DAV POLICE PUBLIC SCHOOL

New Police Lines, Panipat

Summer Vacation Work (2026-27)

Class- XI (Sciences)

ENGLISH CORE (301)

Project Work:

Each student should prepare and submit his/her Project Work Report. Following essentials need to be fulfilled for its preparation and submission.

The following parameters will be applicable for the topic:

1. The entire project should be in file format.
2. The project should be handwritten in blue/ black pen (Highlighters can be used).
3. The project report should be developed in the following sequence-
   * Cover page: School Name, Title Statement, Name of the student and year / Session.
   * Index (List of contents)
   * Acknowledgement
   * Certificate
   * Introduction Statement (The purpose of the project)
   * Detailed project report
   * Learning outcomes/experiences
   * Use A4 size sheets
   * Project work should be well illustrated with relevant / related / supportive photos/pictures there of

   *Total pages: 10-15

Topics are allotted section wise which are mentioned below:

A1- THE PORTRAIT OF A LADY

A2 – We're NOT AFRAID TO DIE. IF WE CAN ALL BE TOGETHER

A3 – THE ADDRESS

B1- A PHOTOGRAPH

C1& C2- THE SUMMER OF THE BEAUTIFUL WHITE HORSE

PHYSICS (042)

- Revise the following chapters
  Chapter 1 - Units and Measurements
  Chapter 2 - Motion in straight line
  Chapter 3 - Motion in a plane (up to Vectors)
- Solve the given assignment in fair notebook.
- Write the following experiments in your practical file:
  1. To find the diameter of small spherical body using a Vernier Callipers.
  2. To find the diameter of a wire using a screw gauge.

CHEMISTRY (043)

- Revise the following chapters
  Chapter 1- Some basic concepts of chemistry
  Chapter 2- Structure of atom
  Chapter 3- Classification of elements and periodicity in properties
  with the help of notes and also solve NCERT back exercise questions in fair notebook.
- Write the formulae and colours of the following salts:
  a. Potassium chromate
  b. Potassium dichromate
  c. Nickel chloride
  d. Aluminium sulphate
  e. Manganese sulphate
  f. Lead acetate
  g. Copper sulphate
  h. Ferrous sulphate
  i. Potassium permanganate
- Solve the given assignment in fair notebook.
- Prepare a project report or working model on the assigned topics.
- Write the following experiments in your practical file:
  1. Cutting of glass rod/tube.
  2. Bending of glass rod.
  3. Salt analysis.

BIOLOGY (044)

- Revise the following chapters:
  Chapter 1 – The Living World
  Chapter 2 – Biological Classification
  Chapter 3 – Plant Kingdom
  Chapter 7- Structural Organisation in Animals
- Solve the given assignment in fair notebook.
- Prepare a project report or working model on the assigned topics.
- Write the following experiments in your practical file:
  1. Parts of a compound microscope.
  2. Specimens/slides/models and identification with reasons – Spirogyra, Rhizopus, Mushroom, Moss, Fern and one Lichen.
  3. Virtual specimens/slides/models and identifying features of – Hydra, Ascaris, Starfish, Rohu, Frog, Lizard, Pigeon and Rabbit.
  4. Mitosis in onion root tip cells from permanent slides.

MATHEMATICS (041)

- Revise the following chapters
  Chapter 1 - Sets
  Chapter 2 - Relations and functions
- Do Lab Manual Activity 1 (Set Theory) and Activity 2 (Elementary Set Theory) in Practical File.
- Solve the assignment questions in separate Notebook.

PAINTING (049)

Complete your 10 page in art file (05 with pencil shading and 5 with colour. **One student submit one project.**

Project work (Note Canvas board size 15 inch/18 inch)

- Buddha painting on Canvas board with acrylic color.
- Mandala painting on canvas board with acrylic color.
- Lippan art painting on MDF board and canvas with acrylic color and mirror work.
- African painting on MDF board and canvas with acrylic color.
- Warli art painting on canvas board with color and permanent marker

PSYCHOLOGY

Solve the assignment shared.

INFORMATICS PRACTICES / ARTIFICIAL INTELLIGENCE

- Write any 10 programs of Python Basic based on Operators and Variables in lab manual and practice.

