P M SHRI

KENDRIYA VIDYALAYA TIKAMGARH SUMMER VACATION HOMEWORK



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PM SHRI KENDRIYA VIDYALAYA TIKAMGARH CLASS – 12 (2025 – 26) SUMMER VACATION HOLIDAY HOMEWORK SUBJECT – PHYSICS



4	 Example 2.5 (a) Determine the electrostatic potential energy of a system consisting of two charges 7 μC and -2 μC (and with no external field) placed at (-9 cm, 0, 0) and (9 cm, 0, 0) respectively. (b) How much work is required to separate the two charges infinitely away from each other? 		
	(c) Suppose that the same system of charges is now placed in an external electric field $E = A (1/r^2)$; $A = 9 \times 10^5 \text{ NC}^{-1} \text{ m}^2$. What would the electrostatic energy of the configuration be?		
5	Example 2.8 A slab of material of dielectric constant K has the same area as the plates of a parallel-plate capacitor but has a thickness $(3/4)d$, where d is the separation of the plates. How is the capacitance changed when the slab is inserted between the plates?		
6	Example 2.9 A network of four 10 μ F capacitors is connected to a 500 V supply, as shown in Fig. 2.29. Determine (a) the equivalent capacitance of the network and (b) the charge on each capacitor. (Note, the <i>charge on a capacitor</i> is the charge on the plate with higher potential, equal and opposite to the charge on the plate with lower potential.)		
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		
	$A \xrightarrow{\begin{array}{c} C_{4} \\ + \\ + \\ + \\ + \\ + \\ + \\ - \\ - \\ - \\ -$		
7	Example 3.3 An electric toaster uses nichrome for its heating element. When a negligibly small current passes through it, its resistance at room temperature (27.0 °C) is found to be 75.3 Ω . When the toaster is connected to a 230 V supply, the current settles, after a few seconds, to a steady value of 2.68 A. What is the steady temperature of the nichrome element? The temperature coefficient of resistance of nichrome averaged over the temperature range involved, is $1.70 \times 10^{-4} {}^{\circ}\text{C}^{-1}$.		



CHAPTER 02	SOLUTION	MARKS 05	
	2001 set I		
Q1 What do you understand by	colligative properties?Write the	em.	03M
Q2 (a)Show graphically that the	e freezing point of a liquid will be	depressed when a non	
volatile solute is dissolv	ved in it.		02M
(b)The freezing point of a soluti	on containing 0.3gm of acetic ac	cid in 30.0gm of benzene is	
lowered by 0.45°C.calcualte	e the vant Hoff factor (K _f for benz	zene = 5.12KKgmol ⁻)	03M
Q3 One litre aqueous solution of	of sucrose (mm =342gmmol ⁻) we	ighting 1015gm is found to recor	d
on osmotic pressure of	4.82 atm at 293K. What is the m	olarity of the sucrose solution?(R	=
0.0821 atm mol K)	2001 est II		3171
O1 (a) Channenschieg lie hann th	2001 set II		
Q1 (a) Show graphically how th	e vapour pressure of solvent an	d a solution in it of a nonvolatile	ad
solution Which is high	or and why?	ie bolling points of the solvent ar	
(b) A solution containing 3 00g	of BaCla in 250g of water boils at	100.083^{0} C Calculate the	02101
value of vant hoff facto	r and molality of BaCl ₂ in this so	lution ($K_{\rm b}$ for water =0.52KKmol ⁻	molar
mass of BaCl ₂ =208.3gn	nol-)		3M
	2002		
Q1 Calculate the number of mo	les of methanol in 5 litre of its 2	m solution. If the density of	
the solution is 0.981Kg	/I (Molecular mass of methanol	- = 32.0gmmol ⁻)	02M
Q2 Explain with suitable diagram	m and appropriate example, why	y some non ideal solution	
shows negative deviation	ons.		03M
	2003 SET 1		
Q1 An aqueous solution contain	ning 1.248g of BaCl ₂ (mm = 208.3	4gmol⁻) in 100 g of water	
boils at 100.0832°C.Calcualate	the degree of dissociation of BaC	Cl ₂ (Kb for water is 0.52KKgmol ⁻)	03M
Q2 What are ideal non ideal sol	utions.Explain with the suitable	diagram the behavior of	
ideal solution	OR		05M
Assuming complete dissociation	n, Calculate the expected freezin	g point of a solution ,	. I-
prepared by dissolving 6.00g of		0.100 kg of water $k_f = 1.80$ kkg/mc	
05M2003Set IIQ1 What is me	eant by Vant Hoff factor? The os	motic pressure of a 0.0103 molar	ſ
solution of	to be 0.70 etc. at 270 Calculate	h = 1/2 at $1/2$ for the $r/D = 0.0021$	
mol K) What conclusion	to be 0.70 atm at 27°C. Calculate	$r_{\rm r}$ the vant Holf factor (R = 0.082)	Latm-
mor-k-) what conclusio			
		anta in the 2 common and Contains	114
Q1 what is the sum of the mole	ecular fraction of all the compon	ents in the 3 component System	
Q2 Define following terms (f)MC	nurely covalent compounds have	ing molecular formulae AB, and	02101
AB ₄ When dissolved in	20g of benzene 1gm of AB ₂ lowe	ers the freezing point by 2 3K who	ereas
1gm of AB₄ lowers it by	1.3K The molar depression con	stant for benzene is 5.1KKgmol ⁻ .	creas
Calculate the atomic m	ass of A and atomic mass of B.		3M
	2005		
O1 Calculate the molality of a s	olution containing 20.7g of K2CC	03. Dissolved in 500ml of	
solution assume densit	y is 1g/ml3		2M
Q2 What would be the value of	Vant Hoff factor for a dilute solution	ution of K_2SO_4 in water	1M
Q3 State Henrys law for solubili	ity of a gas in a liquid. Explain th	e significance of Henrys law	

constant(K_H). at the same temperature , hydrogen is mole soluble in water than helium. Which will have a higher value of K_H and why? 3M

