CAMBRIAN PUBLIC SCHOOL

Kanke Road, Ranchi

Holiday Assignment (Session 2026-27)

Wishing you all a very Happy Diwali and Chhath Puja!

May these auspicious festivals bring happiness, peace, prosperity, and good health to you and your family

Class: XII (Science)

General Instructions:

- Complete all the questions neatly as instructed.
- Maintain proper handwriting and presentation.
- Revise the syllabus covered before attempting the assignment.
- Submit the Completed assignment on the first day after the Vacation.
- Parents are requested to guide and encourage their ward to complete the work independently.

ENGLISH

CREATIVE ENGLISH PROJECT

Project Topics, Guiding Questions and Instructions

Literature • Life • Society • Human Values

Students must select ANY ONE topic from the list below and develop an original project connected to the prescribed CBSE Class XII English syllabus.

SECTION A: CREATIVE PROJECT TOPICS

1. The Last Lesson — When a Language Loses Its Voice

Based on: Alphonse Daudet

Project Question: How does The Last Lesson demonstrate the relationship between language, cultural identity and freedom? Compare the chapter's message with the challenges faced by endangered languages in the modern world.

Creative Component: Prepare a language-preservation poster, interview a multilingual person, or collect words from a local language that deserve preservation.

2. Lost Spring — Childhood Lost to Labour

Based on: Anees Jung

Project Question: Why are thousands of children deprived of education and a carefree childhood? Examine the connection between Saheb and Mukesh's lives and the realities of child labour in contemporary India.

Creative Component: Design an awareness campaign, make a community-based observation, or write a fictional diary entry from the perspective of a child who wishes to attend school.

3. The Third Level — Escaping Reality or Seeking Peace?

Based on: Jack Finney

Project Question: Does the desire to escape from modern life reflect weakness, imagination or a genuine need for peace? Explore the psychological significance of Charley's experience in relation to stress and escapism today.

Creative Component: Create a fictional travel brochure for an imaginary peaceful world and reflect on why people seek escape from reality.

4. My Mother at Sixty-Six — The Fear of Losing Loved Ones

Based on: Kamala Das

Project Question: How does Kamala Das transform an ordinary journey into a deeply emotional reflection on ageing, separation and the fear of losing a parent?

Creative Component: Compose a reflective piece titled "Things I Want to Say to My Parents" or create a photo essay on intergenerational relationships.

5. Journey to the End of the Earth — Lessons from Antarctica

Based on: Tishani Doshi

Project Question: What can Antarctica teach humanity about climate change, ecological balance and the future of our planet? How does the chapter encourage young people to become environmentally responsible?

Creative Component: Prepare an illustrated climate-change report, a sustainability action plan for your school, or a mock expedition journal.

MATHEMATICS

ASSIGNMENT NO.-3

SURE, SHORT QUESTION (PROPERTIES OF DEFINITE INTEGRALS)

1. Evaluate: $I = \int_0^{\frac{\pi}{4}} \log(1 + tanx)\, dx$
2. Evaluate: $I = \int_0^{\pi} \frac{x\, sinx}{1+cos^2 x}\, dx$
3. Evaluate: $I = \int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{dx}{1+\sqrt{tanx}}$
4. Evaluate: $I = \int_0^5 (\,|x-1| + |x-2| + |x-5|\,)\, dx$
5. Evaluate: $I = \int_0^{\pi} \frac{x\, tanx}{secx+tanx}\, dx$
6. Evaluate: $I = \int_0^1 x\,(1-x)^n dx$ (where $x \in N$)
7. Prove that: $I = \int_0^{\frac{\pi}{2}} iog\ sinx\ dx = \int_0^{\frac{\pi}{2}} log\ cosx\ dx = \frac{-\pi}{2} \log 2$
8. Evaluate: $I = \int_0^{\pi} \frac{x\, dx}{a^2 sin^2 x + b^2 cos^2 x}$
9. Evaluate: $I = \int_{\frac{-\pi}{2}}^{\frac{\pi}{2}} \frac{sin^{100} x}{sin^{100} x + cos^{100} x}\, dx$
10. Evaluate: $I = \int_{\frac{-\pi}{2}}^{\frac{\pi}{2}} sin^7 x\, dx$

11. Evaluate: $I = \int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{dx}{1+\sqrt{\cot x}}$

12. Evaluate: $I = \int_0^{2\pi} \cos^5 x \, dx$

Use property: $\int_0^{2a} f(x)\, dx = 2\int_0^a f(x)dx$,if $f(2a - x) = f(x)$

$\int_0^{2a} f(x)\, dx = 0$, if $f(2a-x) = -f(x)$

PHYSCIS

General Instructions for Students:

Part A (Investigative Projects): Every student must select and fabricate any one functional model/investigative project from the listed ten topics. Prepare a formal, handwritten scientific report (15–20 pages) comprising Aim, principle, circuit Diagram, Observations, Calculations, and sources of Error for external viva examination.