PHYSICAL EDUCATION

Do all the assigned work in lab manual:

a) Write down 3 Test in Lab Manual
- 1. Body Mass Index Test (BMI)
- 2. Flamingo Balance Test
- 3. Sit and Reach Test

b) Write down any one Game and Diagram should be hand made .

c) Do practice of 5 Yoga Asan :
- Gomukhasana
- Setubandhasana
- Baddhapadmasana
- Garudasana
- Shalabhasana

DAV POLICE PUBLIC SCHOOL
Holiday Homework (2026-27)
Class- XI (Sciences)

ENGLISH

Instructions:

- Complete all tasks neatly in your English notebook.
- Follow the word limit and format guidelines strictly.
- Submit the homework on the first day after the vacation.
- Originality will be appreciated. Avoid plagiarism.
- Use your creativity where required

(I) Fill in the blanks choosing the most appropriate options from the one given below..

1.Marita read the newspaper sitting (a)…….. the library. She read about a woman (b)…….. had climbed Mt. Everest. Marita said, ” Maybe, one day I (c)…… climb it too.’’

(a) (i) the (ii) in (iii) along (iv) on
(b) (i) which (ii) whose (iii) who (iv) she
(c) (i) is (ii) was (iii) are (iv) shall

2. There is a general belief (a) …… students that (b)……. who write long sentences get (c) …….marks.

(a) (i) in (ii) of (iii) among (iv) between
(b) (i) they (ii) those (iii) all (iv) them
(c) (i) more (ii) many (iii) most (iv) much

3. As soon as I saw the elephant, I knew certainly that I ought not (a) _____ him. But at the moment I (b) _____ round at the crowd that had followed me and were eager (c) _____ fun and meat. The crowd (d) _____ the road for a long distance on either side.

(a) (i) shoots (ii) is shooting (iii) shot (iv) shoot
(b) (i) glances (ii) glanced (iii) is glancing (iv) will be glancing
(c) (i) follow (ii) follows (iii) following (iv) had followed
(d) (i) has blocked (ii) had blocked (iii) will be blocked (iv) blocks

4. Yesterday, as I (a) _____ along the mall, a taxi (b) _____ near me. A man (c) _____ me by my first name. I (d) _____ as I failed to recognise the man, who (e) _____ and repeating my name.

(a) (i) walks (ii) is walking (iii) was walking (iv) had been walking
(b) (i) stopped (ii) stops (iii) to stop (iv) will stop
(c) (i) addressing (ii) addressed (iii) to address (iv) has addressed
(d) (i) is surprised (ii) was surprised (iii) surprising (iv) to surprise
(e) (i) smiles (ii) to smile (iii) was smiling (iv) has been smiling

(II) Read the following sentences and change them into Indirect speech.

1. My uncle said, "I am cooking lunch."
2. My brother said, "I had already eaten."
3. The old lady said to the girl, "Where do you come from?"
4. Jon said, "I like to play rugby."
5. I said to Daniel, "Are you reading this book?"
6. My mother said to me, "Help me carry this bag."
7. I said to Alka, "How long will you stay here?"
8. Raj said to Simran, "Have you ever been to the National Museum?"
9. The teacher said to Vivek, "Draw the diagram of the plant's parts."
10. Rohan said, "I am playing the piano."

(III) Speech Writing

1. The increasing amount of time spent playing indoor games has been a major cause of decreasing the outdoor appearance of children. With this concern, write a speech to be delivered in the morning assembly in 120-150 words. You are Parag/Pragati.
2. You have to speak in the school's morning assembly on 'The Harm that Mobile Phones and Smartphones are Creating in Students' Lives'. Write the speech in 120-150 words. You are Javed/Jyotsana of class XI-A.

(III) Answer the following questions in 120-150 words.

1. Explain how the title 'The Portrait of a Lady' suits the writing.
2. What impression do you form of the poetess and the poetess's mother after reading the poem 'A Photograph'?
3. How did the narrator and his companions save the boat from sinking?
4. Narrate the story of the stolen white horse.
5. Contrast the character of the narrator's mother and Mrs Dorling.

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A2- A PHOTOGRAPH

A3- "WE'RE NOT AFRAID TO DIE..IF WE CAN ALL BE TOGETHER"

B1- THE LABURNAM TOP

C1- THE SUMMER OF THE BEAUTIFUL WHITE HORSE

C2-THE ADDRESS

PHYSICS

1. A train 200 m long is moving with a speed of 90 kmph. In what time does it cross a bridge of length 2 km?
2. A train is moving with speed 80 kmph on a straight track and another train is moving with a speed of 50 kmph on the parallel straight track in the same direction. What is the velocity of the train A relative to train B and velocity of train B relative train A?
3. A thief is running in a jeep with a speed of 10 m/s. A police van chases him with a speed of 12 m/s. If the instantaneous separation of the jeep from the police van is 80m. How long the police will take to catch the thief?
4. A police jeep on a patrol duty on national highway was moving with a speed of 54 kmph. It finds a thief rushing up in a car in same direction at

speed of 126 kmph. Policeman fired at car of the thief with his service revolver with a muzzle speed of 100m/s. With what speed will the bullet hit the car of thief?

