

आचार्यकुलम्

वैदिक समन्वित बी.एस.बी. आवासीय शिक्षण संस्थानम्

शिक्षा
संस्कारः



अभ्युदयः
निःश्रेयसः

Acharyakulam

A Vaidic Integrated BSB affiliated Residential (Co-ed) Educational Institute

SUMMER HOLIDAY HOMEWORK (2026-2027)

ENGLISH

PHYSICS

CHEMISTRY

BIOLOGY

MATHEMATICS

SANSKRIT

A. I.

XII

Class: XII (SCIENCE)

Session: 2026 – 2027

SUBJECT: ENGLISH CORE

Dear Students,

As summer break begins, take this time to relax, reflect, and recharge. Alongside rest and recreation, let this be an opportunity to grow intellectually, creatively, and personally.

Your holiday homework is designed to enrich your learning beyond the classroom. Approach it with sincerity and originality. Ensure your work is neat, well-organized, and aligns with the subject-specific guidelines.

In addition, we encourage you to:

- Read newspapers to stay informed about current affairs.
- Improve handwriting by writing a page in English and Hindi daily.
- Read at least two meaningful books and create a personal word journal.
- Be proactive and responsible—support your family and community in small but meaningful ways.

"Let summer light your inner flame,

Seek new knowledge, rise to fame.

Pause, reflect, explore, and read—

This season, plant your learning seed."

Wishing you a productive, joyful, and refreshing holiday!

TASK 1: FOR PCA & NON-PCA Students

Podcast Summaries and Thematic Analysis

A Project Report is a compilation of the work that you produce during the process of working on a project. You are required to prepare a Project Report, based on the guidelines given, and submit the project, having minimum 8-10 pages, to your respective English teacher for evaluation.

Directions:

1. Choose any three themes from the suggested list below, ensuring that each theme is from a different chapter.
2. For each chosen theme, listen to two podcasts that relate to it.
3. Write a summary of each podcast in approximately 250 words. In your summary, address the following:
 - The main ideas presented in the podcast.
 - How the content of the podcast relates to the corresponding chapter and its themes.

Project Guidelines:

- You may use any medium: pencil, watercolours, pastels, digital tools, etc.
- Use A4 size coloured / designer paper sheets for the project.
- Neatness, originality, and relevance to the theme will be assessed.
- Submit the assignments in a file /folder labelled with your name, class, and section.
- Parameters for Assessment: - Content, language and accuracy.
- Use as many pictures /photographs as you require.
- Use coloured sketch pens for headings and content.
- The project should be hand-written and spiral bound
- Completed project file is to be submitted along with holiday homework.
- Originality of the work will be appreciated.

Suggested Themes:

Prose from Flamingo:

1. **The Last Lesson:** Nostalgia, loss of freedom, importance of language and culture.
2. **Lost Spring:** Child labour, loss of childhood, struggle for education.

Poetry from Flamingo:

1. **My Mother at Sixty-Six:** Aging, mortality, mother-child relationship.
2. **Keeping Quiet:** Reflection, introspection, importance of silence.
3. **A Thing of Beauty:** Beauty, truth, enduring power of art.
4. **Aunt Jennifer's Tigers:** Female empowerment, creativity, patriarchy.

Supplementary Reader (from Vistas):

1. **The Third Level:** Time travel, escapism, fantasy, longing for simpler times.
2. **On the Face of it:** Appearance vs. reality, empathy, and understanding.

The Project must include the following compulsory pages:

1. Title Page
2. Index Page
3. Acknowledgement

ACKNOWLEDGEMENT

I would like to extend my sincere and heartfelt obligation towards all those who have helped me in making this project. Without their active guidance, help, cooperation and encouragement, I would not have been able to present the project on time.

I am extremely thankful and pay my sincere gratitude to my teacher _____ for his/ her valuable guidance and support for completion of this project.

I also acknowledge with a deep sense of reverence, my gratitude towards my parents, other faculty members of the school and friends for their valuable suggestions given to me in completing the project.

(Signature of the Student)

Date:

Place:

4. Certificate of Completion

CERTIFICATE

This is to certify that the project work on _____ based on the curriculum of CBSE has been completed by _____ of Class XII Section _____ of Acharyakulam, Patanjali Yogpeeth, Haridwar, and Uttarakhand.

The above-mentioned project work has been completed under my guidance during the academic year 2026-27.

Signature of Teacher

6. Objective

5. Bibliography / References

Task 2: For NON-PCA students only

(Competency Based Questions)

Direction: Write the answers of the following competency based questions in not more than 120 words in your holiday notebook.

