DAV MULTIPURPOSE PUBLIC SCHOOL, SONEPAT

SUMMER HOLIDAY HOMEWORK 2024-25

CLASS XI (Science + Commerce + Humanities)

Happy Holidays. Have a lot of fun and enjoy your summer holidays. But to be ready for tomorrow's opportunities, do your homework today positively. Learn, refine your skills and focus on your growth. Make each day your masterpiece.

CHEMISTRY

1.Read a biography of any one scientist and write review in 500 words .

2. Do NCERT Exemplar of Chapter1 and 2 in your chemistry notebook.

3. Questions to be done in notebook

1. What is photoelectric effect? State the result of photoelectric effect experiment that could not be explained on the basis of laws of classical physics. Explain this effect on the basis of quantum theory of electromagnetic radiations.

2. What points of Bohr's model of an atom can be used to arrive at this formula? Based on these points derive the above formula giving description of each step and each term.

3. Calculate the energy and frequency of the radiation emitted when an electron jumps from n = 3 to n = 2 in a hydrogen atom.

4. Why was a change in the Bohr Model of atom required? Due to which important development (s), concept of movement of an electron in an orbit was replaced by, the concept of probability of finding electron in an orbital? What is the name given to the changed model of atom?

5. What are quantum numbers? What permitted values can these have? Give the significance of each quantum number

6. Competency based questions

1. Out of electron and proton which one will have, a higher velocity to produce matter waves of the same wavelength? Explain it.

2. A hypothetical electromagnetic wave is shown in fig. Find out the wavelength of the radiation.

3. Chlorophyll present in green leaves of plants absorbs light at 4.620 × 1014 Hz. Calculate the wavelength of radiation in nanometer. Which part of the electromagnetic spectrum does it belong to?

4. Table-tennis ball has a mass 10 g and a speed of 90 m/s. If speed can be measured within an accuracy of 4% what will be the uncertainty in speed and position?

5. The effect of uncertainty principle is significant only for motion of microscopic particles and is negligible for the macroscopic particles. Justify the statement with the help of a suitable example.

6. Hydrogen atom has only one electron, so mutual repulsion between electrons is absent. However, in multi electron atoms mutual repulsion between the electrons is significant. How does this affect the energy of an electron in the orbitals of the same principal quantum number in multi electron atoms?

7. The Balmer series in the hydrogen spectrum corresponds to the transition from n1 = 2 to n2 = 3,4,……. This series lies in the visible region. Calculate the wave number of line associated with the transition in Balmer series when the electron moves to n = 4 orbit.(RH = 109677 cm–1)

8. According to de Broglie, matter should exhibit dual behaviour, that is both particle and wave like properties. However, a cricket ball of mass 100 g does not move like a wave when it is thrown by a bowler at a speed of 100 km/h. Calculate the wavelength of the ball and explain why it does not show wave nature.

4.Make an investigatory Project of any topic of chemistry and the Project report should be handwritten using A4 size sheet, use diagram wherever necessary.

BIOLOGY

1. Revise all syllabus taught in the class for Unit test 2.
2. Write all questions from NCERT EXAMPLAR of each chapter 1 to 5 with answers in your notebook.
3. Do at least 2 case study based questions from each chapter.

4. Prepare a project report on one topic related to human physiology i.e. disorders of different organ system and their treatments assigned to you in the class.

Complete your practical file if pending.

(Experiment – 1,2,3 of section –B)See from the syllabus.

PHYSICS

- **Do all the questions in a separate register.**

Units and Dimensions

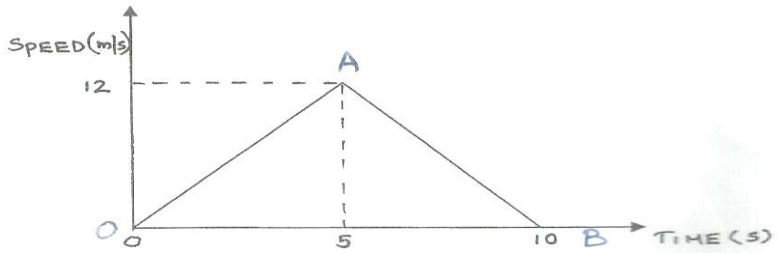
1. When 1 meter, 1 kg and one minute are taken as fundamental units, the magnitude of force is 36 units. What is the value of this force on CGS system?
2. If the units of force, energy and velocity are 10 N, 100 J, 5 m/s, find the units of mass, length and time.