INVESTIGATIVE PROJECTS & WORKING MODELS

(Select any ONE project for Annual Practical Evaluation)

Project 1: Design and Construction of a Step-Down / Step-Up Transformer

Objective: Investigate the relationship between the ratio of output-to-input voltage and the ratio of turns in the secondary and primary coils. Study primary vs. secondary core energy losses and determine the overall power efficiency of the fabricated iron-core unit.

Project 2: Full-Wave Bridge Rectifier with Variable Capacitive Filter

Objective: Construct an AC-to-DC regulated bridge power supply using four 1N4007 junction diodes, step-down transformer, and capacitor filter. Measure and analyse output DC ripple factors across varying load resistances and filter capacities.

Project 3: Conversion of a Moving Coil Galvanometer into an Ammeter and Voltmeter

Objective: Calculate the figure of merit and coil resistance of a Weston galvanometer by the half-deflection method.

Compute and solder the required shunt and multiplier resistances to convert it to specified ammeter and voltmeter ranges; Verify against digital meters.

Project 4: Wireless Resonant Inductive Power Transfer Transmission Model

Objective: Fabricate a working demonstration of near-field non-radiative wireless energy transfer utilizing high-frequency tuned LC resonant air-core driver and receiver coils. Measure coupling coefficient and output illumination intensity as a function of separation distance.

Project 5: Comparative Study of Self-Inductance & Mutual Inductance in Coaxial Solenoids

Objective: Construct pairs of coaxial solenoids to study factors governing mutual inductance (coupling medium, geometry, and number of turns). Investigate the effect of introducing diverse cores (soft-iron laminations, brass, air) on self-induced counter-EMF.

Project 6: High-Voltage Van de Graaff Electrostatic Generator Demonstration

Objective: Design a working tabletop electrostatic belt generator driven by an electric motor. Demonstrate charge accumulation, corona discharge from sharp spray combs, dielectric breakdown of air, and electrostatic repulsion phenomena.

Project 7: Series LCR Resonant Frequency & Quality Factor (Q) Characterization Circuit

Objective: Assemble a series LCR tuning network connected to an AC signal source. Experimentally plot current amplitude versus applied frequency, determine the resonant frequency (fr), band-width, and deduce the circuit Quality Factor.

Project 8: Eddy Current Damping & Electromagnetic Braking Rig (Lenz's Law)

Objective: Fabricate a pendulum rig comparing solid aluminium/copper plates against slotted comb plates swinging through an intense magnetic field gap. Quantify damping coefficients to show magnetic induction and eddy current dissipations.

Project 9: Measurement of Earth's Magnetic Field Horizontal Component (BH)

Objective: Set up a Tangent Galvanometer with a reversing commutator, rheostat, and steady DC source along the magnetic meridian. Determine the horizontal intensity of Earth's magnetic field (BH) at Ranchi coordinates.

Project 10: Dielectric Constant Determination via a Variable Parallel-Plate Capacitor

Objective: Construct an adjustable parallel-plate assembly hooked to an AC capacitance bridge or astable multivibrator. Quantitatively measure capacitance shifts upon introducing diverse dielectric slabs (mica, glass, acrylic, wax) and deduce dielectric constants (K).

CHEMISTRY

SECTION A: THEORETICAL & CONCEPTUAL QUESTIONS (8 Questions)

1. a) What are non-ideal solutions? Distinguish between non-ideal solutions showing positive deviation and negative deviation from Raoult's law with one suitable example of each.

b) Why do aquatic species feel more comfortable in cold water than in warm water?

2. a) Define the term 'Azeotrope'. What type of azeotrope is formed by a mixture of ethanol and water? State its boiling point behavior relative to the components.

b) Explain why abnormal molar mass is observed for solute molecules undergoing association or dissociation in solution.

3. a) State Kohlrausch's Law of Independent Migration of Ions. Write its expression for calculating the limiting molar conductivity ($\Lambda°m$) of acetic acid (CH_3COOH).

b) Explain why limiting molar conductivity ($\Lambda°m$) cannot be obtained by extrapolation to zero concentration for weak electrolytes.

4. a) Define molar conductivity (Λm). How does molar conductivity vary with dilution for

i) a strong electrolyte, and ii) a weak electrolyte? Account for the difference.

b) Write the cell reaction and electrode reactions occurring during the discharging of a Lead Storage Battery.

