

Class: XI (Humanities)

(SUMMER HOLIDAYS' HOMEWORK)

(Session:2026-27)

English

Instructions: Attempt all questions to the best of your ability. Pay attention to grammar, spelling, and presentation. This assignment is designed to help you revise key concepts and express your creativity.

Have a wonderful and productive holiday!

Total Marks: 35

Short Creative & Critical Writing

1. Poster + Slogan (5 Marks) Design a poster on ONE of the following themes: [5 Marks]

- *Healthy Mind, Healthy Body*
- *Digital Detox*

Include a **self-composed slogan**, creative drawings/symbols, and clear typography. Task to be done in Notebook

- **Idea & Relevance (2 marks):** Theme clarity; slogan original and apt.
- **Design & Visuals (2 marks):** Composition, use of space, readable typography.
- **Neatness (1 mark):** Colouring, labels, pasted in notebook.

2. Holiday Reflection Journal (5 Marks) Write a one-page reflection titled “*Three Things I Learnt Outside the Classroom This Holiday.*” Focus on family, travel, books, or personal growth. Marks for honesty, clarity, and neat presentation. Task to be done on a blank/coloured A3 size sheet

[5 Marks]

- **Content & Insight (3 marks):** Honest reflection; three clear learnings.
- **Expression (1 mark):** Coherence, grammar, vocabulary.
- **Presentation (1 mark):** One-page A3 sheet, neat handwriting/layout.

Long Creative & Critical Writing

3- Write a short one-act play (10–12 minutes) and prepare a performance plan for a small class production. Day-by-day plan:

[10 Marks]

Day 1: Brainstorm theme and characters; write a one-page synopsis and character list.

Day 2: Draft Act (dialogue, stage directions) — aim for 6–8 pages script.

Day 3: Revise dialogue for pacing and clarity; add props, costume, and set notes.

Day 4: Rehearsal plan: blocking, cues, and a 5-minute excerpt rehearsal (recorded on phone).

Day 5: Final script with director’s notes and a 2-page reflection on choices.

- ☐ **Script & Structure (3 marks):** Clear synopsis, coherent plot, dialogue quality.
- ☐ **Stagecraft & Practicality (2 marks):** Props, costumes, blocking, rehearsal plan.
- ☐ **Process & Reflection (2 marks):** Director’s notes + 2-page reflection.
- ☐ **Presentation (1 mark):** Typed/handwritten script clarity and completeness.

4 - Visual Storyboard: 6-Panel Comic (3 marks) Task: Create a 6-panel comic (hand-drawn or digital) that tells a complete story about a teenager making a difficult choice related to technology or the environment. Add one short caption per panel and a 50-word reflection on the moral/lesson.

[10 marks]

- ☐ **Narrative (1 mark):** Complete story arc across six panels.
- ☐ **Visual Sequencing (1 mark):** Panel flow, captions, clarity.
- ☐ **Reflection (1 mark):** 50-word moral/lesson.

OR

Create a 6-page **digital mini-magazine** combining writing, visuals, and short interactive elements (QR code to audio, poll results, or short video). Theme: *Holiday discoveries*.

[10 Marks]

Day 1: Plan sections (editorial, 2 features, photo essay, student poll, creative corner); assign word counts.

Day 2: Write two feature pieces (400–600 words total) and collect 6 photos/illustrations.

Day 3: Produce one interactive element (record a 90-second audio, create a 3-question poll and gather 10 responses).

Day 4: Layout magazine pages (digital or printable); add captions, credits, and a contents page.

Day 5: Final proofreading and export as a single PDF or shareable image set; prepare a 150-word editor's statement.

- ☐ **Content & Variety (3 marks):** Editorial, two features, photo essay present and balanced.
- ☐ **Multimedia/Interactive Element (2 marks):** Working QR/audio/poll with evidence of responses.
- ☐ **Design & Layout (2 marks):** Readable pages, captions, contents page.
- ☐ **Editor's Statement (1 mark):** 150-word rationale and polish.

(HOLIDAY HOMEWORK ASSIGNMENT)

Section A: Language & Expression (10 Marks)

1. Grammar in Context (4 Marks) Read the passage below and fill in the blanks with the correct determiners, tenses, modals, or subject-verb forms.

Last Sunday, our school organized _____ (a / an / the) awareness rally on environmental protection. Many students _____ (participate) enthusiastically, while some teachers _____ (guide) them throughout the event. By the time the rally ended, the principal _____ (announce) the winners of the poster competition.

Each student _____ (need / must / should) carry a water bottle, as the weather was hot. The slogans on the posters _____ (be) inspiring and creative. Neither the students nor the teachers _____ (was / were) tired, because the energy of the crowd kept them motivated.

The rally proved that _____ (every / all / both) members of the school community can contribute to change. We realized that we _____ (ought to / dare / may) take responsibility for protecting our environment.

2. Error Hunt (3 Marks) The paragraph below contains 8–10 errors in spelling, punctuation, tense, or concord. Identify and correct them.

A- Yesterday the students was very excited for the science exhibition. Many of them have prepared models since two weeks, but some forget to bring their charts. The teacher say that every student must submit their work on time. Neither the principal nor the teachers was happy with the careless attitude. However, the effort of few students were appreciated, and they recieved prizes.

B- Last week our class plan a trip to the museum. Everyone were excited and discuss the exhibits loudly. The teacher say that students must behave properly. Neither the guide nor the teachers was happy when some students forget the rules. However, the effort of a few students were appreciated, and they recieve praise for their discipline.

