R.S.M.PUBLIC SCHOOL, SUPAUL

HOLIDAY HOME WORK-2020

CLASS-12

(MATHEMATICS)

1. Explain the following:

(i) Square matrix

(ii) Identity matrix

(iii) Diagonal matrix

(iv) Scalar matrix

(v) Zero matrix

2. If $A = \begin{bmatrix} 2 & 4 \\ 3 & 6 \end{bmatrix}$ **and** $B = \begin{bmatrix} 9 & 0 \\ 0 & 1 \end{bmatrix}$ **then (A+B) is equal to**

(i) $\begin{bmatrix} 2 & 3 \\ 11 & 7 \end{bmatrix}$ **(ii)** $\begin{bmatrix} 11 & 4 \\ 3 & 7 \end{bmatrix}$ **(iii)** $\begin{bmatrix} 3 & 7 \\ 11 & 4 \end{bmatrix}$ **(iv)** $\begin{bmatrix} 11 & 4 \\ 3 & 7 \end{bmatrix}$

3. Let A= $\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$ **and B =** $\begin{bmatrix} 1 & x \\ 0 & 1 \end{bmatrix}$ **if AB=BA then what is the value of x?**

(i) -1 (ii) 0 (iii) 1 (iv) Any real number

4. If A= $\begin{bmatrix} 8 & 0 \\ 4 & -2 \\ 3 & 6 \end{bmatrix}$ **and B =** $\begin{bmatrix} 2 & -2 \\ 4 & 2 \\ -5 & 1 \end{bmatrix}$

Then find the matrix X , such that 2A+3X =5B

5. If A = $\begin{bmatrix} 1 & 1 & -1 \\ 2 & 0 & 3 \\ 3 & -1 & 2 \end{bmatrix}$ **,** $B = \begin{bmatrix} 1 & 3 \\ 0 & 2 \\ -1 & 4 \end{bmatrix}$ **and** $C = \begin{bmatrix} 1 & 2 & 3 & -4 \\ 2 & 0 & -2 & 1 \end{bmatrix}$

Find A(BC), (AB)C and show that (AB)C=A(BC)

6. Find the principal value of

(i) $\sin^{-1}(1/\sqrt{2})$ **(ii)** $\cot^{-1}(-1/\sqrt{3})$ **(iii)** $\sin^{-1}(\frac{-1}{2})$ **(iv)** $\cos^{-1}(\frac{-1}{2})$

7. Show that $\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{2}{11} = \tan^{-1}\frac{3}{4}$

8. Express $\tan^{-1}\frac{cosx}{1-sinx}$, $-\frac{\pi}{2} < x < \frac{\pi}{2}$ **in the simplest form.**

9. Show that $\sin^{-1}(2x\sqrt{1-x^2}) = 2\sin^{-1}x$, $\frac{-1}{\sqrt{2}} \leq x \leq \frac{1}{\sqrt{2}}$

10. $\cos^{-1}(\cos\frac{7\pi}{6})$ is equal to :-

(i)$\frac{7\pi}{6}$ (ii) $\frac{5\pi}{6}$ (iii) $\frac{\pi}{3}$ (iv) $\frac{\pi}{6}$

11.Show that $\sin^{-1}\frac{3}{5} - \sin^{-1}\frac{8}{17} = \cos^{-1}\frac{84}{85}$

12. Solve $\tan^{-1}2x + \tan^{-1}3x = \frac{\pi}{4}$

13. If $A=\begin{bmatrix}-2\\4\\5\end{bmatrix}$, $B=\begin{bmatrix}1 & 3 & -6\end{bmatrix}$,Verify that $(AB)' = B'A'$

14. By using elementary operations find the inverse of matrix

$A=\begin{bmatrix}1 & 2\\2 & -1\end{bmatrix}$

15. Obtain the inverse of the following matrix using elementary operations.

$A=\begin{bmatrix}0 & 1 & 2\\1 & 2 & 3\\3 & 1 & 1\end{bmatrix}$

16. If $A=\begin{bmatrix}3 & 1\\-1 & 2\end{bmatrix}$ show that $A^2-5A+7I=0$

17.Evaluate $\Delta=\begin{vmatrix}0 & \sin\alpha & -\cos\alpha\\-\sin\alpha & 0 & \sin\beta\\\cos\alpha & -\sin\beta & 0\end{vmatrix}$

18.Show that $\begin{vmatrix}a & b & c\\a+2x & b+2y & c+2z\\x & y & z\end{vmatrix} = 0$

19. Prove that $\begin{vmatrix}b+c & a & a\\b & c+a & b\\c & c & a+b\end{vmatrix} = 4abc$

20. Find the equation of the line joining A (1,3) and B (0,0) using determinant and find k if D (K,0) is a point such that area of the triangle ABD is 3 sq units.