The Last Lesson

- Q1.** The Last Lesson: Create an illustrated diary entry of Franz capturing his emotions on the last day of French lessons. Add symbolic visuals (e.g., a fading clock, a withering flower) to depict the loss of language and culture.
- Q2.** Flamingo: Prose and Poetry (Alphonse Daudet): The Last Lesson (Analytical Thinking) – Franz realizes the value of his mother tongue only when it is being taken away. If a similar decree were passed in your region, how would the youth react? Reflect on the importance of linguistic identity in a globalized world
- Q3.** M. Hamel wears his fine Sunday clothes on the last day. Evaluate how this act transforms him from a strict taskmaster into a symbol profound patriotism and grief.

The Lost Spring

- Q4.** Lost Spring (Anees Jung) (Thematic Analysis): The bangle-makers of Ferozabad and the rag-pickers of Seemapuri are trapped in a vicious circle of poverty and tradition. Compare their plights and evaluate how systemic apathy contributes to their loss of childhood.

A Thing of Beauty...

- Q5.** A Thing of Beauty (John Keats) (Poetic Analysis): Keats suggests that a thing of beauty provides eternal joy and acts as a “bower quiet for us” against life’s hardships. Identify any three everyday objects around you that serve as your personal “thing of beauty” and explain why?

The Third Level

- Q6.** The Third Level (Jack Finney) Hypothetical Inquiry: Charley escapes into an 1894 world to escape the insecurities, and stress of the modern world. If you were to build up your own “third level” to escape modern pressures, what you era or place would it transport you to and why?

The Last Lesson and The Third Level

- Q7.** Character Social Media Profile: Choose two characters from your syllabus (e.g. M. Hamel and Charley) and draft creative, detailed social media profiles (e.g., Facebook or Instagram bios, recent posts and comments) that reflect their personalities, struggles and character.

Keeping Quiet

Q8. Rohan is a tech -entrepreneur who works 18 hours a day. He constantly feels burnt out, isolated from his family, and anxious about his company’s growth. If Pablo Neruda were to evaluate Rohan’s lifestyle, what advice would the poet give him based on the poem “Keeping Quiet”?

Aunt Jennifer’s Tigers

Q9. Adrienne Rich’s poem is a critique of a society that binds women socially, emotionally, and physically. Based on your reading of the poem, evaluate how the symbols of “uncle’s wedding band” and the “tigers” encapsulate the conflict between oppression and liberation.

My Mother at Sixty-six

Q10. “My Mother at Sixty-six” by Kamla Das is a poignant poem that explores the themes of aging, mortality, and the enduring love between a mother and child. Substantiate the statement.

Task 3:

Revise and practice all the work done in the class (Reference Books, Notebooks, Assignments and Worksheets)

SUBJECT: PHYSICS

For PCA and Non PCA students-

Task 1: Prepare an investigatory project report. Project report must include the following-

- Aim
- Apparatus/ Reagents required
- Theory
- Procedure
- Observation
- Result and Conclusion
- Precaution
- Bibliography

Project Name	Links of Sample Project Files	Links of Sample Project Files	Links of Sample Project Files	Links of Sample Project Files
To study various factors on which the internal resistance/ EMF of a cell depends.	https://drive.google.com/file/d/1u2eYJCZMPmBwRfnZqglZHNjO7CcXzb7R/view?usp=share_link	https://drive.google.com/file/d/1V64CJX1IDeVO_lvZEG5ZyhMerFUrtgE6/view?usp=share_link	https://drive.google.com/file/d/1-qWwm0PhJ8pLixa6hqM1ScPlaH51RYss/view?usp=share_link	https://drive.google.com/file/d/1tS7Ej8F6qug0NhJXkKDwaVV2IHU1WayH/view?usp=share_link
To study the variations in current flowing in a circuit containing an LDR because of a variation in (a) the power of the incandescent lamp, used to 'illuminate' the LDR (keeping all the lamps at a fixed distance). (b) the distance of a incandescent lamp (of fixed power) used to 'illuminate' the	https://drive.google.com/file/d/14rcCbVllcB-fmFbGphwSNpuUoZ_Z4eIh/view?usp=share_link	https://drive.google.com/file/d/1jn9EAEScseMGnpVbCGkLvH7816IUS489/view?usp=share_link	https://drive.google.com/file/d/1QJLz0PjX0xpuUpJmwNoDG5ym4A2WQE7d/view?usp=share_link	https://drive.google.com/file/d/1zOtXFxUPE4GJpHvbClimBrJhmVDcBqw/view?usp=share_link