5. A car is going eastward with a velocity of 10 m/s. to the passenger in the car, A train appears to be moving westward with a velocity 15 m/s. What is the actual velocity of the train?
6. Two trains each of length 100 are running on parallel tracks one overtakes the other in 20 s and one crosses the other in 10 s. Calculate the velocities of the train?
7. An object starts to slide over a horizontal surface with an initial velocity of 10 m/s due to friction, it's velocity decrease at the rate of 1m/s. How much time will it take for the object to stop ?
8. A motorist is rushing at 40 m/s finds a child on the road 82 m ahead. He instantly applies the brakes so as to stop the engine within two m of the child. Find the time required to stop it?
9. A 100 m sprinter increase her speed from rest uniformly at the speed of 1 m/s up to three quarters of the total run and covers the last quarter of the run with uniform speed . How much time does she take to cover the first half and the second half of the run?
10. A car travels a distance from P to Q at a speed of 40 km/h and returns to P at a speed of 30 km/h.

(a) Calculate the average velocity of the journey.

(b) Find it's average speed.

11. The position of an object moving along x-axis is given by $x= a+ bt^2$ where a= 8.5 m and b= 2.5m/s and t is measured in seconds. What is it's velocity at t=0s and t=2s? What is the average velocity between t=2s and t-4s?
12. A body covers a distance of 10 m in the 3rd second of it's motion and 28 m in the 6th second. What distance will be covered by the body in 8th second of its motion?
13. A ball is thrown vertically upward with a velocity of 20 m/s from the top of a multi-storey building. The height of the point from where the ball is thrown is 25.0 m from the ground.
    (a) How high the ball rise
    (b) How long will it be before the ball hits the ground. Take g= 10m/s2
14. The distance traversed during equal intervals of time by a body falling from rest, stand to one another the same ratio as the odd no. Beginning with unity (1:3:5:7.....). Prove it.

15. A body starts to slide over a horizontal surface with an initial velocity of 0.5 m/s due to friction, its velocity decrease at the rate of 0.05 m/s. How much time will it take for the body to stop?
16. An electron travelling at a speed of 5×103 m/s passes through a electric field with an acceleration of 1012 m/s2. How long will it take the electron to double it's speed?
17. A boy travels a distance of 4 m in 3rd s and 12 m in 5th second of its motion. If the motion of body is uniformly accelerated how much will it travel in next 3 s?
18. A particle having initial velocity u moves with a constant acceleration a for time t.
    (a) Find the displacement of the particle in the last one second.
    (b) Evaluate it for u = 5m/s a= 2m/s2 and t= 10s
19. A body is moving with uniform acceleration it's velocity after 5 s is 25 m/s and after 8s is 34 m/s. Calculate the distance it will cover in 10th second?
20. A starts from rest and accelerates uniformly for 20 s to a velocity of 72 km/h it then runs at constant velocity and finally brought to rest in 200 m with a constant retardation. The total distance covered is 600 m. Fond the acceleration, retardation and the total time taken. Also plot the velocity time graph of the motion.
21. On a foggy day two car drivers spot each other when they are just 80 m apart. They were travelling at 72 km/h and 60 km/h respectively. Both of them simultaneously applied brakes which retard both the car at 5m/s2. Determine whether they avert the collision or not.
22. From the top of a tower 100 m height a ball is dropped and at the same time another ball is projected vertically upward from the ground with a velocity of 25 m/s. Find when and where the two balls meet.
23. A body is dropped from rest at a height of 150m simultaneously another body is dropped from rest from a point 100 m above the ground. What is the difference in heights after they have fallen for (a) 2s (b) 3s? How does the difference with height vary?
24. A balloon is ascending at a rate of 14 m/s at a height of 98 m above the ground. A packet is dropped from the balloon after how much time and with what velocity does it reach the ground?
25. A parachutist bails out from an aeroplane and after dropping through a distance of 40m. He opens the parachute and decelerate at 2m/s2 .If he reaches the ground with a speed of 2 m/s . How long is he in the air? At what height did he bail out of the plain?
26. The displacement x of a particle moving in one dimension under the action of a constant force is related to the time t= $\sqrt{X}$ +3 . Where x is in

meter and t in second. Find the displacement of the particle when it's velocity is zero?

