

**DAV VEDANTA INTERNATIONAL SCHOOL LANJIGARH**  
**POOJA VACATION HW-2025-26**  
**CLASS: XI**

**ENGLISH**

**1. Invitation Writing**

The Vedanta Township, Lanjigarh Puja Committee has planned to organize a grand Durga Puja celebration in its newly decorated Pandal. As a member of the organizing committee, design a card-type formal invitation inviting the public to visit the Pandal. Mention dates, timings, cultural programmes, and any eco-friendly initiatives.

**2. Article Writing**

In today's busy world, festivals are more than just rituals—they play a vital role in community bonding, cultural preservation, and mental well-being. Imagine you are a student reporter of your school magazine. Write an article in about 150 words on the topic:

“Significance of Festivals”, highlighting their social, cultural, and psychological importance.

**3. Report Writing**

You are the Secretary of Lanjigarh Puja Mandap Committee. Your committee successfully organized a week-long Durga Puja celebration, starting from the inauguration to the immersion of the deity. Write a report for a local newspaper describing the main events, public participation, safety measures, and conclusion of the festival.

**4. Application with Bio-data**

Vedanta Aluminium Ltd., Lanjigarh, advertised vacancies for Computer Science graduates in a national daily. You have recently completed your Bachelor's in Computer Science and are keen to apply. Write a formal application with a Bio-data to the Chief Personnel Manager, Vedanta Aluminium Ltd., Lanjigarh, expressing your suitability for the post.

**LITERATURE**

**5. Competency-Based Question (80–100 words)**

- a) On the Face of It: Imagine Derry is invited to deliver a motivational talk in his school assembly after meeting Mr. Lamb. Write a short speech (80–100 words) expressing how his outlook towards life has changed.
- b) The Enemy: Suppose Dr. Sadao is nominated for an international award for Humanitarian Service. As part of the award ceremony, draft a short note (80–100 words) justifying why he deserves this honour.
- c) Journey to the End of the World: If you were part of Tishani Doshi's Antarctic journey, what message would you post on your school's eco-club blog (80–100 words) about the urgency of protecting Earth's environment?
- d) The Tiger King: Imagine you are a journalist writing a news column on the death of the Tiger King. Write a brief report (80–100 words) highlighting the irony of his fate.
- e) The Third Level: If Charley had written a diary entry after his discovery of the “third level,” what thoughts and feelings would he express in 80–100 words?
- f) A Thing of Beauty: Imagine you are preparing a motivational write-up for your school bulletin board. In 80–100 words, explain how Keats' idea of beauty can help students overcome stress and negativity.
- g) Keeping Quiet: If Pablo Neruda's message was to be presented as a pledge for humanity, draft that pledge in 80–100 words focusing on peace, harmony, and self-introspection.

