



# SAINIK SCHOOL BHUBANESWAR

## SUMMER VACATION TASK 2020 – 21 (CLASS XII)

### PHYSICS

**Attempt any one from Ques No 1 to 5. Submit a working model along with a writeup for the same.**

1. To study various factors on which the internal resistance/EMF of a cell depends.
2. To find the refractive indices of (a) water (b) oil (transparent) using a plane mirror, an equi-convex lens (made from a glass of known refractive index) and an adjustable object needle.
3. To investigate the relation between the ratio of (a) output and input voltage and (b) number of turns in the secondary coil and primary coil of a self-designed transformer.
4. To investigate the dependence of the angle of deviation on the angle of incidence using a hollow prism filled one by one, with different transparent fluids.
5. To study the factor on which the self-inductance of a coil depends by observing the effect of this coil, when put in series with a resistor/(bulb) in a circuit fed up by an A.C. source of adjustable frequency.
6. Verify the production of charge in a comb dragged in dry hair and attracts the bits of paper placed near it. Explain the scientific principle involved in it.
7. Identify a colour coded resistor, junction diode, capacitor and LED from a unused TV remote. Write the role of these components. Explain the method to find the resistance of given resistor.
8. Two electric bulbs 60W,220V and 100W,220V are connected in series and in parallel to same supply separately. Compare brightness of the bulbs along with reasons for both connections separately.
9. Explain Electromagnetic induction with the help of an activity. Write the required items and principle involved.
10. Why magnets are kept away from the electronic gadgets? Explain its effect on a television.
11. Draw the graph for  $\sin\phi$ ,  $\cos\phi$  and  $\tan\phi$  in graph paper. Interpret the variation of values for same angle. Write its similarity or use in output of a generator.

12. Explain the construction; working of AC generator .How does it differ from DC generator.
13. Explain the construction and working of an electric fan when connected to external power supply.
14. How does a magnet affect a current carrying conductor and why? Verify it with the help of activity.
15. Mention any innovative idea or solution to burning issues like energy crisis, any alternative source of Electric energy or in any other field of your choice. Mention in detail about the same.



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### BIOLOGY

SL No.	Sci No.	Name	Topic
1	5901	BISWARANJAN SAHOO	Microbes in household products
2	5907	RUDRA PRAKASH RAJ	Human insulin: Humulin
3	5908	SACHIDANANDA MOHANTA	Insect pollinated flowers of your surrounding
4	5909	ANANTA DEBASIS SAHOO	Parasitic interaction
5	5910	SRIMANT MISHRA	DNA fingerprinting
6	5920	GAYA CHAND JENA	Adaptation in Kangaroo rat
7	5921	SHARTHAK KUMAR CHAND	Restriction endonuclease
8	5922	ANIL KUMAR ROUT	Coronaviruses family
9	5924	RAJIV KUMAR	Parasitic interaction
10	5932	VIKASH KUMAR	Biofortification
11	5953	ADARSH TRIPATHY	Adaptation in Kangaroo rat
12	5963	CHAMAN KUMAR SINGH	Drugs Addiction
13	5965	NITISH KUMAR	Microbes in household products
14	5969	SONU KUMAR	AIDS
15	5979	CHIRANJIVI	Restriction endonuclease
16	5990	RANJIT KUMAR SINGH	Corona virus family
17	5994	KARTIKESWAR SAMAL	AIDS
18	6001	AASISH KUMAR SAHOO	Drugs Addiction
19	6003	PRACHYA PRADHAN	Insect pollinated flowers of your surrounding
20	6008	MANAS KU SAHOO	Biofortification
21	6009	AMAN KUMAR	Human insulin: Humulin
22	6011	MAHESH KUMAR PRADHAN	DNA fingerprinting



# SAINIK SCHOOL BHUBANESWAR

## SUMMER VACATION TASK 2020 – 21 (CLASS XII)

### CHEMISTRY

#### CH 1 – THE SOLID STATE

- Which of the following conditions favours the existence of a substance in the solid state?
  - High temperature
  - Low temperature
  - High thermal energy
  - Weak cohesive forces
- Which of the following is not a characteristic of a crystalline solid?
  - Definite and characteristic heat of fusion.
  - Isotropic nature.
  - A regular periodically repeated pattern of arrangement of constituent particles in the entire crystal.
  - A true solid
- Which of the following is an amorphous solid?
  - Graphite (C)
  - Quartz glass ( $\text{SiO}_2$ )
  - Chrome alum
  - Silicon carbide (SiC)
- Iodine molecules are held in the crystals lattice by \_\_\_\_\_.
  - London forces
  - dipole-dipole interactions
  - covalent bonds
  - coulombic forces
- Which of the following oxides behaves as conductor or insulator depending upon temperature?
  - TiO
  - $\text{SiO}_2$
  - $\text{TiO}_3$
  - MgO
- Which of the following oxides shows electrical properties like metals?
  - $\text{SiO}_2$
  - MgO
  - $\text{SO}_2(\text{s})$
  - $\text{CrO}_2$

7. Schottky defect is observed in crystals when \_\_\_\_\_.
- (a) some cations move from their lattice site to interstitial sites.
  - (b) equal number of cations and anions are missing from the lattice.
  - (c) some lattice sites are occupied by electrons.
  - (d) some impurity is present in the lattice.
8. Which of the following is true about the charge acquired by *p*-type semiconductors?
- (a) positive
  - (b) neutral
  - (c) negative
  - (d) depends on concentration of *p* impurity
9. In which pair most efficient packing is present?
- (a) *hcp* and *bcc*
  - (b) *hcp* and *ccp*
  - (c) *bcc* and *ccp*
  - (d) *bcc* and simple cubic cell
10. The number of tetrahedral voids per unit cell in NaCl crystal is \_\_\_\_\_.
- (a) 4
  - (b) 8
  - (c) twice the number of octahedral voids.
  - (d) four times the number of octahedral voids.
11. Why are liquids and gases categorised as fluids?
12. Why does table salt, NaCl, sometimes appear yellow in colour?
13. Why does white ZnO (s) become yellow upon heating?
14. Why does the electrical conductivity of semiconductors increase with rise in temperature?
15. Explain why does conductivity of germanium crystals increase on doping with gallium.
16. In a compound, nitrogen atoms (N) make cubic close packed lattice and metal atoms (M) occupy one-third of the tetrahedral voids present. Determine the formula of the compound formed by M and N?

