



RAMJAS INTERNATIONAL SCHOOL

R. K. PURAM, NEW DELHI

Summer Vacation Assignments 2026-27

"Education is the passport to the future, for tomorrow belongs to those who prepare for it today." —
Malcolm X

Dear Students,

As the summer break begins it offers a valuable opportunity to pause, reflect, and recharge. However, for students in Class XI and XII this period is also a critical bridge for academic consolidation. The transition into senior secondary education requires a shift from rote learning to analytical application and self-disciplined research.

The attached Summer Holiday Assignments have been meticulously designed to strengthen core concepts, revisit foundational topics to ensure clarity before moving to advanced syllabus modules.

CLASS XII :

ACCOUNTANCY

Guidelines

Project 1: Analysis of Financial Statements using Accounting Ratios

Objective: To evaluate the liquidity, solvency, and profitability of a real-world entity.

Instructions for Students:

- **Company Selection:** Select any **NSE/BSE listed company** and download its Annual Report for the latest two financial years.
- **Data Extraction:** Focus on the Consolidated Balance Sheet and Statement of Profit & Loss.
- **Ratio Calculation:** Compute at least two ratios from each of the following categories:
 1. **Liquidity Ratios** (e.g., Current Ratio, Quick Ratio)
 2. **Solvency Ratios** (e.g., Debt-to-Equity, Total Assets to Debt)
 3. **Activity/Turnover Ratios** (e.g., Inventory Turnover, Trade Receivables Turnover)
 4. **Profitability Ratios** (e.g., Gross Profit Ratio, Net Profit Ratio)
- **Interpretation:** Do not just provide numbers. Write a brief analysis (3–4 lines per ratio) explaining whether the company's performance has improved or declined compared to the previous year.
- **Visual Representation:** Use **Bar Graphs or Pie Charts** to show the trend of key ratios over the two-year period.

Project 2: Preparation and Analysis of Cash Flow Statement

Objective: To understand the movement of cash and cash equivalents and assess the operating, investing, and financing activities of a business.

Instructions for Students:

- **Methodology:** Using the financial data of your chosen company, prepare a **Cash Flow Statement** following **Accounting Standard-3 (Revised)** using the **Indirect Method**.
- **Segmented Analysis:** Break down the analysis into three distinct sections:
- **Operating Activities:** Discuss why the net cash from operations differs from the Net Profit.
- **Investing Activities:** Identify major capital expenditures or sale of fixed assets/investments.
- **Financing Activities:** Note any new issuance of shares, repayment of loans, or dividend payments.
- **Conclusion:** Conclude whether the company is "Cash Rich" or "Cash Poor" and evaluate its ability to meet future obligations based on its cash position.

Project Formatting Requirements

To ensure a professional presentation, your project should follow this sequence:

1. **Title Page:** Project Topic, Student Name, Roll No., and School Name.
2. **Acknowledgement:** Expressing gratitude to those who assisted.
3. **Index:** Clear page numbering for each section.
4. **Introduction:** Brief overview of the topic (What are Ratios? / Significance of Cash Flow).
5. **Main Content:** The data, calculations, and analysis.
6. **Conclusion:** Your final findings and observations.
7. **Bibliography:** Sources used (e.g., MoneyControl, Company Website).

Pro-Tip: Ensure all calculations are shown clearly. In Accountancy, the **process** is often just as important as the final figure!

Project Guidelines: Segment Analysis (Accounting Standard-17)

Segment Analysis is a vital part of the Class XII Accountancy curriculum, focusing on how large diversified companies report the performance of different components of their business.

Project Objective

The goal is to understand how a company identifies its reportable segments (either **Business Segments** or **Geographical Segments**) and how it allocates revenue, results, and assets among them.

Step-by-Step Project Structure

1. Selection of the Entity

Choose a company that operates in multiple industries or diverse geographical locations.

- **Examples:** **ITC Ltd.** (Cigarettes, FMCG, Hotels, Agri-Business), **Reliance Industries** (O2C, Retail, Digital Services), or **Tata Motors** (Commercial Vehicles, Passenger Vehicles, Jaguar Land Rover).
- To study whether the contribution of various segments of ____ with respect to (i) Revenue, and (ii) Profit, is justified?
- To know as to which operation segment is performing best in terms of Net Profit and Return on Investment.

Visual Representation

To make the project scannable and professional, include:

- **Pie Charts:** To show the Revenue share of each segment.
- **Comparative Bar Graphs:** To show the growth of profits in each segment over two years

➤ Do all Previous Year Questions from T.S.Grewal from P.E. 14 to 16 and P.E.26 to 64 in fair Note Book

CASH FLOW STATEMENT

1. Statement I:- Sale of Marketable Securities will result in no flow of Cash.

Statement II:- Debentures issued as collateral security will result in inflow of cash.

a) Both Statements are correct.	b) Both Statements are incorrect
c) Statement I is correct and Statement II is incorrect	d) Statement I is incorrect and Statement II is correct.

2. What will be the effect of issue of Bonus shares on Cash Flow Statement?

a) No effect	b) Inflow in Financing Activity
c) Inflow in Operating activity	d) Inflow in Investing Activity

3. Assertion (A): Purchase of Marketable Securities will be classified as cash outflow under investing activities.

Reason (R): Marketable Securities are considered as Cash and Cash Equivalents; Hence, they do not affect Cash flows.

In the context of the above two statements, which of the following is correct?

Additional Information:

1. Equity Share Capital raised during the year Rs.3,00,000;
2. 10% Bank Loan was repaid on 01.04.2022.
3. Dividend received during the year was Rs.20,000.
4. Dividend Proposed for the year 2021-22 was Rs.50,000 but only Rs.20,000 was approved by the Shareholders

Find out the cash flow from Financing Activities.

- a) Rs. 1,50,000 b) Rs.2,00,000 c) Rs. 1,70,000 d) Rs. 1,80,000

11. From the following information, calculate Cash flow from Operating Activities.

Particulars	31 March 2023	31 March 2024
Surplus i.e Balance in Statement of Profit and Loss	6,00,000	5,00,000
Provision for Tax	1,00,000	1,20,000
Trade Receivables	2,00,000	2,40,000
Trade Payables	1,50,000	2,00,000
Goodwill	2,00,000	1,50,000

Additional Information:- Proposed Dividend for the year ended March 31, 2023 and March 31, 2024 was Rs. 1,50,000 and Rs. 1,80,000 respectively.

12. From the following information calculate the Cash from Investing Activities:

Particulars	31 March 2023	31 March 2024
Machinery (Cost)	20,00,000	28,00,000
Accumulated Depreciation	4,00,000	6,50,000

Additional Information:-

- (i) Machinery costing Rs. 50,000 (Book Value Rs. 40,000) was lost by fire and insurance claim of Rs. 32,000 was received.
- (ii) Depreciation charged during the year was Rs. 3,50,000.
- (iii) A part of Machinery costing Rs. 2,50,000 was sold at a loss of Rs. 20,000.

13. From the following information, calculate Cash flow from Operating Activities.

Particulars	31 March 2023	31 March 2024
Surplus i.e. Balance in Statement of Profit and Loss	75,000	60,000
Cash and Bank Balance	35,000	12,000
Inventory	3,00,000	2,30,000
Trade Receivables	2,00,000	2,40,000
Trade Payables	60,000	80,000
Prepaid Expenses	3,000	10,000
Goodwill	30,000	20,000
Provision for Tax	10,000	12,000

Additional Information: Proposed Dividend for the year ended March 31, 2023 and March 31, 2024 was 23,000 and 20,000.

b) Calculate Cash Flow from Investing Activities from the following Particulars:

	1 st April 2023	31 st March 2024
Plant and Machinery (Balance)	12,00,000	15,40,000

Additional Information:

- (i) Depreciation Charged during the year Rs.2,20,000.
- (ii) Plant & Machinery costing Rs.2,40,000 on which 90,000 had accumulated as depreciation was sold for Rs.1,70,000

14. The following information is available for the manufacturing

Co. Superior Products Ltd Particulars	Rs 2021-22	Rs 2020-21
Investments in land	16,00,000	6,00,000
10% long term investments	2,50,000	4,00,000

Machinery (at cost)	3,00,000	2,00,000
Goodwill	80,000	15,000

Additional Information:

A machine costing Rs.40,000 (depreciation provided thereon Rs.12,000) was sold for Rs.35,000. Depreciation charged during the year was Rs.60,000.

Calculate Cash Flow of from Investing Activities

15. Niteesh initiated her start-up up Infotech Innovative Solutions Limited in 2021. Its profits are increasing due to the innovations it brought in all fields like ticket vending machines, napkin vending machines, digital podiums etc.

The following is information extracted from the Balance sheet of Infotech Innovative Solutions Limited for the year ended 31st March 2024 and additional information provided.

You are required to calculate cash flows from operating activities and cash flows from financing activities

Equity and Liabilities	31.3.2023	31.3.2024
Equity share capital	20,00,000	30,00,000
10% preference share capital	2,00,000	1,00,000
Securities premium A/C	-	95,000
Profit and loss balance	4,00,000	8,00,000
10% Debenture	10,00,000	10,00,000

Additional information:

- Fresh equity shares were issued on 31st march 2024 at a premium of 10%
- Interim dividend was paid on equity shares @8%

Preference shares were redeemed on 31st march 2024 at a premium of 5%. Premium on redemption was charged against premium received on issue of equity shares.

BIOLOGY

- Trace three generations of your family for three traits: Widows peak, Tongue Rolling, and Blood Group.
 - Construct a family pedigree chart.

b) Apply the Hardy-Weinberg Principle. Use the frequency of the recessive phenotype (q^2) to calculate the frequency of the dominant allele (p) and the carriers ($2pq$) within your sample population.

- Draw and memorise well labelled diagrams of the following from NCERT in your assignment copy- Figure 1.3 (a) Transverse section of a young anther; (b) Enlarged view of one microsporangium showing wall layers; (c) A mature dehisced anther

Figure 1.8 (a) Parts of the ovule showing a large megaspore mother cell, a dyad and a tetrad of megaspores; (b) 2, 4, and 8-nucleate stages of embryo sac and a mature embryo sac; (c) A diagrammatic representation of the mature embryo sac.

Figure 1.13 (a) Fertilised embryo sac showing zygote and Primary Endosperm Nucleus (PEN); (b) Stages in embryo development in a dicot [shown in reduced size as compared to (a)]

Figure 1.14 (a) A typical dicot embryo; (b) L.S. of an embryo of grass

- Finalise the topic and the design of the class XII board project. The project has to be investigatory / survey based. The submission of the final project in black and white print will be due by 20th July.

The project report should be prepared in the following sequence- Cover page should include the title of the Project, student information, school and year. Certificate Acknowledgement Index Project Content Case study/Graphical interpretation Conclusion and Bibliography

- Revise all chapters thoroughly. Complete the back exercise and worksheets in the notebook.

Chemistry

Students are required to complete the following work during the summer vacation. All work should be done neatly and submitted as per the given instructions.

1. Revision (Theory & Practicals)

- Revise all the topics covered till the end of extra classes.
- Ensure thorough preparation of both:
 - **Theory concepts**
 - **Practical experiments and related viva questions**

2. NCERT Practice

- Solve all:
 - **Intext solved examples**
 - **Back exercises**
- From the following units:
 - *Solutions*
 - *Electrochemistry*
 - *Chemical Kinetics*

(Work should be done systematically in your Chemistry notebook.)