Project Name	Links of Sample Project Files	Links of Sample Project Files	Links of Sample Project Files	Links of Sample Project Files
LDR				
To find the refractive indices of (a) water (b) oil (transparent) using a plane mirror, an equiconvex lens (made from a glass of known refractive index) and an adjustable object needle.	https://docs.google.com/document/d/1o7InzE7qUQfOUp7eysx3Ugu1BN18UTe7/edit?usp=share_link&oid=111228412894650855811&rtpof=true&sd=true	https://drive.google.com/file/d/1Rc9UXDTpyj-3Rzk7ENhv3rvIt7dE-opF/view?usp=share_link		
To investigate the relation between the ratio of (i) output and input voltage and (ii) number of turns in the secondary coil and primary coil of a self-designed transformer.	https://drive.google.com/file/d/19RRycrgz1J058ovzVEzyIV0TmI5MIm1f/view?usp=share_link	https://docs.google.com/document/d/1KSWuOGY4UGr5QHKh2FrHtwtrKcfPcE1N/edit?usp=share_link&oid=111228412894650855811&rtpof=true&sd=true	https://drive.google.com/file/d/1iN-rw2yqspINt2BisiCHfalagiXiV0xB/view?usp=share_link	
To investigate the dependence of the angle of deviation on the angle of incidence using a hollow prism filled one by one, with different transparent fluids.	https://drive.google.com/file/d/1c8y20AMUuUre9WUf-9jZp6AFFMM2X2nP/view?usp=share_link	https://docs.google.com/document/d/1s-1ycKMGT4plk1o1jr6NFnH_4wrcExFJ/edit?usp=share_link&oid=111228412894650855811&rtpof=true&sd=true	https://docs.google.com/document/d/1zVlBqzZiItGHEhYzCd6-GX15kOMjJgOX/edit?usp=share_link&oid=111228412894650855811&rtpof=true&sd=true	
To estimate the charge induced on each one of the two identical Styrofoam (or pith) balls suspended	https://docs.google.com/document/d/13QsdNUX3u0X6xWfs1kNymKHDiL6nJFjt/edi	https://drive.google.com/file/d/1e7avcC01C2fAx	https://docs.google.com/document/d/1Jafs5V-fr2RD3mw1F04	

Project Name	Links of Sample Project Files	Links of Sample Project Files	Links of Sample Project Files	Links of Sample Project Files
in a vertical plane by making use of Coulomb's law.	t? usp=share link&oid= 11122841289465085 5811&rtpof=true&sd= true	K82W_Ipdtzk md 0DonCN/view ?usp=share lin k	foKfINlhzo6Nt/ edit? usp=share link &oid=1112284 1289465085581 1&rt pof=true&sd=tru e	
To study the factor on which the self-inductance of a coil depends by observing the effect of this coil, when put in series with a resistor/(bulb) in a circuit fed up by an A.C. source of adjustable frequency.	https://drive.google. com/file/d/1geBDIDN yTNKNnoddP89WhoI _MlQyig3l/view?usp= share link	https://drive.go ogle. com/file/d/1Sb JdeQC5AdlC0 sjXNHwo61 R9 oOp_t77/view ?usp=share lin k		
To study the earth's magnetic field using a compass needle -bar magnet by plotting magnetic field lines and tangent galvanometer.	https://docs.google.co m/document/d/1K- Th1RI70- h8e6O4d0ExSOfNB7 d7yAU/edit? usp=share link&oid= 11122841289465085 5811&rtpof=true&sd= true	https://drive.go ogle. com/file/d/1uz KsKvDpcxcA 3U6yJmYTP 3lF MycDjUE/vie w?usp=share_l ink	https://drive.goo gle. com/file/d/1_O U2cIdrT5sadCZ b6NkwwRMVb XQbEV 6E/view?usp=sh are link	

For NON PCA Students only-

Task 2: WORKSHEET

Answer/Solve the following questions in a separate note book/ A4 sheets

1. Define electric dipole moment. Is it a scalar or vector? Derive the expression for the electric field of a dipole on the equatorial plane of the dipole. Show that an electric dipole held in a uniform electric field will not undergo any translational motion. Hence derive an expression for the torque experienced by the dipole.
2. Using Gauss's law deduce the expression for the electric field due to a uniformly charged spherical conducting shell of radius R at a point (i) outside and (ii) inside the shell. Plot a graph showing variation of electric field as a function of $r > R$ and $r < R$ (r being the distance from the centre of the shell).
3. State Gauss's law in electrostatics. Use this law to derive an expression for the electric field due to a uniformly charged infinite plane sheet having uniform charge density $+\sigma$. Obtain the expression for the amount of work done in bringing a point charge q from infinity to a point, distance r , in front of the charge sheet.
4. Use Gauss law to derive an expression for the electric field due to an infinitely long straight uniformly charged wire having linear charge density λ C/m. Given is a line of charge of uniform linear density. A charge $+q$ is distributed uniformly between $y = 0$ and $y = a$ and charge $-q$ is distributed uniformly between $y = 0$ and $y = -a$. Explain how the direction of the resultant electric field at point P can be obtained. Represent using a vector diagram.
5. Obtain the expression for the amount of work done in bringing a point charge q from infinity to a point, distance r , in front of the line charge. An infinite line charge produces a field of 9×10^4 N/C at a distance of 2 cm. Calculate the linear charge density.
6. (a) An electric dipole (dipole moment $\vec{p} = p\hat{i}$), consisting of charges $-q$ and q , separated by distance $2a$, is placed along the x -axis, with its centre at the origin. Show that the potential V , due to this dipole, at a point x , ($x \gg a$) is equal to $(1/4\pi\epsilon_0) (p\vec{r}/x^2) \cdot \hat{i}$