3 :- Speech Writing (7 Marks) Prepare a 2-minute speech for the morning assembly on ONE of these:

- *The Power of Positive Thinking*
- *Why Discipline Shapes Destiny*

4- Fill in the blanks with suitable prepositions or articles.

1. She is interested _____ learning new languages.
2. The book was placed _____ the shelf near the window.
3. He is _____ honest boy who always speaks the truth.
4. We walked _____ the park and enjoyed the fresh air.
5. There is _____ university in our town that offers good courses.

5- The following sentences each contain one error. Rewrite them correctly.

1. The teacher along with the students were present.
2. He is senior than me in age.
3. She did not knew the answer.
4. One of my friend is coming today.
5. The news are very shocking.

4- Podcast Interview Simulation Imagine you are interviewing few famous environmentalist, author or You tube influencers. Draft 8–10 questions for each one of them and write their possible answers. Pick **any 5** out of the given personalities. One sample question is given for each personalities to give an idea of the level of questions expected :-

$$(6 \times 5 = 30)$$

- **Malala Yousafzai** – Nobel Peace Prize laureate, education activist [“What motivated you to continue advocating for girls’ education even after facing such personal danger?”]
- **Barack Obama** – Former US President, author & speaker[“How did writing your books help you reflect on your journey as a leader?”]
- **Arundhati Roy** – Indian novelist & activist [“What role do you believe literature plays in shaping political awareness?”]
- **Ruskin Bond** – Beloved Indian author of children’s literature[“Why do you think children connect so deeply with stories set in the hills?”]
- **Greta Thunberg** – Climate activist[“What message do you want young people to carry forward about climate action?”]
- **David Attenborough** – Natural historian & broadcaster[“Which moment in your career made you feel the strongest connection to nature?”]

- **CarryMinati** – Indian YouTuber & comedian[“How do you balance humor with responsibility when millions watch your content?”]
- **Bhuvan Bam** – YouTuber, singer, actor [“What inspired you to blend music and comedy in your creative journey?”]
- **Prajakta Koli** – YouTuber & actress (*MostlySane*)[“How do you use your platform to talk about social issues while staying relatable?”]
- **A.R. Rahman** – Oscar-winning Indian composer[“What is your process for creating music that feels both spiritual and modern?”]
- **Amitabh Bachchan** – Legendary Bollywood actor[“What lessons from your long career in cinema do you think young actors should learn?”]
- **Taylor Swift** – Global singer-songwriter[“How do you transform personal experiences into songs that resonate globally?”]

GEOGRAPHY

CARTOGRAPHY SKILLS

☐ Instructions

- Use **separate outline maps** for World and India.
- Label neatly with **blue/black ink** and highlight with **color pencils**.
- Compile all maps in a **single notebook** as your holiday homework file.
- Revise NCERT exercises alongside map work for exam readiness.

Airports

- ☐ Tokyo, Beijing, Mumbai, Jeddah, Aden
- ☐ Johannesburg, Nairobi
- ☐ Moscow, London, Paris, Berlin, Rome
- ☐ Chicago, New Orleans, Mexico City
- ☐ Buenos Aires, Santiago
- ☐ Darwin, Wellington

Sea Ports

- ⚓ London, Hamburg, North Cape
- ⚓ Vancouver, San Francisco, New Orleans
- ⚓ Rio de Janeiro, Colon, Valparaiso
- ⚓ Cape Town, Suez
- ⚓ Yokohama, Shanghai, Hong Kong, Aden, Karachi, Kolkata
- ⚓ Perth, Sydney, Melbourne

Inland Waterways

- ☐ Suez Canal
- ☐ Panama Canal
- ☐ Rhine Waterways
- ☐ St. Lawrence Seaway

Railways

- ☐ Trans-Siberian
- ☐ Trans-Canadian
- ☐ Trans-Australian

Agricultural Activities

- ☐ Subsistence gathering areas
- ☐ Nomadic herding regions
- ☐ Commercial livestock rearing regions
- ☐ Extensive grain farming regions

- ☐ Mixed farming regions

□□ Part B – India Map Items

Major Sea Ports

-  Kandla, Mumbai, Marmagao, Kochi, Mangalore
-  Tuticorin, Chennai, Vishakhapatnam, Paradwip, Haldia

International Airports

- ☐ Ahmedabad, Mumbai, Bengaluru, Chennai, Kolkata
- ☐ Guwahati, Delhi, Amritsar, Thiruvananthapuram, Hyderabad

Population Indicators

- ☐ Highest density: Bihar (2011 Census)
- ☐ Lowest density: Arunachal Pradesh (2011 Census)

Crop Producing States

- ☐ Rice, Wheat, Cotton, Jute, Sugarcane, Tea, Coffee

Minerals and Industries

- ☐ Iron ore: Mayurbhanj, Bailadila, Ratnagiri, Bellary
- ☐ Manganese: Balaghat, Shimoga
- ☐ Copper: Hazaribagh, Singhbhum, Khetri
- ☐ Bauxite: Katni, Bilaspur, Koraput
- ☐ Coal: Jharia, Bokaro, Raniganj, Neyveli
- ☐ Oil refineries: Mathura, Jamnagar, Barauni