3. Previous Year Questions (PYQs)

- Solve **Previous Year Questions (CBSE Board)** from the following units:
 - *Solutions*
 - *Electrochemistry*
 - *Chemical Kinetics*

4. Individual Project Work (Investigatory Project + Model)

- Prepare an **investigatory project or working model** based on a Chemistry concept.
- The project must reflect:
 - **Scientific approach**
 - **Data collection/observation**
 - **Analysis and conclusion**

Project File Must Include

- Title of the Project
- Aim
- Apparatus/Materials Required
- Principle/Theory
- Procedure/Method
- Observations & Calculations
- Result/Conclusion
- Applications of the Concept
- Bibliography

Suggested Investigatory Topics (Choose Any One)

- **Analysis of Cough Syrup**
- **Comparative Study of Cold Drinks**
- **Preparation of Hand Sanitizer**
- **Preparation of Dyes**
- **Analysis of Vinegar Samples**
- **Estimation of Casein in Milk**
- **Preparation of Soya Milk & Comparison with Natural Milk**
- **Analysis of Chocolate**
- **Study of Oxalate Content in Guava at Different Ripening Stages**
- **Comparative Study of Fermentation (Apple Juice vs Carrot Juice)**
- **Study of Constituents of Alloys**
- **Analysis of Commercial Antacids (Neutralizing Capacity)**

- **Fingerprint Development Techniques**
- **Analysis of Honey (Minerals & Carbohydrates)**
- **Detection of Sugar in Sugar-Free Sweets**

Important Instructions

- The project must be **investigatory, not merely descriptive**.
- Include **observations, data, and proper calculations** wherever applicable.
- A working model (if prepared) should clearly demonstrate the concept.
- Maintain **originality and neat presentation**.

Submission Guidelines

- All written work should be **well-organized and properly labeled**.
- Project file should be **handwritten (unless instructed otherwise)**.
- Ensure timely submission after vacation.
-

BUSINESS STUDIES

Project files to be prepared by the students for board exams practical.

Specification for Project file to be prepared for board exams.

- Individual Projects to be prepared.
- Students are expected to conduct research work and show evidence for their research work in their Project File
- Data related to topics should be based on field work, textbooks and not be just taken from Google & Wikipedia. Students are requested to read relevant books, journals, magazines, newspaper related to their topics.
- Length of the project-40 to 50 pages and it must be handwritten.
- Submission date- 6.07.2024

Students are supposed to select one unit out of 4 and are required to make only ONE project from the selected unit.(Consist of one project of 20 marks)

- Business Environment**
- Marketing**
- Principles of management**
- Stock Exchange**

Details about the project can be found in the following link:-

https://cbseacademic.nic.in/web_material/CurriculumMain24/SrSec/BusinessStudies_SrSec_2023-24.pdf

e) And further discussion with the subject teacher.

Allocation of Marks = 20 Marks

The marks will be allocated under the following heads:

1	Initiative, cooperativeness and participation	2 Mark
2	Creativity in presentation	2 Mark
3	Content, observation and research work	4 Marks
4	Analysis of situations	4 Marks
5	Viva	8 Marks
	Total	20 Marks

CHAPTER 9 : FINANCIAL MANAGEMENT

TRADING ON EQUITY

1. The Return on Investment (ROI) of a company ranges between 10% - 12% for the past 3 years. To finance in future fixed capital needs, it has the following option for borrowing debts.

Option A: Rate of Interest 9%

Option B: Rate of Interest 13%

With source of debts, Option A or Option B is better? Give reason in support of your answer. Also state the concept used in taking the decision.

2. D limited is a company manufacturing textile. It has a share capital of Rs60 lakhs. In the previous year, its earning per share was Rs 0.50. For diversification, the company requires an additional capital of Rs 40 lakhs. The company raise funds by issuing 10% debentures for the same. During the year, the company earned a profit of ₹8,00,000 on the capital employed. It paid tax @40%.

State whether the shareholders gained or lost, in respect of earning per share on diversification. Show your calculations clearly.

3. Wellbeing limited is a company engaged in production of organic foods. Presently it sells its product through indirect channels of distribution. But, considering the sudden surge in the demand for Organic products, the company is now inclined to start its online portal for direct marketing. The financial managers of the company are planning to use debt in order to take advantage of trading on equity. In order to finance its expansion plans, it is planning to raise a debt capital of Rs 40 Lakhs through a loan @ 10% from an Industrial Bank. The present capital base of the company comprises of Rs 9lakh equity shares of Rs 10each. The rate of tax is 30%.

In context of the above case

a. What are the two conditions necessary for taking advantage of trading on equity

b. Assuming the expected rate of return on investment to be same as it was for the current year i.e. 15%, do you think the financial managers will be able to meet their goal. Show your workings clearly.

Q1) When is financial leverage considered favourable?

Q2) Why does financial risk arise?

Q3) What is the primary objectives of financial management?

Q4) Every manager has to take three major decisions while performing the finance function. Explain them.

Q5) A capital budgeting decisions is capable of changing the financial fortune of a business. Do you agree? Why or why not?

Q6) Are the share holders of a company likely to gain with a debt component in the capital employed ? Explain with the help of an example?

Q7) State whether the working capital requirements of business manufacturing the following items are big or small. Justify your statement.

(a) Coolers (c) Sugar (b) bread (d) Locomotives

(e) Furniture manufacturing against orders.

Q8) What do you mean by floatation cost?

Q9) "A decision to acquire a new and modern plant to upgrade an old one". Identify the aspect of financial decision.

Q10). Tata International Ltd. earned a net profit of Rs. 50 crores. Ankit the finance manager of Tata International Ltd. wants to decide how to appropriate these profits. Identify the decision that Ankit will have to take and also discuss any five factors which help him in taking this decision.

Q.11. Shalini, after acquiring a degree in Hotel Management and Business administration took over her family food processing company of manufacturing pickles, jams and squashes. The business was established by her great grandmother and was doing reasonably well. However the fixed operating costs of the business were high and the cash flow position was weak. She wanted to undertake modernization of the existing business to introduce the latest manufacturing processes and diversify into the market of chocolates and candies. She was very enthusiastic and approached a finance consultant, who told her that approximately Rs. 50 lakh would be required for undertaking the modernization and expansion programme. He also informed her that her stock market was going through a bullish phase.

1. Keeping the above considerations in mind, name the source of finance Shalini should not choose for financing the modernization and expansion of her food processing business. Give three reasons in support of your answer.

2. Explain any two other factors, apart from those stated in the above situation, which Shalini should keep in mind while taking this decision.

Q.12 Sarah Ltd. is a company manufacturing cotton yarn. It has been consistently earning good profits for many years. This year too, it has been able to generate enough profits. There is availability of enough cash in the company and good prospects for growth in future. It is a well managed organization and believes in quality, equal employment opportunities and good remuneration practices. It has many shareholders who prefer to receive a regular income from their investments. It has taken a loan of Rs. 40 lakhs from IDBI and is bound by certain restrictions on the payment of dividend according to the terms of loan agreement. The above discussion about the company leads to various factors which decide how much of the profits should be retained and how much has to be distributed by the company.

Quoting the lines from the above discussion identify and explain and four such factors.

Q.13 Shubh Ltd. is manufacturing steel at its plant in India. It is enjoying a buoyant demand for its products as economic growth is about 7%-8% and the demand for steel is growing. The company has decided to set up a new steel plant to cash on the increased demand. It is estimated that it will require about Rs. 2000 crore to set up and about Rs. 500 crore of working capital to start the new plant.

1. State the objective of financial management for this company.
2. Identify and state the decision taken by the finance manager in the above case.
3. State any two common factors affecting the fixed and working capital requirements of Shubh Ltd.

Q.14 A company's earnings before interest and tax is Rs. 7 lac. It pays 10% interest on its debt. Total investment of company is Rs. 50 lac.

1. Advise company whenever it should include debt or equity to raise its capital.
2. Name the concept related to this.
3. Will be company's decision to raise funds from debt or equity will change if company's EBIT becomes 3 lac.

Q. 15 Storage Solution Ltd. is a large warehousing network company operating through a chain of warehouses at 40 different locations across India. The company now intends to undertake computerization of its owned ware houses as it seeks to provide better value added and cost effective solutions for scientific storage and preservation services to the market participants dealing in agricultural products including farmers, traders, etc.

In context of the above case:

How is the decision to undertake computerization of owned warehouses likely to affect the fixed capital requirements of its business?

Computer Science

1.
Write a thorough project report on "Computer Networks Concepts" that includes appropriate examples and illustrations (suitable diagrams). (minimum 20 pages).

2.
Write all of the questions related to "Computer Networks Concepts" from the previous four years' CBSE Board question papers, from 2026 to 2023, along with the answers.

ECONOMICS

A. PROJECT Work

Topic can be chosen from any area related to economics preferably from Indian Economy. This project will be submitted for Class XII board exam practical examination.

The expectations of the project work are that:

learners will complete only ONE project in each academic session project should be of 3,500-4,000 words (excluding diagrams & graphs), preferably hand-written it will be an independent, self-directed piece of study

Scope of the project:

Learners may work upon the following lines as a suggested flow chart:

Choose a title/topic Collection of the research material/data

Organization of material/data Present material/data

Analysing the material/data for conclusion

Draw the relevant conclusion Presentation of the Project Work.

Sequence to be followed:

Abstract with key words 1 page

Introduction 12-15 pages

Hypothesis

Ho: Null hypothesis predicts no relationship or difference between variables

H1: Alternative hypothesis predicts a significant relationship or difference between variables.

Research Methodology: Which method you will use ex.Average, correlation etc.

Which data primary or secondary.

Case Study: Explanation

Data presentation: Tabular and Diagrammatic bar diagram, pie chart ,time series graph to be made original not to be pasted.

Data Analysis

Conclusion

Limitations of study

Bibliography

B. INTERNSHIP

All students must try to enrol themselves for an internship which will engage them productively during the summer holidays. The internship can be done in any corporate office/ shop/NGO which will allow the student to observe the management and financial aspects of the organisation

English Core

1. "The Vanishing Frontier" – Environmental Essay

- Text Reference: *Journey to the End of the Earth* by Tishani Doshi

Task: In light of Tishani Doshi's **travelogue**, discuss how Antarctica serves as a "warning bell" for the planet's future. Write an analytical essay (1500–2000 words) supporting your views with scientific data, literary references, and current climate trends. Suggested Structure:

- Introduction: Define the "Students on Ice" programme and the significance of studying the Earth's past to understand its future.
- Connection to the Text: Briefly summarize the author's journey. Explain the metaphor of the "microscopic phytoplanktons" and how small changes in the environment have massive repercussions.
- Historical & Scientific Context: Discuss the impact of the Industrial Revolution on carbon levels. Mention the "Global Warming" milestones of the last decade.
- Examples from Literature & Media: Reference works like Amitav Ghosh's *The Great Derangement* or documentaries like *Our Planet* to highlight the climate crisis.



- e) Personal Responsibility: Share a personal anecdote about a change in your local climate (e.g., erratic monsoons or rising heatwaves).
- f) Conclusion: Reaffirm the urgency of "thinking globally and acting locally".

2. "Escapism vs. Reality" – A Two-Minute Podcast

- Text Reference: *The Third Level* by Jack Finney

Task: Prepare a two-minute podcast on the theme of "Modern Life as a Stress-Inducing Machine," using Charley's discovery of the 1894 Grand Central Station as your base.

- Suggested Podcast Structure:



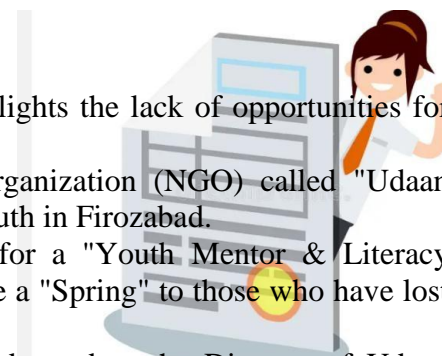
a) Introduction (30 Seconds): Define "Escapism". Briefly introduce Charley and his desire to flee from "war, worry, and insecurity".

b) Main Body (1 Minute): Discuss how the "Third Level" is a product of Charley's subconscious mind. Mention the role of hobbies (like stamp collecting) as a "temporary refuge from reality".

- c) Conclusion (30 Seconds): Give your opinion: Is dreaming of a "simpler past" a healthy coping mechanism or a dangerous delusion?