27. A particle moves along x- axis in such a way that it's coordinate (x) varies with the time (t) according to the relation $x= 2-5t+6^{t2}$ find the initial velocity of the particle.

28. The displacement of a particle moving along x-axis is given by $x = 18t+5t^{2.}$ Calculate the instantaneous velocity at time t= 2s.

29. The speed of a train increasing at constant rate α from zero to v an then remains constant for an interval and finally decrease to zero at a constant rate B . If S be the total distance. Find total time taken.

30. A ball is thrown vertically upward from the ground with an initial velocity u. The ball is at a height of 80m two times, the time interval being 6s. Find u. Take g=10 m/s2

31. An open lift is moving upward with velocity 10 m/s. It has an upward acceleration of 2m/s2. A ball is projected upward with a velocity 20 m/s relative to ground. Find

(a) time when the ball again meets the lift.

(b) displacement of the lift and the ball at that instant.

(c) Distance travelled by the ball up to that instant

CHEMISTRY

1.Pauli exclusion principle helps to calculate the maximum number of electrons that can be accommodated in any

(a) orbital (b) subsell

(c) shell (d) All of these

2.The principal quantum number of an atom is related to the

(a) size of the orbital (b) spin angular momentum

(c) orbital angular momentum (d) orientation of the orbital in Spence

3.The designation of an orbital with n = 4 and l = 3

(a) 4s (b) 4p

(c) 4d (d) 4f

4.What transition in the hydrogen spectrum would have the same wavelength as the Balmer transition n = 4 to n = 2 in the He+ spectrum?

(a) n = 4 to n =1 (b) n = 3 to n = 2

(c) n = 3 to n = 1 (d) n = 2 to n = 1

5.An electron is moving in Bohr's orbit. Its de Broglie wavelength is λ. What is the circumference of the forth orbit?

(a) 2/λ (b) 2λ

(c) 4λ. (d) 4/λ

II. Assertion and Reasoning type questions :-

In the following questions, a statement of Assertion (A) followed by a Reasoning (R) is given. Choose the correct answer out of the following choices.

a. Assertion and reason both are correct and reason is correct explanation of assertion.
b. Both assertion and reason are correct statements but reason is not correct explanation of assertion.
c. Assertion is correct statement but reason is wrong statement.
d. Assertion is wrong statement but reason is correct statement.

1.Assertion (A): All isotopes of a given element show the same type of chemical behaviour.

Reason (R): The chemical properties of an atom are controlled by the number of electrons in the atom.

2. Assertion (A): The black body is an ideal body that emits and absorbs radiations of all frequencies.

Reason (R): The frequency of radiation emitted by a body goes from a lower frequency to higher frequency with an increase in temperature.

3. Assertion (A): It is impossible to determine the exact position and exact the momentum of an electron simultaneously.

Reason (R): The path of an electron in an atom is clearly defined.

4. Assertion : Number of orbitals in 3rd shell is 9.

Reason : Number of orbitals for a particular value of n = n2.

5.Assertion : Two nodal planes are present in 3dxy.

Reason : Number of nodal planes = l

III. Short answers type questions :-

1. Which one is having higher energy last electron of Cl– or last electron of O2–.
2. How many electrons will be present in the sub-shells having ms, value of –1/2 for n = 4 ?
3. Write the electronic configuration of Ni 2+ (At. No. of Ni = 28).
4. How many radial and angular nodes are present in 2p orbital.
5. What is the difference between the terms orbit and orbital?
6. Cricket ball, a tennis ball and a proton which has more uncertainity in velocity and which follows Heisenberg uncertainity principle maximum.
7. The electronic energy in Bohr's orbit is negative .How will you account for it?
8. Draw the shape of dz^2
9. Which series of lines of the hydrogen spectrum lie in the visible region'?
10. Calculate the radius of Bohr's fifth orbit for hydrogen atom.