3. The density of a material in CGS system is 8 g/cm^3. Find density of material in a system where unit length is 5cm and unit of mass is 20 g.
4. Check the correctness of the relation dimensionally
   (a) $h = \frac{2\sigma\, cos\theta}{r^2 dg}$ Where h is the height, σ is the surface tension,θ is angle of contract, r is the radius, and d is the density of material.
   (b) $v = \frac{1}{2\pi}\sqrt{\frac{mgl}{I}}$ Where v is the frequency, l is the length, I is the moment of inertia, m is the mass and g is acceleration due to gravity.
5. Write the dimensions of a/b in the equation $E = \left[\frac{b-x^2}{at}\right]$ where E is the energy, x is distance and t is time.
6. Experiments show that frequency v of a tuning fork depends on length l of the prong, density d and Young's modulus Y of the material. Derive the expressions of the frequency of the tuning fork dimensionally.
7. Calculate the dimensions of linear momentum (P), surface tension (T), Force (F) and impulse (I) in terms of velocity (v), density (d) and frequency (ν).
8. Using the method of dimensions, derive the expression for rate of flow V of a liquid through a pipe of radius r, under a pressure gradient P/I and liquid of coefficient of viscosity η.
9. If $(P+a/v^2)(v-b) = RT$, where the words have their usual meanings, then find the dimensions of a/b.
10. If length, Time and Energy are fundamental units, find the dimensions of mass.
11. In C.G.S system, the value of Stefan's constant is 5.67×10^{-5} erg s^{-1} cm^{-2} K^{-4}. Write down its value in SI units.
12. Name at least seven physical quantities whose dimensions are ML^2T^{-2}.
13. State the number of significant figure in the following:
    (a) $0.007 m^2$ (b) 2.64×10^{24} Kg
    (c) 0.2370 gcm^{-3} (d) 6.320 J
    (e) 6.032 Nm^{-2} (f) 0.0006032m
14. If the unit of force is 100 N, unit of length is 10 m and unit of time is 100 s, what is the unit of mass in this system of units.
15. If velocity of light c, Planck's constant h and gravitational constant G are taken as fundamental quantities, then express mass, length and time in terms of dimensions of these quantities.

KINEMATICS

1. A person moves 30m north and then 20m east and then $30\sqrt{2}$ m southwest. Find its displacement from original position.
2. If the unit vectors $\hat{A}$ and $\hat{B}$ are inclined at an angle θ, then show that $|\hat{A} - \hat{B}| = 2\sin(\theta/2)$.
3. If $\vec{A} = 3\hat{\imath} + \hat{\jmath} + 2\hat{k}$ and $\vec{B} = 2\hat{\imath} - 2\hat{\jmath} + 4\hat{k}$, find the unit vector perpendicular to each of these two.
4. Find the value of n such that the two vectors $2\hat{\imath} + 4\hat{\jmath} - n\hat{k}$ and $3\hat{\imath} - 4\hat{\jmath} - 2\hat{k}$ are orthogonal.
5. If $\vec{A} = 3\hat{t} + 4\hat{\jmath}$ and $\vec{B} = 7\hat{\imath} + 24\hat{\jmath}$
   (a) Find the vector having same magnitude as $\vec{B}$ and parallel to $\vec{A}$.
   (b) Find the component of vector $\vec{A}$ along the direction of $(\hat{\imath} + \hat{\jmath})$

6. The relation between time t and distance x is given by $t = \alpha x^2 + \beta x$ where α *and* β are constants. Show that the retardation is $2\alpha v^3$ where v is the instantaneous velocity.
7. The acceleration an in m/s^2 is given by a = 3t^2 + 2t + 2, where t is time. If the particle starts out with a velocity v = 2m/s at t = 0, then find the velocity at the end of 2s.
8. From the top of a tower 100m in height a ball is dropped and at the same time another ball is projected vertically upwards from the ground with a velocity 25m/s. Find when and where two balls will meet.
9. A body travels a distance of 12m in 2nd and 20m in the 4th second. Find the distance the body will cover in 4 seconds after 5th second?
10. A body travelling along a straight line traversed one third of the total distance with a velocity of 4m/s. The remaining distance was covered with a velocity of 2m/s for half the time and with velocity of 6m/s for the other half time. What is the mean velocity averaged over the whole time of the motion.
11. The speed time graph of a particle moving along a fixed direction is as shown in the figure.
    (a) Obtain the distance travelled by the particles between
        (i) t = 0 to t = 10s



        (ii) t = 2 to t = 6s
    (b) What is the average speed of the particles over these two intervals?
12. A ball projected upwards from A, the top of tower reaches ground in t_1 second. If it is projected vertically downwards from A with the same velocity, it reaches the ground in t_2 seconds. If it falls freely from A, show that it would reach the ground in $\sqrt{t_1 t_2}$ seconds.
13. Two buses started simultaneously towards each other from A and B which are 480 km apart. It took the first bus travelling from A to B, 8hrs to cover the distance and the 2nd bus travelling from B to A, 10hrs. Determine when the buses will meet after starting and at what distance from A.
14. A particle starts from origin at t=0 with the velocity of 10j m/s and moves in a X-Y plane under the action of force which produces a constant acceleration of
    (8i +2j) m/s^2.
        (a) At what time is the x-coordinate of the particle 16m?
        (b) What is y-coordinate of the particle at that time?
        (c) What is the speed of the particle at this time?