### Assertion and Reason Type

Note : 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) Assertion and reason both are correct statements and reason is correct explanation for assertion.
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- (e) Assertion and reason both are incorrect statements.
17. Assertion: The total number of atoms present in a simple cubic unit cell is one.  
Reason: Simple cubic unit cell has atoms at its corners, each of which is shared between eight adjacent unit cells.
18. Assertion: Graphite is a good conductor of electricity however diamond belongs to the category of insulators.  
Reason: Graphite is soft in nature on the other hand diamond is very hard and brittle.
19. Assertion: Total number of octahedral voids present in unit cell of cubic close packing including the one that is present at the body centre, is four.  
Reason : Besides the body centre there is one octahedral void present at the centre of each of the six faces of the unit cell and each of which is shared between two adjacent unit cells.
20. Assertion: The packing efficiency is maximum for the fcc structure.  
Reason: The coordination number is 12 in fcc structures.
21. Assertion: Semiconductors are solids with conductivities in the intermediate range from  $10^{-6} - 10^4 \text{ ohm}^{-1}\text{m}^{-1}$ .  
Reason: Intermediate conductivity in semiconductor is due to partially filled valence band.
22. With the help of a labelled diagram show that there are four octahedral voids per unit cell in a cubic close packed structure.
23. Show that in a cubic close packed structure, eight tetrahedral voids are present per unit cell.
24. How does the doping increase the conductivity of semiconductors?
25. A sample of ferrous oxide has actual formula  $\text{Fe}_{0.93}\text{O}_{1.00}$ . In this sample what fraction of metal ions are  $\text{Fe}^{2+}$  ions? What type of nonstoichiometric defect is present in this sample?

**CH-2 : SOLUTIONS**

- Which of the following units is useful in relating concentration of solution with its vapour pressure?
  - mole fraction
  - parts per million
  - mass percentage
  - molality
- Maximum amount of a solid solute that can be dissolved in a specified amount of a given liquid solvent does **not** depend upon \_\_\_\_\_.
  - Temperature
  - Nature of solute
  - Pressure
  - Nature of solvent
- Low concentration of oxygen in the blood and tissues of people living at high altitude is due to \_\_\_\_\_.
  - low temperature
  - low atmospheric pressure
  - high atmospheric pressure
  - both low temperature and high atmospheric pressure
- Considering the formation, breaking and strength of hydrogen bond, predict which of the following mixtures will show a positive deviation from Raoult's law?
  - Methanol and acetone.
  - Chloroform and acetone.
  - Nitric acid and water.
  - Phenol and aniline.
- Colligative properties depend on \_\_\_\_\_.
  - the nature of the solute particles dissolved in solution.
  - the number of solute particles in solution.
  - the physical properties of the solute particles dissolved in solution.
  - the nature of solvent particles.
- Which of the following aqueous solutions should have the highest boiling point?
  - 1.0 M NaOH
  - 1.0 M Na<sub>2</sub>SO<sub>4</sub>
  - 1.0 M NH<sub>4</sub>NO<sub>3</sub>
  - 1.0 M KNO<sub>3</sub>
- In comparison to a 0.01 M solution of glucose, the depression in freezing point of a 0.01 M MgCl<sub>2</sub> solution is \_\_\_\_\_.
  - the same
  - about twice
  - about three times
  - about six times

8. At a given temperature, osmotic pressure of a concentrated solution of a substance \_\_\_\_\_.
- is higher than that at a dilute solution.
  - is lower than that of a dilute solution.
  - is same as that of a dilute solution.
  - cannot be compared with osmotic pressure of dilute solution.
9. Which of the following statements is false?
- Two different solutions of sucrose of same molality prepared in different solvents will have the same depression in freezing point.
  - The osmotic pressure of a solution is given by the equation  $\Pi = CRT$  (where C is the molarity of the solution).
  - Decreasing order of osmotic pressure for 0.01 M aqueous solutions of barium chloride, potassium chloride, acetic acid and sucrose is  $BaCl_2 > KCl > CH_3COOH > Sucrose$ .
  - According to Raoult's law, the vapour pressure exerted by a volatile component of a solution is directly proportional to its mole fraction in the solution.
10. The values of Van't Hoff factors for KCl, NaCl and  $K_2SO_4$ , respectively, are \_\_\_\_\_.
- 2, 2 and 2
  - 2, 2 and 3
  - 1, 1 and 2
  - 1, 1 and 1

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11. Assertion: Molarity of a solution in liquid state changes with temperature.  
Reason: The volume of a solution changes with change in temperature.
12. Assertion: When methyl alcohol is added to water, boiling point of water increases.  
Reason: When a volatile solute is added to a volatile solvent elevation in boiling point is observed.
13. Assertion: When NaCl is added to water a depression in freezing point is observed.  
Reason: The lowering of vapour pressure of a solution causes depression in the freezing point.

14. Assertion: When a solution is separated from the pure solvent by Semipermeable membrane, the solvent molecules pass through it from pure solvent side to the solution side.  
Reason: Diffusion of solvent occurs from a region of high concentration solution to a region of low concentration solution.
15. Components of a binary mixture of two liquids A and B were being separated by distillation. After some time separation of components stopped and composition of vapour phase became same as that of liquid phase. Both the components started coming in the distillate. Explain why this happened.
16. Explain why on addition of 1 mol of NaCl to 1 litre of water, the boiling point of water increases, while addition of 1 mol of methyl alcohol to one litre of water decreases its boiling point.
17. What is the significance of Henry's Law constant  $K_H$ ?
18. (a) Explain the following phenomena with the help of Henry's law.  
(i) Painful condition known as bends.  
(ii) Feeling of weakness and discomfort in breathing at high altitude.  
(b) Why soda water bottle kept at room temperature fizzes on opening?
19. Define the following modes of expressing the concentration of a solution. Which of these modes are independent of temperature and why?  
(a) w/w (mass percentage)  
(b) V/V (volume percentage)  
(c) w/V (mass by volume percentage)  
(d) x (mole fraction)  
(e) M (Molarity)  
(f) m (Molality)  
(g) ppm. (parts per million)
20. Explain the terms ideal and non-ideal solutions in the light of forces of interactions operating between molecules in liquid solutions.
21. Why is it not possible to obtain pure ethanol by fractional distillation? What general name is given to binary mixtures which show deviation from Raoult's law and whose components cannot be separated by fractional distillation? How many types of such mixtures are there?
22. When kept in water, raisin swells in size. Name and explain the phenomenon involved with the help of a diagram. Give three applications of the phenomenon.
23. Discuss biological and industrial importance of osmosis.