Industrial Locations

- ☐ Iron & Steel: Bhilai, Bokaro, Durgapur, Rourkela, Jamshedpur
- ☐ Cotton Textiles: Surat, Varanasi, Coimbatore, Solapur, Murshidabad
- ☐ Software Parks: Bengaluru, Hyderabad, Noida, Mohali, Gandhinagar, Indore

History

Section-A

A. Multiple Choice Questions:

- Which river determined the boundary of the Roman Empire in the North?
A. Rhine B. Danube C. Tigris and Euphrates D. A and B both
- What was used abundantly for writing in Roman Empire?
A. Paper B. Papyrus C. Metal Tablets D. Clay Tablets
- Who founded 'The Principate' ?
A. Augustus B. Julius Caesar C. Trajan D. Tiberius
- Whose reign is remembered as the "age of peace"?
A. Augustus B. Tiberius C. Constantine D. Justinian
- What were the main business items in the economy of The Roman Empire?
A. Wheat B. Wine C. Olive Oil D. All of the above

Section-B

B. Short Answer Questions:

- 'Roman Empire was a diverse Empire at cultural level'. Justify the statement.
- Emperor Diocletian made what changes in the Roman Empire?
- Review the status of 'Republic' in The Roman Empire.

Section-C

C. Source Based Question:

On the Treatment of Slaves

‘Soon afterwards the City Prefect, Lucius Pedanius Secundus, was murdered by one of his slaves. After the murder, ancient custom required that every slave residing under the same roof must be executed. But a crowd gathered, eager to save so many innocent lives; and rioting began. The

senate-house was besieged. Inside, there was feeling against excessive severity, but the majority opposed any change (...) [The senators] favouring execution prevailed. However, great crowds ready with stones and torches prevented the order from being carried out. Nero rebuked the population by edict, and lined with troops the whole route along which those condemned were taken for execution.'

- Mention the ways by which the slaves were controlled and disciplined.
- How did the common people try to prevent the execution of the slaves?
- According to the passage, was the execution carried out?

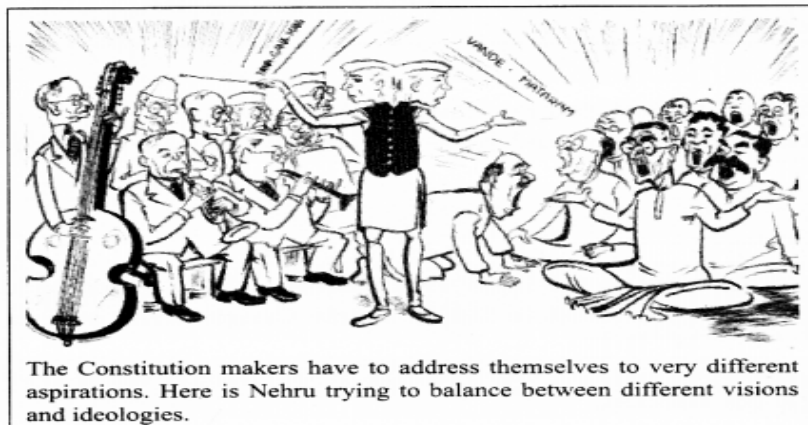
Section-D

D. Long Answer Questions:

- What were the main characteristic features of the Roman Society?
- What were the main contributions of Roman Empire to the world?
- 'Roman army was a key institution of the Roman Empire'. Justify the statement.

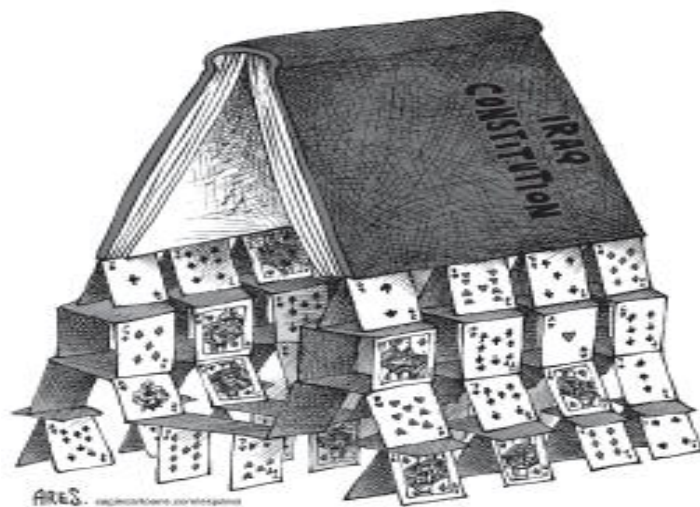
Political Science

Q1. Study cartoon carefully and write answer carefully.



- Can you identify what these different groups stand for?
- Who do you think prevailed in this balancing

Q2. Study Cartoon carefully and write answers of given questions.



- Why does the cartoonist describe the new Iraqi Constitution as the castle of cards?
- Would this description apply to the Indian Constitution

Q3. Understand cartoon and write answers of given questions:



(i) What do these different people stand for?

(ii) Compare the conflict depicted here with that depicted in earlier cartoons for the European Union and India.

Q4. Why elections are important for democracy?

1. Right to franchise is a

- (a) Customary rights. (b) Political right. (c) Moral rights. (d) Cultural right.

2. Freedom of expression is important for

- (a) A state. (b) A democratic government.
(c) Communist society. (d) An individual livelihood.

3. Assertion: The Constitution set some limits on what government can impose on its citizens.

Reason: The Constitution provides the fundamental rights to safeguard the rights of the citizens.