(b) Two isolated metallic spheres S1 and S2 of radii 1 cm and 3 cm respectively are charged such that both have the same charge density $(2/\pi) \times 10^{-9} \text{C/m}^2$. They are placed far away from each other and connected by a thin wire. Calculate the new charge on sphere S1.

7. Derive an expression for potential energy of an electric dipole p in an external uniform electric field E . When is the potential energy of the dipole (1) maximum, and (2) minimum?
8. Three-point charges q , $2q$ and nq are placed at the vertices of an equilateral triangle. If the potential energy of the system is zero, find the value of n .
9. (a) Define the term drift velocity and relaxation time. On the basis of electron drift derive an expression for drift velocity of free electrons in term of relaxation time.
(b) Define the term 'mobility' of charge carriers in a current carrying conductor. Obtain the relation for mobility in term of relaxation time.
10. Derive the formula for Force per unit length between two long straight parallel wires. Define one ampere using your result. A rectangular coil of size 40cm x 50 cm having 500 turns is carrying current of 5A. It is kept in a uniform magnetic of 0.2T field making an angle of 60° from the plane of the coil. Find the force and torque on the coil.

SUBJECT- CHEMISTRY

For PCA and Non- PCA students

Task 1 : Prepare a first draft of an investigatory project for BSBE (Practical) – 2026-27.

Project report must include the following

- Title Page
- Certificate
- Acknowledgement
- Introduction
- Aim
- Apparatus/ Reagents required
- Theory
- Procedure
- Observations
- Result and Conclusion
- Precautions
- Bibliography

Some suggested projects are as follows:

1. Qualitative analysis of ions present in cold drinks like phosphate and fluorides
2. Organic qualitative analysis of functional groups in various classes of drugs and medicines..
3. Electrochemical cells and related calculations.
4. Analysis of alums.
5. Preparation of rayon threads.
6. Preparation of potash alum from scrap aluminium.

To know more about Investigatory projects kindly check link given below:

<https://www.scribd.com/document/893396553/Class12-Chemistry-Project-Guide-1>

https://cbseacademic.nic.in/web_material/Curriculum16/SrSecondary/Chemistry.pdf

Instructions for students:

1. The project must be hand written on A4 size sheet with no designs or water marks on it.
2. The project should be 10 – 15 pages long.
3. Include pictures and chemical reactions wherever relevant.
4. Use blue or black pen only.
5. The cover page must include Project Title, Students' Name, Class, Board Roll No. and Session.

For Non- PCA students only

Task 2 : Refer to your class XI notes of reaction mechanism and answer the following questions:

1. Dehydration of butan-1-ol and butan-2-ol with conc. H_2SO_4 always gives the same mixture of but -2-ene (80%) and but-1-ene (20%) but dehydrohalogenation of 1-bromobutane with alc. KOH gives but-1-ene as the major product while that of 2-Bromobutane gives but-2-ene as the major product. Explain why? Hint: stability of carbocation, hydride shift and 1,2 elimination.
2. Draw resonating structures of the following compounds also mention the directive influence and activity towards electrophilic substitution reaction of the groups attached to benzene ring.
Nitrobenzene, Benzaldehyde, Chlorobenzene, Acetophenone, Benzoic acid, Phenol, Aniline.
3. Explain Markonikov's and anti Markonikov's rule by taking example of propene and HBr (write chemical equations and use arrow marks to show cleavage of bonds and movement of electrons)
4. Identify the following species as electrophiles and nucleophiles:
 HCOO^- , CH_3COO^- , Cl^- , $\text{Cl}_2\text{C}:$, $(\text{H}_3\text{C})_3\text{C}^+$, Br^- , H_3COH , R-NHR , H_3O^+ , R_4N^+ , HS^-
5. Compare the stabilities of following carbocations:
(a) $(\text{CH}_3)_3\text{C-CH}_2^+$ (b) $(\text{CH}_3)_3\text{C}^+$ (c) $\text{CH}_3\text{CH}_2\text{CH}_2^+$ (d) $\text{CH}_3\text{CH}(+)\text{CH}_2\text{CH}_3$
(e) $\text{C}_6\text{H}_5(\text{CH}_3)\text{C}^+$ (f) $(\text{C}_6\text{H}_5)_2\text{CH}^+$ (g) $(\text{C}_6\text{H}_5)_3\text{C}^+$
6. Compare the stabilities of the following anions and give reason for your answers:
(a) $\text{O}_2\text{NCH}_2\text{CH}_2\text{O}^-$ and $\text{CH}_3\text{CH}_2\text{O}^-$
(b) $\text{CH}_2\text{ClCOO}^-$, CH_3COO^- , CCl_3COO^- , $\text{CHCl}_2\text{COO}^-$