3. Job Application & Resume Writing (Real-Life Task)

- Background: In the chapter *Lost Spring*, Anees Jung highlights the lack of opportunities for children in Firozabad and Seemapuri.
- Task: Imagine you are a volunteer for a Non-Profit Organization (NGO) called "Udaan Foundation" that works to provide vocational training to youth in Firozabad.
- The Situation: The NGO has advertised a requirement for a "Youth Mentor & Literacy Coordinator." You are interested in this role to help provide a "Spring" to those who have lost it.



Draft a Formal Letter of application in about 120 – 150 words addressed to the Director of Udaan Foundation, New Delhi. Prepare a detailed Resume (Bio-Data) including your educational qualifications, relevant skills (like empathy, communication, and social work experience), and two references

4. The "Eco-Reviewer" Blog Post

- The Task: Pick one "Green" habit to try for just 3 days (e.g., using a bucket instead of a shower, or carrying a cloth bag everywhere).

- The Writing: Write a short Blog Post in about 120-150 words, titled "My 3Day Green Experiment" sharing details of whether it was easy or difficult?

Was it annoying or pleasant change? Would you do it again- Why/ Why not?

- Art Integration: Design a "Logo" or an "Icon" for your blog that represents sustainability.

Sanchita – 2026

Theme: Mind and Heart

Tagline: Building Intelligence with Empathy

Sub Themes: Mental Health Awareness, Stress and Resilience

Topics:

- The Weight of Expectations
- Stronger Than Yesterday
- Silent Battles
- The Light After Darkness
- Voices in My Mind
- Resilience
- A Heart That Heals

- Not Alone
- When the Mind Speaks
- The Courage to Begin Again
- Mental Health Awareness Among Teenagers
- Coping with Academic Stress
- The Pressure to Succeed
- Building Resilience in Challenging Times
- Why It Is Okay to Ask for Help

Represent the topics through:

1. **Drawing - painting, sketching, caricature, doodling and other suitable mediums**
2. **Written Word: Article, story, one - act play, quiz, slogans, comic strips, letters, connection with pen pals, to name a few.**

The Impact of Social Media on Mental Health

- Stress Management Techniques for Students
- Breaking the Stigma Around Mental Health
- Balancing Studies, Hobbies and Relationships
- The Importance of Self-Care
- Peer Pressure and Emotional Wellbeing

How Schools Can Support Student Mental Health

Informatics Practices

1. Write a thorough project report on "Computer Networks Concepts" that includes appropriate examples and illustrations (suitable diagrams). (minimum 20 pages).
2. Write all of the questions related to "Computer Networks Concepts" from the previous four years' CBSE Board question papers, from 2026 to 2023, along with the answers.

Mathematics

– at the end of this document

PAINTING

Prepare a portfolio with 15 artworks –

7 Still life paintings in poster color

6 Compositions with atleast 2 human figures in color

2 landscape drawings

Sheet size- half imperial cartridge sheets

Medium- Poster colour for Still life and composition

Physical Education

Students please prepare a practical file for physical education.

There will be 3 topics.

Topic no 1

Yoga

1. Write names of all lifestyle diseases.

2. Write 2 Asanas for each disease.

3. Please make proper labelled diagram for each Asana with procedure, benefits and contraindications.

4. Make sure you have paste pics related to each diagram.

Physics

1. Revise all the chapters done in the class and complete the assignment : 3-Current Electricity and 4-Magnetic effects of current
2. Movie to watch-
 - **Gifted Hands: The Ben Carson Story(2009)** is a biographical movie based on Dr. Ben Carson, a renowned neurosurgeon who overcomes a poverty-stricken, challenging childhood in Detroit to become the Director of Pediatric Neurosurgery at Johns Hopkins Hospital. The film highlights his career, focusing on his groundbreaking 1987 surgery to separate conjoined twins.
 - **Mission Mangal:** Loosely based on the life of scientists at the Indian Space Research Organisation who contributed to India's first interplanetary expedition Mars Orbiter Mission.
3. **INDIVIDUAL PROJECT WORK:** - Prepare working model or a project of Investigatory nature. Also prepare its project file explaining the Aim, Apparatus Used, Principle, Observation & Calculation, Conclusion, other Applications of the concept used and Bibliography.

Suggested Topics

● **Static Charge:** -

1. calculating charge-Styrofoam balls

● **Current electricity:** -

1. Efficiency of bulbs
2. Factors affecting resistance
3. Factors affecting the internal resistance of cell
4. Factors affecting the E.M.F of a cell
5. Thermoelectric effects of current
6. Function and usage of photo resistor

● **Magnetic effects of current & magnetism**

1. Curie Law-Verification
2. Magnetic field of earth-null point
3. Transformer- efficiency & losses
4. Eddy currents-minimization
5. EMI- dynamo etc.
6. Tangent galvanometer
7. Electromagnets

● **Optics**

1. Refractive index of liquid-hollow prism, liquid lens, hollow glass slab.
2. Microscope/Telescope-magnification
3. Laser light experiment
4. Diffraction-finding λ
5. Mirror & lenses-combination & special effects
6. Polarization of light

● **Semiconductor devices**

1. Transistor functioning
2. Any electronic circuit

3. Transistor as switch

4. Logic gates

Political Science

Project 1: The "Cold War" Podcast / Interview

Contemporary World Politics (The End of Bipolarity)

The Task: Imagine you are a journalist in 1991. You are interviewing someone who lived through the fall of the Berlin Wall or the USSR's collapse.

The Deliverable: A 5-minute Podcast Episode or a Scripted Interview.

The Angle: Focus on the "Shock Therapy" phase. How did life change overnight when moving from a command economy to capitalism?

Creative Twist: Include "ads" in your podcast for 1990s products to make it feel authentic.

Project 2: The "Coalition Era" Board Game

Politics in India since Independence (Recent Developments in Indian Politics)

The Task: Create a board game called "The Race to 272."

The Deliverable: A physical or digital game board.

Mechanics: Players represent different political parties. They must navigate "chance cards" like "No-Confidence Motion Passed" (move back 3 spaces) or "Support from Regional Party" (move forward 5 spaces).

Goal: To understand how coalition governments (like the NDA and UPA) are formed and why they can be unstable.

Project 3: The "Election Data" Detective

Parties and the Party Systems in India

The Task: Analyze the results of the 2024 General Elections (or the most recent State Assembly election).

The Deliverable: A Visual Infographic (using Canva or hand-drawn).

Compare the performance of National Parties vs. Regional Parties.

Highlight one "Giant Killer" (a small candidate who defeated a famous leader).

Identify the "Vote Share" vs. "Seat Share" discrepancy—did a party get a lot of votes but very few seats?

Project 4: The "Emergency" Newspaper

The Crisis of Democratic Order

The Task: Create the front page of a newspaper dated June 26, 1975 (the day after the Emergency was declared).

The Deliverable: A Vintage-style Newspaper Front Page.

The Catch: One half of the page should be "Censored" (blank white space) to show the reality of press censorship during that time.

Include a "Letter to the Editor" from a citizen expressing their fear or support for the move.

Project 5: The "Global Citizen" Resolution

International Organizations / Globalisation

The Task: You are India's representative at the United Nations Security Council (UNSC).

The Deliverable: A 2-minute Video Speech (Formal attire encouraged!).

Argue why India deserves a Permanent Seat in the UNSC.

Address the current global challenges (like climate change or regional conflicts) and how India's presence would help.

(Enjoy your research, you can also create a group of maximum 3 students for this purpose. Please note, that the portfolio needs to be done neatly on A4 size non colored papers in a paper folder and to be submitted individually!)

PSYCHOLOGY

Task I: As a CBSE mandate, you are required to build upon the case profile of your subject.

For your case profile, after checking that the subject fits the previously mentioned criteria, collect the following information -

1. Subject details -

A) Preliminary information-

Name, age, sex , address etc

B) Physical self -

Height, weight, hair, complexion etc. (you can elaborate upon other sub headings the way you wish)

2. Family history -

Immediate family -

Name, age, qualifications and profession of each member.

Paternal family-

Name of each member, along with age, qualifications and profession

Eg-

Grandfather

Mr. Trilok Nath

67 years

Graduate

Retired as chief administrative officer

This has to be done for each member

Maternal family - same as above

3. Birth history -

DOB, mother's pregnancy journey, any complications , birth weight of baby etc.

Take this information from mother.

4. Childhood history- (age 2 to 11 years)

Memorable experiences , saddening experiences , challenges , how did you overcome them etc

4. Adolescent history- 11 years till 17 years)

Elaborate upon all four headings above.

5. Adult history- in case your subject is above 18

Elaborate upon all 4 headings as above.

6. Relationships

Relation with father, mother, sibling, grandparents, friends etc .

Each heading has to be elaborated upon separately

7. Career aspirations

8. Methodology used -

A) observation

B) interview

C) Psychological testing

Two pages of writeup on the above three methods.

Each above stated topic has to be extensively elaborated upon.

The above should at least be 50 pages.

Paste pictures from the subject' life, however, blur his/her face.

Task II: Revise the following units:

A) Variations in Psychological attributes

B) Self and Personality

Task III: Homework assignment

Do complete the assignments from chapter 1 and 2 in Homework register.

All the above three tasks must be finished during the summer vacations and submitted on July 1, 2026.

SOCIOLOGY

Students to make a project on any social issue following the given guidelines

GUIDELINE FOR SOCIOLOGY PROJECT

PROJECT CARRIES A WEIGHTAGE OF 20 MARKS

IMPORTANT TIPS –

- Keep the class XI sociology book for reference in class XII. You will have to refer chapter 5 of Book 1 for research methods
- Ensure that your project has a heading and content under all the headings which are mentioned above. You might get few marks more or few marks less depending on your content inside but you still would be assured of reasonably good marks as you would be fulfilling the criteria laid down by CBSE.

SEQUENCE OF PROJECT PRESENTATION/FILE BINDING –

- ❖ Cover page - with project name, year
- ❖ First page should be kept blank as the certificate of completion issued by the teacher would be pasted here.
- ❖ Acknowledgement
- ❖ Hypothesis
- ❖ Introduction
- ❖ Causes
- ❖ Consequences
- ❖ Case study
- ❖ Methodology
- ❖ Implementation
- ❖ Presentation of evidence
- ❖ Survey (at least of 75 respondent)
- ❖ Analysis and Interpretation
- ❖ Evaluation
- ❖ Conclusion
- ❖ Limitation of the study,
- ❖ Bibliography

HOW TO START A PROJECT –

STEP – 1

- You can choose your own topic or pick up a board topic to build your project
- You have to get the topic approved by the teacher concern
- Choose the topic once you find sufficient matter available on the that topic. Sometimes topic seems interesting but you end up not getting matter on that. So once the topic is decided then your work starts **STEP – 2**
- Look out for surveys, research, essays written on your topic. You can look for all these in net
- Try to get thorough understanding of the topic by reading them. This would help you to formulate your hypothesis, technique of doing the project and in fact even conclusion to some extent ➤ The simplest technique would be to do survey method

STEP – 3 (HYPOTHESIS)

- Try to form Hypothesis in the form of a question
- Hypothesis is your assumption/reason for a certain problem

➤ For example – Is Nuclear family a reason for increase role of video games in child's life?
OR Are video games the reason for decreased social networking amongst the children? **STEP – 4 (INTRODUCTION)**

➤ Next is writing introduction. This should contain all those matters which relates to your hypothesis.

➤ It can be of 2 to 3 pages

➤ This may also include causes and consequences of the project

STEP – 5 (METHODOLOGY)

➤ In methodology you will have to write the way you plan to do your project ➤ In can be a case study method, survey method, secondary data etc.

➤ Easiest method is to conduct a survey

STEP – 6 (SURVEY)

➤ Survey should be done of at least 75 people.

STEP – 7 (RATIONALE & METHODOLOGY)

➤ In this you have to give reason for selecting/ choosing a particular method.

➤ Like in survey method you can write that it is easier to get the opinion of many people at a time, it is fastest method of collecting data.

➤ It is also most structured way of getting data.

STEPS – 8 (IMPLEMENTATION)

➤ Steps of Implementation – In this you have to write how you went about in the conduction of the project.