- (a) Both A and the R are correct and R is the correct explanation of the A.
(b) Both A and the R are correct but the R is not the correct explanation of the A.
(c) The Assertion is incorrect but the Reason is correct.
(d) The Assertion is correct but the Reason is incorrect.

4. Which of these is not a function of the constitution?

- (a) It gives a guarantee of the rights of the citizen.
(b) It marks out different spheres of power for different branches of government.
(c) It ensures that good people come to power.
(d) It gives expression to some shared values.

5. Which of the following is a good reason to conclude that the authority of the constitution is higher than that of the parliament?

- (a) The constitution was framed before the parliament came into being.
(b) The constitution makers were more eminent leaders than the members of the parliament.
(c) The constitution specifies how parliament is to be formed and what are its powers.
(d) The constitution cannot be amended by the parliament.

6. Which of the following provisions of the Indian Constitution was passed without virtually any debate?

- (a) Introduction of Universal Suffrage (b) Fundamental Rights
(c) Directive Principles of State Policies (d) Parliamentary Democracy

7. India borrowed the Directive Principles of State Policy from the:

- (a) Irish constitution (b) Canadian constitution
(c) British constitution (d) South African constitution

8. A Constitution is a body of

- (a) Basic laws (b) Rules (c) Principles (d) Moral values

9. Who made the constitution of India?

- (a) British Parliament (b) The King of England

© The Indian Parliament

(d) The Constituent Assembly

10. India borrowed the provision of the First Past the Post system from the:

(a) French constitution

(b) Canadian constitution

© British constitution

© South African constitution

11. A body of fundamental principles, according to which a state is constituted is known as

(a) Convention

(b) Constitution

© Law

(d) Tradition

12. Parliament gets to decide about _____

(a) Law and Judiciary

(b) Laws and policies

© Judiciary and application

(d) None of the above

13. How the right to freedom has been designed to address new problems?

a) Through debates and discussions.

b) Through judicial interpretations and government policies.

c) Through amendments in the constitution.

2d) Both a and b

14. _____ has been interpreted to include right to livelihood

a) Right to Life

b) Right to Survival

c) Right to Live

d) All of the above

15. Assertion: The Indian Constitution ensures that the government fulfils the aspirations of the people.

Reason: The Directive Principles are the goal that the states must achieve.

(a) Both A and the R are correct and R is the correct explanation of the A.

(b) Both A and the R are correct but the R is not the correct explanation of the A.

(c) The Assertion is incorrect but the Reason is correct.

(d) The Assertion is correct but the Reason is incorrect.

16. Assertion: The Indian Constitution came into force on 26th January 1950.

Reason: 26th January is celebrated as Republic Day.

(a) Both A and the R are correct and R is the correct explanation of the A.

(b) Both A and the R are correct but the R is not the correct explanation of the A.

(c) The Assertion is incorrect but the Reason is correct.

(d) The Assertion is correct but the Reason is incorrect.

17. Assertion: The Constitution set some limits on what government can impose on its citizens.

Reason: The Constitution provides the fundamental rights to safeguard the rights of the citizens.

(a) Both A and the R are correct and R is the correct explanation of the A.

(b) Both A and the R are correct but the R is not the correct explanation of the A.

(c) The Assertion is incorrect but the Reason is correct.

(d) The Assertion is correct but the Reason is incorrect.

18. Assertion (A): As per the system of FPTP whoever has more votes than all other candidates is declared as elected.

Reason (R): The winning candidate need not secure a majority of the votes.

(a) Both A and the R are correct and R is the correct explanation of the A.

(b) Both A and the R are correct but the R is not the correct explanation of the A.

(c) The Assertion is incorrect but the Reason is correct.

(d) The Assertion is correct but the Reason is incorrect.

Economics

1. Micro Economics studies the behaviour of an _____ unit.

a) Individual Economic

b) As a whole

c) Both A and B

d)

None

2. What are the causes of Economic problems?

a) Unlimited human wants

b) Scarcity of economic resources

c) Alternative uses of resources

d) All of the above

3. Abbreviate MOC _____

- a) Marginal object character b) Marginal opportunity cost
c) Both A and B d) None

4. Abbreviate PPF _____

- a) Production Possibility Frontier b) Possibility Production Frontier
c) A is False d) B is False

5. What are the reasons for the Rightward shift of PPC?

- a) Migration b) War c) Skill development programme d) None

6. When the marginal utility is equal to zero, what will the total utility be?

- A) Maximum B) Laws of return C) Minimum D) None of the above

7. Which of the following is the basis of diminishing marginal utility?

- A) Law of demand B) Laws of return C) Law of supply D) None of the above

8. A consumer is in equilibrium when the marginal utilities are _____ .

- A) Increasing B) Equal C) Minimum D) Highest

9. Why is a consumer's spending restricted?

- A) Due to the utility maximization B) Due to the budget constraint
C) Due to the demand curve D) Due to the marginal utility

10. When MU is positive, what happens to TU?

- A) It decreases. B) It becomes the highest. C) It remains constant. D) It increases.

