

ENGLISH

Answer the following in 125-150 words.

1. Write a report on a Cultural Night organized by your school in about 100-125 words for school magazine. You are Basudev, Cultural Secretary of Sainik School, Bhubaneswar.
2. You are Saroj, the school captain of Sainik School, Bhubaneswar. Your school recently held a Book Fair to promote the habit of reading among its students. Write a report in about 100-125 words.
3. You are Rahul of VSS Nagar, Bhubaneswar. You have come across an advertisement of a coaching institute that prepares students for SSB. Write a letter to the President of the institute asking for information that you need before you decide to join it.
4. You are a reporter for your school magazine 'Blossoms'. Write a short report on the celebration of the Annual Day of your school. Write your report using the following points in about 80-100 words.
5. Write an article in about 125-150 words for your school magazine on the topic 'Generation Gap – A Myth or Reality'.
6. Avinash Kumar, the secretary of Shaheed Nagar welfare society, Bhubaneswar, writes a letter to the Chairman, Bhubaneswar Electricity Supply Undertaking, complaining about frequent power failures in his locality.
7. Describe the changing relationship between the author and his grandmother. Did their feelings for each other change?
8. Discuss the difference between the Chinese and the Western art.
9. Give a character sketch of Uncle Khosrove. Narrate the incident that proves that he was indeed crazy.
10. "We have not inherited this earth from our forefathers, we have borrowed it from our children". Discuss.
11. Which are the earth's principal biological systems? What is their current ecological status?
12. What did the captain of the 'Wavewalker' do to protect his ship when rough weather struck?
13. You want to sell car as you are going abroad. Draft a suitable advertisement to be published in a national daily.
14. Water is precious and each one of us must stop wastage. Design a poster in not more than 50 words urging people to employ various methods of rain water harvesting in their colonies.
15. Your school organized a three day camp in a village during the Autumn Vacation. As the leader of team, write a letter to the editor of a newspaper giving an account of your activities there.

MATHEMATICS

1. Solve all the miscellaneous exercise problems of Chapters Sets, Relations and Functions, Trigonometric Functions, Complex Numbers, Principle of Mathematical Induction, Permutation and combination and binomial theorem
2. Solve all the Exemplar questions of the Chapters Sets, Relations and Functions, Trigonometric Functions, Complex Numbers, Principle of Mathematical Induction, Permutation and combination and binomial theorem

PHYSICS

1. Explain the law of conservation of energy for a freely falling object.
2. Two towns A and B are connected by regular bus service with a bus leaving in either direction every T minutes. A man cycling with a speed of 20Km/hr in the direction A to B notices that a bus goes past him every 18 minutes in the direction of his motion and every 6 minutes in the opposite direction. What is the period T of the bus service and with what speed (assumed constant) do the buses ply on the road?
3. Derive an expression for the velocity for safe journey of a cyclist while passing on a curved road.
4. Derive an expression for equation of trajectory, time of flight, instantaneous velocity and horizontal range for a projectile projected from a height.
5. State and explain law of conservation of linear momentum.
6. Define angular velocity .Derive the relation between linear velocity and angular velocity.
7. Obtain the expression for velocities of two objects after suffering one dimensional elastic head on collision.
8. Establish the relation among torque angular momentum and moment of inertia.
9. Derive an expression for acceleration and kinetic energy for an object in rolling motion along an inclined plane.
10. Derive the expression for moment of inertia of a rod and disc about an axis passing through its cg and perpendicular to it.
11. Define radius of gyration. What is the moment of inertia of a rod of mass M, length L about an axis perpendicular to it through one end? Given moment of inertia of the rod about an axis perpendicular to it and passing at midpoint of the rod is $ML^2 / 12$.
12. Find the torque of a force $7i+3j-5k$ about the origin. The force acts on a particle whose position vector is $i - j + k$. Write the relation that involves torque and moment of inertia of a rigid object.
13. State parallel axis theorem. Find the moment of inertia of a uniform circular disc about one of its tangent parallel to the plane of disc if the moment of inertia of the disc about the axis passing through its centre of mass and perpendicular to its plane is $\frac{1}{2}MR^2$. Also find the radius of gyration of disc about its diameter.
14. State the work energy theorem .Prove it for a variable force. A man raises a mass of 100Kg to a height of 30m in 2 minutes. Find the average power required
15. Obtain the expression for speed at lowest and highest point for an object of mass m tied to a string of length l made to whirl along a vertical circle with l as radius. Also find the expression for energy and tension on the string.
16. Write the conditions of stable equilibrium. Establish a relation between kinetic energy and moment of inertia of a rotating object.
17. State and prove law of conservation of angular momentum. Find the moment of inertia of a ring about one of its diameter if moment of inertia about the axis passing through its centre perpendicularly is $50kg.m^2$
18. Establish a relation between torque and angular acceleration of an object rotating about a given axis. A rope of negligible mass is wound round the rim of a fly wheel of