➤ It would start with collection of data related to the subject, reading of the data, analysing the problem, framing the hypothesis, framing the questionnaire, conduction of sample survey (at least of 75 people), restructuring of questionnaire after sample survey and making required correction, doing proper survey of your sample size – which can be approximately 75 people. ➤ This will be followed by analysis and interpretation.

STEP – 9 (PRESENTATION OF EVIDENCE)

➤ Here you need to attach your sample questionnaire

➤ Which will be followed by the filled 75 questionnaire which should be filled by the respondent in their own hand writing

STEP – 10 (ANALYSIS AND INTERPRETATION)

➤ Now you need to tabulate all the answers

➤ This may be accompanied by pie chart or bar graphs. Responses have to be written in words below the table.

STEP – 11 (EVALUATION)

➤ You need to analyse every question one by one. Make a tally, then graphical representation and then explain each one of them **STEP – 12 (CONCLUSION)**

➤ Here you would try to give what you think the respondents are trying to say and whether it agrees with the hypotheses which were framed by you or not. It would be your correlation of the responses with the impact of the problem.

STEP – 13 – (LIMITATION of the study)

➤ In this you will write the difficulties faced by you in conduction of the study.

➤ Eg – while doing survey many people misplaced or lost the survey forms, or didn't take it seriously etc.

STEP – 14 – (BIBLIOGRAPHY)

➤ Here you would write the names of all the books, web sites referred by you in conduction of the project

Music

<p>MUSIC</p> <p>11th Raag:- BIHAG BHIMPALASI BHAIRVI</p> <p>TAAL:- TEENTAAL EK TAAL CHAR TAAL</p> <p>Folk song(1) Bhajan(1)</p> <p>Class 12th Raag:- BHAIRAV BAGESHRI MALKAUNS</p> <p>TAAL:- JHAPTAAL RUPAK DHAMAR</p> <p>Folk song(1) Bhajan(1)</p>	<p>Make a practical file</p> <ol style="list-style-type: none">1. Cover Page: Include your name, class, roll number, school name, and subject title clearly on the front page.2. Index: Create an index listing all the contents and their page numbers.3. Content<ul style="list-style-type: none">○ Write a brief introduction of Raag (According to your syllabus)○ Write Thekas of prescribed Talas with Thah, Dugun,Chaugun: mention Taals○ Write Notations(Chota Khayal) of mention Raag○ Details about the Structure and history of Tanpura .(with diagram)○ Life sketch and contribution of Tansen, V.N. Bhatkhande and V.D.Paluskar○ Brief study of Musical Elements in Natya Shastra4. Analysis Section: Analyze different notation and talas you have studied5. Personal Reflections: Reflect on what you learned and how your skills improved.6. Presentation: Make sure your file is neatly organized, clean, and well-presented. <p>Assessment : Practical File (05 marks)</p> <ul style="list-style-type: none">● Neatness and Presentation (1 mark)● Completeness of Content (2 marks)● Accuracy of Musical Terms & Notation (2 marks)
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CLASS XI

ACCOUNTANCY

Play the game related to “Accounting Terms” with your name.

<https://commerceatease.com/basic-accounting-terminology/>

Prepare any one project out of the given list below: -

1. Comparison of different accounting standards (e.g., GAAP, IFRS)
2. Impact of AI on business operations:-Explore how artificial intelligence is being used in commerce, such as in customer service chatbots, predictive analytics for sales forecasting, and personalized recommendations for e-commerce platforms.
3. Giving Subsidies and Reservation are a form of Bribery.
4. Consumer exploitation in India: -

What are the different type of problems faced by consumers in India? Give at least 10 examples in detail.

5. Safety in Online Shopping: -

Explain various precautions to be taken in online transactions, clearly mentioning the ways the online frauds are committed to cheat the customers.

6. Financial Literacy:-

Visit RBI’s official website and compile a collection of information like, different coins and currency notes in circulation, special edition coins and currency notes, identification of fake currency notes, banks accounts and banking transactions etc.

7. Business Ideas:-

With a particular financial limit e.g. 10 lakh, 20 lakh etc. how would you start a small venture to earn money? Compile a list of at least 3 ideas with brief description of each such idea.

8. Cryptocurrency and Block chain Technology: Analyze the emergence of cryptocurrencies like Bitcoin and the underlying block chain technology, discussing their potential impacts on traditional finance and commerce.

Question 1. Cash, goods or assets invested by the proprietor in the business for earning profit is called-

- (a) Profit
- (b) Capital
- (c) Fixed assets
- (d) None of these

Question 2. Define Debtors and Creditors of the company

Question 3. Giving examples, explain each of the following accounting terms:

- Fixed assets
- Revenue
- Expenses
- Short-term liability
- Capital

Question 4. Define revenues and expenses..

Question 5. Differentiate between profit and gain.

Question 6. Fill in the blanks

- The document certifying the purchase or sale of goods or any monetary transaction is called.....
- The things or properties which help in the smooth functioning of the business and which are owned by the business are called _____ of the business.
- The unsold goods left at the end of the year are called.....

Represents the excess of assets over liabilities.

Practice the questions from T.S.Grewal for Chapter 5; Accounting Equation

BIOLOGY

1. Research in-depth on any two branches of your interest in biology. Report should include what the field entails, scope, the names of universities and colleges in which available and how to pursue further studies in the same.
2. Finalize one investigatory project idea. Prepare google link for the questionnaire. **Discuss the idea when school re-opens.** The submission of the final project black and white print will be due in half yearly exam.
3. The Bioethics Debate: CRISPR & Gene Editing
Research a case study on CRISPR-Cas9 technology (e.g., treating Sickle Cell Anemia).
Competency: Write a 500-word "Position Paper." Argue both the therapeutic benefits and the ethical concerns regarding "germline editing."
4. Revise and complete the chapters, back exercise and assignments of chapters completed.

Business Studies

General instructions:

- i. The assignment is divided into two parts.
- ii. Part A contains a set of questions to be attempted in the business studies class register.
- iii. Part B has to be done in a project file.

PART A

1. Classify the following into economic and non-economic activities:
 - a) Smita cooks food for her family.
 - b) A person selling cold drinks on the railway station.
 - c) A student praying in a temple for good marks in the test.
 - d) A doctor treating patients at his clinic.
 - e) An old lady attending a 'Satsung'.
 - f) A person teaching his daughter for her Board Exams.
2. Give examples of various types of industries. (three each).
3. Identify the services detailed below:
 - (a) The service which helps in removing hindrance of knowledge.
 - (b) The service which helps in removing hindrance of exchange.
 - (c) The service which helps in removing hindrance of place.
 - (d) The service which helps in removing hindrance of time.
 - (e) The service which helps in removing hindrance of risk.
5. 'Risk is an inherent element of a business'. Do you agree? Give reasons.
6. Which type of business risk involves both the possibility of gain as well as the possibility of loss?
7. Differentiate between Business and Profession.
8. "Profit is an essential objective of business due to certain reasons". Comment.
9. Differentiate between Economic and Non-Economic Activities.
10. "Is Profit maximization the sole objective of a business." Comment.

PART B

11. Select a Consumer durable public limited company of your choice and collect the following information regarding that company :
 - a) Brief history
 - b) Mission statement

- c) Names of its top level officials.
- d) Details of the products manufactured and marketed
- e) Brand name, brand mark and standardization mark adopted by the company.
- f) Market standing
- g) Types of sales promotional techniques used. (paste the advertisements given in the newspapers/ magazines)
- h) Labelling of its products. (paste the labels of its various products)
- i) Innovations made by the company and future plans
- j) Kinds of risks faced by the company
- k) Comment on the social responsibility pursued by that company.
- l) Type of organizational structure followed
- r) Customer support services provided by the company

Part C INTERNSHIP

All students must try to enroll themselves for an internship which will engage them productively during the summer holidays. The internship can be done in any corporate office/ shop/NGO which will allow the student to observe the management and financial aspects of the organization.

Chemistry

1. Revise each unit being taught in the class and do the given assignments in register.
2. In a separate thin register do NCERT back exercise of Unit I and II content covered before summer break.
3. In the same register do any 15 numericals each based on unit I and II. (total 30 numerical) from any reference book.
4. Prepare a working model based on any chemistry concept and submit a brief report along with it on an A4 sheet.
5. Read the Unit 3- Classification of Elements and Periodicity in properties and make notes.
6. Read all the SDG goals by UN and prepare a short PowerPoint presentation in the best illustrative and creative manner (maximum 10 slides)

Computer Science

Make detailed project report on the following topics with suitable diagrams and examples

1. Computer System Organization
2. Emerging Trends
3. Number System
4. Boolean Algebra including logic circuit diagram

ECONOMICS

PROJECT WORK

Students are required to undertake one project based on consumer behaviour and everyday buying habits in India. Choose any one topic from the list below:

1. What do people prefer more – online shopping or offline shopping?
2. How do advertisements affect what people buy?
3. What do teenagers spend most of their money on?
4. Do discounts and sales really attract customers?
5. What factors do people consider before buying a product? (price, brand, quality, etc.)
6. Do people prefer branded products or local products?
7. How do festivals affect people's spending?
8. What are the saving habits of students?
9. Do people check quality, labels, or expiry dates before buying?
10. What type of mobile phones do people prefer and why?
11. What influences people more – price or brand name?

12. What kind of clothes do people prefer for daily use?
13. Do people stick to one brand or try different brands?
14. How does pocket money affect spending habits of students?
15. What kind of food do people prefer – homemade or outside food?

PROJECT GUIDELINES

1. The project must be based on a **survey using a questionnaire** (minimum 10 questions).
2. The total length should be **20 pages (minimum)**.
3. The project should include **3,500–4,000 words** (*excluding graphs/diagrams*).
4. It should be **handwritten** and reflect **original work**.
5. Include **data analysis** using **bar graphs, pie charts, etc.**

FORMAT / SEQUENCE

1. **Title Page**
2. **Introduction**
3. **Executive Summary**
4. **Spreadsheet/Data Table** (collected responses)
5. **Questionnaire**
6. **Data Analysis** (graphs, charts, interpretation)
7. **Conclusion**

PROJECT EXPECTATIONS

1. The work should be **independent and self-directed**.
2. Students must:
 - Select a topic
 - Collect relevant data
 - Organize and present findings
 - Analyse the data
 - Draw meaningful conclusions

INTERNSHIP (Highly Recommended)

Students are encouraged to take up a **short-term internship** during the summer holidays.

This may be in:

- Corporate offices
- Local businesses/shops
- NGOs

The aim is to gain **practical exposure** to:

- Management practices
- Financial operations
- Real-world economic activities

REVISION FOR UT1-

Students should revise all the chapters covered in class for Unit Test 1 (UT–1). Focus on understanding key concepts, important terms, and practice questions to prepare well for the test.

