SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

SR EAMCET
Time: 3 Hours

DPP-10

Date: 19-04-2020

MATHS-A

SYLLABUS: Matrices (Albegra of Matrices)

1. **If** $2X+3Y=\begin{bmatrix}2&3\\4&0\end{bmatrix}$ **and** $3x+2y=\begin{bmatrix}2&-2\\-1&5\end{bmatrix}$**, then the value of** x **and** y **is**

1) $\begin{bmatrix}-5&0\\-1&4\end{bmatrix}$ and $\begin{bmatrix}2&0\\-1&-1\end{bmatrix}$

2) $\begin{bmatrix}\frac{5}{2}&0\\1&0\end{bmatrix}$ and $\begin{bmatrix}2&1\\0&1\end{bmatrix}$

3) $\begin{bmatrix}4&1\\\frac{3}{2}&2\end{bmatrix}$ and $\begin{bmatrix}1&1\\1&\frac{5}{2}\end{bmatrix}$

4) $\begin{bmatrix}\frac{2}{5}&\frac{-12}{5}\\\frac{-11}{5}&3\end{bmatrix}$ and $\begin{bmatrix}\frac{2}{5}&\frac{13}{5}\\\frac{14}{5}&-2\end{bmatrix}$

2. **If** $A=\begin{bmatrix}0&a&b\\-a&0&c\\-b&-c&0\end{bmatrix}$**, if** $Q_1=\frac{1}{2}\left(A+A'\right)$ **and** $Q_2=\frac{1}{2}\left(A-A'\right)$**, then** Q_1,Q_2 **is equal to**

1) l_3 2) 0_3 3) A 4) A^2

3. **If** $A=\begin{bmatrix}1&2&-1\\-1&1&2\\2&-1&1\end{bmatrix}$**, then det** $\left(adj\left(A\right)\right)$ **is**

1) $(14)^2$ 2) $(13)^2$ 3) $(14)^3$ 4) $(13)^3$

4. **If** $P=\begin{bmatrix}\frac{\sqrt{3}}{2}&\frac{1}{2}\\-\frac{1}{2}&\frac{\sqrt{3}}{2}\end{bmatrix}$**,** $A=\begin{bmatrix}1&1\\0&1\end{bmatrix}$ **and** $Q=PAP^T$**, then** $P^TQ^{2005}P$ **is equal to**

1) $\begin{bmatrix}1&2005\\0&1\end{bmatrix}$

2) $\begin{bmatrix}4+2005\sqrt{3}&6015\\2005&4-2005\sqrt{3}\end{bmatrix}$

3) $\frac{1}{4}\begin{bmatrix}2+\sqrt{3}&1\\-1&2-\sqrt{3}\end{bmatrix}$

4) $\frac{1}{4}\begin{bmatrix}2005&2-\sqrt{3}\\2+\sqrt{3}&2005\end{bmatrix}$

5. **If** $A\left(\alpha,\beta\right)=\begin{bmatrix}\cos\alpha&\sin\alpha&0\\-\sin\alpha&\cos\alpha&0\\0&0&e^{\beta}\end{bmatrix}$**, then which of the following is incorrect**

1) $A\left(\alpha,\beta\right)'=A\left(-\alpha,\beta\right)$

2) $A\left(\alpha,\beta\right)^{-1}=A\left(-\alpha,-\beta\right)$

3) $adj\left(A\left(\alpha,\beta\right)=e^{+\beta}A\left(-\alpha,-\beta\right)\right.$

4) $\left(A\left(\alpha,\beta\right)'=A\left(\alpha,-\beta\right)\right.$

6. **If** $i=\sqrt{-1}$**,** $a=\frac{1+\sqrt{5}}{2}$**,** $b=\frac{1-\sqrt{5}}{2}$ **then which of the following matrix is idempotent**

1) $\begin{bmatrix}a&i\\i&-b\end{bmatrix}$ 2) $\begin{bmatrix}b&i\\i&a\end{bmatrix}$ 3) $\begin{bmatrix}a&i\\i&b\end{bmatrix}$ 4) $\begin{bmatrix}a&b\\b&a\end{bmatrix}$

7. **If** $A=\begin{bmatrix}1 & 2\\ -1 & 3\end{bmatrix}$ **and if** $A^6=KA-205I$ **, then**

