THE ROYAL COLLEGE

WINTER HOLIDAY HOMEWORK

STD – XI SCIENCE

Dear Parents,

We are on the verge of bidding goodbye to 2025 and say 'Hello' to 2026.This is the time when we must introspect, look back, review and reflect upon the entire year to analyze as to how to make it better in the year 2026 for our children. We would like to draw your kind attention towards the following points your ward must adhere to:

➤ Must take care of his/her hygiene and take bath regularly and wear clean and well ironed clothes.

➤ Fitness should be prime focus for students and they must take out time for exercise and outdoor games.

➤ The students must also eat homemade healthy and nutritious food.

➤Take out time to pursue a hobby and widen their horizon of learning.

➤ Identify his/her areas where they need improvement-speaking, writing, reading, math skills and handwriting etc. and garnish them.

➤ Revise all the concepts taught in the class and read the covered lessons thoroughly.

Hope you all have a wonderful vacation time with immense learning and lots of fun.

WISHING YOU AND YOUR FAMILY A HAPPY AND PROSPEROUS NEW YEAR 2026.

PHYSICS

Solve all the questions in a separate notebook.

Q.1. Molecules in air in the atmosphere are attracted by the gravitational force of the earth explain why all of them do not fall into the earth just like an apple falling from the tree.

Q.2. Two identical heavy spheres are separated by a distance 10 times their radius. Will an object placed in the midpoint of the line joining their centres in stable equilibrium or unstable equilibrium? Give reasons for your answer.

Q.3 An object of mass m is raised from the surface of the earth to a height equal to the radius of earth that is taken from the distance R to 2R from the centre of the earth. What is the gain in its potential energy?

Q.4 Star like the sun has several bodies moving around it at different distance is considered that all the of them are moving in the circular orbit let r be the distance of the body from the centre of the star and let its linear velocity V angular velocity ω kinetic energy K and gravitational potential energy U, Total energy E and angular momentum L as the radius r of the orbit increases. Determine which of the above quantities increase and which one decrease.

Q.5 A satellite is in an elliptical orbit around the earth with aphelion of 6R and perihelion of 2R where R= 6400 km is the radius of the earth. Find the eccentricity of the orbit. Find the velocity of the satellite at apogee and perigee. What should be done if this satellite has to be transferred to a circular orbit of radius 6R provided mass of Earth is 6 x 10^{24} kg.

Q.6. Uniform pressure is exerted on all sides of a solid cube of a material at temperature t^0 C by what amount should the temperature of the cube be raised in order to bring the original volume back before the pressure was applied. The bulk modulus and coefficient of volume expansion of the material are B and γ respectively.

Q.7. Why is a spring made of steel not of copper?

Q.8. A copper wire of negligible mass, length l and cross section A is kept on a smooth horizontal table with one end fixed. A ball of mass m is attached to the other end the wire and the ball are rotating with angular velocity ω. If elongation in the wire is Δl. obtain the expression for young's modulus

Q.9. Two wires made of the same material are subjected to forces in the ratio 1:4 their lengths are in the ratio 2:1 and the diameters are in the ratio 1: 3. What is the ratio of the extension?

10. Two identical springs of copper and steel are equally stretched, on which more work will have to be done.

Q.11. A tank of square cross section of each side l is filled with the liquid of height h. Find the thrust experience by the vertical surfaces and the bottom surface of the tank.

Q.12. A body of density ρ floats with the volume V1 of its total volume V immersed in one liquid of density ρ1 and with the remainder of volume V2 imersed in another liquid of density ρ2 where ρ1>ρ2. Find the relative volumes immersed into liquids.

Q.13. Explain why some oil spreads uniformly on water, when others float as drop.

Q.14. What is the effect of impurities on the surface tension of liquid?

Q.15. A uniformly tapering vessel of height h whose lower an upper radius r and R is completely filled with the liquid of density ρ. Find the force that acts on the base of the vessel due to the liquid.