English

Integrated Project Work

Part A: Mandatory Tasks (To be completed by all students)

1. Creative Expression Task (Choose any ONE format)

Create an original piece on a relevant social issue (such as environmental conservation, mental health, gender equality, digital addiction, etc.) in any one of the following formats:

- * Podcast
- * Vlog
- * Documentary Script
- * Stand-up Comedy Act
- * Short Commercial / Advertisement

Guidelines:

- * Duration: 3–5 minutes (if recorded) or 400–500 words (if written)
- * Ensure clarity of message, creativity and audience engagement
- * Include a strong opening, impactful content and a meaningful conclusion

2. Film Study & Analysis (Choose any ONE film)

- * A Beautiful Mind (2001)
- * The Blind Side (2009)
- * The Social Network (2010)
- * Life of Pi (2012)
- * The Theory of Everything (2014)
- * A Plastic Ocean (2016)

Prepare a well-organized report including:

i) Introduction

- * Brief overview (year, genre, director, theme)

ii) Plot Construction

- * Summary with key events and turning points

iii) Characters

- * Analysis of major characters and their development

iv) Objective / Message

- * Core theme or moral

v) Critical Appreciation / Review

- * Personal response, strengths, weaknesses, overall evaluation

3. Poster Designing

Design an attractive and a meaningful poster on the theme:
“Diversity and Secularism”

Guidelines:

- * Use creative visuals, colors and symbols
- * Add a powerful slogan promoting peace, unity and harmony

* Ensure neatness, originality and clarity of message

Part B: Choice-Based Task (Choose ANY ONE)

Option 1: Debate Writing (120–150 words)

Motion: “Media – A Pillar of Democracy” (For or Against)

Guidelines:

- * Begin with a formal address
- * Present clear arguments with supporting points
- * Maintain a persuasive tone
- * Conclude effectively

Option 2: Speech Writing (120–150 words)

Topic: “The Importance of Grandparents in a Family”
(Reference: The Portrait of a Lady)

Guidelines:

- * Use a formal and an engaging tone
- * Include emotional and value-based reflections
- * Highlight the role of grandparents in shaping values and traditions
- * End with a thoughtful conclusion

Integration with Sanchita Magazine Theme

Students may also choose to align their Debate or Speech with any of the following topics from the Sanchita Magazine theme:

Theme: “Mind and Heart: Building Intelligence with Empathy”

Suggested Topics:

- * Navigating Identity in a Changing World
- * The Art of Letting Go
- * Beyond Marks: Redefining Success
- * The Power of Positive Thinking
- * Inner Strength in Times of Uncertainty
- * Understanding Emotional Intelligence
- * Healing Through Expression
- * Finding Support in Friendships
- * Listening to Your Inner Voice
- * Embracing New Beginnings
- * Youth Mental Health in the Digital Age
- * Managing Expectations in Senior School
- * The Race for Perfection
- * Developing Grit and Perseverance
- * Speaking Up: The Strength in Seeking Help
- * Social Media: Connection or Comparison?
- * Mindfulness and Its Role in Student Life

- * Creating Safe Spaces for Conversations
- * Striking a Balance in a Competitive World
- * Nurturing Yourself in Busy Times
- * Peer Influence: Making Wise Choices
- * The Role of Educators in Student Wellbeing

Submission Guidelines

- * Compile all tasks neatly in a project file
- * Use proper headings and subheadings
- * Maintain neat handwriting or a well-typed format
- * Include a cover page and index

Informatics Practices

Make detailed project report on the following topics with suitable diagrams and examples

1. Computer System Organization
2. Emerging Trends
2. Number System

Legal Studies

Project 1: The "Legal Time Traveler" (Scrapbook)

Unit 1: Theory and Concepts of Law

Instead of a dry essay on the history of law, students will track how "Justice" has changed.

The Task: Find three historical methods of settling disputes: One from the Ancient period (Dharmashastras), one from the Medieval period (Muftis/Qazis), and one from the British period (Mayor's Courts).

The Deliverable: A "Then vs. Now" Comparison Chart.

- o Creative Element: Draw or paste an image of a "Seal" or "Gavel" that would have been used in each era.
- o The Hook: Explain one law from the past that would be considered "illegal" or "unconstitutional" today.

Project 2: The "Classification" Scavenger Hunt

Unit 2: Forms and Classification of Law

The Task: Students must find real-world examples of different branches of law in their daily lives.

The Deliverable: A 5-slide Digital Presentation or a Physical Poster titled "Law in my Neighborhood."

1. Public Law: A photo of a government notice or a traffic sign.
2. Private Law: A photo of a rent agreement or a grocery bill (Contract).
3. Criminal Law: A newspaper cutting of a "Cognizable Offense."
4. Civil Law: A news snippet regarding a property or family dispute.

Project 3: "Be the Judge" (Case Study)

Unit 3: Sources of Law (Precedents & Customs)

The Task: You are a judge in a Small Claims Court. A neighbor's tree has fallen into another neighbor's garden, but there is no specific written law about who cleans it up.

The Deliverable: Write a "Judicial Opinion" (1 page).

- o Custom: Use a "Local Custom" to solve it (e.g., "In this colony, we always help each other").
- o Precedent: Create a "New Rule" that all future neighbors must follow.

Project 4: The "Courtroom Architect" (Model/Diagram)

Unit 4: Institutions of the Legal System

The Task: Research the physical layout of a District Court vs. the Supreme Court of India.

The Deliverable: Create a labeled 3D Model (using recycled materials) or a detailed Floor Plan.

- Must Include: The Judge's Bench, the Witness Box (Katghara), the Bar (where lawyers sit), and the Public Gallery.
- The Twist: Write a brief note on why the Judge sits at a higher level than everyone else (The concept of Judicial Majesty).

Project 5: The "Local Governance" Vlog

Unit 4: Panchayati Raj and Municipalities

The Task: Identify your local Municipal Ward or Panchayat.

The Deliverable: A 2-minute "Field Report" video.

- Who is the current Ward Councilor or Sarpanch?
- Identify one "Public Utility" they manage (e.g., the local park, street lights, or waste collection).
- Suggest one "By-law" (a local rule) that would improve your area.

(Enjoy your research, you can also create a group of maximum 3 students for this purpose. Please note, that the portfolio needs to be done neatly on A4 size non colored papers in a paper folder and to be submitted individually!)

Maths

- at the end of this document

Physical Education

Students please prepare a practical file for physical education.

There will be 3 topics.

Topic no 1

Yoga

1. Write names of all lifestyle diseases.
2. Write 2 Asanas for each disease.
3. Please make proper labelled diagram for each Asana with procedure, benefits and contraindications.
4. Make sure you have paste pics related to each diagram.

Physics

1. Look around you at the areas where concepts of Physics are used in day-to-day life, based on your understanding of Physics write down one area where you applied Physics and made things easier for yourself and your family.
2. This holiday, let learning go beyond textbooks—explore ideas, emotions, science, and society through carefully chosen films that inspire curiosity, critical thinking, and reflection.
 - **The Boy Who Harnessed the Wind (2019)** science-based movie for a 16-year-old student, based on a true story, it highlights how a teenage boy uses physics, engineering, and resourcefulness to build a windmill, solving a severe drought for his village
 - **Gifted Hands: The Ben Carson Story(2009)** is a biographical movie based on Dr. Ben Carson, a renowned neurosurgeon who overcomes a poverty-stricken, challenging childhood in Detroit to become the Director of Pediatric Neurosurgery at Johns Hopkins Hospital. The film highlights his career, focusing on his groundbreaking 1987 surgery to separate conjoined twins.
3. **INDIVIDUAL PROJECT WORK: -**
To promote experiential learning and art integration students shall prepare working models (for display in exhibition) & its PPT explaining the principle and other Applications of the concept used for Display Board. The students shall be evaluated based on the individual contribution, originality and aesthetics.

Roll No	Topics for project work
(1-6)	Kinematics +Dynamics
(7-12)	Rotation & center of mass
(13-18)	Fluid statics
(19-24)	Fluid Dynamics
(25-30)	Surface Tension
(31-36)	Heat and Thermodynamics
(37-45)	Waves and Oscillatio

Political Science

Project 1: The "Constituent Assembly" Time Machine

Textbook: Constitution: Why and How?

Instead of just reading about the debates, students will step into the shoes of the founders.

The Task: Choose one major debate from the Constituent Assembly (e.g., National Language, Separate Electorates, or Fundamental Rights vs. Directive Principles).

The Deliverable: Create a "Twitter (X) Thread from 1948." * Write a series of 10-15 "tweets" where historical figures like Dr. B.R. Ambedkar, Jawaharlal Nehru, and Sardar Patel argue their points.

Use modern hashtags like #DraftingIndia, #RightsMatter, or #FederalismVibes.

Goal: Understand that the Constitution wasn't just "written"; it was fiercely negotiated.

Project 2: The "Political Lens" Movie Review

Textbook: Political Theory: An Introduction

Political theory is everywhere, even in Bollywood and Hollywood.

The Task: Watch one of the following movies and write a "Political Critique."

Article 15 (Hindi): Focus on the concept of Equality.

Newton (Hindi): Focus on the Electoral Process and its challenges.

The Trial of the Chicago 7 (English): Focus on Freedom of Speech and Dissent.

The Deliverable: A 2-page review. Don't summarize the plot! Instead, identify three scenes where a "Political Theory" concept (Equality, Justice, or Liberty) was either upheld or violated.

Project 3: The "Local Hero" Interview

Chapter: Local Governments

The Task: Visit your local Ward Councilor (Parshad), Sarpanch, or a member of the Resident Welfare Association (RWA).

The Deliverable: Conduct a 5-minute recorded interview or a written transcript. Ask them:

1. What is the biggest challenge in our locality?
2. How do you get funds from the state government?
3. If you could change one law about local governance, what would it be?

The Goal: To realize that "Politics" isn't just what happens in New Delhi; it's what happens on their street.

Project 4: The "Mock Election" Campaign

Chapter: Election and Representation

The Task: Students must create a Political Party for the year 2050.

The Deliverable: A creative "Campaign Kit" including:

A Manifesto: 5 core promises (e.g., Right to Internet, Climate Action Laws).

The Symbol: Draw and explain why they chose it.

The Strategy: Will they use First-Past-The-Post (FPTP) or Proportional Representation (PR)? Explain why their system is fairer.

Project 5: The "News Junkie" Scrapbook

Chapters: The Executive, Legislature, and Judiciary

The Task: Follow the news for 15 days.

The Deliverable: Create a digital or physical scrapbook titled "Checks and Balances in Action."
Find one news clipping where the Judiciary corrected the Executive (e.g., a Court stay order).
Find one news clipping where the Legislature debated a bill.
Write a 2-line "Simplified Version" of each news story so a 10-year-old could understand it.

(Enjoy your research, you can also create a group of maximum 3 students for this purpose. Please note, that the portfolio needs to be done neatly on A4 size non colored papers in a paper folder and to be submitted individually!)

PSYCHOLOGY

TASK I: MOVIE ANALYSIS

Watch any film or read a book depicting a psychological disorder /learning disability and answer the following questions on A4 sized sheets.

Recommended movies-

“Shutter Island”

“Good Will Hunting”

“The Blind side”

“Taare Zameen Par”

“One who flew over the cuckoo’s nest”.

“Barfi”

“A Beautiful Mind”

“As Good as it Gets”

Books:

“The Invisible Plague” - The Rise and Fall of Mental Illness from 1750 to the Present”
by Torrey E.F .and Miller,

“The curious Incident of the Dog in the Night-Time” by Mark
Haddon “A Child called” “IT”-by Dave Pelzer)

Answer the following questions:

- 1) Briefly explain the disorder/disability depicted in the film/book.
- 2) What are the symptoms of the disorder? How effectively was the character able to emote these characteristics in the film/book?
- 3) If you get to change one thing about the character and their life’s situations. What would that be ? and how would that change the ending/climax of the movie/novel?

Task II: PROJECT

Make a 40 page (minimum) project on any Psychology based Topic. (The topics have been approved in class).

Task III: WORKSHEET

Do the worksheet for Chapter 1 and 2 as given in class in Home work register.

Task IV: REVISION

Revise chapter 1: What is Psychology??

Revise chapter 2: Methods in Psychological enquiry

All the above tasks should be complete and to be submitted by July 1.

SOCIOLOGY

Students to make a project on any social issue following the given guidelines

GUIDELINE FOR SOCIOLOGY PROJECT

PROJECT CARRIES A WEIGHTAGE OF 20 MARKS

IMPORTANT TIPS –

- Keep the class XI sociology book for reference in class XII. You will have to refer chapter 5 of Book 1 for research methods
- Ensure that your project has a heading and content under all the headings which are mentioned above. You might get few marks more or few marks less depending on your content inside but you still would be assured of reasonably good marks as you would be fulfilling the criteria laid down by CBSE.

