading: 3.8 NTU 2nd reading: 1.1 NTU 3rd reading: 4.3 NTU
Sample 3 (Mandi)	1st reading: 3.2 NTU 2nd reading: 9.5 NTU 3rd reading: 7.4 NTU
Sample 4 (Jukhala)	1st reading: 15.8 NTU 2nd reading: 7.4 NTU 3rd reading: 2.8 NTU
Sample 5 (Kothipura)	1st reading: 17.4 NTU 2nd reading: 21.7 NTU 3rd reading: 46.2 NTU



Key Finding: Sample 5 from AIIMS Kothipura showed the highest turbidity (46.2 NTU), indicating significant suspended particles. Sample 2 from Charla showed the lowest turbidity (1.1 NTU), indicating clearer water.

Project Conclusions & Impact

The soil analysis project provided valuable insights into soil characteristics across different regions of Himachal Pradesh:

Key Benefits of Soil Analysis:

Understanding Physical & Chemical Properties

Comprehensive analysis of soil composition and characteristics

Nutrient Level Assessment

Identification of nitrogen, phosphorus, potassium, and carbon levels

Fertility Evaluation

Determining soil suitability for agriculture and crop selection

Improved Farming Practices

Helping farmers make informed decisions about fertilizer use and irrigation

Problem Identification

Detecting issues like erosion, pollution, and nutrient imbalances

Cost Reduction

Optimizing fertilizer use leads to reduced costs and increased profitability

Soil Health Improvement

Understanding characteristics enables better soil management

Environmental Sustainability

Promoting efficient farming practices and resource management

Acknowledgment:

Special gratitude to Mrs. Shalu Chauhan and Mrs. Rita Chandel of the Chemistry Department for their valuable guidance and support in completing this project.

Department of Botany

Comprehensive Phytochemical Studies

SEC Botany Projects 2024-25

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Botany Department: Research Projects

Project I: *Achyranthes aspera*

(The project was carried out by the students of SEC botany during the session 2024-25)

(A detailed project report is with Department of Botany)

A Comprehensive Study on the Anatomical, Morphological, and Phytochemical Characteristics of *Achyranthes aspera*

This study provides a comprehensive examination of the anatomical, morphological, and phytochemical features of *Achyranthes aspera*. Qualitative screening identified a diverse range of secondary metabolites extracted from different plant parts using both shaking and boiling methods with solvents including methanol, ethanol, acetone, diethyl ether, and water. Steroids and terpenoids were absent in all extracts. Tannins were consistently found in shoots and roots across multiple solvents, while alkaloids appeared in methanolic, ethanolic, and aqueous extracts from both extraction methods. Phenols were detected only in boiled extracts of methanol, ethanol, and water. Flavonoids occurred in the leaves and inflorescences, whereas saponins were found in roots and stems using the shaking method and in leaves and inflorescences when boiled. Coumarins were present in all solvents except diethyl ether.

Overall, the phytochemical profile confirms the presence of numerous secondary metabolites known for their medicinal value. *Achyranthes aspera* is recognized for its potential antiperoxidative activity, with its bioactive compounds contributing to free radical scavenging, carcinogen detoxification, and enhancement of antioxidant defenses. This qualitative analysis underscores the plant's therapeutic potential and phytochemical richness.

General Anatomy

Stem

The stem has a single-layered cutinized epidermis bearing multicellular and sometimes glandular trichomes. Beneath this lies an outer collenchymatous cortex for mechanical strength and an inner parenchymatous cortex involved in storage and photosynthesis. The endodermis is indistinct, while the pericycle forms alternating patches of sclerenchyma and parenchyma, contributing to anomalous secondary thickening. Numerous conjoint, collateral, and open vascular bundles form a ring, with fascicular and interfascicular cambium developing into a vascular cambium ring. Successive cambial rings produce concentric bands of xylem and phloem. The pith is large, parenchymatous, and serves as a food reservoir.

Leaf

Leaves are dorsiventral with upper and lower cutinized epidermis; stomata are predominantly on the lower surface. The mesophyll differentiates into palisade parenchyma (1–2 layers, chloroplast-rich) and spongy parenchyma with intercellular spaces for gas exchange. Vascular bundles are collateral and closed, each surrounded by a parenchymatous bundle sheath. Pith is absent, as mesophyll occupies the ground tissue.

Root

The root shows a thin-walled epiblema with root hairs, a wide parenchymatous cortex for storage, and a distinct endodermis with Casparian strips and passage cells. The pericycle is single-layered and generates lateral roots and vascular cambium during secondary growth. Vascular bundles are radial and typically tetrarch; xylem is exarch with phloem alternating between xylem arms. As in dicot roots, the pith is very small or absent.


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Phytochemical Analysis

Phytochemical screening of ethanol and water extracts of leaf, stem, and root tissues revealed the presence of key secondary metabolites. Tests confirmed:

- **Proteins:** Present in ethanol root extract and water stem extract.
- **Tannins:** Present in both ethanol and water leaf extracts.
- **Anthraquinones:** Found in ethanol root and water stem and root extracts.
- **Glycosides:** Detected in all ethanol extracts and in leaf and stem water extracts.
- **Reducing sugars:** Absent in all samples.
- **Flavonoids:** Found in ethanol root and water stem and root extracts.
- **Terpenoids:** Present in ethanol and water root extracts.

Extract preparation involved soaking powdered plant material in ethanol or water, filtration, evaporation, and cold storage. Standard qualitative tests, including Biuret, Fehling's, ferric chloride, NaOH/HCl reactions, and chloroform-sulfuric acid tests, confirmed metabolite presence.