1) $K=11$ 2) $K=22$ 3) $K=33$ 4) $K=44$

8. **Matrix** M_r **is defined as** $M_r=\begin{bmatrix}r & r-1\\ r-1 & r\end{bmatrix}$, $r\in N$ **value of det**

$(M_1)+\det(M_2)+\det(M_3)+...+\det(M_{2007})$ **is**

1) 2007 2) 2008 3) 2008^2 4) 2007^2

9. **If** $A=\begin{bmatrix}2 & -2 & -4\\ -1 & 3 & 4\\ 1 & -2 & x\end{bmatrix}$ **is an idempotent matrix, then** x **is equal to**

1) -5 2) -1 3) -3 4) -4

10. **If** $A=\begin{bmatrix}-1 & \frac{3}{2}\\ -\frac{1}{2} & \frac{1}{2}\end{bmatrix}$**, then** $I+A+A^2+....\infty$ **is equal to**

1) $\begin{bmatrix}1 & -3\\ 1 & 4\end{bmatrix}$ 2) $\frac{2}{7}\begin{bmatrix}1 & -3\\ -1 & 4\end{bmatrix}$ 3) $\frac{2}{7}\begin{bmatrix}1 & 3\\ -1 & 4\end{bmatrix}$ 4) $\begin{bmatrix}3 & 4\\ 5 & 1\end{bmatrix}$

11. **The values of x, so that** $\begin{bmatrix}1 & x & 1\end{bmatrix}\begin{bmatrix}1 & 3 & 2\\ 0 & 5 & 1\\ 0 & 3 & 2\end{bmatrix}\begin{bmatrix}1\\ 1\\ x\end{bmatrix}=0$ **is /are**

1) ± 2 2) 0 3) $\frac{-7\pm\sqrt{35}}{2}$ 4) $\frac{-9\pm\sqrt{53}}{2}$

12. **Matrix X satisfying the equation** $2X-Y=\begin{bmatrix}3 & -3 & 0\\ 3 & 3 & 2\end{bmatrix}$, $2Y+X=\begin{bmatrix}4 & 1 & 5\\ -1 & 4 & -4\end{bmatrix}$ is

1 $2\begin{bmatrix}-2 & -1 & 0\\ -1 & 2 & 1\end{bmatrix}$ 2) $2\begin{bmatrix}-2 & 1 & 1\\ -1 & 2 & 0\end{bmatrix}$ 3) $\begin{bmatrix}2 & -1 & 1\\ 1 & 2 & 0\end{bmatrix}$ 4) $\begin{bmatrix}3 & 1 & 2\\ 1 & 2 & 0\end{bmatrix}$

13. **If** $A=\begin{bmatrix}a & p\\ b & q\\ c & r\end{bmatrix}$**,then** $\det(AA^T)$ **is equal to**

1) 0 2) 7 3) 2 4) 3

14. **If** $E(\theta)=\begin{bmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{bmatrix}$**, then** $E(\alpha).E(\beta)$ **is equal to**

1) $E(\alpha-\beta)$ 2) $E(\alpha+\beta)$ 3) $E(\alpha)$ 4) $E(\beta)$

15. **If** $A=\begin{bmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{bmatrix}$ **and A (adj A) =** λI **, then the value of** λ **is**

1) 1 2) 2 3) 3 4) 4

16. **If** $A=\begin{bmatrix}\alpha & \beta\\ \gamma & -\alpha\end{bmatrix}$ **is such that** $A^2=I$ **, then**

1) $1+\alpha^2+\beta\gamma=0$ 2) $1-\alpha^2+\beta\gamma=0$ 3) $1-\alpha^2-\beta\gamma=0$ 4) $1+\alpha^2-\beta\gamma=0$

17. **Find the values of x, y and z, if the matrix** $A=\begin{bmatrix}0 & 2y & z\\ x & y & -1\\ x & -y & z\end{bmatrix}$ **satisfies the equation** $A'A=I$ **are**

1) $\pm\frac{1}{\sqrt{2}},\pm\frac{1}{\sqrt{6}},\pm\frac{1}{\sqrt{3}}$ 2) $\pm\frac{1}{2},\pm\frac{1}{6},\pm\frac{1}{3}$ 3) $\pm\frac{1}{\sqrt{2}},\pm\frac{1}{\sqrt{3}},\pm\frac{1}{\sqrt{5}}$ 4) None of these

18. If A is a square matrix such that $A^2 = I$, then $(A-I)^3+(A+I)^3-7A$ is equal to

1) A 2) $1-A$ 3) $1+A$ 4) 3A

19. If $A=\begin{bmatrix}0&1\\1&1\end{bmatrix}$ and $B=\begin{bmatrix}0&-1\\1&0\end{bmatrix}$, then which of the following is correct?