Class XI Biology Assignment

Chapters 1, 2, 14, 15 & 17

(2 Marks, 3 Marks & 5 Marks Questions)

Chapter 1 – The Living World

2 Marks Questions

1. Define taxonomy and systematics.

2. What is binomial nomenclature?

3. Write the taxonomic hierarchy of Mango.

3 Marks Questions

4. Explain the hierarchy of taxonomic categories.

5. Describe the importance of taxonomy.

6. Differentiate between genus and species with examples.

5 Marks Questions

7. Explain the process of binomial nomenclature and its significance.

8. State the universal laws of binomial nomenclature.

9. Explain the importance of classification in understanding biodiversity.

Chapter 2 – Biological Classification

2 Marks Questions

10. What are archaebacteria?

11. Name the five kingdoms proposed by Whittaker.

12. Differentiate between viruses and viroids.

3 Marks Questions

13. Explain the characteristics of Kingdom Monera.

14. Describe the structure of bacteria.

15. Explain the economic importance of fungi.

5 Marks Questions

16. Describe Whittaker's five kingdom classification system.

17. Explain the characteristics of Kingdom Protista with examples.

18. Describe different groups of fungi with suitable examples.

Chapter 14 – Breathing and Exchange of Gases

2 Marks Questions

19. Define tidal volume and vital capacity.

20. What is the function of haemoglobin?

21. Differentiate between inspiration and expiration.

3 Marks Questions

22. Explain the mechanism of breathing in humans.

23. Describe the transport of oxygen in blood.

24. Explain respiratory disorders: asthma and emphysema.

5 Marks Questions

25. Describe the human respiratory system with labelled diagram.

26. Explain the mechanism of gaseous exchange in lungs and tissues.

27. Describe the transport of carbon dioxide in blood.

Chapter 15 – Body Fluids and Circulation

2 Marks Questions

28. What is double circulation?

29. Name the components of blood.

30. What are blood groups?

3 Marks Questions

31. Explain the structure of human heart.

32. Describe the process of blood clotting.

33. Differentiate between arteries and veins.

5 Marks Questions

34. Explain the cardiac cycle in humans.

35. Describe the conducting system of human heart.

36. Explain the lymphatic system and its functions.

Chapter 17 – Locomotion and Movement

2 Marks Questions

37. Define locomotion and movement.

38. What are actin and myosin?

39. Differentiate between red and white muscle fibres.

3 Marks Questions

40. Explain the sliding filament theory of muscle contraction.

41. Describe the structure of a sarcomere.

42. Explain different types of joints in human body.

5 Marks Questions

43. Describe the mechanism of muscle contraction.

44. Explain the internal structure of skelatal muscle with diagram.

45. Describe disorders of muscular and skeletal systems.

DAV POLICE PUBLIC SCHOOL
MATHEMATICS (XI)
HOLIDAYS's HOMEWORK

Chapter 1: Sets

MCQs

1.The set $A = \{x : x \in R, x^2 = 16 \text{ and } 2x = 6\}$ equals
(a) ϕ (b) {3,4} (c){3} (d) {4}

2. Which of the following is true?
(a) $a \in \{\{a\}, b\}$ (b) $\{b, c\} \in \{a, \{b, c\}\}$
(c) $\{a, b\} \in \{a, \{b, c\}\}$ (d) None of these

3. Which of the following is a singleton set?
(a) $\{x : |x| = 5, x \in N\}$ (b) $\{x : |x| = 6, x \in Z\}$
(c) $\{x : x^2 + 2x + 1 = 0, x \in N\}$ (d) $\{x : x^2 = 7, x \in N\}$

4. If A and B are two sets, then $A \cap (A \cup B)'$ is equal to
(a) A (b) B (c) ϕ (d) None of these

5. The number of the proper subset of {a, b, c} is:
(a) 3 (b) 8 (c) 6 (d) 7

6. In a group of 52 persons, 16 drink tea but not coffee, while 33 drink tea. How many persons drink coffee but not tea?
(a) 17 (b) 36 (c) 23 (d) 19

7. Which of the following sets is a finite set?
(a) $A = \{x : x \in Z \text{ and } x^2 - 5x + 6 = 0\}$ (b) $B = \{x : x \in Z \text{ and } x^2 \text{ is even}\}$
(c) $C = \{x : x \in Z \text{ and } x > -10\}$ (d) All of these

8. Which of the following is a null set?
(a) {0} (b) $\{x: x > 0 \text{ or } x < 0\}$
(c) $\{x: x\ 2 = 4 \text{ or } x = 3\}$ (d) $\{x : x\ 2 + 1 = 0, x \in \mathbf{R}\}$

9. Let P be a set of squares, Q be set of parallelograms, R be a set of quadrilaterals and S be a set of rectangles. Consider the following :
I. $P \subset Q$ II. $R \subset P$ III.$P \subset S$ IV. $S \subset R$
Which of the above are correct?
(a) I, II and III (b) I, III and IV (c) I, II and IV (d) III and IV