(CHEMISTRY)

1. Define the following terms:
(i) Colligative properties.
(ii) Molality (m)
2. State Raoult's law for a solutions containing non volatile solute. What type of deviation from Raoult's law is shown by a solution of chloroform and acetone and why ?
3. What is meant by elevation in boiling point? Why is it a colligative property?
4. What do you understand by depression in freezing point? Derive the relationship between depression of freezing point and molar mass of the solute.
5. Write two differences between between an ideal solution and non ideal solution.
6. Why does a solution containing non volatile solute have higher boiling point than the pure solvent? Why is elevation of boiling point a colligative property?
7. Define the relationship between relative lowering of vapour pressure and molar mass of the solute.
8. What is meant by positive deviation from Raoult's law? Give an example what is the sign of Δmix H for positive deviation?
9. Define azeotropes. What type of azeotropes is formed by positive deviation from Raoults law? Give an example.
10. (i) On mixing liquid x and liquid Y, volume of resulting solution decreases. what type of deviation from Raoult's law is shown by the resulting solution? What change in temperature would you observe after mixing liquids x and y?
(ii) What happens when we place the blood cell in water (hypotonic solution) give reason?
11. What is meant by negative deviation from Raoult's law ? Give an example. What is the sign of ΔmixH for negative deviation?
12. Define azeotropes. What type of azeotropes is formed by negative deviation from Raoult's law. Give an example.
13. A solution is prepared by dissolving 5 g of non –volatile solute in 95 g of water. It has a vapour pressure of 23.375mm of hg at 25 0C. Calculate the molar mass of the solute. (vapour pressure of pure water at 250C is 23.75 mm Hg).
14. Calculate the freezing point of the solution when 31 g of ethylene glycol ($C_2H_6O_2$) is dissolved in 500 g of water.(Kf for water=1.86 K kg mol-1)
15. What possible value of 'i' will it have if solute molecules undergo association in solution?

16. What are isotonic solutions?
17.How is vapour pressure of solvent affected when non- volatile solute is dissolved in it?
18. Differentiate between molarity and molality for a solution.
19. Calculate the mass of compound (molar mass=256 g mol-1)to be dissolved in 75 g of benzene to lower its freezing point by 0.48 K (Kf =5.12 K kg mol-1).
20. State Henry's law. What is the effect of of temperature on the solubility of a gas in a liquid?
21. State Raolult's law for the solution containing volatile component. What is the similarity between Raoult's law and Henry's law?
22. What type of deviation is shown by mixture of ethanol and acetone? Give reason.
23. 18 g of glucose, C6H12O6 (Molar mass =180 g mol-1) is dissolved in 1 kg of water in sauce pan. At what temperature will this solution boil?
24. Henry's law constant (KH) For the solution of methane in benzene at 298K is 4.27 x 105 mm Hg. Calculate the solubility of methane in Benzene at 298 K under 760 mm Hg.
25. Define Ebullioscopy constant.
26. Why are aquatic species more comfortable in cold water in comparison to warm water?
27. Define the following term:
(i) Ideal solution (ii) Azeotrope (iii) Osmotic pressure
28. What is meant by reverse osmosis?
29. What is van't Hoff factor? What possible values can it have if the molecules undergo dissociation?

Project work

01. Determine the rate of evaporation of different liquids. You have been provided three liquids (i) water (ii) benzene (iii) acetone

(BIOLOGY)

1. Name the organism where these features can be found.
(a) Transverse fission (b) Oestrous cycle
(c) Multiple fission (d) Heterothallism
(e) Fragmentation (f) Gemmules
(g) Buds (h) Zygospore
2. Define the following terms
(a) Endosperm (b) Triple fusion and double fertilization
(c) Parthenocarpic fruit (d) Apomixis and Polyembryony
(e) Hypocotyle and Epicotyle
3. Explain embryogeny in monocots and dicots.
4. Explain the growth and development of embryo sac in angiosperm plant.
5. What are the post fertilization change in the ovule?
6. What do you mean by self incompatibility? What is its significance in the reproduction in flowering plants ?
7. Describe the mechanism of pollen germination on the stigma of a flower and development of male gamete.
8. Sexual mode of reproduction is treated as the advantageous mode over asexual mode of reproduction. Why?
9. What are chasmogamous and cleistogamous flowers? What is its importance ?
10. Sexually produced offspring have a marked variation among them. Why?
11. Explain the gametic and zygotic meiosis.
12. Project work
Try to observe the seeds of different flowering plants and make a list of those seeds, which can be dispersed by :
(a) Wind (b) Birds (c) Humans
Write the vernacular and scientific name of each plant and characteristics that favour its dispersal by wind, birds and humans.