11. What will be the MU when TU is maximum?

12. Which direction does the indifference curve slope?

13. What is a consumer surplus?

14. What is the point of satiety?

15. Calculate the missing figures:

Units	1	2	3	4	5
TU	16	-----	-----	-----	40
MU	-----	12	8	6	-----

16. Write the formula of the following terms:

- a. Marginal Utility = _____
b. Total Utility = _____
c. Budget Line = _____
d. Consumer Equilibrium in case of one commodity = _____
e. Consumer Equilibrium in case of two commodity = _____

Sociology

Research-Based Project Work

Theme: "Understanding Society Around Us"

Objective:

To help students develop observation, research, analytical thinking, and sociological imagination by connecting classroom concepts with real-life social situations. "Society is the best classroom. Observe carefully, question deeply, and connect your experiences with sociological concepts."

Students may choose any ONE project from the following topics:

Topic1. Changing Family Patterns

Study how families are changing in urban or rural areas.

Research Questions:

- ❖ What type of family is most common today?
- ❖ Are joint families decreasing?
- ❖ How has technology changed family relationships?
- ❖ What role do grandparents play today?

Methodology

- ❖ Interview 5 families.
- ❖ Prepare a comparison chart.
- ❖ Include photographs/drawings if possible.

Submission

- ✓ Introduction
- ✓ Objectives
- ✓ Findings
- ✓ Conclusion
- ✓ Personal learning
- ✓ Short video interview

Topic 2. Social Media and Teenagers

Analyse the impact of social media on students' lives.

Research Questions:

- Average screen time
- Positive and negative effects
- Influence on friendships and studies
- Online trends and peer pressure

Methodology

- Conduct a survey of 15 students.
- Prepare graphs/charts.
- Interpret results sociologically.

Submission

- Introduction
- Objectives
- Findings
- Conclusion
- Personal learning
- Photo collage

Topic 3. Gender Roles in Society

Observe how gender roles operate at home, school, or workplace.

Research Questions:

- ✓ Household responsibilities
- ✓ Career expectations
- ✓ Dress codes and restrictions
- ✓ Sports and hobbies

Methodology

- ✓ Interview family members from different generations.
- ✓ Compare opinions of males and females.
- ✓ Culture and Traditions in My Community
- ✓ Study local traditions, festivals, food habits, language, or customs.

Submission

- ✓ Introduction
- ✓ Objectives
- ✓ Findings
- ✓ Conclusion

- ✓ Personal learning
- ✓ Photo collage
- ✓ Origin/significance of traditions
- ✓ Changes over time
- ✓ Influence of modernization and globalization
- ✓ Attach pictures, sketches, folk songs
- ✓ Newspaper-style report related to your topic.

Rubrics	Marks
Research & Data Collection	5
Creativity & Presentation	5
Sociological Understanding	5
Analysis & Conclusion	5
Viva/Presentation	5
Total	25

PHYSICAL EDUCATION

Prepare a project file on yoga as preventive measure of lifestyle diseases. (Use A4 colour sheets)**

Three asana each for the following lifestyle diseases;-

1. Obesity
2. Diabetes
3. Asthma
4. Hypertension
5. Back pain

Each Lifestyle disease should contain 3 Asanas and details about-

1. Causes,
2. Procedure
3. Benefits
4. Contraindications

Suitable pictures should be pasted along each asana (size and posture, prefer colour pic's from magazines, newspaper etc.

**** (Use self/your own color printed pic's against the described asanas)**

Informative & printed matter in sort of research, medical, nutrition, etc. can also be pasted in your project.

***** Video diary with standing, sitting and lying posture asana. Use a good app with proper effects and text details etc. to be maintained and shared to the teacher concerned. (Approx. 30-35 sec. video clip with at least 8-10 asanas, also keep your video below 12mb)**

*****Try regular practice of asanas for first 20 days and then make a video; it will help you get perfect pose for the digital diary.**