SEQUENCE OF PROJECT PRESENTATION/FILE BINDING –

- ❖ Cover page - with project name, year
- ❖ First page should be kept blank as the certificate of completion issued by the teacher would be pasted here.
- ❖ Acknowledgement
- ❖ Hypothesis
- ❖ Introduction
- ❖ Causes
- ❖ Consequences
- ❖ Case study
- ❖ Methodology
- ❖ Implementation
- ❖ Presentation of evidence
- ❖ Survey (at least of 75 respondent)
- ❖ Analysis and Interpretation
- ❖ Evaluation
- ❖ Conclusion
- ❖ Limitation of the study,
- ❖ Bibliography

HOW TO START A PROJECT –

STEP – 1

- You can choose your own topic or pick up a board topic to build your project
- You have to get the topic approved by the teacher concern
- Choose the topic once you find sufficient matter available on the that topic. Sometimes topic seems interesting but you end up not getting matter on that. So once the topic is decided then your work starts **STEP – 2**
- Look out for surveys, research, essays written on your topic. You can look for all these in net
- Try to get thorough understanding of the topic by reading them. This would help you to formulate your hypothesis, technique of doing the project and in fact even conclusion to some extent ➤ The simplest technique would be to do survey method

STEP – 3 (HYPOTHESIS)

- Try to form Hypothesis in the form of a question
- Hypothesis is your assumption/reason for a certain problem

➤ For example – Is Nuclear family a reason for increase role of video games in child's life?
OR Are video games the reason for decreased social networking amongst the children? **STEP – 4 (INTRODUCTION)**

➤ Next is writing introduction. This should contain all those matters which relates to your hypothesis.

➤ It can be of 2 to 3 pages

➤ This may also include causes and consequences of the project

STEP – 5 (METHODOLOGY)

➤ In methodology you will have to write the way you plan to do your project ➤ In can be a case study method, survey method, secondary data etc.

➤ Easiest method is to conduct a survey

STEP – 6 (SURVEY)

➤ Survey should be done of at least 75 people.

STEP – 7 (RATIONALE & METHODOLOGY)

➤ In this you have to give reason for selecting/ choosing a particular method.

➤ Like in survey method you can write that it is easier to get the opinion of many people at a time, it is fastest method of collecting data.

➤ It is also most structured way of getting data.

STEPS – 8 (IMPLEMENTATION)

➤ Steps of Implementation – In this you have to write how you went about in the conduction of the project.

➤ It would start with collection of data related to the subject, reading of the data, analysing the problem, framing the hypothesis, framing the questionnaire, conduction of sample survey (at least of 75 people), restructuring of questionnaire after sample survey and making required correction, doing proper survey of your sample size – which can be approximately 75 people. ➤ This will be followed by analysis and interpretation.

STEP – 9 (PRESENTATION OF EVIDENCE)

➤ Here you need to attach your sample questionnaire

➤ Which will be followed by the filled 75 questionnaire which should be filled by the respondent in their own hand writing

STEP – 10 (ANALYSIS AND INTERPRETATION)

➤ Now you need to tabulate all the answers

➤ This may be accompanied by pie chart or bar graphs. Responses have to be written in words below the table.

STEP – 11 (EVALUATION)

➤ You need to analyse every question one by one. Make a tally, then graphical representation and then explain each one of them **STEP – 12 (CONCLUSION)**

➤ Here you would try to give what you think the respondents are trying to say and whether it agrees with the hypotheses which were framed by you or not. It would be your correlation of the responses with the impact of the problem.

STEP – 13 – (LIMITATION of the study)

➤ In this you will write the difficulties faced by you in conduction of the study.

➤ Eg – while doing survey many people misplaced or lost the survey forms, or didn't take it seriously etc.

STEP – 14 – (BIBLIOGRAPHY)

➤ Here you would write the names of all the books, web sites referred by you in conduction of the project

HOLIDAY HOMEWORK CLASS 12

MATHS

DO THESE IN ASSIGNMENT NOTEBOOK

VERY SHORT ANSWER TYPE QUESTIONS(VSA-2 MARKS)

1. If a matrix has 6 elements, what are the possible orders it can have?

ANS; 1. 1×6 , 6×1 , 2×3 , 3×2

2. Construct a 3×2 matrix whose elements are given by $a_{ij} = |i - 3j|$ $\begin{bmatrix} 1 & 5 \\ \frac{1}{2} & 2 \\ 0 & \frac{3}{2} \end{bmatrix}$

3. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 1 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 3 & 1 \\ 1 & 0 & 2 \end{bmatrix}$, then find $A - 2B$. $\begin{bmatrix} -3 & -4 & 1 \\ 1 & 1 & -1 \end{bmatrix}$

4. If $A = \begin{bmatrix} 2 & 1 & 4 \\ 4 & 1 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & -1 \\ 2 & 2 \\ 1 & 3 \end{bmatrix}$, write the order of AB and BA . 4. 2×2 , 3×3

5. Find the matrices X and Y if $X + Y = \begin{bmatrix} 5 & 2 \\ 0 & 9 \end{bmatrix}$ and $X - Y = \begin{bmatrix} 3 & 6 \\ 0 & -1 \end{bmatrix}$

6. Solve: $\begin{bmatrix} x & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ -2 & -3 \end{bmatrix} \begin{bmatrix} x \\ 3 \end{bmatrix} = 0$.

7. Find the co-factor of a_{12} in $A = \begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$ Ans :7. 46

8. Find the adjoint of the matrix $A = \begin{bmatrix} 2 & -1 \\ 4 & 3 \end{bmatrix}$ Ans; 8
 $\begin{bmatrix} 3 & 1 \\ -4 & 2 \end{bmatrix}$

9. If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$, write A^{-1} in terms of A Ans: 9 $A^{-1} = -A$

10. If A is square matrix satisfying $A^2 = I$, then what is the inverse of A ?
 Ans 10. $A^{-1} = A$

11. For what value of k , the matrix $A = \begin{bmatrix} 2-k & 3 \\ -5 & 1 \end{bmatrix}$ is not invertible ? Ans:
 11 $k = 17$

12. Evaluate $\begin{vmatrix} \cos 15^\circ & \sin 15^\circ \\ \sin 75^\circ & \cos 75^\circ \end{vmatrix}$ Ans 12.0

13. What is the value of $|3I|$, where I is identity matrix of order 3? Ans
 13.27

14. If A is non singular matrix of order 3 and $|A| = 3$, then find $|2A|$
 Ans 14.24

15. For what value of a , $\begin{bmatrix} 2a & -1 \\ -8 & 3 \end{bmatrix}$ is a singular matrix? Ans
 15.-4/3

16. If A is a 3×3 invertible matrix, then what will be the value of k if $\det(A^{-1}) = (\det A)^k$

17 If $|A| = 3$ and $A^{-1} = \begin{bmatrix} 3 & -1 \\ -5 & 2 \\ 3 & 3 \end{bmatrix}$ then write the adj A

Ans $\begin{bmatrix} 9 & -3 \\ -5 & 2 \end{bmatrix}$

18. Construct a matrix of order 2×3 whose elements are

(a) $a_{ij} = \frac{(i-2j)^2}{2}$

(ii) $a_{ij} = \frac{|-2i+j|}{3}$

Ans (a) $\begin{bmatrix} \frac{1}{2} & \frac{9}{2} & \frac{25}{2} \\ 0 & 2 & 8 \end{bmatrix}$

(b) $\begin{bmatrix} \frac{1}{3} & 0 & \frac{1}{3} \\ 1 & \frac{2}{3} & \frac{1}{3} \end{bmatrix}$

19 Show that the elements on the main diagonal of a skew symmetric matrix are all zero

20. If the matrix $A = \begin{bmatrix} 0 & a & 3 \\ 2 & b & -1 \\ c & 1 & 0 \end{bmatrix}$ is a skew symmetric matrix, find the value of

a, b, c

Ans : $a=-2, b=0, c=-3$

21. A matrix which is both symmetric as well as skew symmetric is a null matrix.

22. If $\begin{bmatrix} 4 & x+2 \\ 2x-3 & x+1 \end{bmatrix}$ is a symmetric matrix, then find the value of x .

Ans: $x=5$

23. Find the equation of line joining $A(1,3)$ and $B(0,0)$ using determinants and find k if

$D(k,0)$ is a point such that area of ΔABD is 3 sq unit

Ans: $3x-y=0,$

$k = \pm 2$

24. Solve the equations using matrix method $x + 2y + z = 7$; $x + 3z = 11$; $2x - 3y = 1$

Ans: $x=2, y=1, z=3$

25. $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & 1 & -3 \\ 1 & 1 & 1 \end{bmatrix}$ Find A^{-1} Hence , solve system of linear equations

$x + 2y + z = 4$ $-x + y + z = 0$ $x - 3y + z = 2$

$$\text{Ans } A^{-1} = \frac{1}{10} \begin{bmatrix} 4 & 2 & 2 \\ -5 & 0 & 5 \\ 1 & -2 & 3 \end{bmatrix}, x = \frac{9}{5},$$

$$y = \frac{2}{5}, z = \frac{7}{5}$$

26. Let $A = \begin{bmatrix} 2 & 3 \\ -1 & 2 \end{bmatrix}$ and $f(x) = x^2 - 4x + 7$. $F(A) = O$. Use this result to find A^5 .

$$\text{Ans: } \begin{bmatrix} -118 & -93 \\ 31 & -118 \end{bmatrix}$$

27. Find matrix A such that $\begin{bmatrix} 4 \\ 1 \\ 3 \end{bmatrix} A = \begin{bmatrix} -4 & 8 & 4 \\ -1 & 2 & 1 \\ -3 & 6 & 3 \end{bmatrix}$

$$\text{Ans: } \begin{bmatrix} -1 & 2 & 1 \end{bmatrix}$$

28. Find matrix A such that $\begin{bmatrix} 2 & -1 \\ 1 & 0 \\ -3 & 4 \end{bmatrix} A = \begin{bmatrix} -1 & -8 & -10 \\ 1 & -2 & -5 \\ 9 & 22 & 15 \end{bmatrix}$

$$\text{Ans: } \begin{bmatrix} 1 & -2 & -5 \\ 3 & 4 & 0 \end{bmatrix}$$

29. Given $A = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$

find the product of matrices BA and hence solve the system of equations

$$x - y = 3, \quad 2x + 3y + 4z = 17, \quad y + 2z = 7 \quad \text{Ans: } x=2, y=-1, z=4$$

30. Given $A = \begin{bmatrix} 1 & 2 & 0 \\ -2 & -1 & -2 \\ 0 & -1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 & 0 \\ -2 & -1 & -2 \\ 0 & -1 & 1 \end{bmatrix}$

Find the product of matrices AB and hence solve the system of equations

$$x - y = 3, \quad 2x + 3y + 4z = 17, \quad y + 2z = 7$$

$$\text{Ans } x=0, y=-5, z=-3$$

31. Use the product $\begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix} \begin{bmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{bmatrix}$ solve the system of equations

$x + 3z = -9$, $-x + 2y - 2z = 4$, $2x - 3y + 4z = -3$ Ans: $x=0, y=5, z=3$

32. $A = \begin{bmatrix} 1 & 2 & 0 \\ -2 & -1 & -2 \\ 0 & -1 & 1 \end{bmatrix}$ Find A^{-1} Hence, solve system of linear equations

$x - 2y = 10$

$2x - y - z = 8$

$-2y + z = 7$ Ans: $x=4, y=-3, z=1$

33. If $A = \begin{bmatrix} 4 & -5 & -11 \\ 1 & -3 & 1 \\ 2 & 3 & -7 \end{bmatrix}$ find A^{-1} . Hence, solve the system of equations

$4x - 5y - 11z = 12$; $x - 3y + z = 1$; $2x + 3y - 7z = 2$ Ans: $x=-1, y=-1, z=-1$

34. If $A = \begin{bmatrix} 1 & -2 & 3 \\ 0 & -1 & 4 \\ -2 & 2 & 1 \end{bmatrix}$ find $(A')^{-1}$ Ans: $\begin{bmatrix} -9 & -8 & -2 \\ 8 & 7 & 2 \\ -5 & -4 & -1 \end{bmatrix}$

35. (a) If $A = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & -1 & 1 \\ -15 & 6 & -5 \\ 5 & -2 & 2 \end{bmatrix}$ find $(AB)^{-1}$.