(c) CH_3CH_2^- , CHC^- , $\text{CH}_2=\text{CH}^-$

7. Compare stabilities of following alkenes on the basis of hyperconjugation effect:
(a) 2,3 Dimethylbut-2-ene (b) But-1-ene (c) But-2-ene (d) 2-Methylbut-2-ene
8. Explain formation of carbon free radical, carbocation and carbanion through homolytic and heterolytic cleavage with the help of suitable examples.
9. Discuss hybridisation and geometry of carbocations and carbanions.
10. Solve IUPAC nomenclature questions of Chapter 6 to 9 NCERT PART II Class XII.

SUBJECT: BIOLOGY

For PCA and Non PCA students-

Task 1: Prepare an investigatory project report. Project report must include the following-

- Aim
- Apparatus/ Reagents required
- Theory
- Procedure
- Observation
- Result and Conclusion
- Precaution
- Bibliography

To Know more about Investigatory projects kindly check link given below-

<https://ncert.nic.in/pdf/publication/sciencelaboratorymanuals/classXII/biology/1elm216.pdf>

For NON PCA Students only-

Task 2: Worksheet on Topic: Principles of Inheritance and Variation, Molecular Basis of Inheritance, and Evolution

Instructions for Worksheet:

1. Solve all the given questions neatly on A4 size sheets.
2. Write both the questions and answers in proper sequence.
3. Draw neat and labelled diagrams wherever required.
4. The completed worksheet should be arranged properly and submitted in a stick file after summer vacation.

Questions-

1. In an experiment, the amount of adenine in a DNA sample is found to be 30%. Calculate the percentage of: (a) thymine (b) guanine (c) cytosine. Give reason for your answer.
2. A DNA strand has the sequence: 3' – TAC GGA TTT ACC – 5'
 - a) Write the complementary mRNA sequence formed during transcription.
 - b) Identify the amino acids coded using genetic code knowledge.
 - c) Name the process by which proteins are synthesized from mRNA.
3. A mutation changes the codon GAA to GUA in a gene responsible for haemoglobin synthesis.
 - a) Identify the disorder associated with this mutation.
 - b) Explain how a single base change affects the structure and function of haemoglobin.
 - c) Why is this called a point mutation?
4. A group of birds living on different islands developed different types of beaks depending on the available food.
 - a) Name the scientist associated with this observation.
 - b) Which concept of evolution does this example support?
 - c) (Explain how adaptive radiation occurs.
5. In a family, both parents have blood group AB and their child has blood group O. A student claims this is impossible. Analyse the statement and justify your answer using the concept of multiple alleles and codominance.
6. A karyotype analysis of a child shows 47 chromosomes with an extra chromosome number 21.
 - a) Name the disorder.
 - b) Explain how nondisjunction leads to this condition.
 - c) Mention any two characteristic features of the disorder.
7. Fossils of extinct animals are found in deeper layers of rocks while modern organisms are found in upper layers. Explain how fossil evidence supports the theory of evolution.
8. Study the following statement carefully:

“The lac operon remains switched off in the absence of lactose.”

Explain the role of regulator gene, repressor protein, and operator gene in this condition.

9. Compare sickle-cell anaemia and thalassemia on the basis of:

- a) genetic defect
- b) effect on haemoglobin
- c) inheritance pattern

NOTE- Revise Ch 1 to Ch 6 of your biology textbook.

SUBJECT: MATHEMATICS

Task 1: FOR NON-PCA STUDENTS ONLY

General Instructions:

- (i) Homework is divided in two sections A and B. Section A is related the subjective competency based, source integrated and critical thinking based questions and section B is related the lab activity in Mathematics for file record.
- (ii) Complete the homework in separate note book for section A and activities are complete in Maths Lab Activity file, if graph or colored paper or any relevant material required then first make and paste it on with respective activity.
- (iii) Write your name, class, section, subject, date of submission and roll number on cover page of homework.
- (iv) Write the all steps, formula and explanation with solutions of questions.
- (v) Try to keep the work neat, clean and decorative and answer the questions exactly as asked.