2006

Q1 Define mole fraction .1M Q2. Define an ideal solution. 1M

Q3 (a)Urea forms an ideal solution in water. Determine the vapour pressure of an aqueous

solⁿ containing 10% by mass of urea at 40^oC vapour pressure of water at 40^oC is 55.3 mmHg.3M (b)Why is freezing point depression of 0.1 M NaCl solution twice that of 0.1 M glucose solution.1M

2007

Q1. State the condition resulting in reverse osmosis.

Q2 A 0.1539 molal aqueous solution of cane sugar (M=342 g mol⁻) has a freezing point of 271K while the freezing point of pure water is 273.15K. What will be the freezing point of on aqueous solution containing 5g of glucose (M=180 g mol⁻) per 100 g of solution. 3M

2008

- Q1 State Raoult's law for solution for volatile liquids components. Taking a suitable example.Explain the meaning of deviation from Raoult's law.2M
- Q2 Define osmotic pressure and describe how the molecular mass can be determined on the basis of osmotic pressure measurement. 02M

2008 comportment

- 1State the law, correlating the pressure of a gas and its solubility in a liquid. State an application of this law.
- 2State Raoults law for Solution of volatile liquid components. Taking a suitable example explain the meaning of (+) deviation.

3A Solution containing 8 gm of a substance in 100 gm of diethyl ether boils at 36.86 C whereas pure ether boils at 35.60° C. Determine the mole mass of solute K_b=2.02 KKg/ mol)

4Calculate the temp. at which a solⁿ containing 54 gm of glucose in 250 g of water will freeze ($K_f=1$.)

2009

Q1 a) Define i) Mole fraction ii) Vant Hoff factor

b) 100mg of a protein is dissolved in enough water to make 10ml of a solution. If this solution has an osmotic pressure of 13.3mm Hg at 25° C. What is the molar mass of the protein? R=0.0821 Latm mol⁻ k⁻) and 760 mm Hg=1atm 3M

OR

What do you know by1) Colligative properties and2) Molality of solution2Mb) What con. of nitrogen should be present in a glass of water at room temperature?Assume a temp of 25°C, total pressure is 1 atm and mole fraction of Nitrogen in air is 0.78. K_H is
8.42 X10⁻⁷M/mmHg for nitrogen.3M

2010

Q1 Differentiate between molarity & molality.

- Q2 Define the terms Osmosis and Osmotic pressure. What is the advantage of using osmotic pressure as compared to other colligative properties for the determination of molar masses of solutes in Solution . 2M
- Q3 What mass of ethylene glycol (M=62.0g/mol) must be added to 5.50kg of water from 0° C to -10° C (K_f for water = 1.86kg/mol) 3M
- Q4 15g of an unknown molecular substance was dissolved in 450g of water. The resulting solution freezes at -0.34°C. What is the molar mass of the substance (K_f for water is 2.86KKg mol⁻)3M

Q5 What mass of NaCl (58.5g/mol) must be dissolved in 65g of water to lower the freezing point by 7 .

2M

1M

1M

The freezing point depression constant K_f is 1.86KKg/mol. Assume vant Hoff faction forNaCl. Is 1.87.

2011

Q1 State the followings.1Raoult's law in its general form in reference to solutions.

2Henry's law about partial pressure of a gas in a mixture.

- Q2 A solution prepared by dissolving 8.95mg of a gene fragment in 35 ml of water has an osmotic pressure of 0.335 tarr at 25°C. Assuming that the gene fragment is a non-electrolyte, calculate its molar mass.
- Q3 What mass of NaCl must be dissolved in 65.0gm of water to lower the freezing point of water by 7.50°C. The freezing point depression constant K_f 1.86KKg/mol. Assume vant Hoff factor for NaCl is 1.87 (M=58.5 gm)
- Q4What is meant by reverse osmosis.
- Q5 Differentiate between molarity and molality values for a soln. What is the effect of change in temperature on molarity & molality value.

2012

- Q1 Define the following terms (i) mole fraction and (ii) Ideal solution
- Q2 15.0 g of an unknown molecular material is dissolved in 450g o water .The resulting solution freezes at -0.34°C.What is the molar mass of the material?(K_f for water is 1.86KKg/mol)

OR

Explain the followings1Henry's law about dissolution of a gas in a liquid.

2Boiling point elevation constant for a solvent.