5. a) Define 'Molecularity' and 'Order' of a reaction. Differentiate between them in at least two key points.

b) Show that for a first-order reaction, the time required for 99.9% completion is approximately 10 times the half-life ($t_{½}$) of the reaction.

6. Give suitable chemical/theoretical explanations for the following observations:
   a) Transition metals and their compounds exhibit high catalytic activity.
   b) Zr (Z = 40) and Hf (Z = 72) possess almost identical ionic radii.
   c) $E°(Fe^{3+}/Fe^{2+})$ value is exceptionally high (+0.77 V) compared to $E°(Mn^{3+}/Mn^{2+})$ (+1.57 V).
7. a) What is Lanthanide Contraction? State its primary cause and two major consequences on the chemistry of post-lanthanide elements.
   b) Account for why Cu^{+} ion is unstable in aqueous solution and undergoes disproportionation.
8. a) Using Valence Bond Theory (VBT), predict the hybridization, geometry, and magnetic behavior (paramagnetic or diamagnetic) of $[Fe(CN)_6]^{3-}$.
   b) State the postulates of Werner's coordination theory regarding primary and secondary valencies.

SECTION B: NUMERICAL PROBLEMS (2 Questions)

9. A solution prepared by dissolving 1.00 g of a non-volatile, non-electrolyte solute in 50 g of benzene lowered the freezing point of benzene by 0.40 K.
   Find the molar mass of the solute. (Given: Molal freezing point depression constant, Kf for benzene = 5.12 K kg mol^{-1}).
10. a) The rate constant for a first-order chemical reaction increases from 2.0×10^{-2} s^{-1} at 300 K to 4.0×10^{-2} s^{-1} at 320 K. Calculate the activation energy (Ea) for the reaction.
    (Given: R = 8.314 J K^{-1} mol^{-1}, log 2 = 0.3010).
    b) Calculate the EMF of the following cell at 298 K:

    $Mg(s) \mid Mg^{2+}$ (0.001 M) $\| Cu^{2+}$ (0.0001 M) $\mid Cu(s)$

    (Given: $E°(Mg^{2+}/Mg)$ = -2.37 V, $E°(Cu^{2+}/Cu)$ = +0.34 V).

BIOLOGY

Unit: Biology and Human Welfare

Chapters:

1. **Human Health and Disease** 2. **Microbes in Human Welfare**

Section A: Diagram-Based Questions (5)

1. Draw a neat, well-labelled diagram of the life cycle of Plasmodium. Explain the role of humans and female Anopheles mosquito in its life cycle.
2. Draw a labelled diagram of an antibody molecule (Immunoglobulin). Identify the heavy chains, light chains, antigen-binding sites and disulphide bonds.
3. Draw a flowchart representing the different stages of HIV infection in the human body, from entry of the virus to the development of AIDS.
4. Draw a well-labelled diagram of a sewage treatment plant. Show primary treatment, secondary treatment, activated sludge formation and anaerobic sludge digestion.
5. Draw a labelled diagram of a biogas plant. Explain the role of methanogenic bacteria in biogas production.

Section B: Project and Model-Based Questions (2)

6. Project: Microbial Diversity and Human Welfare

Prepare an informative chart or 3D display showing at least eight useful microorganisms belonging to bacteria, fungi, algae and viruses.

For each microorganism, mention:

- Scientific name
- Group to which it belongs
- Product obtained
- Its application in human welfare

Include examples such as Lactobacillus, Saccharomyces cerevisiae, Penicillium notatum, Methanobacterium and Trichoderma.

7. Working Model: Wastewater Treatment and Biogas Production

Prepare a working or demonstration model showing how organic waste can be converted into useful products through microbial activity.

Your model must demonstrate:

- Collection of organic waste.
- Anaerobic decomposition.
- Production of biogas.
- Collection of digested slurry.
- Environmental and agricultural benefits.

Use recyclable and eco-friendly materials wherever possible.

Section C: Conceptual and Application-Based Questions (3)

8. A person suffering from an infectious disease shows a sudden increase in body temperature, followed by weakness and chills. Explain the role of the immune system in combating pathogens. Differentiate between innate and acquired immunity with suitable examples.

9. In a pharmaceutical industry, two different microorganisms are used for producing antibiotics and immunosuppressive agents.

Identify suitable microorganisms and explain their respective products, biological functions and applications in medicine.

10. A dairy industry uses microbial cultures to improve the nutritional quality, flavour and shelf life of milk products. Explain the role of lactic acid bacteria in curd formation. Also discuss the importance of microbes in producing fermented beverages and industrial enzymes.

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