SECTION-A

1. To simplify Inverse trigonometric expression, following substitution table can use

If use see	use the sub	so that	and
$\sqrt{a^2 - x^2}$	$x = a \sin \theta$	$dx = a \cos \theta d\theta$	$\sqrt{a^2 - x^2} = a \cos \theta$
$\sqrt{a^2 + x^2}$	$x = a \tan \theta$	$dx = a \sec^2 \theta d\theta$	$\sqrt{a^2 + x^2} = a \sec \theta$
$\sqrt{x^2 - a^2}$	$x = a \sec \theta$	$dx = a \sec \theta \tan \theta d\theta$	$\sqrt{x^2 - a^2} = a \tan \theta$

Based on the above information, answer the following question.

- (i) Prove that: $\tan^{-1} \frac{\sqrt{1+\cos x} + \sqrt{1-\cos x}}{\sqrt{1+\cos x} - \sqrt{1-\cos x}} = \frac{\pi}{4} - \frac{x}{2}, \pi < x < \frac{3\pi}{2}$
- (ii) Prove that: $\cos^{-1} x + \cos^{-1} \left\{ \frac{x}{2} + \frac{\sqrt{3-3x^2}}{2} \right\} = \frac{\pi}{2}, \frac{1}{2} \leq x \leq 1$
- (iii) Find derivative of $\tan^{-1} \frac{\sqrt{1+x^2}-1}{x}$ w. r. t. x after simplification. ($x \neq 0$)
- (iv) Simplify and verified: $\tan^{-1} \left(\frac{\sqrt{1+\cos x} + \sqrt{1-\cos x}}{\sqrt{1+\cos x} - \sqrt{1-\cos x}} \right), \pi < x < \frac{3\pi}{2}$

1. A student of class XII, multiplies the two matrices A and B where,

$$A = \begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix} \text{ and } B = \begin{bmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{bmatrix} \text{ later on he uses the product } AB \text{ in solving}$$

the system of equations

$$x - y + 2z = 1, 2y - 3z = 1 \text{ and } 3x - 2y + 4z = 2$$

- (i) Find the product AB
 - (ii) Find the value of A^{-1} by use the product of AB.
 - (iii) Write the solution of given system of equations by using the product AB.
 - (iv) Find the value of $x + y + z$
2. Sumit has a doubt in the continuity and differentiability problem, but due to COVID-19 he is unable to meet with his teachers or friends. So he decided to ask his doubts with his friends Sunita and Vikram with the help of a video call. Sunita said that the given function is continuous for all the real values of x while Vikram said that the function is continuous for all the real values of x except at $x = 3$.

The given function is $f(x) = \frac{x^2-9}{x-3}$

Based on the above information, answer the following questions:

- a) Whose answer is correct?
 - b) Find the derivative of the given function with respect to x.
 - c) Find the value of $f'(3)$.
 - (d) Find the second differentiation of the given function with respect to x.
3. A potter made a mud vessel, where the shape of the pot is based on $f(x) = |x - 3| + |x - 2|$, where $f(x)$ represents the height of the pot.



- a) When $x > 4$ What will be the height in terms of x?
- b) What is $\frac{dy}{dx}$ at $x = 3$?
- c) When the x value lies between (2, 3) then the function is _____
- d) If the potter is trying to make a pot using the function $f(x) = [x]$, will he get a pot or not? Why?

4. Two schools A and B want to award their selected students on the values of Honesty, Hard work and Punctuality. The school A wants to award ₹ x each, ₹ y each and ₹ z each for the three respective values to its 3, 2 and 1 students respectively with a total award money of ₹ 2200. School B wants to spend ₹ 3100 to award its 4, 1 and 3 students on the respective values (by giving the same award money to the three values as school A). The total amount of award for one prize on each value is ₹ 1200.



Using the concept of matrices and determinants, answer the following questions.

- (i) What is the award money for Honesty?
 - (ii) What is the award money for Punctuality?
 - (iii) What is the award money for Hard work?
 - (iv) If a matrix P is both symmetric and skew-symmetric, then find $|P|$.
5. To promote the usage of house toilets in villages, especially for women, organisations tried to generate awareness among the villagers through (i) house calls (ii) letters, and (iii) announcements.



The cost for each mode per attempt is given below.

- (i) ₹ 50 (ii) ₹ 20 (iii) ₹ 40 The number of attempts made in villages X, Y, and Z is given below:

	(i)	(ii)	(iii)
X	400	300	100
Y	300	250	75
Z	500	400	150

Also, the chance of making toilets corresponding to one attempt of given modes is:

- (i) 2% (ii) 4% (iii) 20% Let A, B, and C be the cost incurred by the organisation in three villages respectively.

Based on the above information answer the following questions:

- (i) Form a required matrix on the basis of the given information.
(ii) From a matrix, related to the number of toilets expected in villagers X, Y, and Z after the promotion campaign.
(iii) What is the total amount spent by the organisation in all three villages X, Y, and Z?