24. How can you remove the hard calcium carbonate layer of the egg without damaging its semipermeable membrane? Can this egg be inserted into a bottle with a narrow neck without distorting its shape? Explain the process involved.
25. Why is the mass determined by measuring a colligative property in case of some solutes abnormal? Discuss it with the help of Van't Hoff factor.

### CH-3 : ELECTROCHEMISTRY

1. Which cell will measure standard electrode potential of copper electrode?
- (a)  $\text{Pt (s) H}_2 \text{ (g, 0.1 bar) H}^+ \text{ (aq., 1 M) } \parallel \text{ Cu}^{2+} \text{ (aq., 1 M) Cu}$   
 (b)  $\text{Pt(s) H}_2 \text{ (g, 1 bar) H}^+ \text{ (aq., 1 M) } \parallel \text{ Cu}^{2+} \text{ (aq., 2 M) Cu}$   
 (c)  $\text{Pt(s) H}_2 \text{ (g, 1 bar) H}^+ \text{ (aq., 1 M) } \parallel \text{ Cu}^{2+} \text{ (aq., 1 M) Cu}$   
 (d)  $\text{Pt(s) H}_2 \text{ (g, 1 bar) H}^+ \text{ (aq., 0.1 M) } \parallel \text{ Cu}^{2+} \text{ (aq., 1 M) Cu}$
2. The difference between the electrode potentials of two electrodes when no current is drawn through the cell is called \_\_\_\_\_.
- (a) Cell potential  
 (b) Cell emf  
 (c) Potential difference  
 (d) Cell voltage
3. An electrochemical cell can behave like an electrolytic cell when \_\_\_\_\_.
- (a)  $E_{\text{cell}} = 0$   
 (b)  $E_{\text{cell}} > E_{\text{ext}}$   
 (c)  $E_{\text{ext}} > E_{\text{cell}}$   
 (d)  $E_{\text{cell}} = E_{\text{ext}}$
4. Which of the statements about solutions of electrolytes is not correct?
- (a) Conductivity of solution depends upon size of ions.  
 (b) Conductivity depends upon viscosity of solution.  
 (c) Conductivity does not depend upon solvation of ions present in solution.  
 (d) Conductivity of solution increases with temperature.
5. The quantity of charge required to obtain one mole of aluminium from  $\text{Al}_2\text{O}_3$  is \_\_\_\_\_.
- (a) 1F  
 (b) 6F  
 (c) 3F  
 (d) 2F

6. The cell constant of a conductivity cell \_\_\_\_\_.
- changes with change of electrolyte.
  - changes with change of concentration of electrolyte.
  - changes with temperature of electrolyte.
  - remains constant for a cell.
7. While charging the lead storage battery \_\_\_\_\_.
- PbSO<sub>4</sub> anode is reduced to Pb.
  - PbSO<sub>4</sub> cathode is reduced to Pb.
  - PbSO<sub>4</sub> cathode is oxidised to Pb.
  - PbSO<sub>4</sub> anode is oxidised to PbO<sub>2</sub>.
8. The positive value of the standard electrode potential of Cu<sup>2+</sup>/Cu indicates that \_\_\_\_\_.
- this redox couple is a stronger reducing agent than the H<sup>+</sup>/H<sub>2</sub> couple.
  - this redox couple is a stronger oxidising agent than H<sup>+</sup>/H<sub>2</sub>.
  - Cu can displace H<sub>2</sub> from acid.
  - Cu cannot displace H<sub>2</sub> from acid.
9. Conductivity of an electrolytic solution depends on \_\_\_\_\_.
- nature of electrolyte.
  - concentration of electrolyte.
  - power of AC source.
  - distance between the electrodes.
10. Molar conductivity of ionic solution depends on \_\_\_\_\_.
- temperature.
  - distance between electrodes.
  - concentration of electrolytes in solution.
  - surface area of electrodes.

### **Assertion and Reason Type**

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11. Assertion: Cu is less reactive than hydrogen.  
Reason: Cu<sup>2+</sup> /Cu  $E^{\circ}$  is negative.

12. Assertion: ECell should have a positive value for the cell to function.  
Reason:  $E_{\text{cathode}} < E_{\text{anode}}$
13. Assertion: Conductivity of all electrolytes decreases on dilution.  
Reason: On dilution number of ions per unit volume decreases.
14. Assertion:  $\Lambda_m$  for weak electrolytes shows a sharp increase when the electrolytic solution is diluted.  
Reason: For weak electrolytes degree of dissociation increases with dilution of solution.
15. Assertion: For measuring resistance of an ionic solution an AC source is used  
Reason: Concentration of ionic solution will change if DC source is use
16. What does the negative sign in the expression  $Zn^{2+}/Zn E^{\circ} = -0.76 V$  mean?
17. Aqueous copper sulphate solution and aqueous silver nitrate solution are electrolysed by 1 ampere current for 10 minutes in separate electrolytic cells. Will the mass of copper and silver deposited on the cathode be same or different? Explain your answer. Value of standard electrode potential for the oxidation of  $Cl^-$  ions is more positive than that of water, even then in the electrolysis of aqueous sodium chloride, why is  $Cl^-$  oxidised at anode instead of water?
18. A galvanic cell has electrical potential of 1.1V. If an opposing potential of 1.1V is applied to this cell, what will happen to the cell reaction and current flowing through the cell?
19. How will the pH of brine (aq. NaCl solution) be affected when it is electrolysed?
20. Solutions of two electrolytes 'A' and 'B' are diluted. The  $\Lambda_m$  of 'B' increases 1.5 times while that of A increases 25 times. Which of the two is a strong electrolyte? Justify your answer.
21. Consider a cell given below  
 $Cu|Cu^{2+}||Cl^-|Cl_2,Pt$   
Write the reactions that occur at anode and cathode
22. Write the cell reaction of a lead storage battery when it is discharged. How does the density of the electrolyte change when the battery is discharged?
23. Why on dilution the  $\Lambda_m$  of  $CH_3COOH$  increases drastically, while that of  $CH_3COONa$  increases gradually?
24. What is the relationship between Gibbs free energy of the cell reaction in a galvanic cell and the emf of the cell? When will the maximum work be obtained from a galvanic cell?