15. A race car accelerates uniformly from 18.5 m/s to 46.1 m/s in 2.47 seconds.

Determine the acceleration of the car and the distance traveled.

- Revise Chapter 1, 2 &3 thoroughly. Do practice of numericals.
- Write 1-60 dimension formulae thrice from NCERT book.

Physical Education

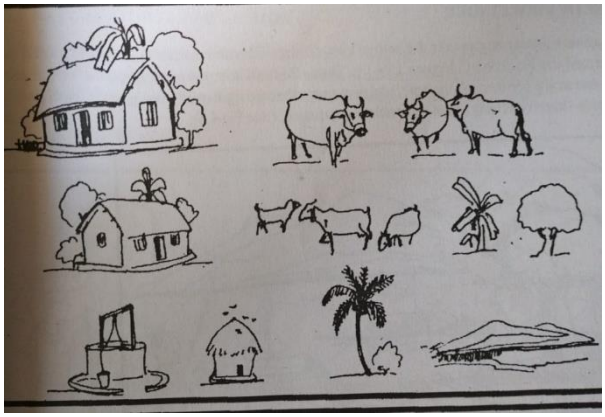
1. Prepare practical file

2. Revise all the chapters done in the class.

Painting

1. Make one creative Painting in mix-media on A2 size cartridge or ivory sheet.
2. Make one Warli or Gond painting on A2 size cartridge or ivory sheet.
3. Make one Kalamkari, Pithora or Madhubani painting on A2 size cartridge or ivory sheet.
4. Make two still life compositions by using household items.

Create composition with the following elements and colour with pastel/pencil/water colours.



INFORMATICS PRACTICE

Note: Write these commands in Practical file

1. To create a database school.
2. To create student table with the Rollno, class, section, gender, name, dob, and marks as attributes where the student id is the primary key.
3. To insert the details of at least 10 students in the above table.
4. To display the entire content of table.
5. To add a new column address of Varchar(20) in the existing table Student.
6. To delete column gender from student table.
7. To delete primary key constraint from Rollno column of student table.
8. To display Rollno, Name and Marks of those students who are scoring marks more than 50.
9. To display Rno, Name, DOB of those students who are born between '2005- 01-01' and '2005-12-31'.
9. Complete Q 1,2,3 of Ch-8 of NCERT book in fair Notebook
10. Revise all the syllabus done in class.

TYPOGRAPHY

Q1) Practice of QWERTY keyboard for students through"Rapid-Typing"software.

Q2) Enter a paragraph and format it according to the given specifications.

- Align the text in different alignment of the paragraph
- Keep the lines pacing of 1.5

Q3) Create stationary list having four columns(using tab)

- Font specifications for the heading (Stationary List): 14-point Arial font in bold and italics.
- The headings of the columns shouldbein12-point and bold.
- The rest of the document should be in10-point Times New Roman.
- Leave a gap of 12-points after the heading.

Q4) Design a time-table form for your class.

- The first line should mention the class/section in16-point Arial Font and should be bold.
- Leave a gap of 12-points.
- The rest of the document should use10-point Times New Roman font.
- The footer should contain your specifications as the name and date of creation.

Q5)Design a certificate for an athlete meet in landscape orientation with a border around the document.

Q6) Enter the data into a given table for 5 employees of an organization:

Emp. No.	Name	Address	Mobile No.

Add a column e-mail address between the Address and Mobile No .to the table.

Q7) Prepare a birthday card for your friend.

ENGLISH

1. It really pained Khushwant Singh's grandmother that the schools did not teach anything about God and the scriptures. Should moral education be taught in schools? What do you think? Write a Speech expressing your ideas on the same.
2. Make a glossary of the nautical terms used in the chapter "We're Not Afraid to Die…….. if We Can all Be Together ".
3. Uncle Khosrove of 'The Summer of the Beautiful White Horse ' was subconsciously disturbed by the Armenian Massacre resulting into his irritable behavior. Such genocide is criminal. Highlighting the need of harmony, draft a Poster on the theme of- INTERNATIONAL HARMONY.
4. Develop a conversation between Shirley Toulson and Marga Minco discussing the loss that each has suffered. Also elaborate their coping mechanism.