- Q3 A solution of glycerol(C₃H₈O₃)) in water was prepared by dissolving some glycerol in 500g of water. This solution has a boiling point of 100.42°C.What mass of glycerol was dissolved to make this solution?(Kb for water is 0.512KKg/mol)
- Q1 When is the value of Vant Hoff factor more than one?
- Q2 An aqueous solution of 10gm of glucose ($C_6H_{12}O_6$) in 90gm of water at 303K. If the vapor pressure of pure water at 303K be 32.8mmHg. What would be the vapour pressure of the solution.
- Q3 With the help of a suitable diagram show that the lower vapour pressure of a solution then the pure solvent causes a lowering of freezing point for the solution compared to that of pure solvent.

2013SET III

- Q1 (a) State Raoults law for a solution containing volatile components. How does Raoults law become a special case of Henrys law.
- (b)1.00g of a non electrolyte solute dissolved in 50g of benzene by 0.40K. Find the molar mass of the solute (Kf for benzene is 5.12KKg/mol)

OR

Q1Define the following terms (i)Ideal solution (ii) Azeotrope (iii) Osmotic pressure Q2A solution of glucose($C_6H_{12}O_6$) in water is labeled as 10% by weight. What would be the molality ot the solution?(molar mass of glucose is 180mol⁻)

2014

Q1 (a) Define the following terms(i)Molarity(ii) molal elevation constant2M(b)A solution containing 15g urea (M = 60) per litre of solution in water has the same osmotic pressure
(isotonic) as a solution of glucose (M180) in water. Calculate the mass of glucose present in one
litre of its solution.3M

Q1What type of deviation is shown by a mixture of ethanol ad acetone? Give reason. 2M Q2 A solution of glucose (M180) in water is labeled as 10% by mass. What would be the molality and molarity of the solution .(Density of solution is 1.2g/mol) 3M

2015 all 3 sets have same type of questions

Q1 (i)Why are aquatic species more comfortable in cold water than in warm water? 1M (ii) What happens when we place the blood cell in saline water solution(hypertonic solution)? Give reason 2M

Q2 Vapour pressure of water at 20°C is 17.5mmHg.Calculate the vapour pressure of water at 20°C When 15 gm of glucose is dissolved in 150gm of water. 3M

2016 all 3 sets have same type of questions

Q1(i)Write the colligative property which is used to find the molecular mass of macromolecules. (ii)In non ideal solution what type of deviation shows the formation of minimum boiling Azeotropes 1M

Q2 Calculate the boiling point of solution when 2g of Na₂SO₄ was dissolved in 50g of water, assuming Na₂SO₄ undergoes complete ionization. 2M

2017 (SET I/SET II / SET - III)

Q1 (a)A 10% solution (by mass) of sucrose in water has a freezing point of 269.15K. Calculate the freezing point of10% glucose in water if the freeing point of pure water is 273.15K Given (Molar mass of sucrose = 342gmol⁻¹ and Molar mass fo glucose = 180gmol⁻¹)3M

(b) Define the following terms i. Molality(m) and (ii) Abnormal molar mass 2M

OR

- (a) 30g of urea (M=60gmol-1) is dissolved in 846 g of water. Calculate the vapour pressure of water for this solution if vapour pressure of pure water at 298K in 23.8 mmHg.3M
- (b) Write two differences between ideal solutions and non-ideal solutions. 2M

2018

- Q1 Calculate the freezing point of a solution containing 60 g of in 250 g ofwater(k_f of water
- = 1.86 KKgmol⁻)
- Q2 Give reasons for the following
- a. Measurement of osmotic pressure method is preferred for the determination of molar masses of macro molecules such as proteins and polymers.
- b. Aquatic animals are more comfortable in cold water than in warm water.
- c. Elevation of boiling point of 1M KCl solution is nearly double than that of 1M sugar solution

2019

Q1 Give reason for followings

- a. Cooking is faster in pressure cooker than in cooking pan
- b. RBC shrink when placed in saline water but swell in distilled water.
- Q2 A solution containing 1.9 g per 100 ml of KCl (M = 74.5 g mol⁻) is isotonic with a solution containing 3 g per 100 ml of Urea (M = 60). Calculate the degree of dissociation of KCl solution. Assume that both the solution have same temperature. 3M

2020 set 1

Q1What happens when

2M

2M

3M

- (i) A pressure greater than osmotic pressure is applied on the solution side separated from solvent by a semipermeable membrane ?
- (ii) Acetone is added to pure ethanol?

Q2 State Henery's law. Calculate the solubility of CO₂ in water at 298K under 760mm Hg.

 $(K_{\rm H} \mbox{ for } {\rm CO}_2 \mbox{ in water at } 298 \mbox{ K is } 1.25 \mbox{ X } 10^6 \mbox{ mmHg}) \qquad 2M \\ Q3 \mbox{ The freezing point of a solution containing 5g of benzoic acid (M = 122g \mbox{ mol}^{-1}) \mbox{ in } 35 \mbox{ g of bezene is depressed by } 2.94 \mbox{ K. What is the percentage association of benzoic acid if it forms a dimer in solutions? (K_f \mbox{ for benzoic acid } = 4.9 \mbox{ Kg mol}^{-1}) \qquad 3M \\ 2021 \mbox{ exam suspended due to covid } 19$

2022 term i

Q1 Which of the following conditions is correct for an ideal solution?

Ans. H_{mix} = 0 and V_{mix} = 0

Q2 For determination of molar mass of polymers and proteins, which colligative property is used ?