**CH-4 : CHEMICAL KINETICS**

- The role of a catalyst is to change \_\_\_\_\_.
  - gibbs energy of reaction.
  - enthalpy of reaction.
  - activation energy of reaction.
  - equilibrium constant.
- In the presence of a catalyst, the heat evolved or absorbed during the reaction \_\_\_\_\_
  - increases.
  - decreases.
  - remains unchanged.
  - may increase or decrease.
- Activation energy of a chemical reaction can be determined by \_\_\_\_\_.
  - determining the rate constant at standard temperature.
  - determining the rate constants at two temperatures.
  - determining probability of collision.
  - using catalyst.
- Consider the Arrhenius equation given below and mark the correct option.  
 $k = A e^{-E_a/RT}$ 
  - Rate constant increases exponentially with increasing activation energy and decreasing temperature.
  - Rate constant decreases exponentially with increasing activation energy and decreasing temperature.
  - Rate constant increases exponentially with decreasing activation energy and decreasing temperature.
  - Rate constant increases exponentially with decreasing activation energy and increasing temperature.
- Which of the following statements is not correct about order of a reaction.
  - The order of a reaction can be a fractional number.
  - Order of a reaction is experimentally determined quantity.
  - The order of a reaction is always equal to the sum of the stoichiometric coefficients of reactants in the balanced chemical equation for a reaction.
  - The order of a reaction is the sum of the powers of molar concentration of the reactants in the rate law expression.
- Which of the following statements is correct?
  - The rate of a reaction decreases with passage of time as the concentration of reactants decreases.
  - The rate of a reaction is same at any time during the reaction.
  - The rate of a reaction is independent of temperature change.
  - The rate of a reaction decreases with increase in concentration of reactant(s).

7. Which of the following statements is incorrect about the collision theory of chemical reaction?
- It considers reacting molecules or atoms to be hard spheres and ignores their structural features.
  - Number of effective collisions determines the rate of reaction.
  - Collision of atoms or molecules possessing sufficient threshold energy results into the product formation.
  - Molecules should collide with sufficient threshold energy and proper orientation for the collision to be effective.
8. A first order reaction is 50% completed in  $1.26 \times 10^{14}$  s. How much time would it take for 100% completion?
- $1.26 \times 10^{15}$  s
  - $2.52 \times 10^{14}$  s
  - $2.52 \times 10^{28}$  s
  - infinite

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9. Assertion: Order of the reaction can be zero or fractional.  
Reason: We cannot determine order from balanced chemical equation.
10. Assertion: Order and molecularity are same.  
Reason: Order is determined experimentally and molecularity is the sum of the stoichiometric coefficient of rate determining elementary step.
11. Assertion: The enthalpy of reaction remains constant in the presence of a catalyst.  
Reason: A catalyst participating in the reaction, forms different activated complex and lowers down the activation energy but the difference in energy of reactant and product remains the same.
12. Assertion: All collision of reactant molecules lead to product formation.  
Reason: Only those collisions in which molecules have correct orientation and sufficient kinetic energy lead to compound formation.

13. Assertion: Rate constants determined from Arrhenius equation are fairly accurate for simple as well as complex molecules.  
Reason: Reactant molecules undergo chemical change irrespective of their orientation during collision.
14. Write the rate equation for the reaction  $2A + B \rightarrow C$  if the order of the reaction is zero.
15. How can you determine the rate law of the following reaction?  
 $2NO(g) + O_2(g) \rightarrow 2NO_2(g)$
16. In a reaction if the concentration of reactant A is tripled, the rate of reaction becomes twenty seven times. What is the order of the reaction?
17. Derive an expression to calculate time required for completion of zero order reaction.
18. The reaction between  $H_2(g)$  and  $O_2(g)$  is highly feasible yet allowing the gases to stand at room temperature in the same vessel does not lead to the formation of water. Explain.
19. Why does the rate of a reaction increase with rise in temperature?
20. Why in the redox titration of  $KMnO_4$  vs oxalic acid, we heat oxalic acid solution before starting the titration?
21. All energetically effective collisions do not result in a chemical change. Explain with the help of an example.
22. What happens to most probable kinetic energy and the energy of activation with increase in temperature?
23. With the help of an example explain what is meant by pseudo first order reaction.



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## SUMMER VACATION TASK 2020 – 21 (CLASS XII)

### ENGLISH

#### ASSIGNMENT NO. 01 (WRITING SKILLS)

1. Your family owns a newly built house to be given on rent. On behalf of your father, draft a suitable classified advertisement to be published in The Times of India.(50 words).
2. You are Dr. Amit Gupta, an eminent educationist. You have been invited to preside over an Inter-Zonal Declamation Competition by Nalini, the President of English Literary club of Government Model Sr. Sec. School, Sector-20, Bhubaneswar. Write a reply accepting the invitation.
3. There is a flood of advertisements on television channels these days. Write a letter to the Editor, Indian Express about the negative influence which such advertisements have on the minds of the people. You are Sunita / Sunil of Mayur Vihar, Kanpur.
4. You are Kaurna / Kishan. Write a letter to the police Commissioner of Delhi Complaining about the late arrival of the Police when a robbery was committed in your neighborhood. (120-150 Words).
5. You are Vani / Vikrant Kapoor, Head of the Health & Wellness club of your school. Your club organized a seminar to make students aware about alarming use of chemicals in Vegetables & fruits. Experts from the medical field and consumer forums were invited to answer the queries of the audience. Write a report in 150-200 words for your school magazine.
6. The policy of reservation of seats for admission to the professional courses is good for the deprived sections of society. Write a debate in 150-200 words either for or against the motion.
7. On the threshold of being a World Super Power, India does have a large young workforce but unfortunately not many in this force are employable for want of necessary skills. Write an article in about 150-200 words for a newspaper on the topic 'Skill Development is the Need of the Hour'. You are Anita / Arnav.
8. YOGA Unites the Body, mind & soul. When you are in a harmony, the journey through life is calmer, happier & more fulfilling. Write a speech in 150-200 words to be delivered in the morning assembly on the topic 'YOGA - a Way of Life". You are Karan / Kajal, Head Boy / Head Girl of DAV Public School, Cuttack.