10. Write $\{x: x \in R, -12 < x \leq -10\}$ as intervals.
(a) $(-12, -10)$ (b) $(-12, -10]$ (c) $[-12, -10]$ (d) $[-12, -10)$

1 Mark Each

11. Write all subsets of set {1, 3, 9}

12. Write {14, 21, 28, 35, ..., 98} in set builder form.

13. Write the following set in the roster form:
A={x: x is a positive integer les that 10 and $2^x - 1$ is an odd number}

14. If A and B are two finite sets, then $n(A) + n(B)$ is equal to _____.

15. Write set builder form of set $\left\{\frac{1}{2}, \frac{2}{5}, \frac{3}{10}, \frac{4}{17}, \frac{5}{26}\right\}$.

16. Write down all possible subsets of {1,{1}}

17. Two sets have m and n elements. Then number of subsets of the first set is 56 more than that of the subsets of second set. Find the value of m and n.

2 Marks Each

18. Write the following sets in roster form:
(i) A=$\{x: x \text{ is an integer and } -3 \leq x < 7\}$
(ii) B={x: x is a natural number less than 6}
(iii) C={x: x is a two digit natural number such that the sum of the digit is 9}
(iii) D= {x: x is a prime number which is divisor of 60}

19. A={3,5,7,9,11}, B={7,9,11,13},C={11,13,15} and D={15,17} find $A \cap (B \cup D)$

20. If A={2,4,6,8,10}, B={1,2,3,4,5,6,7} and C={2,6,7,10} then show that
$A - (B \cup C) = (A - B) \cap (A - C)$

21. If U={1,2,3,4,5,6,7,8,9}, B={1,2,3,4}, C={2,4,6,8} and C={3,4,5,6} find:
(i) $(A \cup B)'$ (ii) $A - (B - A)$

22. Write the following as intervals:-
(i)$A = \{x: x \in R, -4 < x \leq 6\}$ (ii) $B = \{x: x \in R, 0 \leq x \leq 10\}$
(iii) $C = \{x: x \in R, -3.2 < x \leq 1.5\}$ (iv) $D = \{x: x \in R, 7/4 < x < 4/5\}$

23. Prove that
(i) $(A \cup B)' = A' \cap B'$ (ii) $(A \cap B)' = A' \cup B'$

3 Marks Each

24. Draw the venn diagrams to illustrate the following relationship among set E, M and U where E is the set of students studying English in a school, M is the sets of students studying Mathematics in the same school, U is the set of all student in that school.
(a) All the students who study Mathematics study English also, but some students who study English do not study Mathematics.
(b) There is no student who studies both Mathematics and English.
(c) Some of the students study Mathematics but do not study English, some study English but do not study Mathematics and some study both.
(d) Not all students study Mathematics but every student studying English studies Mathematics.

25. If U={1,2,3,4,5,6,7,8}, A={1,2,3,4}, B={3,4,6}, C={5,6,7,8} then verify that
(i) $A - (B \cup C) = (A - B) \cap (A - C)$
(ii) $(A \cup B)' = A' \cap B'$
(iii) A$\cup$ $(B \cap C) = (A \cup B) \cap (A \cup C)$

26. If U={1,2,3,4,5,6,7,8,9}, X={1,3,5,9}, Y={2,3,4,6}, Z={1,9} Find

(i) X′	(ii) $X' \cap Y'$	(iii) $X \cap (Y \cup Z)$	(iv) $X \cup (Y \cap Z)$
(v) $X - Y$	(vi) $Y - X$	(vii) $(X \cap Y) \cup (Y \cap Z)$	(viii) X$\cap$ Y'

27. Let A and B be two sets. If $A \cap X = B \cap X = \phi$ and $A \cup X = B \cup X$ for some set X Prove that $A = B$

28. From 50 students taking examinations in Mathematics, Physics and Chemistry, each of student has passed in at least one of the subject, 37 passed Mathematics, 24 Physics and 43 Chemistry. At most 19 passed Mathematics and Physics, at most 29 Mathematics and Chemistry and at most 20 Physics and Chemistry. What is the largest possible number that could has passed all three examination?