Ans. Osmotic pressure

Q3Pure water boils at 373.15K and nitric acid boils at 359.15K. An azeotropic mixture of H_2O boils at 393.55 K. Distilling the azeotropic mixture will cause?

Ans. Both of them to distill over in the same composition as that of the mixture being distilled. Q 4 A 5% (by mass) solution of glucose (180mm) is isotonic with 1% solution by mass of a substance X. The molar mass of X is

Q5 When 2.5g of a non-volatile solute was dissolved in 50ml of water , it gave boiling point elevation of 0.52° C. The molar mass of the solute is (K_b for water = 0.52 Km⁻¹) Ans. 50g mol⁻¹

Q6 The solution of a pair of volatile liquids A and B shows negative deviation from Raloult's law. This is because –

Ans. The intermolecular force A-A,B-B<A-B

Q7 Assertion (A) Relative lowering in vapour pressure is a colligative property.

Reason (R) Relative lowering in vapour pressure depends upon mole fraction of pure solvent Q8 Which of the following analogies is correct?

Ans π = CRT:Osmotic pressure :: P> π : Reverse osmosis

Electrochemistry

1. Conductivity of 0.00241M acetic acid is 7.896X10⁻⁵ Scm⁻¹. Calculate its molar conductivity and it the limiting molar conductivity of acetic acid is 390.5 Scm² mol-1. What is its degree dissociation?

2.Write the Nernst equation for the cell and find the emf of the cell at 298K

 $Mg(s) / Mg^{2+}(0.001M) llCu^{2+}(0.0001m) / Cu(s)$ Given that E⁰ Mg²⁺/Mg= -2.36V, E⁰Cu²⁺/Cu = +0.34V

3.Represent the cell in which the following reaction takes place

Mg(s) + 2Ag⁺ (0.0001M) \longrightarrow Mg²⁺ (0.130 M) + 2Ag(s)

Calculate its E_{cell} if $E_{cell}^{o} = 3.17 \text{ V}$. Calculate Gibb s free energy change and equilibrium constant 4.Can a Nickel spatula be used to stir a solution of copper sulphate? Justify your answer.

 $(E^{\circ}_{Ni}^{2}/Ni} = -0.25V$ $E^{\circ}_{Cu}^{2}+/Cu} = 0.34V)$

5.The conductivity of 0.20M KCl solution at 298K is 0.0248Scm⁻¹. Calculate its molar conductivity.

6. How much charge is required for the following reduction? Al $^{3+}$ \rightarrow Al (s)

7. Write the Nernst equation for the following cell.

Ni(s) +2Ag⁺ (0.01M)-----→ Ni²⁺(aq) (0.001M) + 2Ag(s)

8. Given that standard electrode potentials, of different metal ion are:

$$K^+/K = -2.93V$$
, $Ag^+/Ag = 0.80V$, $Hg^{2+}/Hg = 0.79V$, $Mg^{2+}/Mg = 2.37V$, $Cr^{3+}/Cr = -0.74V$

Arrange these metals in their increasing order of reducing power.

9. Why does conductivity of a solution decrease with dilution?

10. The EMF of a cell corresponding to the reaction ($E^{\circ}_{Zn}^{2+}/Zn = -0.76V$)

 $Zn(s) + 2H^{+}(aq) - ---- \Rightarrow zn^{2+}(0.1M) + H_2(g, 1atm) \text{ is } 0.28V \text{ at } 25^{\circ}c$

Write the half cell reaction and calculate the PH of the solution at Hydrogen electrode 11. EMF =0.2V at 298KCd(s) /Cd²⁺(?)llNi²⁺(2.0M)/Ni(s)