Ans: $\begin{bmatrix} 10 & 7 & 21 \\ -49 & -34 & -103 \\ 17 & 12 & 36 \end{bmatrix}$

36. Solve the following system of equations by matrix method:

$x + 2y + 3z = 6$, $2x - y + z = 2$, $3x + 2y - 2z = 3$. Ans: $x = 1, y = 1, z = 1$.

This section comprises long answer (LA) type questions of 5 marks each.

37. If $A = \begin{bmatrix} -3 & -2 & -4 \\ 2 & 1 & 2 \\ 2 & 1 & 3 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 2 & 0 \\ -2 & -1 & -2 \\ 0 & -1 & 1 \end{bmatrix}$ then find AB and use it to solve

the following system of equations.

$x - 2y = 3$

$2x - y - z = 2$

$-2y + z = 3$. Ans: $x = 1, y = -1, z = 1$

38.. If $f(\alpha) = \begin{bmatrix} \cos\alpha & -\sin\alpha & 0 \\ \sin\alpha & \cos\alpha & 0 \\ 0 & 0 & 1 \end{bmatrix}$, then prove that $f(\alpha) \cdot f(-\beta) = f(\alpha - \beta)$.

39. Using determinants, find the area of ΔPQR with vertices $P(3, 1)$, $Q(9, 3)$ and $R(5, 7)$. Also, find the equation of line PQ using determinants. Ans; $x - 3y = 0$

40. Show that the determinant, $\Delta = \begin{vmatrix} x & \sin \theta & \cos \theta \\ -\sin \theta & -x & 1 \\ \cos \theta & 1 & x \end{vmatrix}$ is independent of θ .

INTEGRAL

1. $\int \frac{dx}{\sqrt{4-x^2}}$ dx

(a) $\frac{1}{2} \sin^{-1}(\frac{x}{2}) + c$

(b) $\sin(\frac{x}{2}) + c$

(c) $\cos^{-1}(\frac{x}{2}) + c$

(d) $\frac{1}{2} \cos^{-1}(\frac{x}{2}) + C$

Ans(a)

2. $\int e^x (\cos x - \sin x) dx$ is equal to

(a) $e^x \cos x + C$

(b) $e^x \sin x + C$

(c) $-e^x \cos x + C$

(d) $-e^x \sin x + C$

Ans (a)

3. Given $\int 2^x dx = f(x) + C$, then $f(x)$ is

(a) 2^x

(b) $2^x \log_e 2$

(c), as $\frac{d}{dx} \left(\frac{2^x}{\log_e 2} \right)$

(c) $\frac{2^x}{\log_e 2}$

(d) $\frac{2^{x+1}}{x+1}$

Ans(c)

$= \frac{1}{\log_e 2} \cdot 2^x \cdot \log_e 2 = 2^x$.

4.

$\int \frac{1}{\sin^2 x \cos^2 x} dx$ is equal to

(a) $\sin^2 x - \cos^2 x + C$

(b) -1

(c) $\tan x + \cot x + C$

(d) $\tan x - \cot x + C$

$= \int \frac{\sin^2 x + \cos^2 x}{\sin^2 x \cos^2 x} dx$

$= \int (\sec^2 x + \operatorname{cosec}^2 x) dx$

Ans(d) $= \tan x - \cot x + C$

5.

$$\int \frac{\cos 2x - \cos 2\theta}{\cos x - \cos \theta} dx \text{ is equal to}$$

(a) $2(\sin x + x \cos \theta) + C$

(b) $2(\sin x - x \cos \theta) + C$

(c) $2(\sin x + 2x \cos \theta) + C$

(d) $2(\sin x - 2x \cos \theta) + C$

Ans (a)

6. $\int \cot^2 x dx$ equals to

(a) $\cot x - x + C$

(b) $\cot x + x + C$

(c) $-\cot x + x + C$

(d) $-\cot x - x + C$

Ans (d)

7.

$$\int \frac{\sin x + \cos x}{\sqrt{1 + \sin 2x}} dx, \frac{3\pi}{4} < x < \frac{7\pi}{4} \text{ is equal to}$$

(a) $\log |\sin x + \cos x|$

(b) x

(c) $\log |x|$

(d) $-x$

Ans (d)

8. If $\int \sec^2(7 - 4x) dx = a \tan(7 - 4x) + C$, then value of a is

(a) 7

(b) -4

(c) 3

(d) -14

(d), $-1/4 \tan(7 - 4x) + C$.

9. The value of X for which

$$\int \frac{4x^3 + \lambda 4^x}{4^x + x^4} dx = \log|4^x + x^4| \text{ is}$$

(a) 1

(b) $\log_e 4$

(c) $\log_e 4 e$

(d) 4

Ans (b)

10.

$$\text{If } \int \frac{1}{\sqrt{4 - 9x^2}} dx = \frac{1}{3} \sin^{-1}(ax) + C, \text{ then}$$

value of a is

(a) 2

(b) 4

(c) $\frac{3}{2}$

(d) $\frac{2}{3}$

Ans (c)

11.

If $x = \int_0^y \frac{dt}{\sqrt{1+9t^2}}$ and $\frac{d^2y}{dx^2} = ay$,

then value of a is equal to

- (a) 3 (b) 6 (c) 9 (d) 1 Ans (c)

12.

$\int e^x \left(\frac{1-x}{1+x^2} \right)^2 dx$ is equal to

- (a) $\frac{e^x}{1+x^2} + C$ (b) $-\frac{e^x}{1+x^2} + C$
(c) $\frac{e^x}{(1+x^2)^2} + C$ (d) $\frac{e^x}{(1+x^2)^2} + C$ Ans (a)

13

$\int_0^{\frac{\pi}{2}} \frac{dx}{1+\sin x}$ equals to

- (a) 0 (b) $\frac{1}{2}$
(c) 1 (d) $\frac{3}{2}$ Ans (c)

14.

Let $I_1 = \int_1^2 \frac{dx}{\sqrt{1+x^2}}$ and $I_2 = \int_1^2 \frac{dx}{x}$, then

- (a) $I_1 > I_2$ (b) $I_2 > I_1$ (c) $I_1 = I_2$ (d) $I_1 > 2I_2$ Ans (b)

15. If a is such that $\int_0^a x dx \leq a + 4$, then

- (a) $0 \leq a \leq 4$ (b) $-2 \leq a \leq 0$ (c) $a \leq -2$ or $a \leq 4$ (d) $-2 \leq a \leq 4$

Ans (d)

16.

$\int \frac{3x^2 + 3^x \cdot \log 3}{3^x + x^3} dx$ is equal to

- (a) $3^x + x^3 + C$ (b) $\log |3^x + x^3| + C$
 (c) $3x^2 + 3^x \log_e 3 + C$ (d) $\log |3x^2 + 3^x \log_e 3| + C$

17. $\int_0^{\frac{\pi}{6}} \sec^2 \left(x - \frac{\pi}{6}\right) dx$ is equal to

- (a) $\frac{1}{\sqrt{3}}$ (b) $\frac{-1}{\sqrt{3}}$ (c) $\sqrt{3}$ (d) $-\sqrt{3}$ Sol. (a)

18. $\int \frac{1+\tan x}{1-\tan x} dx$ is equal to

- (a) $\sec^2 \left(\frac{\pi}{4} + x\right) + C$ (b) $\sec^2 \left(\frac{\pi}{4} - x\right) + C$
 (c) $\log \left| \sec \left(\frac{\pi}{4} + x\right) \right| + C$ (d) $\log \left| \sec \left(\frac{\pi}{4} - x\right) \right| + C$

Sol. (c)

19. The primitive of $\frac{2}{1+\cos 2x}$ is

- (a) $\sec^2 x$ (b) $2 \sec^2 x \tan x$ (c) $\tan x$ (d) $-\cot x$

Sol. (c)

20. If $\int_0^{2\pi} \cos^2 x dx = k \int_0^{\frac{\pi}{2}} \cos^2 x dx$ then the value of k is

- (a) 4 (b) 2 (c) 1 (d) 0

Sol. (a)

21. $\int 2^{x+2} dx$ is equal to

- (a) $2^{x+2} + C$ (b) $2^{x+2} \log 2 + C$ (c) $\frac{2^{x+2}}{\log 2} + C$ (d) $2 \frac{2^x}{\log 2} + C$

Sol. (c)

22. $\int \frac{2 \cos 2x - 1}{1 + 2 \sin x} dx$ is equal to

- (a) $x - 2 \cos x + C$ (b) $x + 2 \cos x + C$
 (c) $-x - 2 \cos x + C$ (d) $-x + 2 \cos x + C$

Sol. (b)

23. $\int_0^2 \sqrt{4 - x^2} dx$ equals

- (a) $2 \log 2$ (b) $-2 \log 2$ (c) $\frac{\pi}{2}$ (d) π Sol. (d)

24. $\int e^x \left(\frac{x+1}{x^2}\right) dx$ is equal to

- (a) $\frac{e^{-x}}{x} + C$ (b) $\frac{e^x}{x} + C$ (c) $\frac{e^x}{x^2} + C$ (d) $\frac{-e^{-x}}{x} + C$

Sol. (d)

25. The value of $\int_0^{\frac{\pi}{2}} \log(\tan x) dx$ is

- (a) $\frac{\pi}{2}$ (b) 0 (c) $\frac{-\pi}{2}$ (d) 1

Sol. (b)

26. $\int \frac{\sec x}{\sec x - \tan x} dx$ equals

- (a) $\sec x - \tan x + c$ (b) $\sec x + \tan x + c$ (c) $\tan x - \sec x + c$ (d) $-(\sec x + \tan x) + c$

Ans(b)

27. $\int_{-1}^1 \frac{|x-1|}{x+1} dx$ $x \neq -1$ is equal to

- (a) 1 (b) -1 (c) 2 (d) -2

Ans(d)

28. The value of $\int_0^{\frac{\pi}{4}} \sin 2x dx$ is

- (a) 0 (b) 1 (c) $\frac{1}{2}$ (d) $\frac{-1}{2}$ Ans (c)

29. $\int e^{5 \log x} dx$ is equal to

- (a) $\frac{x^5}{5} + C$ (b) $\frac{x^6}{6} + C$ (c) $5x^4 + C$ (d) $6x^5 + C$

Sol. (b)

30. If $\int_0^a 3x^2 dx = 8$, then the value of 'a' is

- (a) 2 (b) 4 (c) 8 (d) 10

Sol. (a)

TRIGONOMETRIC FUNCTIONS

ONE MARK QUESTIONS

1. Solve $2 \tan^2 x + \sec^2 x = 2$ for $0 \leq x \leq 2\pi$

Ans $x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}$ and $\frac{11\pi}{6}$ where $0 \leq x \leq 2\pi$

2. The greatest value of $\sin x \cos x$ is

(a) 1 (b) 2 (c) $\sqrt{2}$ (d) $\frac{1}{2}$ Ans : 1

3. The value of $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ$ is

(a) $\frac{-3}{16}$ (b) $\frac{5}{16}$ (c) $\frac{3}{16}$ (d) $\frac{1}{16}$. (d) $\frac{1}{2}$ Ans: $\frac{3}{16}$

4. The value of $\cos \frac{\pi}{5} \cos \frac{2\pi}{5} \cos \frac{4\pi}{5} \cos \frac{8\pi}{5}$ is

(a) $\frac{1}{16}$ (b) 0 (c) $\frac{-1}{8}$ (d) $\frac{-1}{16}$ Ans : (d) $\frac{-1}{16}$

5 Which of the following is not correct -

(a) $\sin \theta = \frac{-1}{5}$ (b) $\cos \theta = 1$ (c) $\sec \theta = \frac{1}{2}$ (d) $\tan \theta = 20$. Ans
:(c)

6. The value of $\tan 1^\circ \times \tan 2^\circ \times \tan 3^\circ \dots \dots \dots \tan 89^\circ$ is -

(a) 0 (b) 1 (c) $\frac{1}{2}$ (d) Not defined. Ans :(b)

7 If $\tan x = -1$ and $0 < x < 2\pi$, then solutions are -

(a) $\frac{\pi}{3}, \frac{4\pi}{3}$ (b) $\frac{\pi}{4}, \frac{7\pi}{4}$ (c) $\frac{3\pi}{4}, \frac{5\pi}{4}$ (d) $\frac{3\pi}{4}, \frac{7\pi}{4}$ Ans (d) $\frac{3\pi}{4}, \frac{7\pi}{4}$

8 If $\cos x = \frac{-1}{2}$ and $0 < x < 2\pi$, then solutions are -

(a) $\frac{\pi}{3}, \frac{5\pi}{3}$ (b) $\frac{2\pi}{3}, \frac{4\pi}{3}$ (c) $\frac{2\pi}{3}, \frac{7\pi}{6}$ (d) $\frac{2\pi}{3}, \frac{\pi}{3}$ Ans (b) $\frac{2\pi}{3}, \frac{4\pi}{3}$

9. If $P = 2\sin^2 x - \cos^2 x$, then P lies in the interval –

- (a) [1, 3] (b) [1, 2] (c) [-1, 2] (d) None of these.