Q.16. A block of foot is floating on water at 0^0 C with certain volume V outside water level. The temperature of water slowly raised from 0^0 C to 20^0 C. How will the volume V change with rise in temperature.

Q.17. Why are the smaller droplets of Mercury brought in contact pulled together to form a big Mercury drop. Explain whether the temperature of the big drop of Mercury formed will be the same or more or less than the temperature of smaller droplets.

Q.18. If a capillary tube is immersed at first in cold water and then in the hot water the height of capillary rises will be smaller in the second case how can this speak explained?

Q.19. Two soap bubbles have radii in the ratio 2:3 compared to the excess of pressure inside these bubbles. Also compare the works done in blowing these bubbles

Q.20. A barometer kept in an elevator accelerating upwards reaches 76 CM of mercury if the elevator is accelerating upwards at 4.5 m per second square find the

air pressure in the elevator in centimetre of Mercury. Density of mercury is 13.6 x 10³ kg/m³

CHAPTER OSCILLATIONS AND WAVES

1. What conditions must be satisfied for a system to perform simple harmonic motion (SHM)?

2. Explain why the restoring force in SHM must be directly proportional to displacement and opposite in direction.

3. Distinguish between periodic motion and oscillatory motion with suitable examples.

4. Explain how uniform circular motion can be treated as the projection of simple harmonic motion.

5. What is meant by the phase of a particle in SHM? How does it help in comparing two oscillatory motions?

6. Derive the expression for maximum velocity of a particle executing SHM and state the position at which it occurs.

7. Why does the time period of a simple pendulum depend on the length of the pendulum and acceleration due to gravity but not on the mass of the bob?

8. Explain how the total mechanical energy of a particle executing SHM remains constant. How is this energy shared between kinetic and potential energy during motion?

9. Why is SHM considered a special case of periodic motion but not all periodic motions are SHM?

10. Explain why the time period of SHM is independent of amplitude for small oscillations.

11. What is a mechanical wave? Why is a material medium necessary for its propagation?

12. Differentiate between transverse waves and longitudinal waves on the basis of particle motion and examples.

13. Define wavelength, frequency, and wave velocity. Write the relation connecting them and explain its physical meaning.

14. What is meant by phase difference between two points on a wave? How is it related to the path difference?

15. Explain why sound waves cannot propagate in vacuum while electromagnetic waves can.

16. What are progressive waves? State any two important characteristics of progressive waves.

17. Explain the principle of superposition of waves. What happens when two waves of the same frequency and amplitude travel in the same direction?

18. What is meant by reflection of waves at a rigid boundary? Explain the change in phase during reflection.

19. What are standing waves? Mention two differences between standing waves and progressive waves.

20. Explain why the speed of sound in a gas depends on temperature but is independent of the frequency of the sound wave.

CHEMISTRY

Solve all the questions in a separate notebook.

IUPAC Nomenclature Question Bank - Class 11

Write the IUPAC names of the following alkanes:

CH3-CH2-CH3 (b) CH3-CH(CH3)-CH2-CH3

Write the IUPAC name of: CH3-CH=CH-CH3. Write the IUPAC name of: CH3-C ≡ C-CH3

Write the IUPAC names of the following compounds: (a) CH3-CH2-OH (b) CH3-CH2-CH2-OH.

Write the IUPAC name of: CH3-COOH

Write the IUPAC name of: CH3-CHO

Write the IUPAC name of: CH3-CH2-CO-CH3

Write the IUPAC name of: CH3-CH2-NH2

Write the IUPAC names of the following haloalkanes: (a) CH3Cl (b) CH3-CH2-Br

Write the IUPAC name of: CH2=CH-CH2Cl

Write the IUPAC name of: CH3-CH(OH)-CH3

Write the IUPAC names of the following aromatic compounds: (a) C6H6-CH3 (b) C6H5-Cl

. Write the IUPAC name of: HO-C6H4-COOH (ortho form)