Given that $E^{0}Cd^{2+}/Cd = -0.40V E^{0}Ni^{2+}/Ni = -0.25V$

S.No.	RELATION AND FUNCTION	YEAR	MARKS
1	If $f(x)$ is the invertible function, find the inverse of $f(x) = \frac{3x-2}{5}$	2008	1
2	Let T be the set of all triangles in a plane with R as relation in T given by $R = \{(T_1, T_2): T_1 \cong T_2\}$. Show that R is equivalence relation.	2008	4
3	Let * be a binary operation on N given by a *b=HCF (a , b) where a , $b \in N$ find a *b	2009	1
4	Let $f: N \to N$ be defined by $f(n) = \begin{cases} \frac{n+1}{2}, & \text{if } n \text{ is odd} \\ \frac{n}{2}, & \text{if } n \text{ is even} \end{cases}$ $n \forall N$ find whether the function is bijective.	2009	4
5	If $f(x): R \to R$ be defined by $f(x) = (3 - x)^{1/3}$ then find $f(x)$	2010	1
6	(x) = (x + b) + b + b + b + b + b + b + b + b +	2010	
b	Show that the relation on the set $N \times N$ by $(a, b)S(c, a) \Rightarrow a + a = b + c$ is equivalence relation.	2010	4
7	Let A={1,2,3}, B={4,5,6,7} and $f = \{(1,4), (2,5), (3,6)\}$ be a function from A to B. State whether f is one-one or not.	2011	1
8	Let $f: R \to R$ be the defined as $f(x) = 10x + 7$. Find the function $g: R \to R$ such that $g0f = f0g = I_R$. OR A binary operation on the set {0,1,2,3,4,5} is defined as: $a * b = \begin{cases} a+b \ if \ a+b < 6 \\ a+b-6 \ if \ a+b \ge 6 \end{cases}$ Show that zero is the identity for this operation and each element 'a' of the set is invertible with 6- a being the inverse of 'a'	2011	4
9	The binary operation $*R \times R \rightarrow R$ is defined as $a * b = 2a + b$. Find $(2 * 3) * 4$		1
10	Show that $f: N \to N$, given by $f(x) = \begin{cases} x+1 & \text{if } x \text{ is odd} \\ x-1 & \text{if } x \text{ is even} \end{cases}$	2012	4
	is one-one and onto. OR Consider the binary operation $*: R \times R \to R$ and $0: R \times R \to R$ defined as $a * b = a - b $ and $a0b = a$ for all $a, b \in R$. show that the * is commutative but not associative $a^{(0)}$ is associative but not commutative		
11	Consider $f: R_+ \rightarrow [4, \infty)$ given by $f(x) = x^2 + 4$ show that f is invertible with the inverse f^{-1} of given by $f^{-1}(y) = \sqrt{y - 4}$ where R_+ is the set of all non-negative real numbers.	2013	4
12	If $R = \{(x, y): x + 2y = 8\}$ is a relation on N, write the range of R.	2014	1
13	If $f: R \to R$, be given by $f(x) = x^2 + 2$ and $g: R \to R$ be given by $g(x) = \frac{x}{x-1}, x \neq 1$ find $g0f, f0g$ and hence find $f0g(2)$ and $g0f(-3)$		4
14	Determine whether the relation R defined on the set \mathbb{R} of all real number as $R = \{(a, b): a, b \in \mathbb{R} \text{ and } a - b + \sqrt{3} \in S, where S is the set of all irretinal number}\}$ is equivalence relation. OR Let $A = \mathbb{R} \times \mathbb{R}$ and $*$ be the binary operation on A defined as $(a, b) * (c, d) = (a + c, b + d)$. Prove that $*$ is commutative and associative. Find the identity element for $*$ on A. Also write the inverse element of the element (3,-5) in A.	2015	6

15	Let $A = R \times R$ and $*$ be a binary operation on A defined by $(a, b) * (c, d) = (a + c, b + d)$ show that $*$ commutative and associative. Find the identity element for $*$ on A. Also find the inverse of every element $(a, b)\epsilon A$.	2016	6
16	Let $A = \mathbb{Q} \times \mathbb{Q}$ and $*$ be a binary operation on A defined by $(a, b) * (c, d) = (ac, b + ad) (a, b), (c, d) \in A$ determine, whether $*$ commutative and associative. Then, with respect to $*$ on A (i) find the identity element in A (ii) find the invertible elements of A.	2017	6
	Consider $f: R - \left\{-\frac{4}{3}\right\} \rightarrow R - \left\{\frac{4}{3}\right\}$ given by $(x) = \frac{4x+3}{3x+4}$. show that f is bijective. Find the inverse of f and hence find $f^{-1}(0)$ and x such that $f^{-1}(x) = 2$	2	
17	If $a * b$ denotes the larger of 'a' and 'b' and if $aob = a * b + 3$, then write the value of 5010, where $*$ and oare the binary operations.	2018	1
18	Let $A = \{x \in Z : 0 \le x \le 12\}$. Show that $R = \{(a, b) : a, b \in A, a - b \text{ is divisible by } 4\}$ is an equivalence relation. Find the set of all elements related to 1. Also write the equivalence class of [2]. OR Show that the function $f : \mathbb{R} \to \mathbb{R}$ defined by $f(x) = \frac{x}{x^2+1}$, $\forall \in \mathbb{R}$ is neither one-one nor onto. Also if $g : \mathbb{R} \to \mathbb{R}$ is defined as $g(x) = 2x - 1$, find $gof(x)$.	2018	6
19	Examine the whether the operation $*$ defined on \mathbb{R} , the set of all real number, by $a * b = \sqrt{a^2 + b^2}$ is a binary operation or not, and if it is a binary operation, find whether it is associative or not.	2019	2
20	Check whether the relation defined on the set $A = \{1, 2, 3, 4, 5, 6\}$ as $R = \{(a, b): b = a + 1\}$ is reflexive, symmetric and transitive. OR Let $f: N \to Y$ be a function defined as $f(x) = 4x + 3$, where $Y = \{y \in N: y = 4x + 3, for some x \in N\}$. Show that f is invertible. Find its inverse.	2019	4
21	If $f: R \to R$ is given by $f(x) = (3 - x^3)^{1/3}$ then $fof(x) = \cdots$	2020	1
22	Check if the relation <i>R</i> on the set <i>A</i> = {1, 2, 3, 4, 5, 6} defined as <i>R</i> = {(<i>x</i> , <i>y</i>) : <i>y</i> is divisible by <i>x</i> } is (i) symmetric (ii) transitive OR Prove that $\frac{9\pi}{8} - \frac{9}{4}\sin^{-1}\frac{1}{3} = \frac{9\pi}{4}\sin^{-1}\frac{2\sqrt{2}}{3}$	2020	2
23	Prove that the relation R on Z defined as $R = \{(x, y) : x - y \text{ is divisible by 5}\}$ is an equivalence relation	2020	4
24	Show that the function defined by $f: R \to R$, be given by $f(x) = \frac{x}{x^2+1}$ is neither one-one or onto.	2020	
25	If N denotes the set of natural numbers and R is the relation on $N \times N$ defined by $(a, b)R(c, d)$, if $ad(b + c) = bc(a + d.)$. Show that R is equivalence relation. OR Let $f: R - \left\{-\frac{4}{3}\right\} \rightarrow R$ given by $(x) = \frac{4x}{3x+4}$. show that f is one-one function. Also check whether f is an onto function or not.	2023	5