**ASSIGNMENT NO. 02 (WRITING SKILLS)**

1. You are Simar / Smriti of Lotus International School, Jajpur. Your school is organizing a workshop on "Prevention of Drug Abus" in the coming week. Prepare a poster with complete information for the students of class XII.
2. You are Faiz / Falak living at 39, Udampur Colony, Shimla. You decide to hold a dinner party to congratulate your grandparents on their golden wedding anniversary. Draft a formal invitation in not more than 50 words inviting all family members to attend a grand dinner at home.
3. You are Reshma / Raghu staying at the Press Apartments at Nagpur. The main road leading to this colony has three open manholes causing frequent accidents at night. Also it gets so dark in the evenings in winter that the children and women just cannot venture to move out alone during night time. Write a letter to the Editor of 'The Times of India' drawing attention of the government towards this problem of the residents.
4. You read an article in the newspaper 'An Old Couple Murdered in Delhi'. You decide to write a letter to the Commissioner of police complaining against the rising rate of crime against the old and helpless People. Write the letter giving suggestions for the security of the older people. You are Arun of D-L , Phase-I, VSS Nagar.
5. The recent rise in incidents of violent behaviour of students is a matter of concern for all. The problem can be curbed if students learn how to manage anger. Write a speech on the topic "Violent Behaviour of Students is a Matter of Concern" in 150-200 words to be delivered in the school morning assembly.
6. Are celebrities responsible for the products they endorse? Taking a clue from the headlines given below and using your own ideas, write a debate for or against the topic. (150-200 words)
  - (a) Amitabh Bachchan steps back from promoting Pepsi after a school girl questions the health impact of the drink.
  - (b) Brief ban on Maggi noodles causes trouble for its celebrity Brand Ambassadors.
7. By 2050, India will be amongst the countries which will face acute water shortage. You are highly alarmed and terrified of the future world without water. Write an article on "Save water- are we doing enough?" for the local daily in 150-200 words.
8. You are Karan/ Kirti of L.M. Memorial Public School, Dwarka. Your school has adopted a village as a social responsibility. Students are being taken to teach the children of that village on a regular basis. Write a report, for your school magazine, on the various other programmes organized there in 150-200 words.

**ASSIGNMENT NO. 03 (WRITING SKILLS)**

1. Your school, Adarsh Vidyamandir, Ambala has planned to raise money for the flood victims of Bihar through cultural programmes. As Cultural Secretary, draft a poster giving all necessary details of the same and inviting students and parents to witness the spectacle in large numbers to make it a grand success.(50 words)
2. COVID-19 is spreading fast in your locality. The Health Club of your Town has decided to organise a talk on 'How to Prevent the Spread of COVID-19' to create awareness among the people. You plan to invite the Chief District Medical Officer of your district as the speaker for this programme. As In-Charge of the club draft the invite in 50 words giving all necessary details. (50 words)
3. The new traffic rules have created a panic among people in general using two- wheelers and four-wheelers on road. Riding/driving a vehicle without proper documents such as driving license, registration, insurance, pollution certificate and without using helmet or seat belt results in imposition of heavy penalty anybody could have ever imagined. In certain cases, the ill treatment by the police also adds to the common man's woe. You are a social activist who wants to draw the attention of the concerned authorities to stop such harassment and ill treatment to people and reduce the penalty amount. Write a letter to the editor of a national daily on the issue. (120-150 words)
4. As Librarian of Guru Gobind Singh Public School, Patiala. Place an order with Arihant Publications, New Delhi for some reference books for the higher secondary students of your school. Add all necessary details. (120-150 words)
5. A recent study has revealed that teenagers who use the smart phone more than four hours a day dissociate themselves with family members and friends ultimately ending up in mental depression. Write an article for a national daily on 'The Impact of Smart Phone on Teenagers' creating awareness among them. You are Ankan / Anita. (150-200 words)
6. Your school recently celebrated the 150<sup>th</sup> Birth Anniversary of Mahatma Gandhi. The school also conducted various competitions among students and organised cultural programmes featuring Gandhi's life and work. As student reporter for your school magazine, write a report giving details of the celebrations. You are Paramesh/Paramita. (150-200 words)
7. Abrogation of Article 370 and 35A from the state of Jammu and Kashmir was an unprecedented event in Indian democracy. As Rohit/ Radhika write a speech in 150-200 words on 'Abrogation of Article 370: A Step towards Peace, Progress and Prosperity'.
8. 'Preparation of War is essential for Peace'. Write a debate in 150-200 words either for or against the motion. You are Sobhan / Sobhana.

**ASSIGNMENT NO. 04 (WRITING SKILLS)**

1. Rajeev Ranjan wants to launch an IAS Competition Tutorial Centre. On his behalf draft an advertisement in about 50 words giving necessary details of the course to be published in the classified columns of a newspaper.
2. You are Smitha / Sunil, secretary AVM Housing Society .You are going to organise a Yoga Camp. Write a notice in not more than 50 words urging the members of your society to come in large numbers to attend the camp. Invent all the necessary details.
3. There are many students who do not have the opportunity to get guidance about their future career or for the selection of subjects at the school or college level. Write a letter to the Director, Doordarshan in about 120 – 150 words requesting him to introduce a regular programme on “Career Counselling” for students of the country.
4. You are interested in doing a short- term course in computer graphics during your holidays. Write a letter to the Director, Easy Computers, enquiring about their short- term courses and asking for all the necessary details in 150 -200 words. You are Naresh / Nandini, B-94 Anand Road, Rourkela.
5. Mahatma Gandhi once said, “I regard the English language as an open window for peeping into western thought and science.” Write an article in 150-200 words on “The Usefulness of English Language in India “.You are Pratyush / Priya.
6. Your school celebrated the 150<sup>th</sup> Birth Anniversary of the father of the nation, Mahatma Gandhi. Write a report in 150-200 words for your school magazine, giving details of the celebration. You are Amit / Amita of Maharani Senior Secondary School, Gwalior.
7. You have always been proud of being a citizen of the country which shows love and care for elders. However, now this value is found to be disappearing. Write a speech in 150-200 words on “Difficulties faced by senior citizens”.
8. The way human beings connect and network with one another today has taken on an entirely new meaning and momentum in the digital age. Where we used to have handshakes and word-of-mouth referrals, today’s relationships are often begun and developed on networking sites like Google+, Face Book, Twitter etc . Yet, their unceasing use is affecting real-time relationships as well as work culture. Do the benefits of social media outweigh their disadvantages? As Abhishek/Anushka draft a debate in favour of or against the motion – Modern Generation has become a tool in the hands of Social Media.