Ans(c) [-1, 2]

10. If $\frac{\pi}{4} < x < \frac{\pi}{2}$, then write the value of $\sqrt{1 - \sin 2x}$ is -

- (a) $\cos x - \sin x$ (b) $\cos x + \sin x$ (c) $\sin x - \cos x$ (d) 2. Ans:

(c) $\sin x - \cos x$

11 The value of $\tan x \sin\left(\frac{\pi}{2} + x\right) \cos\left(\frac{\pi}{2} - x\right)$ is,

- (a) 1 (b) -1 (c) $\frac{1}{2} \sin 2x$ (d) None of these Ans (a) 1

12. $\cos 40^\circ + \cos 80^\circ + \cos 160^\circ + \cos 240^\circ =$

- (a) 0 (b) 1 (c) $\frac{1}{2}$ (d) $-\frac{1}{2}$. Ans (d)

13 Find the degree measure for the following radian measure:

- (i) $\frac{7\pi}{12}$ (ii) $\frac{1}{4}$ (iii) -3

Ans(i) 105° (ii) $14^\circ 19' 5''$ (iii) $-171^\circ 49' 5''$

14. Find the radian measure for the following degree measure:

- (i) $-22^\circ 30'$ (ii) $5^\circ 37' 30''$ (iii) -270°

Ans(i) $-\frac{\pi}{8}$ (ii) (iii) $-\frac{3\pi}{2}$

15 What is the value of $\sin 75^\circ$

- (a) $\frac{\sqrt{3}+1}{2\sqrt{2}}$ (b) $\frac{\sqrt{2}+3}{2\sqrt{3}}$ (c) $\frac{\sqrt{3}+2}{2\sqrt{3}}$ (d) $\frac{\sqrt{3}+2}{2\sqrt{2}}$ Ans(a)

16. If $\tan \theta = \frac{-4}{3}$ then $\sin \theta$ is equal to

- (a) $\frac{-4}{5}$ but not $\frac{4}{5}$ (b) $\frac{4}{5}$ but not $\frac{-4}{5}$ (c) $\frac{-4}{5}$ or $\frac{4}{5}$ (d) none of these Ans (c)

17. If $\frac{5\pi}{2} < x < 3\pi$, then the value of expression $\frac{\sqrt{1-\sin x} + \sqrt{1+\sin x}}{\sqrt{1-\sin x} - \sqrt{1+\sin x}}$ is

$$\frac{-\cot x}{2}$$

$$(b) \frac{\cot x}{2}$$

$$(c) \frac{\tan x}{2}$$

$$(d) \frac{-\tan x}{2}$$

TWO MARK QUESTIONS

1. What is the sign of $\cos x/2 - \sin x/2$ when

(i) $0 < x < \frac{\pi}{4}$

(ii) $\frac{\pi}{2} < x < \pi$ Ans (i) positive (ii) negative

2. Find the value of $\sin(-11\pi/3)$ Ans $\frac{\sqrt{3}}{2}$

3 Evaluate

$$\sin \frac{7\pi}{12} \cos \frac{\pi}{4} - \cos \frac{7\pi}{12} \sin \frac{\pi}{4} \text{ Ans } \frac{\sqrt{3}}{2}$$

4. Find the value of $\sin 105^\circ$ Ans $\frac{\sqrt{6} + \sqrt{2}}{4}$

5 The value of is $\frac{1 - \tan^2 15^\circ}{1 + \tan^2 15^\circ}$ Ans $\frac{\sqrt{3}}{2}$

6. Find the general solution of $\sin x - \cos x = 1$. Ans $(4n + 1)\frac{\pi}{2}, (2n + 1)\pi$

THREE /SIX MARK QUESTIONS

Prove the following Identities

1. $\frac{\cos 4x \sin 3x - \cos 2x \sin x}{\sin 4x \sin x + \cos 6x \cos x} = \tan 2x$

2. $\frac{\sin(x+y) - 2\sin x + \sin(x-y)}{\cos(x+y) - 2\cos x + \cos(x-y)} = \tan x$

3. $\frac{\sin 8\theta \cos \theta - \sin 6\theta \cos 3\theta}{\cos 2\theta \cos \theta - \sin 3\theta \sin 4\theta} = \tan 2\theta$

4. $\frac{(\cos \theta - \cos 3\theta)(\sin 8\theta + \sin 2\theta)}{(\sin 5\theta - \sin \theta)(\sin 4\theta - \cos 6\theta)} = 1$

5 Find $\sin \frac{x}{2}$, $\cos \frac{x}{2}$ and $\tan \frac{x}{2}$ when $\tan x = 2\sqrt{2}$ and x is in quadrant III.

$$\text{Ans. } \sqrt{\frac{2}{3}}, -\sqrt{\frac{1}{3}}, -\sqrt{2}$$

6. (i) Find the range of $f(x) = 1 + 3\cos 2x$

(ii) Find the domain of $f(x) = \frac{1}{\sqrt{1-\cos x}}$

Ans. (i) $[-2, 4]$ (ii) $x \in R - \{2n\pi\}$ where $n \in Z$

7. Prove that $\cos 10^\circ \cos 30^\circ \cos 50^\circ \cos 70^\circ = \frac{3}{16}$

8. Prove that $\cos^2 A + \cos^2(A+120^\circ) + \cos^2(A-120^\circ) = \frac{3}{2}$

9 Solve $\sin 2\theta + \cos 2\theta = 0$ Ans: $x = n\pi \pm \frac{3\pi}{8}$

10. Solve $\sqrt{3}\cos \theta + \sin \theta = \sqrt{2}$ Ans. $x = 2n\pi - \frac{\pi}{12}, 2n\pi + \frac{5\pi}{12}$

11. If $\sin \theta + \sin \phi = a$ and $\cos \theta + \cos \phi = b$, then prove

$$\cos(\theta + \phi) = \frac{b^2 - a^2}{b^2 + a^2}$$

12. Find the general solution of the equation $5\cos^2 \theta + 7\sin^2 \theta - 6 = 0$

Ans. $n\pi \pm \frac{\pi}{4}$

13. Prove that : a) $\cos^2 x + \cos^2(x + \frac{\pi}{3}) + \cos^2(x - \frac{\pi}{3}) = \frac{3}{2}$

14. Prove that $\cos 2x \cos \frac{x}{2} - \cos 3x \cos \frac{9x}{2} = \sin 5x \sin \frac{5x}{2}$

15. Find the general solution of the equation, $2\sin x + \sqrt{3} \cos x = 1 + \sin x$.

16. Prove that $\cos \frac{\pi}{5} \cos \frac{2\pi}{5} \cos \frac{4\pi}{5} \cos \frac{8\pi}{5} = \frac{-1}{16}$

17. Prove that $\sin \frac{\pi}{15} \sin \frac{2\pi}{15} \sin \frac{4\pi}{15} \sin \frac{7\pi}{15} = \frac{1}{16}$

18. If $\tan x = \frac{3}{4}$, $\pi < x < \frac{3\pi}{2}$, find the values of $\frac{x}{2}$, $\cos \frac{x}{2}$ and $\tan \frac{x}{2}$

PERMUTATIONS AND COMBINATIONS

Q1. How many words, with or without meaning can be made from the letters of the word MONDAY. Assuming that no letter is repeated, it

(i) 4 letters are used at a time?

ii) All letters are used but first letter is a vowel?

Q2. A bag contains 5 black and 6 red balls determine the number of ways in which 2 black and 3 red balls can be selected.

Q3. In how many ways can 5 girls and 3 boys be seated in a row so that no two boys are together?

Q4. How many words, with or without meaning, each of 3 vowels and 2 consonants can be formed from the letters of the word INVOLUTE

Q5. A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has:

(i) no girl?

ii) at least one boy and one girl?

(iii) at least 3 girls?

LONG ANSWER QUESTIONS

1. How many arrangements can be formed by the letters of the word *VOWELS* if

There is no restriction

Each word begins with *S*

Each word begins with *S* and ends with *E*

All vowels come together.

All consonants come together.

Ans (i) 720 (ii) 120 (iii) 24 (iv) 240 (v) 144

2. What is the number of ways of choosing 4 cards from a pack of 52 playing cards? In how many of these

Cards are of the same suit

Cards are of the same colour

are face cards

two are red and two are black cards

cards belong to different suits?

Ans. (i)2860(ii)29900(iii)495(iv)105625(v)28561

3. There are 10 professors and 20 students out of whom a committee of 2 professors and 3 students is to be formed. Find the number of ways in which this can be done. Further find in how many of these committees:

A particular professor is included

A particular student is included

A particular student is excluded.

Ans. 51300(i)10260(ii)7695(iii)43605

4. A group consists of 4 *girls* and 7 *boys*. In how many ways can a team of 5 *members* be selected if the team has

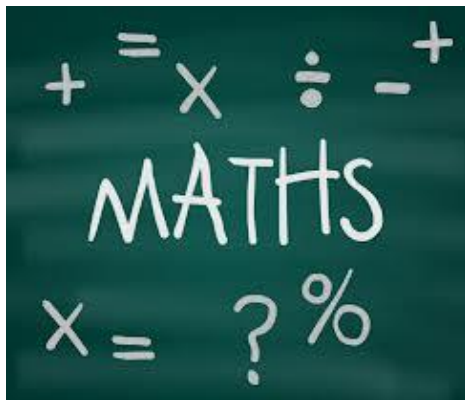
No girls?

At least three girls?

At least one girl and one boy?

CASE STUDY

I. During the math class, a teacher clears the concept of permutation and combination to the 11th standard students. After the class was over she asks the students some questions, one of the question was: how many numbers between 99 and 1000 (both excluding) can be formed such that:



every digit is either 3 or 7.

(i) 8 ways b) 2 ways c) 27ways d) 16 ways *Ans:2 ways*

(ii) there is no restriction.

1000 ways b) 900 ways c) 800 ways d) 700 ways *Ans:900 ways*

(iii) no digit is repeated.

684 ways b) 600 ways c) 648 ways d) 729 ways *Ans:648 ways*

(iv) the digit in hundred's place is 7

(a) 70 ways b) 80 ways c) 90 ways d) 100 ways *Ans:100 ways*

(v) at least one of the digits is 7

a) 252 ways b) 525 ways c) 200 ways d) 500 ways *Ans:100 ways*

II Anish appears in an examination. While reading the instructions, Anish observed that the question paper consists of 12 questions divided into two parts Part I and Part II, containing 5 and 7 questions, respectively. Based on the given information, answer the following questions



(i) If Anish is required to attempt 8 questions in all, selecting at least 3 from each part, then in how many ways can he select the questions?*Ans: 210+175+35=420*

(ii) If Anish is required to attempt 8 questions in all, selecting at most 3 from part 1, then in how many ways can he select the questions?
Ans: 5+70+210=285