S.No.	INVERSE TRIGONOMETRIC FUNCTION	YEAR	MARKS
1	Write the principal value of $\cos^{-1}\left(\cos\frac{7\pi}{6}\right)$	2009	1
2	Prove the following: $\cot^{-1} \left[\frac{\sqrt{1+sinx} + \sqrt{1-sinx}}{\sqrt{1+sinx} - \sqrt{1-sinx}} \right]$ OR Solve forx: $2 \tan^{-1}(cosx) = \tan^{-1}(2cosecx)$	2009	4
3	Write the principal value of $\sec^{-1}(-2)$	2010	1
4	Write the principal value of $\cot^{-1}(-\sqrt{3})$	2010	1
5	Find the value of $\sin^{-1}\left(\sin\frac{4\pi}{5}\right)$	2010	1
6	Prove the following: $\tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{5} + \tan^{-1}\frac{1}{7} + \tan^{-1}\frac{1}{8} = \frac{\pi}{4}$ OR If $\tan^{-1}\frac{x-1}{x-2} + \tan^{-1}\frac{x+1}{x+2} = \frac{\pi}{4}$ then find the value of x.	2010	4
7	Prove the following: $\tan^{-1} x + \tan^{-1} \frac{2x}{1-x^2} = \tan^{-1} \frac{3x-x^3}{1-3x^2}$ OR Prove the following: $\cos[\tan^{-1}{\sin(\cot^{-1} x)}] = \sqrt{\frac{1+x^2}{2+x^2}}$	2010	4
8	Find the principal value of $\cos^{-1}\left(\cos\frac{2\pi}{2}\right) + \sin^{-1}\left(\sin\frac{2\pi}{2}\right)$	2011	1
9	Prove that: $\tan^{-1}\frac{1}{n} + \tan^{-1}\frac{1}{n} + \tan^{-1}\frac{1}{n} = \frac{\pi}{n}$	2011	4
10	Prove that: $2\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{7} = \tan^{-1}\frac{31}{17}$	2011	4
11	Prove the following: $\tan^{-1} \left[\frac{\sqrt{1+x} - \sqrt{1-x}}{\sqrt{1+x} - \sqrt{1-x}} \right] = \frac{\pi}{4} - \frac{1}{2} \cos^{-1} x, -\frac{1}{\sqrt{2}} \le x \le 1$	2011	4
12	Write the principal value of $\tan^{-1}(\sqrt{3}) - \sec^{-1}(2)$	2012	1
13	Prove the following: $\cos(\sin^{-1}\frac{3}{5} + \cot^{-1}\frac{3}{2}) = \frac{6}{5\sqrt{13}}$	2012	4
14	Prove that: $\sin^{-1}\frac{3}{5} + \cos^{-1}\frac{12}{12} = \sin^{-1}\frac{56}{55}$	2012	4
15	Prove that: $\cos^{-1}\frac{12}{12} + \cos^{-1}\frac{4}{5} = \cos^{-1}\frac{33}{55}$	2012	4
16	Write the principal value of $\tan^{-1}(\sqrt{3}) - \cot^{-1}(-\sqrt{3})$	2013	1
17	Write the value of: $\tan^{-1} \left[2\sin\left(2\cos^{-1}\frac{\sqrt{3}}{3}\right) \right]$	2013	1
18	Show that: $\tan\left(\frac{1}{2}\sin^{-1}\frac{3}{4}\right) = \frac{4-\sqrt{7}}{3}$ OR Solve the following equation: $\cos(\tan^{-1}x) = \sin(\cot^{-1}\frac{3}{4})$	2013	4
19	If $\tan^{-1} x + \tan^{-1} y = \frac{\pi}{2}$, $xy < 1$ then write the value of $x + y + xy$.	2014	1
20	Prove the following: $\tan^{-1} \left[\frac{\sqrt{1+x} - \sqrt{1-x}}{\sqrt{1+x} - \sqrt{1-x}} \right] = \frac{\pi}{4} - \frac{1}{2} \cos^{-1} x, -\frac{1}{\sqrt{2}} \le x \le 1$ OR If $\tan^{-1} \frac{x-2}{4} + \tan^{-1} \frac{x+2}{4} = \frac{\pi}{4}$ then find the value of x.	2014	4
21	Evaluate: $tan \left\{ 2 \tan^{-1} \left(\frac{1}{2} \right) + \frac{\pi}{2} \right\}$	2015	4
22	Solve for x: $\tan^{-1}(x-1) + \tan^{-1}x + \tan^{-1}(x+1) = \tan^{-1}3x$ OR OR	2016	4
23	From that $\tan^{-1} \frac{x-3}{1-12x^2} - \tan^{-1} \frac{x+3}{1-4x^2} = \tan^{-2} 2x 2x < \sqrt{3}$	2017	4
24	If $\tan \frac{1}{x-4} + \tan \frac{1}{x+4} = \frac{1}{4}$ then find the value of x. 2017		
PG4.	Find the value of tail $(\sqrt{3}) = cot (-\sqrt{3})$	2010	