Conclusion

Achyranthes aspera exhibits a diverse phytochemical composition and well-developed anatomical systems that support its medicinal value. The plant contains significant bioactive compounds such as glycosides, flavonoids, tannins, terpenoids, and anthraquinones, many of which contribute to its anti-inflammatory, anticancer, antiviral, antibacterial, cardioprotective, and anticoagulant activities. Due to its broad pharmacological potential and accessibility, *A. aspera* remains an important natural resource for developing novel, affordable therapeutic agents, particularly in regions relying on plant-based primary healthcare.

Project II: *Valeriana jatamansi*

(The project was carried out by the students of SEC botany during the session 2024-25)

(A detailed project report is with Department of Botany)

A Comprehensive Study on the Anatomical, Morphological, and Phytochemical Characteristics of *Valeriana jatamansi*

Valeriana jatamansi—formerly known as *V. wallichii*—is a rhizomatous herb of the Valerianaceae family and is commonly called Indian Valerian or Tagar-Ganthoda. The genus *Valeriana* includes nearly 200 species distributed globally. *V. jatamansi* has long been valued in traditional systems such as Ayurveda and Unani, with references in classical texts like the *Charaka Samhita* and *Sushruta Samhita*. Traditionally, it has been used to treat a wide range of conditions, including obesity, skin diseases, mental disorders, epilepsy, and snake bites.

The roots and rhizomes serve as the main source of medicinal preparations and are widely used in pharmaceuticals for their mild sedative effects, primarily due to valepotriates. The plant's therapeutic potential extends beyond sedation; its extracts are known to help manage various ailments owing to a rich array of bioactive compounds. These include alkaloids, flavonoids, saponins, tannins, and essential oils. All plant parts—root, rhizome, seed, and flower—carry medicinal value, with the roots particularly noted for their strong, distinctive aroma.

General Anatomy

Stem

The stem shows a single-layered cutinized epidermis with occasional protective trichomes. Beneath it lies a collenchymatous cortex providing mechanical support, followed by inner parenchyma rich in chloroplasts. The endodermis consists of barrel-shaped cells, while the pericycle forms a discontinuous ring of sclerenchymatous fibers. Numerous conjoint, collateral, and open vascular bundles form a ring with xylem directed inward and phloem outward. A large parenchymatous pith occupies the center, storing starch and metabolites.

Leaf

The leaves are dorsiventral, with upper and lower cutinized epidermis; stomata occur mainly on the abaxial side. The mesophyll differentiates into palisade cells (photosynthetic) and spongy parenchyma (gas exchange). Vascular bundles are collateral and enclosed by a parenchymatous bundle sheath. No pith is present, as mesophyll forms the ground tissue.

Root

The dicot root has a single-layered epiblema with root hairs for absorption, and a broad parenchymatous cortex for food storage. A distinct endodermis with Casparian strips surrounds the vascular cylinder, and passage cells occur opposite protoxylem. The pericycle contributes to lateral roots and secondary growth. Radial vascular bundles (typically tetrarch-pentarch) show exarch xylem; pith is very small or absent.

Medicinal Uses

Valeriana jatamansi is renowned as a nervine tonic, sedative, and memory enhancer. It is prescribed for stress, epilepsy, hysteria, spasms, insomnia, and behavioral disorders such as hyperactivity. Its essential oil (spikenard oil) displays antiarrhythmic, hypotensive, CNS-depressant, and analgesic actions. Traditionally, it is used for liver disorders, headaches, migraines, digestive problems, respiratory ailments, reproductive health issues, skin diseases, and even for treating snake and scorpion bites. The plant is valued cosmetically for promoting hair growth and preventing greying. It is also used in perfumery, dyes, and as an anthelmintic for treating intestinal worms.

Phytochemical Constituents

The therapeutic value of *V. jatamansi* is attributed to a rich profile of bioactive compounds, including:

- **Sesquiterpenes:** valerenic acid, valeranone, valerenal.
- **Iridoids (Valepotriates):** valtrate, didrovaltrate, acevaltrate.
- **Lignans/Organoids:** pinoresinol derivatives.
- **Alkaloids:** chatinine, morpholine derivatives, valerine, and others.
- **Flavonoids:** quercetin, kaempferol, luteolin, hesperidin, acacetin, linarin.
- **Other constituents:** essential oils, sugars, starch, resins, ketones, gum, and bitter principles.

In summary, *Valeriana jatamansi* is a pharmacologically rich species with distinctive anatomical features and potent therapeutic properties. Its diverse secondary metabolites support its traditional use as a sedative, antioxidant, anti-inflammatory, antimicrobial, and multi-system medicinal herb.

Conclusion: Institution-Wide Project Excellence

The examples presented from the Department of Economics, Department of Physics, and Department of Botany demonstrate the comprehensive and rigorous approach to project-based learning at Government College Sanjauli during the academic session 2024-25. These initiatives reflect a commitment to experiential learning, critical thinking, and practical application of theoretical knowledge.

Every department of the college is actively engaged in project-related work, fostering an environment of academic excellence, research orientation, and holistic student development. Through field visits, laboratory investigations, presentations, and community engagement, students across all disciplines are developing essential skills in research methodology, data analysis, teamwork, and professional communication.

This institution-wide emphasis on project work ensures that students graduate not only with theoretical knowledge but also with practical experience and the ability to apply their learning to real-world challenges.


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