(PHYSICS)

1. If E = 5i + 3j + 2k units, Calculate the electric flux through a surface of area 40 units in Y-Z plane.
2. Calculate Coulomb force between two alpha particles separated by a distance of 3.2× m in vacuum.
3. By what factor the capacitance of a metal sphere increase if its volume is made 27 times?
4. A conductor of length 'L' is connected to a dc source of potential difference 'V'. If length is doubled by keeping V constant, how is the drift speed be affected?
5. A battery of emf 3V and internal resistance 0.2 Ω is being charged by a current of 6 A. What is the potential difference between the terminals of the battery?
6. Two wires A and B of same material have their lengths in the ratio 1:5 and diameters in the ratio 3:2. If the resistance of the wire B is 180Ω, find the resistance of wire A.
7. Two small charged spheres A and B have charges 10 μC and 40 μC respectively, held at 90 cm from each other. At what distance from A, E will be zero?
8. State and prove Gauss Law in Electrostatics.
9. Three charges each equal to 'q' are placed at the three corners of a square of side 'a'. Find the electric field at the fourth corner.
10. The force experienced by a unit charge when placed at a distance of 0.10 m from the middle of an electric dipole on its axial line is 0.025 N. When it is placed at a distance of 0.2 m , the force becomes 0.002 N. Calculate the dipole length (It's not negligible compared to the distance involved).

11. Define an electric line of force. Draw its sketch for an electric dipole. State any of its two properties.
12. An electric dipole of length 2cm is placed with its axis making an angle of 600to a uniform electric field of 105N/C. If it experiences a torque of $8\sqrt{3}$ Nm, calculate a) magnitude of each charge comprising the dipole b) potential energy of dipole.
13. Derive an expression for the Electric potential at an arbitrary point due to an electric dipole. Hence discuss the axial and equatorial case.
14. Two capacitors C1 and C2 charged to V1 and V2 respectively and then connected in parallel. Calculate the common potential across the combination, the electrostatic energy stored in the system and the change in the electrostatic energy from its initial value.
15. Derive a relation between electric current and drift velocity. Hence deduce Ohm's Law. Hence obtain the expression for resistivity in terms of number density of free electrons and relaxation time.
16. Define mobility of a charge carrier. A potential difference of 6V is applied across a conductor of length 0.12 m . Calculate the drift speed of electrons if the electron mobility is 5.6 × .
17. Obtain an expression for torque experienced by an electric dipole in an external electric field.
18. State the principle of a Potentiometer. Explain with a circuit diagram how it can be used to compare the emf of two primary cells.
19. A potentiometer wire of length 100 cm has a resistance of 10 Ω. It is connected in series with an external resistor R and a battery of 2 V of negligible internal resistance. A source of 10 mV is balanced against a length of 40 cm of the potentiometer wire. Find the value of 'R'.

20. a) A current of 2 mA passed through a color coded carbon resistor of yellow, green and orange colors respectively. Calculate the voltage drop.

b) Write the dimensional formula for Resistance.

a) A cylindrical wire is stretched to increase its length by 10%. Calculate % increase in resistance.

21. a) Without using Gauss Law, obtain the expression for electric field at a point at distance 'y' from an infinite long straight charged wire having linear charge density λ.

b) Use Gauss Law to find Electric field at a point near uniformly charged infinite plane sheet.

22. a) Derive an expression for electrostatic potential energy of a system of two charges.

b) Two charges 5 nC and —2 nC are placed at (2 cm, 0, 0) and (y cm , 0, 0) in a region with no external electric field . If U = — 0.5 μJ for the system, Find y .

c) Write the formula for capacitance of a spherical capacitor of radius R.

23. Obtain Wheatstone Bridge condition and show how it applies to Metre Bridge for finding unknown resistances.

24. Derive an expression for capacitance of a parallel plate capacitor with a dielectric slab inserted in it.

25. Obtain an expression for Electric potential due to a point charge at an arbitrary point. Discuss the axial and equatorial cases.

26. Do back exercise 1.4 to 1.26, 2.1 to 2.14, 2.18 to 2.21, 3.1 to 3.13, 3.20 to 3.23.