25	Prove that : $3\sin^{-1} x = \sin^{-1}(3x - 4x^3)$. $x \in \left[-\frac{1}{2}, \frac{1}{2}\right]$	2018	2
26	Find the value of sin $(\cos^{-1}\frac{4}{5} + \tan^{-1}\frac{2}{3})$ SET-1,2 Solve for $x: \tan^{-1}(x-1) + \tan^{-1}x + \tan^{-1}(x+1) = \tan^{-1}\frac{8}{31}$.	2019	4
27	The value of $\sin^{-1}\left(\cos\frac{3\pi}{5}\right)$ (i) $\frac{\pi}{10}$ (ii) $\frac{3\pi}{5}$ (iii) $-\frac{\pi}{10}$ (iv) $\frac{3\pi}{5}$	2020	1
28	The value of $\tan^{-1}\left[\frac{1}{2}\cos^{-1}\frac{\sqrt{5}}{3}\right]$	2020	1
29	 (a) Both Assertion (A) and Reason(R) are true and Reason(R) is correct explanation of the Assertion (A). (b) Both Assertion (A) and Reason(R) are true but Reason(R) is not correct explanation of the Assertion (A). (c) Assertion (A) is true and Reason(R) is false. (d) Assertion (A) is false and Reason(R) is true. Assertion (A) : All the trigonometric functions have their inverses over their respective domains. Reason(R) : The inverse of tan⁻¹ x exists for some x ∈ ℝ. 	2023	1 2/3
30	Find the domain of $y = \sin^{-1}(x^2 - 4)$ Evaluate: $\cos^{-1}\left[\cos\left(-\frac{7\pi}{2}\right)\right]$	2023	2

HOLI DAY HOME WORK CLASS -XII BIO

1 ACTIVITY - Study of pollen grains germination by making temporary slide.

2 ACTIVITY - Study of the adaption of flowers to pollination by wind, and insects.

3 ACTIVITY -TO study the different stages of gametes development like T. S. OF TESTIS AND OVARY.

4 ACTIVITY - Study of T.S. of blastula of a mammals by permanent slide.

5 ACTIVITY -To study the plant density by quadrate method.

6 ACTIVITY- To study the plant population frequency by quadrate method.

PM SHRI KENDRIYA VIDYALAYA, TIKAMGARH

Holiday Homework- Summer Break

2025-26

CLASS XII

Subject- English

Summer break is for the students to relax and rejuvenate themselves. It is hoped that you find the following assignment an interesting learning exercise.

- 1. Design the first page of your assignment as your portfolio which should have the following details:
 - a) Name, class & section
 - b) Passport sized latest photograph
 - c) Self-introduction in 50 words
- 2. Reading Challenge:

Read the lessons of the supplementary reader- Footprints without Feet and attempt the MCQs- link will be shared in the class group. Also write the descriptive answers in the fair notebook.

- 3. Watch the following two movies (in English). You will have to fill in a questionnaire when you come back to school after the break.
 - a) Mr. Popper's Penguins (released in 2011, Director- Mark Waters)
 - b) The Chronicles of Narnia 1 (Released in 2005, director- Andrew Adamson)
- 4. After reading lessons from your supplementary reader, which two characters did you like the most? Describe these characters in about 100 words each.

Points to Remember:

- a) Holiday homework should be done in the grammar notebook.
- b) Do your work neatly and creatively.
- c) Make your assignment attractive with illustrations.
- d) This assignment carries 10 marks. These marks will be added in the final Internal assessment scores.

कक्षा -12

ग्रीष्मकालीन गृहकार्य सत्र 2025 -2026

विषय – हिन्दी

- प्रेमचंद्र की पांच कहानियों को याद करे तथा लिखकर समीक्षा करें । (प्रोजेक्ट कार्य) फाइल में करना
- 2- हरिवंशराय बच्चन और महादेवी वर्मा के जीवन, साहित्यिक और शिक्षा पर विस्तृत वर्णन । (प्रोजेक्ट कार्य) फाइल में करना
- 3- जनसंचार तथा उसके भेद-प्रभेद , इटरनेट , जनसंचार के साधन पर विस्तृत वर्णन । (प्रोजेक्ट कार्य)
- 4- तुलसीदास तथा सूरदास के जीवन , रचनाओं का विस्तृत वर्णन । (प्रोजेक्ट कार्य)
- 5- आपकी कालोनी में आवारा जानवरों की संख्यां अचानक बढ़ गई है, जिससे कालोनी वासियों को परेशानी का सामना करना पड रहा है। इसकी तरफ ध्यान दिलाते हुए मुख्य नगर पालिका अधिकारी को पत्र लिखिए।