5. Prepare Mind-Map (include theme, characters and literary devices)of all the poems of Hornbill.
6. Do Note-Making and Summarizing of the following chapters -

- DISCOVERING TUT..
- AILING PLANET….
- SILK ROAD
  (HORNBILL)

7. Read a leading English newspaper daily and rewrite any three Articles that appealed to you the most. (100-120 words)
8. Improve your vocabulary by finding out the meaning of 5 new words daily. Also frame a sentence with each new word.
9. Based on your reading of the newspaper, record a video of 2 minutes reporting any 5 burning topics. You have to play the role of a news reporter in the same. It will be used for evaluating your Speaking Skills.
10. Choose a topic for Project Work and prepare a report on it based on the guidelines shared in the class.

PSYCHOLOGY

1. Watch any documentary/ movie on psychological issue (disorder/disability) and write a summary in 500 words in a scrapebook.

2. Prepare the scope of psychology in india and abroad in a scrapebook.

3. Prepare a project file on any topic on coloured sheets.

4. Frame at learst 10 MCQ from each chapter 1 and 2.

5. An autobiography is story of your life. Your holidays homework is to write an autobiography. You may write it in a coversation or story style. Share your photographs, family pictures etc. Feel free to write about any significant event that you have experienced and what you learnt from it.

(Use A4 size coloured paper)

6. Prepare a chart or poster on any psychological aspect/ topic.

Accountancy

1. Revise all the chapters done in the class.

2. Do illustrations of Journal, Accounting equation and Cash book in a separate notebook.

Art integration activity

3. Make any one on any topic of your choice.

A. Collage

B. Chart

C. PPT

D. You tube video

4. Prepare practical file as discussed in the class.

5. Complete Fair note book work (if not done)

BUSINESS STUDIES

1. Learn chapter 1 and 2

2. Do case studies of chapter 1 and 2 given in the book at the end of chapter.

Art integration activity

3. Make any one on any topic of your choice.

A. Collage

B. Chart

C. PPT

D. You tube video

4. Prepare practical file as discussed in the class.

5. Complete Fair note book work (if not done)

6. solve assignment in separate notebook. Assignment will be shared on broadcast group.

ECONOMICS

1. **Revise** Chapters 1 to 7
2. Do all miscellaneous practicals in fair notebook.
3. **UT 2 Syllabus:** Ch 3, 5 and 6
4. **Art Integrated Activity:**
   For Roll Numbers:
   1 to 15: Prepare a PPT on Topic " Tabulation"
   16 to 30: Prepare a beautiful Chart on any topic from Chapter 2
   31 to 45: Prepare a PPT on Chapter -6
   45 and above: Prepare a PPT on Chapter -7

POLITICAL SCIENCE

A. Project Work :20 Marks

AS PER TOPIC ALLOTTED BY THE TEACHER IN THE CLASS:

GENERAL GUIDELINES:

- The project is to be done on inter-leaf sheets.
- The total length of the project will be 20-25 pages.
- Students have to preserve the initial drafts of the project as well as any research papers that they may have used.
- Students have to be prepared to give a presentation of the project in the class.
- A summary/synopsis(one page) of the project has to be prepared covering:

  The objective statement: Their observations and findings

  The learning outcomes
- Any other learning from this exercise such as skill soft team work, problem solving, time management, information collection, processing, analysing and synthesizing relevant information to derive meaningful conclusions;
- The projects must be neat and well-presented and must be completely hand-written.
- No whiteners to be used or written matter to be crossed out .In case of any mistakes, redo the sheet.
- Do not number sheets or write dates unless instructed.·
- Colour illustrations, maps, charts may be hand draw nor printed (If it is relevant for any aspect of your project) are welcome to make the look attractive.

Presentation:

In the format art form like cartoons ,caricatures ,posters.... digital prints or sheets

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

- **Choose a Title/Topic Need of the Study,**
- **Objective of the Study**
- **Hypothesis Content-Time line, Maps, Mind maps, Pictures, cartoons etc.**
- **(Organization of Material/Data Present Material/Data)**
- **Analysing the Material/Data for Conclusion**
- **Draw the Relevant Conclusion**
- **Bibliography**

Expected Check list for the Project Work:

- Introduction of topic/title
- Identifying the causes, events, consequences and/or remedies
- Various stake holders and effect on each of them
- Advantages and disadvantages of situations or issues identified
- Short-term and long-term implications of strategies suggested during research
- Validity, reliability, appropriateness, and relevance of data used for research work and for presentation in the project file
- Presentation and writing that is succinct and coherent in project file
- Citation of the materials referred to,in the file in foot notes,resources section, bibliography etc.

Assessment of Project Work:

- Project Work has broadly the following phases :Synopsis/ Initiation, Data Collection,

Data Analysis and Interpretation through activities, quiz, survey, interviews and Conclusion.