HOLIDAY HOMEWORK

CLASS XI- MATHS

Trigonometric Functions

1. If $\sin \theta = \frac{3}{5}$, $\tan \varphi = \frac{1}{2}$, $\frac{\pi}{2} < \theta < \pi < \varphi < \frac{3\pi}{2}$ then find the value of $8 \tan \theta - \sqrt{5} \sec \varphi$.
 $\left(A = \frac{-7}{2} \right)$
2. If $\sin A = \frac{3}{5}$, $0 < A < \frac{\pi}{2}$, $\cos B = \frac{-12}{13}$, $\pi < B < \frac{3\pi}{2}$, find the value of $\sin(A - B)$, $\cos(A + B)$, $\tan(A - B)$
3. If A lies in the fourth quadrant and $\cos A = \frac{5}{13}$, find the value of $\frac{13 \sin A + 5 \sec A}{5 \tan A + 6 \csc A}$
4. If $\cos \theta = \frac{-1}{2}$ and $\pi < \theta < \frac{3\pi}{2}$, find the value of $4 \tan^2 \theta - 3 \cos^2 \theta$
5. If $\sin A = \frac{3}{5}$, $0 < A < \frac{\pi}{2}$ and $\cos B = \frac{-12}{13}$, $\pi < B < \frac{3\pi}{2}$ then find the following:
 (i) $\sin(A - B)$ (ii) $\cos(A + B)$ (iii) $\tan(A - B)$ $\left(A = \frac{-16}{65}, \frac{-33}{65}, \frac{16}{63} \right)$
6. Find the value of $\tan(A + B)$, given that $\cot A = \frac{1}{2}$, $\sec B = \frac{-5}{3}$, $\pi < A < \frac{3\pi}{2}$, $\frac{\pi}{2} < B < \pi$
7. Prove the following:
 - a) $\cos 570^\circ \sin 510^\circ + \sin(-330^\circ) \cos(-390^\circ) = 0$
 - b) $\frac{\cos(2\pi + \theta) \csc(2\pi + \theta) \tan\left(\frac{\pi}{2} + \theta\right)}{\sec\left(\frac{\pi}{2} + \theta\right) \cos(\theta) \cot(\pi + \theta)} = 1$
 - c) $\frac{\cos(90^\circ + \theta) \sec(-\theta) \tan(180^\circ - \theta)}{\sec(360^\circ - \theta) \sin(180^\circ + \theta) \cot(90^\circ - \theta)} = -1$
 - d) $\sin^2 \frac{\pi}{4} + \sin^2 \frac{3\pi}{4} + \sin^2 \frac{5\pi}{4} + \sin^2 \frac{7\pi}{4} = 2$
 - e) $\sin 600^\circ \tan(-690^\circ) + \sec 840^\circ \cot(-945^\circ) = \frac{3}{2}$
 - f) $\cos 306^\circ + \cos 234^\circ + \cos 162^\circ + \cos 18^\circ = 0$
 - g) $\sin^2 54^\circ - \sin^2 72^\circ = \sin^2 18^\circ - \sin^2 36^\circ$
8. In any quadrilateral ABCD, prove that: $\sin(A + B) + \sin(C + D) = 0$
9. Prove that:
 - a) $\tan 315^\circ \cot(-405^\circ) + \cot 495^\circ \tan(-585^\circ) = 2$
 - b) $\cos 510^\circ \cos 330^\circ + \sin 390^\circ \cos 120^\circ = -1$
 - c) $\sin \frac{8\pi}{3} \cos \frac{23\pi}{6} + \cos \frac{13\pi}{3} \sin \frac{35\pi}{6} = \frac{1}{2}$
 - d) $\cos 570^\circ \sin 510^\circ + \sin(-330^\circ) \cos(-390^\circ) = 0$

e) $3\sin\frac{\pi}{6}\sec\frac{\pi}{3} - 4\sin\frac{5\pi}{6}\cot\frac{\pi}{4} = 1$

f)
$$\frac{\cos(2\pi + \theta)\operatorname{cosec}(4\pi + \theta)\tan\left(\frac{\pi}{2} + \theta\right)}{\sec\left(\frac{\pi}{2} + \theta\right)\cos(-\theta)\cot(\pi + \theta)} = 1$$

10. In any cyclic quadrilateral ABCD, prove:

a) $\tan A + \tan B + \tan C + \tan D = 0$

b) $\cos(180^\circ - A) + \cos(180^\circ + B) + \cos(180^\circ + C) - \sin(90^\circ + D) = 0$

11. Find x from the following equation: $\operatorname{cosec}(90^\circ + \theta) + x \cos \theta \cot(90^\circ + \theta) = \sin(90^\circ + \theta)$

12. If A,B,C,D are angles of a cyclic quadrilateral, prove that:

$\cos A + \cos B + \cos C + \cos D = 0$

13. Find x from the following equation:

a) $\operatorname{cosec}(270^\circ + A) = \cos(180^\circ + A) + x \sin(90^\circ + A) \cot(270^\circ + A)$

b) $x \cot(90^\circ + A) + \tan(90^\circ + A) \sin A + \operatorname{cosec}(90^\circ + A) = 0$

14. Prove that:

a) $\tan 8\theta - \tan 6\theta - \tan 2\theta = \tan 8\theta \tan 6\theta \tan 2\theta$

b) $\tan 70^\circ = \tan 20^\circ + 2 \tan 50^\circ$

c) $\frac{\cos 11^\circ + \sin 11^\circ}{\cos 11^\circ - \sin 11^\circ} = \tan 56^\circ$

d) $\frac{\cos 15^\circ - \sin 15^\circ}{\cos 15^\circ + \sin 15^\circ} = \frac{1}{\sqrt{3}}$

15. If $A + B = \frac{\pi}{4}$, prove that $(1 + \tan A)(1 + \tan B) = 2$

16. Evaluate : a) $\cos(-1125^\circ)$ b) $\tan\left(\frac{11\pi}{6}\right)$ c) $\operatorname{cosec}(-1200^\circ)$

17. Prove that :

a) $\frac{\sin(A+B) + \sin(A-B)}{\cos(A+B) + \cos(A-B)} = \tan A$

b) $\frac{\sin(A-B)}{\cos A \cos B} + \frac{\sin(B-C)}{\cos B \cos C} + \frac{\sin(C-A)}{\cos C \cos A} = 0$

c) $\tan 13\theta - \tan 9\theta - \tan 4\theta = \tan 13\theta \tan 9\theta \tan 4\theta$

d) $\tan 15^\circ + \tan 30^\circ + \tan 15^\circ \tan 30^\circ = 1$

e) $\tan 36^\circ + \tan 9^\circ + \tan 36^\circ \tan 9^\circ = 1$

f) $\frac{\cos 8^\circ - \sin 8^\circ}{\cos 8^\circ + \sin 8^\circ} = \tan 37^\circ$

g) $\frac{\cos 9^\circ + \sin 9^\circ}{\cos 9^\circ - \sin 9^\circ} = \tan 54^\circ$

h) $\tan 50^\circ = \tan 40^\circ + 2 \tan 10^\circ$

i) $\tan\left(\frac{\pi}{4} + A\right) \tan\left(\frac{\pi}{4} - A\right) = 1$

j) $(1 + \tan A)(1 + \tan B) = 2 \tan A$, where $A - B = \frac{\pi}{4}$

k) $\tan 75^\circ - \tan 30^\circ - \tan 75^\circ \tan 30^\circ = 1$

18. If $\tan x + \tan\left(x + \frac{\pi}{3}\right) + \tan\left(x + \frac{2\pi}{3}\right) = 3$, then prove that : $\frac{3 \tan x - \tan^3 x}{1 - 3 \tan^2 x} = 1$