विषय पर निबंध लिखिए ।

- 6- (क) देश के विकास में महिलाओं का योगदान (ख) अच्छे नागरिक के देश के प्रति उत्तरदायित्व
- 7- आपने गर्मियों की छुट्टियां कैसे बिताई ? इस दौरान आपकी दिनचर्या कैसे रही ? लिखिए |
- 8- गीत (हरिवंशराय बच्चन), कविता के बहाने (कुंवर नारायण), भक्तिन (महादेवी वर्मा), कैमरे में बंद अपाहिज (रघुवीर सहाय) के प्रश्नोत्तर पुस्तिका में लिखे एवं याद करें ।

PM SHRI KENDRIYA YIDYALAYA TIKAMGARH

CLASS - XII BY RIMJHIM DUBEY (YOGA INSTRUCTOR)

- 1. What is Yoga?
- Write an introduction to Yoga and explain its importance in human life. How can the practice of Yoga help in preventing and managing various diseases?
- 3. Who is Maharshi Patanjali?Write a brief introduction about Maharshi Patanjali, known as the father of Yoga philosophy. Also, attach a related photograph of him.
- 4. What are the Benefits and Steps of Survanamaskar?
- 5. Describe the step-by-step process of Suryanamaskar (Sun Salutation) along with its benefits. Also, include photographs of each step.
- 6. What is Meditation?Explain what meditation is, mention its different types, and describe how chanting 'Om' helps in relaxing and calming the mind.
- 7. What are the Steps and Benefits of the Following Asanas?

For each of the following yoga poses, write the procedure, mention their benefits, and attach relevant photographs:

A) Tadasana (Mountain Pose)

- B) Kukkutāsana (Rooster Pose)
- C) Katichakrasana (Waist Rotation Pose)
- D) Dhanurasana (Bow Pose)
- E) Matsyendrasana (Spinal Twist Pose)

Please follow the instructions below while preparing your yoga project:

- Begin with a cover page that includes the title "<u>Yoga File Project</u>" and your name.
- 2. Allocate 20 pages for the content, ensuring each page is neat and clear.
- Write using a pen with clear handwriting, avoiding the use of whitener or correction fluid.
- Include relevant text describing various yoga poses, techniques, benefits, and precautions.
- Use pictures and drawings where necessary to illustrate the poses and techniques effectively.

Organize the content logically, perhaps grouping poses by difficulty level or focusing on specific benefits.

- Include a <u>table of contents to help navigate through the file easily.</u>
- Proofread the content to ensure accuracy and clarity.
- 9. Use high-quality paper to enhance the overall presentation.
- Bind the pages securely to prevent them from getting lost or damaged.



and day	P M SHRI KENDRIYA VIDYALAYA TIKAMGARH MP		
-	CLASS XII YOGA PROJECT WORK DURING SUMMER HOLIDAYS 2025		
SN	NAME OF STUDENT	PROJECT	
1	ABHINAV YADAV	"Shatkarma Secrets: Ancient Cleansing Techniques Unveiled" (halaasan	
2	ANAMIKA AHIRWAR	Yoga Through the Ages: Tracing the Evolution of Practicebhujang aasan)	
3	ANAMIKA SINGH	Yogasana Mastery: Exploring the Art of Yoga Postures(padhasth aasan)	
4	ANSHIKA SHESHA	Pranayama Pathways: Journeying into the BreathGomukh aasan)	
5	AYUSH KUMAR SUMAN	5. "Meditation Matters: Cultivating Stillness in a Busy World"vrikshsha aasan)	
6	AYUSHI SUMAN	Modern Diet Insights: Bridging Nutrition with Yoga PhilosophyTrikon aasan)	
7	AYUSHI TIWARI	Yogic Diet Demystified: Nourishing Body and Soul(ardh chakrasan)	
8	CHIRAG PATHAK	8. "Hatha Yoga Revisited: Understanding its Importance in Modern Times" (dhanurasana)	
9	GOURI TRIPATHI	Patanjali's Perspective: Mental Health in Yoga Philosophy(utkat aasan)	
10	HARSHITA YADAV	Kriya Yoga: Awakening the Inner Fire of TransformationShasank aasan)	
11	HIMANSHU PRABHAKAR	Ashtanga Yoga Unveiled: Eight Limbs to WholenessVakra aasan)	
12	NENCY AHIRWAR	Living Well with the Bhagavad Gita: Lessons for Healthy Livinguttanpad aasan)	
13	NISHA SEN	Mind-Body Connection: Exploring Psychosomatic Health in Yogapawanmukt aasan)	
14	PALAK TIWARI	Stress Less, Live More: Yoga Solutions for Modern Stressshav aasan)	
15	RAJEEV LOCHAN RAIKWAR	The Physiology of Stress: Understanding its Impact on the Body(manduk aasan)	
16	SHIVANSH PATERIYA	Sun Salutation Essentials: Exploring the Benefits of Surya Namaskar(Nauka aasan)	
17	SURBHI SHRIVASTAVA	Obesity and Wellness: Yoga Approaches for Weight Management(pashmuttan aasan)	
18	VED PRAKASH PANDEY	Holistic Hypertension Management: Integrating Yoga Practices(shalabh aasan)	
19	VISHWAJEET SINGH YADAV	Back to Basics: Yoga Strategies for Lower Back Pain Relief(janusir aasan)	
20	YUVRAJ SINGH GHOSH	20. "Arthritis Awareness: Yoga Techniques for Joint Health"(bhadra aasan)	



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