- Viva

B. Make a model of EVM and VVPT.

C. Inculcate habit of reading news paper and make short reports for further reference.

D. Make a sample paper on Book1 :Indian Constitution

E. Write the summary of every chapter done in the class.

F. Revise all the chapters done in the class.

Geography

1. Make a geological time scale.

2. Define the term degassing and differentiation.

3. Explain the evolution of the earth with diagram.

4. What do you understand by intrusive landforms. Explain with diagram.

5. What are the physical features of India.

6. Explain the evolution of Himalayan mountains.

7. Define the continental drift theory with hypothesis.

8. Explain the theory of sea floor spreading.

9. What do you understand by plate movement?

10. Explain the theory of plate tectonics.

Learn UT syllabus

1. Structure and physiography

2. The origin and evolution of the earth

3. Distribution of oceans and continents.

Complete your practical file in A3 size sheets.

HISTORY

1. **Learn Chapter 1,2,3**
2. Frame **15** one mark Questions from each chapter and write in fair notebook.
3. Art integration activity-

4. Make 2 writing tablets of Mesopotamian civilization by using wet clay .Carve the symbols using a sharp pencil or any other material as a stylus. Leave the tablet to dry . paint the clay tablets.
5. Create an informational/Travel Brochure on Roman Civilization (location, Important rulers, economy, society , religion, art, architecture, other achievements).
   Note- Students can paste or draw pictures.
6. Prepare a family tree of Mongols on A-3 size sheet.
7. **Do the following Assignment-**

   Q1.In the following questions a statement of assertion followed by a statement of reason is given choose the correct answer out of the following choices:
   (A)(A) and (R) both are correct and (R) is the correct explanation of (A).
   (B)(A) and (R) both are correct but (R) is not the correct explanation for (A)
   (C) (A) is correct but (R) is wrong.
   (D) (A) is wrong but (R) is correct.
   Assertion (A)Hammurabi was responsible for the unification of the whole Mesopotamia.
   Reason (R)The entire Mesopotamian region is now spread across present day Iraq, Kuwait, Turkey and Syria.

   Q2. Assertion (A): The division of labour is a mark of urban life in Mesopotamia.

   Reason (R): In such a system some people give commands that others obey.

   Q3.Which one of the following statement is incorrect regarding Mesopotamian society-

   A)From 3000 BCE, settlements had begun to develop in Southern Mesopotamia.
   B) In Mesopotamian society there were nuclear families.
   C) The father was the Head of the family.
   D)There was absence of town planning.
   Q.4) Identify the given image-

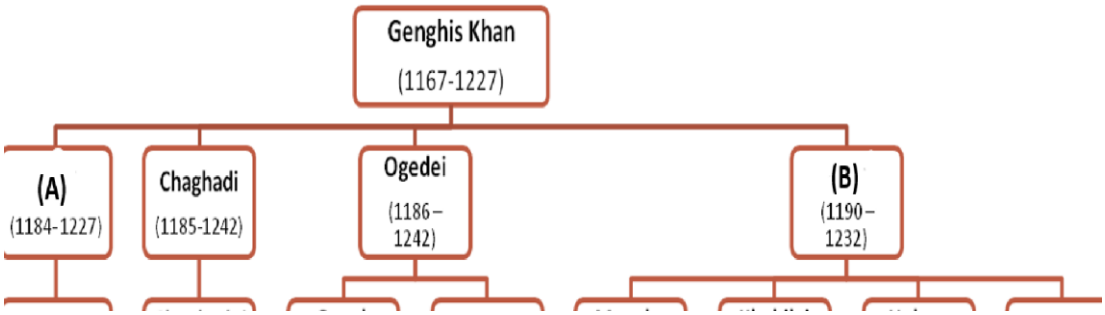
   Q.5 On the given map of West Asia mark and locate any five centres related to Mesopotamia civilisation and the entire Mountainous region.

Q.6The emperor who made Christianity the official religion in the Roman Empire was
A) Alexander B) Augustus C) Constantine D) Nero

Q.7Assertion (A): Romans lived in a Nuclear family
Reason (R): Two brothers not share a didhousehold..
A). Both A and R are true and R is the correct explanation
B) Both A and R are true but R is not the correct explanation
C) A is true but R is False
D).A is False but R is true

Q.8The city of Alexandria, founded by Alexander the Great, was a major center for:
A) Trade and commerce B) Literature and philosophy
C) Military training D) Religious pilgrimage

Q9 Replace **(A) and (B)** with Appropriate names:



A) Borte, B- Jochi B) A-Jochi, B- Toluy

C) Yesugei, B- Borte D) Toluy , B- Jochi

Q.10The structure depicted in the picture is:

A) Colosseum B) Hadrian's Wall

C) Great wall of China D)Santa Maria Del Fiore

Q.11**Case based study question**

A major difference between the two superpowers and their respective empires was that theRoman Empire was culturally much more diverse than that of Iran. The Parthians and later the Sasanians, the dynasties that ruled Iran in this period, ruled over a population that was largelyIranian. The Roman Empire, by contrast, was a mosaic of territories and cultures that werechiefly bound together by a common system of government. Many languages were spoken inthe empire, but for the purposes of administration Latin and Greek were the most widely used,indeed the only languages. The upper classes of the east spoke and wrote in Greek, those ofthe west in Latin, and the boundary between these broad language areas ran somewhereacross the middle of the Mediterranean, between the African provinces of Tripolitania (whichwas Latin speaking) and Cyrenaica (Greek- speaking). All those who lived in the empire weresubjects of a single ruler, the emperor, regardless of where they lived and what language they spoke.