19. Prove that:

a) $\frac{1 + \sin 2\theta + \cos 2\theta}{1 + \sin 2\theta - \cos 2\theta} = \cot \theta$

b) $\frac{\cos 2\theta}{1 + \sin 2\theta} = \tan\left(\frac{\pi}{4} - \theta\right)$

c) $\frac{\cot \theta + \operatorname{cosec} \theta - 1}{\cot \theta - \operatorname{cosec} \theta + 1} = \cot \frac{\theta}{2}$

d) If $\tan \frac{x}{2} = \frac{n}{m}$, find the value of $m \cos x + n \sin x$

20. Show that: $\sqrt{2 + \sqrt{2 + \sqrt{2 + 2 \cos 8\theta}}} = 2 \cos \theta$

21. Prove that :

a) $\frac{\sin 2\theta}{1 - \cos 2\theta} = \cot \theta$

b) $\frac{1 + \sin \theta - \cos \theta}{1 + \sin \theta + \cos \theta} = \tan \frac{\theta}{2}$

c) $\sqrt{\frac{1 - \cos 2\theta}{1 + \cos 2\theta}} = \tan \theta$

d) $\sqrt{2 + \sqrt{2 + 2 \cos 4\theta}} = 2 \cos \theta$

e) $\frac{\sin 2\theta + \sin \theta}{1 + \cos \theta + \cos 2\theta} = \tan \theta$

f) $\cos 4\theta = 1 - 8 \sin^2 \theta + 8 \sin^4 \theta$

22. If $\sin x = \frac{\sqrt{5}}{3}$ and $\frac{\pi}{2} < x < \pi$, find the value of $\sin \frac{x}{2}, \cos \frac{x}{2}, \tan \frac{x}{2}$.

23. Prove that : $\cos^4 \frac{\pi}{8} + \cos^4 \frac{3\pi}{8} + \cos^4 \frac{5\pi}{8} + \cos^4 \frac{7\pi}{8} = \frac{3}{2}$

24. Prove that: $\left(1 + \cos \frac{\pi}{8}\right)\left(1 + \cos \frac{3\pi}{8}\right)\left(1 + \cos \frac{5\pi}{8}\right)\left(1 + \cos \frac{7\pi}{8}\right) = \frac{1}{8}$

25. Prove that : $\sin^4 \frac{\pi}{8} + \sin^4 \frac{3\pi}{8} + \sin^4 \frac{5\pi}{8} + \sin^4 \frac{7\pi}{8} = \frac{3}{2}$

26. Prove that: $\cos 5A = 16 \cos^5 A - 20 \cos^3 A + 5 \cos A$

27. Prove that :

a) $\frac{\sin 5x + \sin 3x}{\cos 5x + \cos 3x} = \tan 4x$

- b) $\frac{\sin x - \sin y}{\cos x + \cos y} = \tan\left(\frac{x - y}{2}\right)$
- c) $\frac{\cos x - \cos 2x + \cos 3x}{\sin x - \sin 2x + \sin 3x} = \cot 2x$
- d) $\frac{(\cos x - \cos 3x)(\sin 8x + \sin 2x)}{(\sin 5x - \sin x)(\cos 4x - \cos 6x)} = 1$
- e) $\frac{\sin A + 2 \sin 3A + \sin 5A}{\sin 3A + 2 \sin 5A + \sin 7A} = \frac{\sin 3A}{\sin 5A}$
- f) $\frac{\sin 3A + \sin 5A + \sin 7A + \sin 9A}{\cos 3A + \cos 5A + \cos 7A + \cos 9A} = \tan 6A$
- g) $\frac{\sin(x + y) - 2 \sin x + \sin(x - y)}{\cos(x + y) - 2 \cos x + \cos(x - y)} = \tan x$
- h) $\cos 40^\circ + \cos 50^\circ + \cos 70^\circ + \cos 80^\circ = \cos 10^\circ + \cos 20^\circ$
- i) $\cos \theta - \cos 3\theta + \cos 5\theta - \cos 7\theta = 4 \sin \theta \sin 4\theta \cos 2\theta$
- j) $\sin \theta + \sin\left(\frac{2\pi}{3} + \theta\right) + \sin\left(\frac{4\pi}{3} + \theta\right) = 0$
- k) If $\frac{\sin x}{a} = \frac{\cos x}{b}$, prove that $a \sin 2x + b \cos 2x = b$