Or

- (iv) What is the total no. of toilets expected after the promotion campaign?

6. Sherlin and Danju are playing Ludo at home during Covid-19. While rolling the dice, Sherlin's sister Raji observed and noted that possible outcomes of the throw every time belong to the set $\{1, 2, 3, 4, 5, 6\}$. Let A be the set of players while B be the set of all possible outcomes.



$$A = \{S, D\}, B = \{1, 2, 3, 4, 5, 6\}$$

- (i) Let $R : B \rightarrow B$ be defined by $R = \{(x, y) : y \text{ is divisible by } x\}$. Show that relation R is reflexive and transitive but not symmetric.
(ii) Let R be a relation on B defined by $R = \{(1, 2), (2, 2), (1, 3), (3, 4), (3, 1), (4, 3), (5, 5)\}$. Then check whether R is an equivalence relation.
(iii) Raji wants to know the number of functions from A to B. How many numbers of functions are possible?

OR

- (iv) Raji wants to know the number of relations possible from A to B. How many numbers of relations are possible?

7. Students of Grade 9, planned to plant saplings along straight lines, parallel to each other to one side of the playground ensuring that they had enough play area. Let us assume

that they planted one of the rows of the saplings along the line $y = x - 4$. Let L be the set of all lines which are parallel on the ground and R be a relation on L .

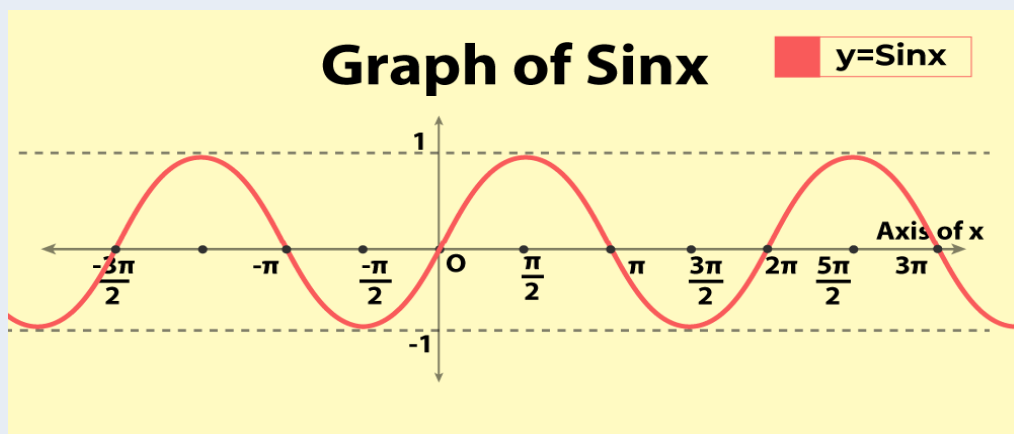


- (i) Let relation R be defined by $R = \{(L_1, L_2) : L_1 \parallel L_2 \text{ where } L_1, L_2 \in L\}$. What is the type of relation R ?
- (ii) (a) Check whether the function $f : \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = x - 4$ is bijective or not.

OR

- (b) Consider $f: \mathbb{R}^+ \rightarrow [-5, \infty)$ given by $f(x) = 9x^2 + 6x - 5$. Find range and show that f is invertible.

8. If a function $f : X \rightarrow Y$ defined as $f(x) = y$ is one-one and onto, then we can define a unique function $g : Y \rightarrow X$ such that $g(y) = x$, where $x \in X$ and $y = f(x)$, $y \in Y$. Function g is called the inverse of f . The domain of sine function is \mathbb{R} and function $\sin: \mathbb{R} \rightarrow \mathbb{R}$ is neither one-one nor onto. The following graph shows the sine function.



Let sine function be defined from set A to $[-1, 1]$ such that inverse of sine function exists, i.e., $\sin^{-1} x$ is defined from $[-1, 1]$ to A.

On the basis of above information, answer the following questions.

- (i) If A is the interval other than principal value branch, give an example of one such interval.
- (ii) If $\sin^{-1} x$ is defined from $[-1, 1]$ to its principal value branch, find the value of $\sin^{-1}(-1/2) - \sin^{-1}(-1)$
- (iii) Draw the graph of $\cos^{-1} x$ from $[-1, 1]$ to its principal value branch $[0, \pi]$.
- (iv) Find the domain and range of
 - (a) $f(x) = 2\sin^{-1}(1-x)$
 - (b) $f(x) = \sin^{-1} x + \tan^{-1} x + \sec^{-1} x$

DOWNLOAD THE SQP & QP OF PREVIOUS YEAR 2026 OF YOUR REGION AND SOLVE THE QUESTIONS OF FOLLOWING TOPICS:

1. Continuity and Differentiability
2. Application on Derivatives
3. Sets, Relation and Function
4. Inverse Trigonometric Function
5. Matrix and Determinants

SECTION-B

Task 2 : FOR PCA & NON-PCA STUDENTS
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Complete the following lab activities:

A1: To verify the relation R in the set L of all lines in a plane, defined as $\{(l,m): l \perp m \text{ and } l, m \in L\}$ is symmetric but neither reflexive nor transitive.