Write the IUPAC names of the following ethers: (a) CH3-O-CH3 (b) CH3-O-C2H5

Write the IUPAC name of: CH3-CH=CH-CHO

Write the IUPAC names of the following nitro compounds: (a) CH3-NO2 (b) C6H5-NO2

Write the IUPAC name of: CH3-CH2-CH2-CN

Write the IUPAC names of the following compounds: (a) CH3-CH2-COOH (b) HOOC-COOH
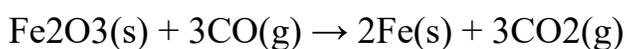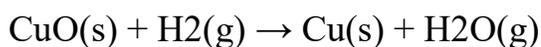
Write the IUPAC name of: C6H5-COOH

Write the IUPAC name of: CH3-CH2-CH=CH2

Q1.Assign oxidation numbers to the underlined elements in each of the following species:

(a)NaH2PO4 (b) NaHSO4 (c) H4P2O7 (d) K2MnO4 (e) CaO2 (f) NaBH4 (g) H2S2O7 (h) KAl(SO4)2.12 H2O
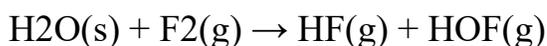
Q2.What are the oxidation numbers of the underlined elements in each of the following and how do you rationalise your results?

KI3 (b) H2S4O6 (c) Fe3O4 (d) CH3CH2OH € CH3COOH

Q3.Justify that the following reactions are redox reactions:

CuO(s) + H2(g) → Cu(s) + H2O(g)

Fe2O3(s) + 3CO(g) → 2Fe(s) + 3CO2(g)

4BCl3(g) + 3LiAlH4(s) → 2B2H6(g) + 3LiCl(s) + 3 AlCl3 (s)

2K(s) + F2(g) → 2K+F− (s)

4NH3(g) + 5 O2(g) → 4NO(g) + 6H2O(g)
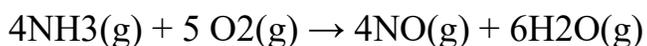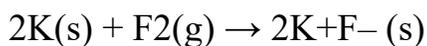
Q4Fluorine reacts with ice and results in the change

H2O(s) + F2(g) → HF(g) + HOF(g)

Justify that this reaction is a redox reaction.

Q5 Calculate the oxidation number of sulphur, chromium and nitrogen in H_2SO_5, Cr_2O7_{-2}, $NO3_-$
Suggest structure of these compounds. Count for the Fallacy.

Q6 Write the formulae for the following compounds:

(a)Mercury(II) chloride (b) Nickel(II) sulphate

(c)Tin(IV) oxide. (d) Thallium(I) sulphate

(e)Iron (III) sulphate (f) Chromium(III) oxide

Q 7. While sulphur dioxide and hydrogen peroxide can act as oxidising as well as reducing agents in their reactions, ozone and nitric acid act only as oxidants. Why?

Q8The compound AgF_2 is an unstable compound. However, if formed, the Compound acts as a very strong oxidizing agent. Why?

Q9 Identify the substance oxidised, reduced, oxidising agent and reducing agent for each of the following reactions: $2AgBr (s) + C_6H_6O_2(aq) \rightarrow 2Ag(s) + 2HBr (aq) + C_6H_4O_2(aq)$ $HCHO(l) + 2[Ag (NH_3)_2]^+(aq) + 3OH^-(aq) \rightarrow 2Ag(s) + HCOO^-(aq) \, 4NH_3(aq) + 2H_2O(l) \, HCHO (l) + 2Cu^{2+}(aq) + 5 OH^-(aq) \rightarrow Cu_2O(s) + HCOO^-(aq) \, 3H_2O(l)$

$N_2H_4(l) + 2H_2O_2(l) \rightarrow N_2(g) + 4H_2O(l)$
$Pb(s) + PbO_2(s) + 2H_2SO_4(aq) \rightarrow 2PbSO_4(s) + 2H_2O(l)$