28. Prove that: $\frac{\cos 8A \cos 5A - \cos 12A \cos 9A}{\sin 8A \cos 5A + \cos 12A \sin 9A} = \tan 4A$

29. Prove that: $\sin 10^\circ \sin 30^\circ \sin 50^\circ \sin 70^\circ = \frac{1}{16}$

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

31. Prove the following :

a) $\frac{\sin 3A \cos 2A - \sin 6A \cos A}{\sin A \sin 2A - \cos 2A \cos 3A} = \frac{\sin 3A}{\cos A}$

b) $\frac{\sin 3A \cos 4A - \sin A \cos 2A}{\sin 4A \sin A + \cos 6A \cos A} = \tan 2A$

c) $\frac{\sin 2A \sin 3A - \sin A \sin 4A + \sin 5A \sin 2A}{\cos 4A \cos 5A - \cos 3A \cos 6A + \cos 5A \cos 2A} = \tan 4A \tan 3A$

d) $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ = \frac{1}{16}$

e) $\sin 10^\circ \sin 50^\circ \sin 60^\circ \sin 70^\circ = \frac{\sqrt{3}}{16}$

f) $\tan 20^\circ \tan 30^\circ \tan 40^\circ \tan 80^\circ = 1$

COMPLEX NUMBERS

1. Find the value of x and y ($x, y \in R$) if : $2y + (3x - y)i = 5 - 2i$
2. Express $3i^3 + 6i^{16} - 7i^{29} + 4i^{27}$ in the form $x + iy$ where $x, y \in R$.
3. Evaluate : $\left(i^{41} + \frac{1}{i^{257}}\right)^9$
4. If $Z_1 = 1 - i, Z_2 = -2 + 4i$, find $\text{Im}\left(\frac{Z_1 Z_2}{Z_1}\right)$.
5. Find the conjugate of the complex number: $\frac{1}{2 - 3i}$
6. Write the following complex numbers in the polar form:
(i) $-2 - 2i$ (ii) $\frac{1}{1 + i}$
7. Find the complex conjugate of $\frac{(8 - 3i)(6 - i)}{2 - 2i}$.
8. Find the multiplicative inverse of $\left(\frac{3 + 4i}{4 - 5i}\right)$
9. Find the modulus and argument of $\frac{1 + 2i}{1 - 3i}$
10. If $(a + ib)^2 = (x + iy)$, prove that $(a^2 + b^2)^2 = (x^2 + y^2)$
11. Find x and y if $\frac{(1 + i)x - 2i}{3 + i} + \frac{(2 - 3i)y + i}{3 - i} = i$
12. For what values of x and y are the numbers $-3 + ix^2y$ and $x^2 + y + 4i$ complex conjugates? (x, y are real numbers.)
13. Solve the following quadratic equations:
(i) $6x^2 - 17ix - 12 = 0$
(ii) $3x^2 + 7ix + 6 = 0$
(iii) $x^2 - (7 - i)x + 18 - i = 0$
(iv) $x^2 - (3\sqrt{2} - 2i)x - 6\sqrt{2}i = 0$
(v) $2x^2 - (3 + 7ix)x + 9i - 3 = 0$
14. Find the square root of: (i) $-8 - 6i$, (ii) $-5 + 12i$, (iii) $-i$

Ch: Permutations

1. How many even numbers of 3 digits can be formed with the digits 1,2,3,4,6 if no digit is repeated?
2. How many numbers of six digits can be formed from the digits 0,1,3,5,7 and 9, which are divisible by 10 and no digit is repeated?
3. Find the number of different signals that can be generated by arranging at least 2 flags in order (one below the other) on a vertical staff, if five different flags are available.
4. How many numbers greater than 1000 and less than 4000 can be formed with the digits 0,1,2,3,4 if (a) repetition of digits is allowed (b) repetition of digits is not allowed?
5. How many odd numbers greater than 80000 can be formed using the digits 2,3,4,5 and 8 if each digit is used only once in a number?
6. Three dice are rolled. Find the number of possible outcomes in which at least one die shows a 5.
7. Evaluate: (a) $12! - 10!$ (b) $\frac{9!}{5! \times 4!}$
8. Which of the following is true? (a) $(2 + 3)! = 2! + 3!$ (b) $(2 \times 3)! = 2! \times 3!$
9. Find x , if: $\frac{1}{9!} + \frac{1}{10!} = \frac{x}{11!}$
10. If ${}^{11}P_r = {}^{12}P_{r-1}$, find r .
11. Find r , if $5 \cdot {}^4P_r = 6 \cdot {}^5P_{r-1}$
12. If ${}^{2n-1}P_n \cdot {}^{2n+1}P_{n-1} = 22 : 7$, find n .
13. How many words can be made from the letters of the word MONDAY assuming that no letter is repeated if (a) 4 letters are used at a time (b) All letters are used at a time? (c) All letters are used but the first letter is a vowel?
14. The letters of the word TRIANGLE are arranged in such a way that vowel and consonants remain together. How many different arrangements will be obtained?
15. Four different mathematics books, six different physics books and two different chemistry books are to be arranged on a shelf. How many different arrangements are possible if (a) the book in a particular subject must all stand together (b) only the mathematics books must stand together?
16. In how many ways can 5 children be arranged in a row such that two boys Akash and Samir are (a) always together (b) never together?
17. How many different 8 letter words can be formed out of the letters of the word DAUGHTER so that (a) The word starts with D and ends with R (b) Position of H remains unchanged (c) Relative position of vowels and consonants remain unaltered (d) No two vowels are together (e) All vowels never occur together?
18. How many words can be formed with the letters of the word EQUATION? In how many of them (a) vowels occur together (b) the vowels never occur together (c) the vowels and the consonants are together?
19. In how many ways can 5 boys and 3 girls be seated in a row so that no two girls are together?