A2: To demonstrate a function which is not one-one but is onto?

A3: To draw the graph of $\sin^{-1} x$, using the graph of $\sin x$ and demonstrate the concept of mirror reflection about $y=x$

A4: To draw the graph of $\sec^{-1} x$, using the graph of $\sec x$ and demonstrate the concept of mirror reflection about $y=x$

A4: To find analytically the limit of a function at $x = 5$, $f(x) = \frac{x^2-25}{x-5}$ when $x \neq 5$ and $f(x) = 10$ when $x = 5$ and also to check the continuity of the function at that point.

A5: To sketch the graphs of 2^x and $\log_2 x$ and to examine that they are mirror images of each other.

A6: To construct an open box of maximum volume from a given rectangular sheet by cutting equal squares pieces from each corner.

विषय – संस्कृत

1. सामूहिकं यज्ञं कृत्वा सामूहिकं योगप्रशिक्षणं च दत्वा तस्य सामूहिकछायाचित्रम् एकस्मिन् A4 sheet कर्गदि संश्लेश्य तस्य विवरणं संस्कृतेन लिखत।
2. स्व-पाकशालायाम् उपलब्ध-खाद्य-वस्तूनां नामानि तेषां पात्रेषु संस्कृते विलिख्य छायाचित्राणि A4 sheet कर्गदि संश्लेश्य आनयन्तु।
3. 'अनुशासनम्' इति पाठं स्मृत्वा तद्विषयाधारितं सार्द्धं द्विपृष्ठात्मकं निबन्धं एकस्यां संचिकायां (FILE) संस्कृतेन लिखत।
4. प्रथम,द्वितीय एवं तृतीय पाठेषु आगतानां समस्त सन्धि-समास-प्रत्यय-शब्दानां चयनं कृत्वा एकस्यां लघु-टिप्पणीपुस्तिकायां विलिख्य आनयन्तु।
5. क्रियाकलाप -

क्रम.सं.	दिनाङ्कः	अभिवादनम्	योगः	यज्ञः	भोजनमन्त्रः	संस्कृतवाक्यम्	शयनमन्त्रः	अभिभावक-हस्ताक्षरम्
1.	27.05.26							
2.	28.05.26							
3.	29.05.26							
4.	30.05.26							
5.	31.05.26							
6.	1.06.26							
7.	2.06.26							
8.	3.06.26							
9.	4.06.26							
10.	5.06.26							
11.	6.06.26							

12.	7.06.26							
13.	8.06.26							
14.	9.06.26							
15.	10.06.26							
16.	11.06.26							
17.	12.06.26							
18.	13.06.26							
19.	14.06.26							
20.	15.06.26							
21.	16.06.26							
22.	17.06.26							
23.	18.06.26							
24.	19.06.26							
25.	20.06.26							
26.	21.06.26							
27.	22.06.26							
28.	23.06.26							
29.	24.06.26							
30.	25.06.26							

धातव्य-

1. भो छात्र! प्रतिदिन आपको उपरोक्त क्रिया कलाप अवश्य करने हैं और प्रतिनित्य अपने अभिभावकों के हस्ताक्षर इस आशय से कराने हैं कि आपने उनके समक्ष किया है।

2. प्रतिदिन किये गये क्रिया कलाप को चित्र के माध्यम से प्रमाण सहित उपस्थित करना अनिवार्य है।
3. **संस्कृत वाक्य** में प्रतिदिन अपने अभिभावकों को एक-एक संस्कृत का वाक्य सिखाना है।
4. इस गृहकार्य के अंक आपके आंतरिक मूल्यांकन (Internal Assessment) के क्रियाकलाप (Activity) में जोड़े जायेंगे।

SUBJECT- ARTIFICIAL INTELLIGENCE

1. Prepare a **Capstone Project**, identifying a real-world problem, using the Design Thinking (DT) framework to solve it, and documenting the AI Project Cycle.
2. Prepare a **Practical File (hard bound practical book) - Python & Data Handling**
 - This requires you to document core Python and data manipulation programs. You should write the Question, Code, and Output on A4 sheets (or prepare a digital document):
 - **Basic Data Frames:** Write a program to create a Pandas Data Frame using a sequence (dictionary) and display the first 5 records.
 - **CSV Operations:** Write a script to read data from a .csv file, convert it into a Pandas Data Frame, and perform operations on it.