**ASSIGNMENT NO. 05 (WRITING SKILLS)**

1. You are Mohan/ Radha. You have been invited by the Lions Club as one of the judges for a Talent Search Competition for children. Due to a previous engagement, you cannot accept this invitation. Write a formal reply in not more than 50 words to the President of the club regretting your inability.
2. You are Harish /Harshita of 12, Seva Nagar, Pune. You want to sell your flat as you are shifting to another city for work. Draft a suitable advertisement in not more than 50 words to be published in 'The Pune Times' under classified columns.
3. You bought a refrigerator two months ago from Mohan Sales, Ashok Vihar, Bangalore. It has developed certain problems regarding its functioning. Cooling has stopped and it is making a lot of noise. Write a letter of complaint to the Manager, asking him for immediate repair/replacement of the same. You are Sachin/ Shashi, 61 Pratap Enclave, Bangalore (120-150 words)
4. You are Radhika /Rajeev from 21, Cherry Road, Madurai. Draft an application with a separate bio-data in about 120-150 words for the post of the librarian in Vision Senior Secondary School, Calicut. You came to know about the vacancy in the said post from a National newspaper.
5. Rising pollution, fast and competitive lifestyle, lack of nutritious food etc. have caused health woes for a large section of our population. Providing healthcare used to be a charitable and ethical activity in the past but today it has become commercialised, a money spinning business. Write an article in 150-200 words on "How to provide proper healthcare to the common man". You are Rohit/ Rashmi.
6. Your school is situated near a road intersection. Last week, in the morning, a bus coming at a great speed overturned when it braked suddenly. Senior students of your school rushed out and did everything to save the passengers. You were part of the rescue efforts. Write a report in 150-200 words on the accident and your friends' role to be published in a national daily. You are Manish / Mary, the news correspondent.
7. You are Preeti/Pawan, Head Girl/Boy of your school. Write a speech to be delivered at the Career Counseling Session for students of Classes IX-XII of your school advising students on the benefits of thinking seriously about their goals and aptitudes before choosing a stream of study. Write the speech in 150-200 words.
8. You are Komal/Kamal. You have been selected to represent your school in All India Sainik Schools Debate Competition. The topic for the debate is 'Imparting value based education is the best solution to decrease crime in India'. Write a debate in not more than 200 words for the motion, giving arguments for your stand.



# SAINIK SCHOOL BHUBANESWAR

## SUMMER VACATION TASK 2020 – 21 (CLASS XII)

### COMPUTER SCIENCE

1. What is network? Why is it needed?
2. What is communication channel? Explain.
3. What are different types of network?
4. What are repeaters?
5. What are routers?
6. What are protocols?
7. How is the Telnet service of internet useful?
8. What is VoIP?
9. What is modulation?
10. Write short note on IPv6 addressing?
11. What is null value in MySQL?
12. What is the purpose of GROUP BY clause?
13. What is Having clause?
14. What is a base table?
15. What is not null constraint?
16. What are single row and multiple row functions?

Table: STUDENT

Std ID	Name	F Name	Stream	TeacherID
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17. Write a query to find out the number of students in each stream in STUDENT Table.
18. Write a query to find out sum, average, lowest and highest marks in Student Table.
19. What is Cartesian product operation? How is it reflected in resultant table?
20. What is Module in Python? Write the advantages of it.



# SAINIK SCHOOL BHUBANESWAR

## SUMMER VACATION TASK 2020 – 21 (CLASS XII)

### MATHEMATICS

#### Instructions :

- Go through the NCERT text book thoroughly.
- Can take reference from videos (class lectures) on the topics from Youtube
- Learn the formulae uploaded as Formula sheet in the School Website.
- Solve the questions in Separate Maths Note Book.
- Utilize the available time to solve the Chapters (Class XI) from NDA Pathfinder as your preparations towards NDA.

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#### Chapter-01 : Relation and Function Assignment – 2 (4/6 Marks Questions)

1. Show that an onto function  $f: \{1,2,3\} \rightarrow \{1,2,3\}$  is always one-one and vice-versa.
2. Let  $A = \{1, 2, 3, \dots, 9\}$  and  $R$  be the relation in  $A \times A$  defined by  $(a, b) R (c, d)$  if  $a + d = b + c$  for  $(a, b), (c, d)$  in  $A \times A$ . Prove that  $R$  is an equivalence relation and also obtain the equivalent class  $[(2, 5)]$ .
3. Show that if  $f : A \rightarrow B$  and  $g : B \rightarrow C$  are one-one then  $g \circ f : A \rightarrow C$  is also one-one.
4. Show that if  $f : A \rightarrow B$  and  $g : B \rightarrow C$  are onto then  $g \circ f : A \rightarrow C$  is also onto.
5. Let  $f : W \rightarrow w$  be defined as  $f(x) = n-1$ , if  $n$  is odd,  $n+1$  if  $n$  is even.
6. Are the following set of ordered pairs functions? If so, examine whether the mapping is injective or surjective.
  - (a)  $\{(x, y) : x \text{ is a person, } y \text{ is the mother of } x\}$ .
  - (b)  $\{(a, b) : a \text{ is a person, } b \text{ is an ancestor of } a\}$ .
7. Check the injectivity and surjectivity for the  $f : \mathbb{R} \rightarrow \mathbb{R}$  defined by  $f(x) = \frac{x}{1+x^2}$ ,  $x \in \mathbb{R}$ .
8. Let  $C$  be the set of complex numbers. Prove that  $f : C \rightarrow \mathbb{R}$  given by  $f(z) = |z|$ ,  $\forall z \in C$ . is neither one-one nor onto.
9. Let the function  $f : \mathbb{R} \rightarrow \mathbb{R}$  be defined by  $f(x) = \cos x$ ,  $\forall x \in \mathbb{R}$ . Show that  $f$  is neither one-one nor onto.