## MATHEMATICS

1. A survey shows that 63% of the Indians like Cheese whereas 76 % like apples. If x% of the Indians like both cheese and apples, then find the values of x. (Ans:  $39 \leq x \leq 63$ )
2. In a committee, 50 people speak French, 20 speak Spanish and 10 speak both Spanish and French. The no of people who speak atleast one of these two languages, is
3. The domain and range of the function  $f(x) = \frac{1}{2 - \sin 3x}$ .
4. If  $f(x) = \frac{4^x}{4^x + 2}$ , then  $f\left(\frac{1}{97}\right) + f\left(\frac{2}{97}\right) + f\left(\frac{3}{97}\right) + \dots - \dots - \dots + f\left(\frac{96}{97}\right)$ .
5. If two sets A and B are having 99 elements in common, then the number of elements common to each of the sets  $A \times B$  and  $B \times A$  are
6. The angles of a triangle are in AP. The number of degrees in the least is to the no. of radians in the greatest is as  $60 : \pi$ . Find the angles in degree.
7. The moon's distance from the earth is 3,60,000 kms and its diameter subtends an angle of  $31'$  at the eye of the observer. Find the diameter of the moon.
8. If  $a \cos x + b \sin x = m$  and  $a \sin x - b \cos x = m$ , prove that  $a^2 + b^2 = m^2 + n^2$ .
9. If  $\tan x = \frac{b}{a}$ , then find the value of  $\sqrt{\frac{a+b}{a-b}} + \sqrt{\frac{a-b}{a+b}}$ .
10. If  $\tan A - \tan B = x$  and,  $\cot B - \cot A = y$ , prove that  $\cot(A - B) = 1/x + 1/y$ .
11. If  $\cos(x + y) = 4/5$ ,  $\sin(x - y) = 5/13$  and x, y lie between 0 and  $\frac{\pi}{4}$ , prove that  $\tan 2x = 56/33$ .
12.  $\cos^4\left(\frac{\pi}{8}\right) + \cos^4\left(\frac{3\pi}{8}\right) + \cos^4\left(\frac{5\pi}{8}\right) + \cos^4\left(\frac{7\pi}{8}\right) = \frac{3}{2}$
13. If  $\tan x = \frac{\sin \alpha - \cos \alpha}{\sin \alpha + \cos \alpha}$ , then show that  $\sin \alpha + \cos \alpha = \sqrt{2} \cos x$ .
14. Prove that :  $\cos x \cos\left(\frac{\pi}{3} - x\right) \cos\left(\frac{\pi}{3} + x\right) = \frac{1}{4} \cos 3x$ .
15. If  $\sin \theta + \sin \phi = \sqrt{3}(\cos \phi - \cos \theta)$ , prove that  $\sin 3\theta + \sin 3\phi = 0$ .
16. Prove that :  $\cos(x) \cos\left(\frac{x}{2}\right) - \cos(3x) \cos\left(\frac{9x}{2}\right) = \sin 7x \sin 8x$ .
17. Prove that :  $\left(1 + \cos \frac{\pi}{8}\right) \left(1 + \cos \frac{3\pi}{8}\right) \left(1 + \cos \frac{5\pi}{8}\right) \left(1 + \cos \frac{7\pi}{8}\right) = 1/8$ .
18. Show that :  $2\sin^2 \beta + 4\cos(\alpha + \beta) \sin \alpha \sin \beta + \cos 2(\alpha + \beta) = \cos 2\alpha$ .
19. Show that :  $\sqrt{3} \cos 20^\circ - \sec 20^\circ = 4$ .
20.  $\cos^3 x + \cos^3\left(\frac{2\pi}{3} + x\right) + \cos^3\left(\frac{4\pi}{3} + x\right) = \frac{3}{4} \cos 3x$ .
21. Evaluate :  $1 + i^2 + i^4 + i^6 + \dots + i^{2n}$ .
22. Express the number  $\frac{\sqrt{5+12i} + \sqrt{5-12i}}{\sqrt{5+12i} - \sqrt{5-12i}}$  in the standard form. Also find their conjugate.
23. If  $z_1, z_2$  are complex number such that  $\frac{2z_1}{3z_2}$  is purely imaginary number, then find  $\left|\frac{z_1 - z_2}{z_1 + z_2}\right|$ .
24. If  $|z_1| = |z_2| = \dots = |z_n| = 1$ , prove that  $|z_1 + z_2 + z_3 + \dots + z_n| = \left|\frac{1}{z_1} + \frac{1}{z_2} + \frac{1}{z_3} + \dots + \frac{1}{z_n}\right|$ .
25. If  $\left(\frac{1+i}{1-i}\right)^3 - \left(\frac{1-i}{1+i}\right)^3 = x + iy$ , find (x, y).
26.  $\left(\frac{1-i}{1+i}\right)^{100} = a + ib$ , find (a, b).
27. If  $\cos \theta + i \sin \theta$ , find the value of  $\frac{1+a}{1-a}$ .
28. If  $(1+i)z = (1-i)\bar{z}$ , then show that  $z = -i\bar{z}$ .
29. Solve the system of inequations :  $\frac{6x}{4x-1} < \frac{1}{2}$ ,  $\frac{x}{2x+1} \geq \frac{1}{4}$ .  

$$\left\{ \begin{array}{l} \text{If } a \text{ is a positive real number, then} \\ (i) |x| < a \Leftrightarrow -a < x < a \\ (ii) |x| > a \Leftrightarrow x < -a \text{ or } x > a. \end{array} \right\}$$

Let r be a + ve real number and a be a fixed real number. Then, (i)  $|x - a| < r \Leftrightarrow a - r < x < a + r$   
(ii)  $|x - a| > r \Leftrightarrow x < a - r, \text{ or } x > a + r$  i.e  $x \in (-\infty, a - r) \cup (a + r, \infty)$ .