Q10.Balance the following redox reactions by ion-electron method:
$MnO_4^-(aq) + I^-(aq) \rightarrow MnO_2 (s) + I_2(s)$ (in basic medium)
$MnO_4^-(aq) + SO_2 (g) \rightarrow Mn^{2+} (aq) + HSO_4^-(aq)$ (in acidic solution)

(c)$H_2O_2 (aq) + Fe^{2+} (aq) \rightarrow Fe^{3+} (aq) + H_2O (l)$ (in acidic solution)
(d)$Cr_2O_7^{2-} + SO_2(g) \rightarrow Cr^{3+} (aq) + SO_4^{2-}(aq)$ (in acidic solution)
Chemical equilibrium Chapter
Do all questions of exemplar book of equilibrium Chapter

<u>MATHEMATICS</u>

Use the link and do the following questions in a separate notebook.

https://drive.google.com/drive/folders/1sWmY2Hv9I4GizFmMErF68Jy7o5i0zGp5?usp=sharing

<u>BIOLOGY</u>

Solve all the questions in a separate notebook.
Do the following questions in a separate notebook.
1.   Define taxonomy. Name any one taxonomical aid.

2. What is binomial nomenclature? Who proposed it?
3. Mention any two differences between prokaryotic and eukaryotic cells.
4. State any two characteristics of Kingdom Monera.
5. What are lichens? Name the two organisms involved in their formation.
6. Write any two differences between algae and fungi.
7. What is transpiration? Mention any one of its functions.
8. Name any two types of simple permanent tissues.
9. What is diffusion? Give one biological example.
10. Define plasmolysis. When does it occur?
11. Name the two phases of photosynthesis.
12. What is double circulation? Why is it important?
13. Write any two functions of blood.
14. What is the role of bile in digestion?
15. Name any two enzymes present in pancreatic juice.
16. Define respiration. Mention its two main types.
17. What is mitosis? Mention one significance of mitosis.
18. Name the stages of prophase I of meiosis.
19. What is a gene? Where is it located?
20. Define mutation. Mention one cause of mutation.
21. What is ecosystem? Name its two components.
22. Write any two differences between food chain and food web.
23. What is ecological pyramid? Name its types.
24. Describe the hierarchical levels of biological classification.
25. Explain the structure of a bacterial cell with the help of points.
26. Describe the structure and function of mitochondria.
27. Explain the opening and closing mechanism of stomata.
28. Describe the structure of xylem tissue.
29. Explain the process of transpiration pull.
30. Describe the structure of human heart.
31. Explain the mechanism of breathing in humans.
32. Describe the digestion of proteins in humans.
33. Explain the structure of nephron with its functions.
34. Describe the stages of mitosis.
35. Explain the significance of meiosis.
36. State Mendel's Law of Segregation with an example.
37. Describe the structure of DNA according to Watson and Crick.
38. Explain the process of transcription.
39. Describe the different types of joints in human body.
40. Explain the characteristics of a population.

41. Describe energy flow in an ecosystem.
42. Explain the carbon cycle in nature.
43. Describe the structure of a flower.
44. Explain the process of pollination and its types.
45. Describe any three adaptations of desert plants

<u>Most Important</u>

Everyone has to do this online certification course on basic python. Bring the print out of the certificate as it will be assessed for your internal assessment.

https://www.udemy.com/course/complete-python-bootcamp/?utm_campaign=Search_Keyword_Alpha_Prof_la.EN_cc.India&utm_source=google&utm_medium=paid-search&portfolio=India&utm_audience=mx&utm_tactic=nb&utm_term=online+python+courses&utm_content=g&funnel=&test=&gad_source=1&gad_campaignid=21178559968&gclid=CjwKCAiA3rPKBhBZEiwAhPNFQKbPC0NZfJCRgSR5E-uoK1Ordoal1Pu8tN0RQmCGhefT6qhgIPXetxoCq3QQAvD_BwE&couponCode=CM251226G1

For any query please connect Mr. Devansh Kohli between 11:00 am to 12:00 noon on 7906097284.