10. Let  $A = [-1, 1]$ . Then discuss whether  $f : A \rightarrow A$  defined as  $f(x) = x|x|$  is one-one, onto or bijective.
11. Classify the following functions as one-one, onto or bijective.
- $f : \mathbb{N} \rightarrow \mathbb{N}$  defined by  $f(x) = x^2 + 1$
  - $f : \mathbb{Z} \rightarrow \mathbb{Z}$  defined by  $f(x) = x^3$
12. Given  $A = \{2, 3, 4\}$ ,  $B = \{2, 5, 6, 7\}$ . Construct an example of each of the following:
- an injective mapping from  $A$  to  $B$
  - a mapping from  $A$  to  $B$  which is not injective .
  - a mapping from  $B$  to  $A$ .
13. Discuss injectivity and surjectivity of the function  $f : \mathbb{Q} - \{3\} \rightarrow \mathbb{Q}$  defined by  $f(x) = \frac{2x+3}{x-3}$ .
14. Let  $f : [0, \infty) \rightarrow \mathbb{R}$  be a function defined by  $f(x) = 9x^2 + 6x - 5$ . Prove that  $f$  is not invertible. Modify, only the codomain of  $f$  to make  $f$  invertible and then find its inverse.
15. Let  $f, g : \mathbb{R} \rightarrow \mathbb{R}$  be two functions defined as  $f(x) = |x| + x$  and  $g(x) = |x| - x \forall x \in \mathbb{R}$ . Then, find  $f \circ g$  and  $g \circ f$ .
16. If the function  $f : \mathbb{R} \rightarrow \mathbb{R}$  be defined by  $f(x) = 2x - 3$  and  $g : \mathbb{R} \rightarrow \mathbb{R}$  by  $g(x) = x^3 + 5$ , then prove that  $g \circ f : \mathbb{R} \rightarrow \mathbb{R}$  is a bijective function. Also, verify that  $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$ .
17. If  $f : \mathbb{R} \rightarrow \mathbb{R}$  is defined by  $f(x) = x^2 - 3x + 2$  write  $f(f(x))$ .

**Chapter-02 : Inverse Trigonometric Functions**  
**Assignment – 3 (4/6 Marks Questions)**

- Find the value of  $\sin[2 \cot^{-1}(-\frac{2}{5})]$ .
- Evaluate  $\cos[\sin^{-1}\frac{1}{4} + \sec^{-1}\frac{4}{3}]$ .
- Find the value of  $\tan^2(\sec^{-1} 2) + \cot^2(\operatorname{cosec}^{-1} 3)$ .
- If  $3 \tan^{-1} x + \cot^{-1} x = \frac{\pi}{2}$ , then find  $x$ .
- If  $\tan^{-1} x + \tan^{-1} y = \frac{\pi}{4}$ , then find  $\cot^{-1} x + \cot^{-1} y$ .
- Evaluate  $\tan(\tan^{-1}(-4))$ .
- Evaluate  $\sin(\sin^{-1}(-\frac{7}{8}))$ .
- Solve  $4 \sin^{-1} x = \pi - \cos^{-1} x$
- If  $a < 2 \sin^{-1} x < b$  then find  $a$  and  $b$ .
- Find the greatest and least values of  $(\sin^{-1} x)^2 + (\cos^{-1} x)^2$ .
- Find  $x$  for the equation:  $\sin^{-1} x + \sin^{-1}(1-x) = \cos^{-1} x$ .
- Simplify  $\tan^{-1} 1 + \tan^{-1} 2 + \tan^{-1} 3$  and find the value.

### Chapter-03 & 04 : Matrices and Determinant

**Matrix** :A matrix is an ordered rectangular array of numbers or functions. The numbers or functions are called the elements of the matrix.

**Order of Matrix** :A matrix having ' $m$ ' rows and ' $n$ ' columns is called the matrix of order  $m \times n$ .

**Square Matrix** :An  $m \times n$  matrix is said to be a square matrix of order  $n$  if  $m = n$ .

**Column Matrix** :A matrix having only one column is called a column matrix i.e.  $A = [a_{ij}]_{m \times 1}$  is a column matrix of order  $m \times 1$ .

**Row Matrix** :A matrix having only one row is called a row matrix i.e.  $B = [b_{ij}]_{1 \times n}$  is a row matrix of order  $1 \times n$ .

**Zero Matrix** :A matrix having all the elements zero is called zero matrix or null matrix.

**Diagonal Matrix** :A square matrix is called a diagonal matrix if all its non diagonal elements are zero.

**Scalar Matrix** :A diagonal matrix in which all diagonal elements are equal is called a scalar matrix.

**Identity Matrix** :A scalar matrix in which each diagonal element is 1, is called an identity matrix or a unit matrix. It is denoted by  $I$ .

**Transpose of a Matrix** :If  $A = [a_{ij}]_{m \times n}$  be an  $m \times n$  matrix then the matrix obtained by interchanging the rows and columns of  $A$  is called the transpose of the matrix. Transpose of  $A$  is denoted by  $A'$  or  $A^T$ .

**Properties of the transpose of a matrix.**

- a.  $(A')' = A$  (ii)  $(A + B)' = A' + B'$
- b.  $(kA)' = kA'$ ,  $k$  is a scalar (iv)  $(AB)' = B'A'$

**SymmetrixMatrix** :A square matrix  $A = [a_{ij}]$  is symmetrix if  $a_{ij} = a_{jii}$ ,  $j$ . Also a square matrix  $A$  is symmetrix if  $A' = A$ .

**Skew SymmetrixMatrix** :A square matrix  $A = [a_{ij}]$  is skew-symmetrix, if  $a_{ij} = -a_{jii}$ ,  $j$ . Also a square matrix  $A$  is skew - symmetrix, if  $A' = -A$ .