28. Solve the inequations :  $|x - 1| \leq 5$ ,  $|x| \geq 2$ .

29. Solve the inequation :  $\frac{|x+3|+x}{x+2} > 1$ .

30. Find the number of ways in which 5 boys and 5 girls be seated in a row so that

(i) No two girls may sit together. (ii) All the girls sit together and all the boys sit together. (iii) All the girls are never together.

31. Five boys and five girls form a line with the boys and girls alternating. Find the number of ways of making the line.

32. In how many ways can the letters of the word PERMUTATIONS be arranged if there are always 4 letters between P and S?

33. Show that  $2^{4n+4} - 15n - 16$ , where  $n \in \mathbb{N}$  is divisible by 225.

34. Show that the middle term in the expansion of  $\left(x - \frac{1}{x}\right)^{2n}$  is  $\frac{1.3.5 \dots (2n-1)}{n!} (-2)^n$ .

35. If the middle term in the expansion of  $\left(\frac{1}{x} + x \sin x\right)^{10}$  is equal to  $\frac{63}{8}$ , find the value of  $x$ .

36. Find the coefficient of  $x^4$  in the expansion of  $(1 + x + x^2 + x^3)^{11}$ .

37. Find the sixth term in the expansion  $(y^{1/2} + x^{1/3})^n$ , if the binomial coefficient of the third term from the end is 45.

38. Find  $n$  in the binomial  $\left(\sqrt[3]{2} + \frac{1}{\sqrt[3]{3}}\right)^n$ , if the ratio of 7<sup>th</sup> term from the beginning to the 7<sup>th</sup> term from the end is  $\frac{1}{6}$ .

39. If 7<sup>th</sup> term from beginning and end in the binomial expansion of  $\left(\sqrt[3]{2} + \frac{1}{\sqrt[3]{3}}\right)^n$  are equal, find  $n$ .

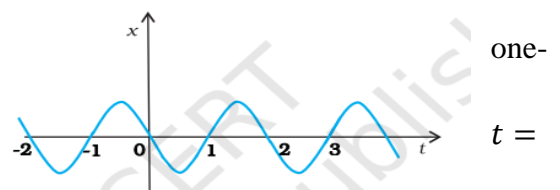
## PHYSICS

1. A famous relation in physics relates 'moving mass'  $m$  to the 'rest mass'  $m_0$  of a particle in terms of its speed  $v$  and the speed of light,  $c$ . (This relation first arose as a consequence of special relativity due to Albert Einstein). A boy recalls the relation almost correctly but forgets where to put the constant  $c$ . He writes:

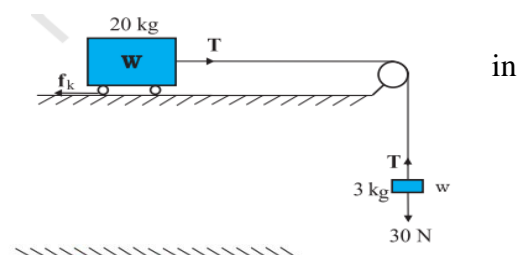
$$m = \frac{m_0}{(1 - v^2)^{1/2}}$$

Guess where to put the missing  $c$ .