Questions:

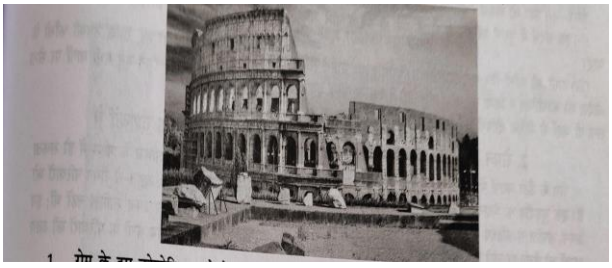
1. How would you differentiate the RomanEmpire from Iran?

2. Name two dynasties who ruled over Iran during this period.

3. Which empire was bound together by a common system of government and why?

Q 12) **Picture Based Questions**

Look at the given picture carefully and answer the multiple choice questions given below it:



Q.13) What conclusion do you draw after seeing this Colosseum in Rome? (A) The Romans used to build grand buildings.

(B) His building art (architecture) was of high quality.

(C) Only (A)and (B)

(D) Both (A) and (B)..

Q.14) In this building, swordsmen fought with animals. Who are the 'swordsmen'?

(A) People who make swords

(B) A warrior skilled in sword fighting

(C) People having power like swords

15) Project Work-

Choose any one topic for project from the list given below and collect information for the same.

Note- Student can also choose any other topic related to curriculum.

The Topic will be done by student individually.

FEW SUGGESTIVE TOPICS FOR PROJECTS - CLASS XI

1. Facets of the Industrialization in sixteenth- eighteenth centuries. 2. Crusades: causes; rationale; events; outcomes; Holy Alliance

3. Ancient History in depth: Mesopotamia 4. Greek Philosophy and City States

5. Contributions of Roman Civilization

6. The spirit of Renaissance: Manifestation in art; Literature; Sculpture; Influence on Trading Community; Social Fabric; Philosophy; Political Values; Rational Thinking; Existentialism

7. Aspects of Development -South American States /Central American States

8. Different schools of thoughts- Realism: Humanism: Romanticism

9. Piecing together the past of Genghis Khan

10.Myriad Realms of Slavery in ancient, medieval, and modern world

11.History of Aborigines – America /Australia

12.Facets of Modernization – China /Japan/Korea

DAV MULTIPURPOSE PUBLIC SCHOOL

Subject: Mathematics

Questions: 35

Q1. Let f and g be two real functions defined by $f(x) = \sqrt{x+1}$ and $g(x) = \sqrt{9-x^2}$ Then describe the following functions: $\frac{g}{f}$ **2 Marks**

Q2. Is g = {(1, 1), (2, 3), (3, 5), (4, 7)} a function? Justify. If this is described by the relation, $g(x) = \alpha x + \beta$, then what values should be assigned to α and β? **2 Marks**

Q3. Find the domain following function given by: **2 Marks**
$f(x) = \frac{1}{\sqrt{1-\cos x}}$

Q4. If R_1 = {(x, y) | y = 2x + 7, where $x \in R$ and – 5 ≤ x ≤ 5} is a relation. Then find the domain and Range of R_1. **2 Marks**

Q5. Given $R = \{(x, y) : x, y \in W, x^2 + y^2 = 25\}$. Find the domain and Range of R. **2 Marks**

Q6. Prove that: **2 Marks**
$2\cos\frac{\pi}{13}\cos\frac{9\pi}{13} + \cos\frac{3\pi}{13} + \cos\frac{5\pi}{13} = 0$

Q7. Find the radian measures corresponding to the following degree measures: **2 Marks**
–47° 30'

Q8. If α and β are different complex numbers with $|\beta| = 1$, then find $\left|\frac{\beta-\alpha}{1-\bar{\alpha}\beta}\right|$. **3 Marks**

Q9. If $\left(\frac{1-i}{1+i}\right)^{100} = a + ib$, find (a, b). **3 Marks**

Q10. Find the least positive integral value of n for which $\left(\frac{1+i}{1-i}\right)^n$ is real. **3 Marks**

Q11. Find the multiplicative inverse of the following complex numbers: **3 Marks**
$\sqrt{5} - 3i$

Q12. If $a+ib = \frac{(x+i)^2}{2x^2+1}$, prove that $a^2 + b^2 = \frac{(x^2+1)^2}{(2x^2+1)^2}$. **3 Marks**