**Determinant** :To every square matrix  $A = [a_{ij}]$  of order  $n \times n$ , we can associate a number (real or complex) called determinant of  $A$ . It is denoted by  $\det A$  or  $|A|$ .

**Adjoint of a Square Matrix A** is the transpose of the matrix whose elements have been replaced by their cofactors and is denoted as  $\text{adj } A$ .

Let  $A = [a_{ij}]_{n \times n}$ , then  $\text{adj } A = [A_{ji}]_{n \times n}$

### Properties

- $A(\text{adj } A) = (\text{adj } A) A = |A| I$
- If  $A$  is a square matrix of order  $n$  then  $|\text{adj } A| = |A|^{n-1}$
- $\text{adj}(AB) = (\text{adj } B) (\text{adj } A)$ .

**Note** :Correctness of  $\text{adj}A$  can be checked by using  $A.(\text{adj } A) = (\text{adj } A) . A = |A| I$

**Singular Matrix** :A square matrix is called singular if  $|A| = 0$ , otherwise it will be called a non-singular matrix.

**Inverse of a Matrix** :A square matrix whose inverse exists, is called invertible matrix. Inverse of only a non-singular matrix exists. Inverse of a matrix  $A$  is denoted by  $A^{-1}$  and is given by  $\frac{\text{Adj } A}{|A|}$ .

### Properties

- $AA^{-1} = A^{-1}A = I$
- $(A^{-1})^{-1} = A$
- $(AB)^{-1} = B^{-1}A^{-1}$
- $(AT)^{-1} = (A^{-1})^T$

### Solution of system of equations using matrix :

If  $AX = B$  is a matrix equation then its solution is  $X = A^{-1}B$ .

- If  $|A| \neq 0$ , system is consistent and has a unique solution.
- If  $|A| = 0$  and  $(\text{adj } A) B \neq 0$  then system is inconsistent and has no solution.
- If  $|A| = 0$  and  $(\text{adj } A) B = 0$  then system is either consistent and has infinitely many solutions or system is inconsistent and has no solution.

### Assignment – 4 (Matrices and Determinant)

1. If  $A = \begin{bmatrix} a & 0 & 0 \\ 0 & a & 0 \\ 0 & 0 & a \end{bmatrix}$ , then find  $A^{-1}$ .

2. If  $A = \begin{bmatrix} \cos \alpha & -\sin \alpha \\ \sin \alpha & \cos \alpha \end{bmatrix}$  then find the value of  $\alpha$  such that  $A^{-1} + A = I$ .

3. Find a symmetric matrix and a skew symmetric matrix from the matrix  $\begin{bmatrix} 5 & -1 \\ 9 & -7 \end{bmatrix}$

4. Solve  $\begin{bmatrix} 1 & -2 \\ 3 & 0 \end{bmatrix} = O$ .

5. If  $A$  is a square matrix such that  $A^2 = A$ , then write the value of  $(I + A)^2 - 3A$ .
6.  $[2x-3y \quad -4x+7y] = [1 \quad -2]$ , then find the possible values of  $x$  and  $y$ , where  $x, y \in \mathbb{Z}$ .
7. Show that a matrix which is both symmetric and skew symmetric is a zero matrix.
8. Let  $A$  be a square matrix of order  $3 \times 3$ . Write the value of  $|2A|$ , where  $|A|=4$ .
9. If  $A$  is a square matrix of order 3,  $A$  is non singular and  $|3A|=k|A|$ , then write the value of  $k$ .
10. If  $A$  and  $B$  are the square matrices of order 3, such that  $A = -1$  and  $B = 3$ , then find the value of  $|9AB|$ .
11. If  $A$  and  $B$  are the square matrices of same order 2, such that  $|A|=36$  and  $|AB|=24$ , then write the value of  $B$ .
12. If  $A$  is a skew symmetric matrix of order 3, write the value of  $|A|$ .
13. If  $A$  is an invertible matrix of order 3, and  $|\text{adj}A|=64$ , then find the value of  $|A|$ .
14. If  $A$  is a square matrix such that  $|A(\text{adj}A)| = 8I$ , then find  $A$ .
15. 15. If  $A$  and  $B$  are square matrices of the same order, then find  $(A + B)(A - B)$ .
16. If  $A$  is a non- singular square matrix such that  $|A|=5$ , then find  $A^{-1}$ .
17. If area of triangle is 35 sq units with vertices  $(2,-6)$ ,  $(5,4)$  and  $(k, 4)$ , then find  $k$ .
18. A farmer posses 30 acre cultivated land that must be cultivated in two different mode of cultivations organic and inorganic. The yield for organic and inorganic system of cultivations is 11 quintals/acre and 14 quintals/acre respectively. Using matrix method, determine how to divide 30 acre land among two mode of cultivation to obtained yield 390 quintals.
19. If  $A$  and  $B$  are symmetric matrices of the same order, then prove that  $(AB' - BA')$  is a skew symmetric matrix.
20. A trust invested some money in two type of bonds. The first bond pays 10% interest and second bond pays 12 % interest. The trust received Rs. 2800 as interest. However, if trust had interchanged money in bonds, they would have got Rs. 100 less as the interest. Using matrix method, find the amount invested by the trust.

21. For the non singular matrix A,  $(A')^{-1} = (A^{-1})'$ .

Using properties of determinant prove the following :

$$(a) \begin{vmatrix} 1 & a^2 + bc & a^3 \\ 1 & b^2 + ca & b^3 \\ 1 & c^2 + ab & c^3 \end{vmatrix} = (a-b)(b-c)(c-a)(a^2 + b^2 + c^2).$$

$$(b) \begin{vmatrix} \sin \alpha & \cos \alpha & \cos(\alpha + \delta) \\ \sin \beta & \cos \beta & \cos(\beta + \delta) \\ \sin \gamma & \cos \gamma & \cos(\gamma + \delta) \end{vmatrix} = 0$$

$$(c) \begin{vmatrix} b^2c^2 & bc & b+c \\ c^2a^2 & ca & c+a \\ a^2b^2 & ab & a+b \end{vmatrix} = 0$$

$$(d) \begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = ab + bc + ca + abc$$

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