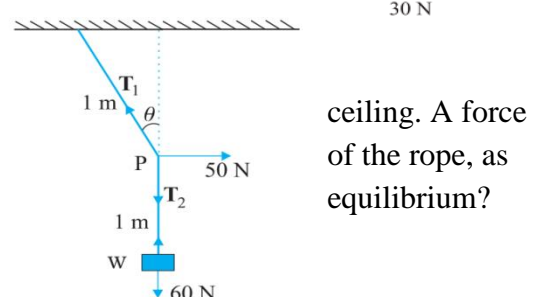
2. Figure below gives the  $x - t$  plot of a particle executing one-dimensional simple harmonic motion. Give the signs of position, velocity and acceleration variables of the particle at 0.3 s, 1.2 s, -1.2 s.



3. What is the acceleration of the block and trolley system shown in the figure below, if the coefficient of kinetic friction between the trolley and the surface is 0.04? What is the tension in the string? (Take  $g = 10 \text{ m s}^{-2}$ ). Neglect the mass of the string.

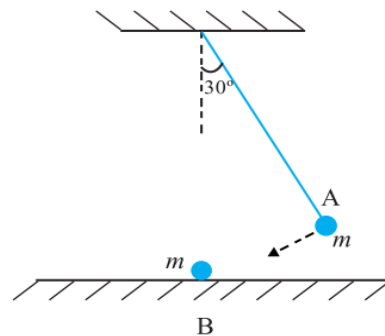


4. A mass of 6 kg is suspended by a rope of length 2 m from the ceiling. A force of 50 N in the horizontal direction is applied at the midpoint P as shown. What is the angle the rope makes with the vertical in



(Take  $g = 10 \text{ ms}^{-2}$ ). Neglect the mass of the rope.

5. The bob A of a pendulum released from  $30^\circ$  to the vertical hits another bob B of the same mass at rest on a table as shown in the figure below. How high does the bob A rise after the collision? Neglect the size of the bobs and assume the collision to be elastic.



6. A pump on the ground floor of a building can pump up water to fill a tank of volume  $30 \text{ m}^3$  in 15 min. If the tank is 40 m above the ground, and the efficiency of the pump is 30%, how much electric power is consumed by the pump?

7. Find the centre of mass of three particles at the vertices of an equilateral triangle. The masses of the particles are 100 g, 150 g, and 200 g respectively. Each side of the equilateral triangle is 0.5 m long.

8. (a) A child stands at the centre of a turntable with his two arms outstretched. The turntable is set rotating with an angular speed of 40 rev/min. How much is the angular speed of the child if he folds his hands back and thereby reduces his moment of inertia to  $2/5$  times the initial value? Assume that the turntable rotates without friction.

(b) Show that the child's new kinetic energy of rotation is more than the initial kinetic energy of rotation. How do you account for this increase in kinetic energy?

9. Two identical heavy spheres are separated by a distance 10 times their radius. Will an object placed at the mid-point of the line joining their centres be in stable equilibrium or unstable equilibrium? Give reason for your answer.

10. A particle starts from the origin at  $t = 0 \text{ s}$  with a velocity of  $10.0\hat{j} \text{ m/s}$  and moves in the  $x - y$  plane with a constant acceleration of  $(8.0\hat{i} + 2.0\hat{j})\text{ms}^{-2}$ .

(a) At what time is the  $x$ -coordinate of the particle 16 m? What is the  $y$ -coordinate of the particle at that time?

(b) What is the speed of the particle at the time?

## CHEMISTRY

1. Why is the bond angle in  $\text{H}_2\text{O}$  ( $104.5^\circ$ ) smaller than that in  $\text{NH}_3$  ( $107^\circ$ ), although both have lone pairs of electrons?
2.  $\text{CO}_2$  is a linear molecule while  $\text{H}_2\text{O}$  is bent, even though both contain central atoms with two bonded atoms. Explain on the basis of VSEPR theory.
3. Why does  $\text{BF}_3$  act as a Lewis acid, while  $\text{NH}_3$  acts as a Lewis base?
4. Draw the molecular orbital (MO) diagram for  $\text{O}_2$  and explain why it is paramagnetic, whereas  $\text{N}_2$  is diamagnetic.
5. Why does the bond length of  $\text{O}_2^{2-}$  (peroxide ion) differ from that of  $\text{O}_2$  molecule? Explain using MO theory.
6. Although both  $\text{CH}_4$  and  $\text{NH}_3$  undergo  $\text{sp}^3$  hybridization, their molecular shapes are different. Justify.
7. Which will have a higher bond order:  $\text{N}_2^+$  or  $\text{N}_2^-$ ? Explain using MO theory.
8. Explain why  $\text{XeF}_2$  is linear, even though xenon has more than 8 electrons in its valence shell.