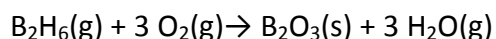
mass 20 Kg and radius 20 cm. What is the angular acceleration of fly wheel if the rope is pulled with a force 25 N. Assume M I of fly wheel about its axis is $\frac{1}{2} MR^2$.

19. Derive an expression for elastic potential energy of a spring. Find the work done in changing the velocity of a cricket ball of mass 10 gm from 36 Km/hr to 72 Km/hr.
20. A small stone of mass 0.2 Kg tied to a mass less, inextensible string is rotated in a vertical circle of radius 2 m. If the particle is just able to complete the vertical circle, what is the speed at the highest point of circular path?
21. Chapters from 2 to 6 to be covered as per the note given.
22. Solve exercise -2,3,4,5,6 and in text questions (NCERT) of chapter-2 to 6

CHEMISTRY

Answer the following questions.

1. Diborane is a potential fuel which undergoes combustion according to the following reaction.



From the following data, calculate the enthalpy change for the combustion of diborane.

- (i) $2 \text{B}(\text{s}) + 3/2 \text{O}_2(\text{g}) \rightarrow \text{B}_2\text{O}_3(\text{s}) \quad \Delta_f H = (-1273 \text{ kJ/mol})$
 - (ii) $\text{H}_2(\text{g}) + 1/2 \text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l}) \quad \Delta_f H = (-286 \text{ kJ/mol})$
 - (iii) $\text{H}_2\text{O}(\text{l}) \rightarrow \text{H}_2\text{O}(\text{g}) \quad \Delta_f H = (+44 \text{ kJ/mol})$
 - (iv) $2 \text{B}(\text{s}) + 3 \text{H}_2(\text{g}) \rightarrow \text{B}_2\text{H}_6(\text{g}) \quad \Delta_f H = (+36.0 \text{ KJ/mol})$
2. $2 \text{A}(\text{g}) + \text{B}(\text{g}) \rightarrow 2 \text{D}(\text{g})$
 $\Delta U_{298} = -10.5 \text{ kJ}, \quad \Delta S = -44.1 \text{ J K}^{-1}$

Calculate ΔG_{298} for the reaction and predict whether the reaction is spontaneous or not.