Q13. Find the real values of θ for which the complex number $\frac{1+i\cos\theta}{1-2i\cos\theta}$ is purely real. **3 Marks**

Q14. Find the square root of the following complex numbers: **3 Marks**
$-11 - 60\sqrt{-1}$

Q15. If $f(x) = \frac{1}{1-x}$, show that $f[f\{f(x)\}] = x$ **3 Marks**

Q16. Find $\sin\frac{x}{2}, \cos\frac{x}{2}$ and $\tan\frac{x}{2}$ in each of the following : **3 Marks**
$\cos x = -\frac{1}{3}$, x in quadrant III

Q17. **3 Marks**
The function f is defined by $f(x) = \begin{cases} 1-x, & x < 0 \\ 1, & x = 0 \\ x+1, & x > 0 \end{cases}$ Draw the graph of f(x).

Q18. Prove that: **3 Marks**
$\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ = \frac{3}{16}$

Q19. Find the domain of the following real valued functions of real variable: **3 Marks**
$f(x) = \frac{2x+1}{x^2-9}$

Q20. Find the domain and range of the following real valued functions: **3 Marks**
$f(x) = \frac{x-2}{2-x}$

Q21. Find the range of the following function given by: **3 Marks**
$f(x) = \frac{3}{2-x^2}$

Q22. Find the domain and range of the following real valued functions: **3 Marks**
$f(x) = \sqrt{x^2 - 16}$

Q23. Let A, B, and C be the sets such that $A \cup B = A \cup C$ and $A \cap B = A \cap C$. Show that B = C. **3 Marks**

Q24. Let A = {x : x ∈ N}, B = {x : x = 2n, n ∈ N}, C = {x : x = 2n - 1, n ∈ N} and D = {x : x is a prime natural number}. Find: **3 Marks**
$B \cap C$

Q25. If $\tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n$, then prove that $m^2 - n^2 = 4\sin\theta\tan\theta$ **4 Marks**

Q26. Let A and B be two stes such that: $n(P) = 20, n(A \cup B)$=42 and $n(A \cap B) = 4$. Find: **4 Marks**
$n(A - B)$.

Q27. Prove that: **4 Marks**
If $\cos A + \cos B = \frac{1}{2}$ and $\sin A + \sin B = \frac{1}{4}$, prove that $\tan\left(\frac{A+B}{2}\right) = \frac{1}{2}$.

Q28. If $\cos(\alpha + \beta) = \frac{4}{5}$ and $\sin(\alpha - \beta) = \frac{5}{13}$, where α lie between 0 and $\frac{\pi}{4}$, find the value of $\tan 2\alpha$ **4 Marks**
[**Hint:** Express $\tan 2\alpha$ as $\tan(\alpha + \beta + \alpha - \beta)$]

Q29. If $m\sin\theta = n\sin(\theta + 2\alpha)$, then prove that $\tan(\theta + \alpha)\cot\alpha = \frac{m+n}{m-n}$ **4 Marks**
[**Hint:** Express $\frac{\sin(\theta+2\alpha)}{\sin\theta} = \frac{m}{n}$ and apply componendo and dividendo]

Q30. If $\cos(\theta + \phi) = m\cos(\theta - \phi)$, then prove that $\tan\theta = \frac{1-m}{1+m}\cot\phi$. **4 Marks**
[**Hint:** Express $\frac{\cos(\theta+\phi)}{\cos(\theta-\phi)} = \frac{m}{1}$ and apply Componendo and Dividendo]

Q31. The conjugate of a complex number z, is the complex number, obtained by changing the sign of imaginary part of z. It is denoted by $\bar{z}$. The modulus (or absolute value) of a complex number, z = a + ib is defined as the non-negative real number $\sqrt{a^2 + b^2}$ It is denoted by |z|. i.e. $|z| = \sqrt{a^2 + b^2}$ Multiplicative inverse of z is $\frac{\bar{z}}{|z|^2}$. It is also called reciprocal of z. **5 Marks**
$z\bar{z} = |z|^2$.
On the basis of above information, answer the following questions.