29. In a survey of 60 people, it was found that 25 people read newspaper H, 26 read newspaper T, 26 read newspaper I, 9 read both H and I, 11 read both H and T, 8 read both T and I, 3 read all three newspapers. Find:
(i) the number of people who read at least one of the newspapers
(ii) the number of people who read exactly one newspaper

30. Draw the venn diagram of each of the following

(i) A'	(ii) $A - B$	(iii) $A \cup B$	(iv) $A \cap B$
(v) $(A \cup B)'$	(vi) $(A \cap B)'$	(vii) $A' \cap B'$	(viii) $A' \cup B'$
(ix) $A \cup B \cup C$	(x) $(A - B) \cup (B - A)$	(xi) $(A \cap B) \cup (A \cap C)$	(xii) $A \cup B - C$

31. **Case study-1**
Two non- empty sets A and B are given by:
A={x:x is a letter in ' I LIKE MATHEMATICS}
B={x:x is a letter in ' I LIKE STATISTICS}
Based on the above information, answer any four of the following questions:

(a) Which set is a subset of other.	(b) What will be A$\cup$B
(c) What will be A$\cap$B	(d) What will be $B - A$

32. **Case Study-2**
You are the manager of a local supermarket, and you have three sets of products that represent different categories of items in your store : Set A={1,3,4,5,7,9} represents the inventory of fruits. Set B={0,2,4,6} represents the inventory of dairy products. Set C={4,7,8,9} represents the inventory of customer-favorite items. Your goal is to optimize your supermarket's inventory and customer satisfaction. You plan to use set operations to make informed decisions.
(i) Which items can you offer to your customers if you combine the inventories of fruits (A) and dairy products (B)?
(ii) You want to stock items that are both fruits (A) and customer favourites (C). Find the items.
(iii) To maximize sales, you want to offer products that are either fruits (A) or items that are both dairy products (B) and customer favourites (C). Find the items.

33. **Case study -3**

The sum of cardinal numbers of two finite sets A and B is 9. The ratio of number of subsets of set A is to number of set B is 8:1. Based on above information answer the following questions:

(i) What is the cardinal number of set A?

(ii) What is the cardinal number of set B?

(iii) What is maximum value of $n(A \cup B)$?

(iv) If B is subset of A, then what is $n(A \cap B)$?

Chapter 2: Relations and Functions

1. If $g = \{(1, 1), (2, 3), (3, 5), (4, 7)\}$ is a function described by the formula, $g(x) = \alpha x + \beta$ then what values should be assigned to α and β ?

(a) $\alpha = 1, \beta = 1$ (b) $\alpha = 2, \beta = -1$ (c) $\alpha = 1, \beta = -2$ (d) $\alpha = -2, \beta = -1$

2. If $f(x) = x^3 - \frac{1}{x^3}$ then $f(x) + f\left(\frac{1}{x}\right)$ is equal to

(a) $2x^3$ (b) $2\frac{1}{x^3}$ (c) 0 (d) 1

3. Domain of $\sqrt{a^2 - x^2}$, (a>0) is

(a) (–a, a) (b) [–a, a] (c) [0, a] (d) (–a, 0]

4. The domain of the function f defined by $f(x) = \frac{1}{\sqrt{x-|x|}}$ is

(a) R (b) R^- (c) R^+ (d) ϕ

5. The domain of the function f defined by $f(x) = \frac{1}{\sqrt{x+|x|}}$ is

(a) R (b) R^- (c) R^+ (d) ϕ

6. Consider the following statements.

I. The relation $R = \{(x, x^3) : x \text{ is a prime number less than } 10\}$ is $\{(3, 27), (5, 125), (7, 343)\}$

II. The range of the relation

$R = \{(x + 2, x + 4) : x \in N, x < 8\}$ is $\{1, 2, 3, 4, 5, 6, 7\}$.

Choose the correct option.

(a) Only I is true (b) Only II is true (c) Both are true (d) Both are false

7. If $f : R \to R$ is defined by $f(x) = 3x + |x|$, then $f(2x) - f(-x) - 6x =$

(a) f(x) (b) 2f(x) (c) – f(x) (d) f(– x)

8. If $(4x + 3, y) = (3x + 5, -2)$, then the sum of the values of x and y is

(a) 0 (b) 2 (c) –2 (d) 1

9. The number of elements in the set $\{(x, y) : 2x^2 + 3y^2 = 35, x, y \in Z\}$, where Z is the set of all integers,

(a) 8 (b) 2 (c) 4 (d) 6

10. If n (X) = 5 and n (Y) = 7, then the number of relations on X ×Y is 2^k. The value of 'k' is

(a) 5 (b) 7 (c) 35 (d) 12

1 Mark Each

11. Given A={1,2,3,4,5} and R ={(x, y): $x \in$ A, $y \in$ B } find the ordered pairs which satisfy the condition $x + y < 5$.