3. For an isolated system, $\Delta U = 0$, What will be ΔS ?
4. For the reaction, $2 \text{Cl}(\text{g}) \rightarrow \text{Cl}_2(\text{g})$, What are the signs of ΔH and ΔS ?
5. Calculate the enthalpy change on freezing of 1 mol of water at 10°C to ice at -10°C . $\Delta_{\text{fus}} H = 6.03 \text{ KJ/mol}$ at 0°C . $C_p[\text{H}_2\text{O}(\text{l})] = 75.3 \text{ J mol}^{-1} \text{K}^{-1}$, $C_p[\text{H}_2\text{O}(\text{s})] = 36.8 \text{ J mol}^{-1} \text{K}^{-1}$.
6. If the water vapour is assumed to be a perfect gas, molar enthalpy change for vapourisation of 1 mol of water at 1 bar and 100°C is 41 KJ/mol. Calculate the internal energy change, when a) 1 mol of water is vapourised at 1 bar pressure and 100°C .
b) 1 mol of water converted into ice.
7. The combustion of 1 mol of benzene takes place at 298 K and 1 atm. After combustion, $\text{CO}_2(\text{g})$ and $\text{H}_2\text{O}(\text{l})$ are produced and 3267 KJ of heat is liberated. Calculate the standard enthalpy of formation, $\Delta_f H^\circ$ of benzene. Standard enthalpies of formation of $\text{CO}_2(\text{g})$ and $\text{H}_2\text{O}(\text{l})$ are -393.5 KJ/mol and -285.83 KJ/mol respectively.
8. Using the equation of state $PV = nRT$, show that at a given temperature density of a gas is proportional to gas pressure P.
9. Explain the physical significance of van der Waals parameters.
10. In terms of Charles' law explain why -273°C is the lowest possible temperature.
11. Calculate the total pressure in a mixture of 8 gm of dioxygen and 4 gm of dihydrogen confined in a vessel of 1 dm^3 at 27°C .
12. Critical temperature for carbon dioxide and methane are 31.1°C and -81.9°C respectively. Which of these has stronger intermolecular force and why?
13. A mixture of dihydrogen and dioxygen at one bar pressure contains 20% by weight of dihydrogen. Calculate the partial pressure of dihydrogen.
14. 2.9 gm of a gas at 95°C occupied the same volume as 0.184 gm of dihydrogen at 17°C , at the same pressure. What is the molar mass of the gas?

15. What is the effect of temperature on: a) density b) surface tension c) viscosity d) vapour pressure of a liquid.
16. What is the effect of pressure on: a) volume b) boiling point c) viscosity of a liquid.
17. Explain the following:
- The boiling point of a liquid rises on increasing pressure.
 - Drops of liquids assume spherical shape.
 - The boiling point of water (373 K) is abnormally high when compared to that of hydrogen sulphide (211.2 K).
 - The level of mercury in a capillary tube is lower than the level outside when a capillary tube is inserted into the mercury.
 - Liquids like ether and acetone are kept in cool places.
 - Tea or coffee is sipped from a saucer when it is quite hot.

BIOLOGY

- Q1). (a) How many types of nephridia are found in earthworm based on their locomotion.
- (b) What is the function of nephridia.
- Q2) Distinguish between Prostomium and Peristomium.
- Q3) Describe the types of epithelial tissues with the help of a labelled diagram.
- Q4) Mention briefly the circulatory system of earthworm.
- Q5) Take one flower of each of families:
- a) Fabaceae
 - b) Solanaceae
 - c) Liliaceae
- And write its semi-technical description. Also draw their floral diagram after studying them.
- Q6) Write the characteristics of 5 kingdom classification.
- Q7) List the biological names of Man, Housefly, Mango, and Wheat.
- Q8) Differentiate between monocot and dicot seed. Draw diagrams.
- Q9) Define protonema.
- Q10) Practice diagrams of
- a) Monocot stem and root
 - b) Dicot stem and root.

COMPUTER SCIENCE

- Q1. How does the following functions:
- i. Laser Printer
 - ii. Dot matrix Printer
 - iii. Inkjet Printer
 - iv. Hard disk drive
 - v. CD ROM
 - vi. Speakers

- Q2. Describe the functions of Operating system.
- Q3. What do you mean by paging and segmentation?
- Q4. Distinguish between Physical IOCS and logical IOCS.
- Q5. What are tokens? Describe them all.
- Q6. How many types of operators are there? Explain them all.
- Q7. What is a variable? Discuss Lvalue and Rvalue.
- Q8. Define Scope & Life time of a variable.
- Q9. What is conditional operator?
- Q10. What do you mean by comments? How many types of comments can be used in C++?
- Q11. Describe all types of operators.
- Q12. What is the difference between if .. Else and switch statement?
- Q13. What do you mean by iteration? Explain.

END