1. If (x - iy) (3 + 5i) is the conjugate of −6 - 24i, then the value of x + y is equal to:
   1. 0
   2. 1
   3. 2
   4. 3
2. The value of $(z + 3)(\bar{z} + 3)$ is equivalent to:
   1. $|z + 3|^2$
   2. $|z - 3|$
   3. $z^2 + 3$
   4. None of these
3. If $f(z) = \frac{7-z}{1-z^2}$, where z = 1 + 2i, then f(z) is equal to:
   1. $\frac{|z|}{2}$
   2. $|z|$
   3. $2|z|$
   4. None of these
4. If z_1 = 1 - 3i and z_2 = -2 + 4i, Then $|z_1 + z_2|$ is equal to:
   1. $\sqrt{2}$
   2. 2
   3. $\sqrt{3}$
   4. 1
5. If z = 3 + 4i Then $\frac{z+\bar{z}}{2}$ is equal to:
   1. 1
   2. 2
   3. 3
   4. 4

Q32. We have, $i = \sqrt{-1}$. So, we can write the higher powers ofi as follows. **5 Marks**
i^2 = -1
$i^3 = i^2 . i = (-1). i = -i$
$i^4 (i^2)^2 = (-1)^2 = 1$
$i^5 = i^{4+1} = i^4 . i = 1. i = i$
$i^6 = i^{4+2} = i^4 . i^2 = 1. i^2 = -1$
In order to compute i^n for n > 4, write $i^n = i^{4q+r}$ for some q, $r \in N$ and $0 \leq r \leq 3$. Then, $i^n = i^{4q} . i^r = (i^4)^q . i^r = (1)^q . i^r = i^r$.
In general for any integer k, $i^{4k} = 1$, $i^{4k+1} = i$, i^{4k+2} = -1 and i^{4k+3} = -i.
On the basis of above information, answer the following questions.

1. The value of i^{37} is equal to:
   1. i
   2. −i
   3. 1

4. −1

2. The value of i^{-30} is equal to:

1. i
2. 1
3. -1
4. -i

3. If $z = i^9 + i^{19}$, Then z is equal to:

1. 0 + 0i
2. 1 + 0i
3. 0 + i
4. 1 + 2i

4. The value of $\left[i^{19} + \left(\frac{1}{i}\right)^{25}\right]^2$ is equal to:

1. -4
2. 4
3. i
4. 1

5. If $z = i^{-39}$, Then simplest form of z is equal to:

1. 1 + 0i
2. 0 + i
3. 0 + 0i
4. 1 + i

Q33. Two complex numbers $Z_1 = a + ib$ and $Z_2 = c + id$ are said to be equal, if a = c and b = d. **5 Marks**

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

1. If (3a - 6) + 2ib = -6b + (6 + a)i, then the real values of a and b are respectively.

1. −2, 2
2. 2, -2
3. 3, -3
4. 4, 2

2. If (2a + 2b) + i (b - a) = -4i, then the real values of a and b are respectively.

1. 2, 3
2. 2, -2
3. 3, 1
4. -2, 2

3. If $\left(\frac{1-i}{1+i}\right)^{100}$ = a + ib, then the values of a and b are respectively.

1. 1, 0
2. 0, 1
3. 1, 2
4. 2, 1

4. If $\frac{(1+i)^2}{2-i}$ = x + iy, then The value of x + y is:

1. $\frac{1}{5}$
2. $\frac{3}{5}$
3. $\frac{4}{5}$
4. $\frac{2}{5}$

5. If (x + y) + i(x - y) = 4 + 6i, Then xy is equal to:

1. 5
2. -5
3. 4
4. -4

Q34. Prove that: **5 Marks**

$$\sin\alpha + \sin\beta + \sin\gamma - \sin(\alpha+\beta+\gamma)$$
$$= 4\sin\left(\frac{\alpha+\beta}{2}\right)\sin\left(\frac{\beta+\gamma}{2}\right)\sin\left(\frac{\gamma+\alpha}{2}\right)$$

Q35. Ordered Pairs The ordered pair of two elements a and 3 is denoted by (a, b) : a is first element (or first component) and d is second element (or second component). Two ordered pairs are equal if their corresponding elements are equal. ie. (a, b) = (c, d) ⇒ a = c and b = d **5 Marks**

Cartesian Product of Two Sets For two non-empty sets A and B, the cartesian product A . B is the set of all ordered pairs of elements from sets Aand B. In symbolic form, it can be written as

$\mathrm{A} \cdot \mathrm{B} = \{(\mathrm{a}, \mathrm{b}) : \mathrm{a} \in \mathrm{A}, \mathrm{b} \in \mathrm{B}\}$

Based on the above topics, answer the following questions.

If (a - 3, 6 + 7) = (3, 7), then the value of aand d are:

6, 0

3, 7

7, 0

3, -7

If (x + 6, y - 2) = (0, 6), then the value of x and y are:

6, 8

-6, -8

-6, 8

6, -8

If (x + 2, 4) = (5, 2x + y), then the value of x and y are:

-3, 2

3, 2

-3, -2

Let A and B be two sets such that A . B consists of 6 elements. If three elements of A . B are (1, 4), (2, 6) and (3, 6), then

(A . B) = (B . A)

$(\mathrm{A} \cdot \mathrm{B}) \neq (\mathrm{B} \cdot \mathrm{A})$

A . B = {(1, 4), (1, 6), (2, 4)}

None of the above

If m(A . B) = 45, then n(A) cannot be

15

17

5

9