12. If A={$-1,1$} find A×A×A

13. If A={$x: x \in W, x < 2$}, B={$x: x \in N, 1 < x < 5$} and C={3,5} then find A×(B∪C).

14. If A ⊆ B, prove that A × C ⊆ B × C for any set C.

15. $If\ y = f(x) = \frac{ax-b}{bx-a}$ prove that $f(y) = x$

16. Let f be a function defined by the rule $f(x) = 4x^2 + 2x - 3$ find $f(2)$ also $f(f(1))$

2 Marks Each

17. Find range of the following:

(i) $f(x) = -|x|$ (ii) $f(x) = \frac{x^2-16}{x-4}$

18. Let R be the set of real numbers. Define a real function $f: \boldsymbol{R} \to \boldsymbol{R}$ by $f(x) = x + 10$. Sketch the graph of the function.

19. In the set of natural numbers, Let R be a relation defined as a R b if and only if a, b ∈ N and $a + 2b = 11$. Write relation in roster form also write domain and range.

20. Let A be a non-empty set such that A×B= A×C. Show that $B = C$.

21. Let A={1,2,3,4,……..25} and R is a relation "is one fourth of" in A . Write R as a subset of A×A. Also find domain and range of R.

22. Let $f = \{(1,1), (2,3), (0,-1), (-1,-3), \ldots \ldots \ldots\}$ be a function from Z to Z defined by $f(x) = ax + b$, for some integer a and b. Determine a and b.

23. Let A be the set of first ten natural numbers and let R be a relation on A defined by $(x, y) \in R \leftrightarrow x = y^2$. Express R as sets of ordered pairs and also find R^{-1}.

3 Marks Each

24. Let A = {1, 2, 3, 4, 5, 6}. Define a relation R from A to A by R = {$(x, y) : y = x+1$}
(i) Depict this relation using an arrow diagram.
(ii) Write down the domain, co-domain and range of R.

25. Let $P = \{x: x < 3,\ x \epsilon N\}, Q = \{x: x <= 2, x \in W\}$ Find $(P \cup Q) \times (P \cap Q)$ where W is a set of whole numbers.

26. Let A = {0, 1, 2, 3}, B = {3, 4} and C = {4,5,6}. Find

(i) $A \times (B \cap C)$ (ii) $(A \times B) \cap (A \times C)$

(iii) $A \times (B \cup C)$ (iv) $(A \times B) \cup (A \times C)$

27. Prove Let A = {1, 2, 3, 4, 6}. Let R be the relation on A defined by $\{(a, b): a, b \in A, b$ is exactly divisible by $a\}$.

(i) Write R in roster form

(ii) Find the domain and range of R

(iii) Find R^{-1}.

28. Let R be a relation from **N** to **N** defined by $R = \{(a, b) : a, b \in \mathbf{N}$ and $a = b^2\}$. Are the following true?

(i) $(a, a) \in R$, for all $a \in \mathbf{N}$

(ii) $(a,b) \in R$, implies $(b,a) \in R$

(iii) $(a, b) \in R$, $(b,c) \in R$ implies $(a,c) \in R$.

29. Let f, g: $\boldsymbol{R} \to \boldsymbol{R}$ be defined, respectively by $f(x) = x + 1, g(x) = 2x - 3$

find $f + g,\ f - g,\ f.g,\ f/g$

30. Let $f = \left\{\left(x, \frac{x^2}{1+x^2}\right) : x \in \boldsymbol{R}\right\}$ be a function from **R** to **R** Determine the range of f.

31. Define greatest integer function. Draw graph. Write domain and range also.

32. Find domain and range of $f(x) = \frac{x}{1+x^2}$

33. Draw the graph of function $f(x) = x + |x + 1|$. Hence find the range.

34. If $f(x)$ is a real function defined by $f(x) = \frac{x-1}{x+1}$ then prove that $f(2x) = \frac{3f(x)+1}{f(x)+3}$

35. Find domain of following

(i) $\frac{x^3+3x-4}{x^2-8x+12}$ (ii) $\sqrt{3 - 2x - x^2}$ (iii) $1 - |x - 2|$

36. Find the domain and range of the following

(i) $f(x) = \sqrt{4 - x^2}$ (ii) $f(x) = \frac{|x-1|}{x-1}$ (iii) $[x] - x$ (iv) $\sqrt{x^2 - 16}$