9. Why is the bond angle in  $\text{F}_2\text{O}$  ( $\sim 102^\circ$ ) smaller than in  $\text{H}_2\text{O}$  ( $104.5^\circ$ ), even though both have two lone pairs on oxygen?
10. The dipole moment of  $\text{BeF}_2$  is zero, but that of  $\text{H}_2\text{O}$  is not. Explain why, based on molecular geometry.
11. A gas is compressed adiabatically. Explain why its temperature increases even though no heat enters the system.
12. For an isothermal reversible expansion of an ideal gas, explain why the work done is maximum compared to any other expansion process between the same initial and final states.
13. Can the internal energy of a system change without any heat or work transfer? Justify with an example.
14. A block of iron at high temperature is dropped into water at a lower temperature. Using the concept of entropy, explain why the process is spontaneous.
15. Why is it not possible to convert all the heat energy absorbed from a reservoir into an equal amount of work in a cyclic process? Relate your answer to the **second law of thermodynamics**.
16. Explain why enthalpy change ( $\Delta H$ ) and internal energy change ( $\Delta U$ ) differ for reactions involving gases. Under what condition will they be equal?
17. A reversible process is an idealization. Why are all natural processes irreversible? Illustrate with suitable examples.
18. Why is Gibbs free energy (GGG) considered a better criterion of spontaneity than entropy (SSS) alone for processes occurring at constant TTT and PPP?
19. If the entropy of the universe is continuously increasing, why does the Earth not become uniformly hot and lifeless?
20. Calculate the change in internal energy ( $\Delta U$ ) for an isothermal expansion of 2 moles of an ideal gas from volume 5 L to 10 L at 300 K. Explain the result.

## BIOLOGY

1. Give a comparative account of various classes of Fungi
2. Some symbiotic organisms are very good pollution indicators and composed Of a chlorophyllous and a non-chlorophyllous member. Describe them
3. Differentiate between nucleotide and nucleoside with an example
4. The gametophytes of bryophytes and pteridophytes are different from that of gymnosperms. How ?
5. Roots in some gymnosperms have fungal or algal association. Give examples, their names and role in the plants.
6. Explain T.S of dicot root with a neat labelled diagram
7. Describe chemiosmotic synthesis with neat labelled diagram.
8. Describe C3 and C4 cycle with diagram.
9. Describe Prophase I and Mitosis.
10. What is apical dominance. Name any two synthetic auxins.

**Complete your record and investigatory in all respects and submit.**

## **PHYSICAL EDUCATION**

1. Explain the Aims and Objectives of Physical Education in detail. Discuss how it helps in achieving the holistic development of an individual (physical, mental, social, and emotional).
2. Elaborate on the concept of Olympic Value Education. Discuss the relevance of the values like 'Joy of Effort' and 'Fair Play' in a student's life.
3. Define Physical Fitness, Wellness, and Lifestyle. Describe the various dimensions and components of Wellness.
4. Explain the meaning and importance of Astanga Yoga. Describe the procedure and benefits of any two Asanas that help improve concentration.
5. What is the Khelo India Programme? Discuss its main objectives and how it contributes to the development of sports at the grassroots level in India.
6. List any four different career options available in the field of Physical Education.
7. State the three Olympic Values and list the five components of the Olympic Motto.
8. Briefly explain the difference between Disability and Disorder with a suitable example for each.
9. Define Test and Measurement in sports. What is the role of Evaluation?
10. Differentiate between the three Somatotypes (Endomorphy, Mesomorphy, and Ectomorphy) based on their physical characteristics.