1) $(A+B).(A-B)-A^2-B^2$ 2) $(A+B).(A-B)=A^2-B^2$

3) $(A+B).(A-B)=1$ 4) None of these

20. If $A=\begin{bmatrix}0&-\tan\frac{\alpha}{2}\\ \tan\frac{\alpha}{2}&0\end{bmatrix}$ and I is the identity matrix of order2, $(I-A)\begin{bmatrix}\cos\alpha&-\sin\alpha\\ \sin\alpha&\cos\alpha\end{bmatrix}$ is equal to

1) A 2) 1 3) $1+A$ 4) None of these

MATHS-B

<u>SYLLABUS</u>: - Limits & Continuity

1. $\underset{x\to 0}{Lt}\frac{\sin[\cos x]}{1+[\cos x]}$**, where [.] denotes the greatest integer function is equal to**

1) 1 2) 0 3) Does not exist 4) None of these

2. Let [x] denotes the greatest integer less than or equal to x then

$\lim_{x\to 0}\frac{\tan(\pi\sin^2 x)+(|x|-\sin(x[x]))^2}{x^2}$ equal to

1) π 2) 0 3) $\pi+1$ 4) Does not exist

3. $\lim_{x\to 1-}\frac{\sqrt{\pi}-\sqrt{2\sin^{-1}x}}{\sqrt{1-x}}$ **is equal to**

1) $\sqrt{\pi}$ 2) $\sqrt{\frac{2}{\pi}}$ 3) $\frac{1}{\sqrt{2\pi}}$ 4) $\sqrt{\frac{\pi}{2}}$

4. $\lim_{n\to\infty}\sum_{x=1}^{20}\cos^{2n}(x-10)=$

1) 0 2) 1 3) 19 4) 20

5. If $l(x)$ is least integer not less than x and $g(x)$ is the greatest integer not greater than x then

$\lim_{x\to e+\pi}[l(n)+g(x)]=$

1) 1 2) 9 3) 11 4) 13

6. $\lim_{x\to 0}\left[\frac{\sin(Sgn(x))}{(Sgn(x))}\right]$ **=, (where [x] denotes the integral part of x)**

1) -1 2) 0 3) 1 4) Does not exist

7. If $y=\frac{1}{2}\sin^{-1}\left(\frac{2xy}{x^2+y^2}\right)$ and $y<x$ then $\lim_{y\to 0}x=$

1) 0 2) 1 3) -1 4) ∞

8. $\lim_{x\to 0}\frac{\sin(x^2)}{\log[\cos(2x^2-x)]}=$

1) -1 2) 1 3) 2 4) -2

9. For each $t \in R$, let [t] be the greatest integer less than or equal to 't' then

$$\underset{x\to 1+}{Lt}\frac{\left(1-|x|+\sin|1-x|\right).\sin\left(\frac{\pi}{2}[1-x]\right)}{|1-x|[1-x]}$$ **equal to**

1) -1 2) 0 3) 1 4) Does not exist

10. $\underset{x\to 0}{Lt}\frac{(\sin x-x)^2+(1-\cos x^3)}{x^5\sin x}=$

1) $\frac{19}{36}$ 2) $\frac{9}{37}$ 3) $\frac{19}{73}$ 4) 0

11. Which of the following functions have finite number of points of discontinuity ([.] represents greatest integer function)

1) $\tan x$ 2) $x[x]$ 3) $\frac{|x|}{x}$ 4) $Sin[n\pi x]$

12. The function $f(x)=\frac{4-x^2}{4x-x^3}$ is

1) Discontinuous at only one point
2) Discontinuous exactly at two points
3) Discontinuous exactly at three points
4) None of these

13. The function $f(x)=\frac{(3^x-1)^2}{Sinx\log(1+x)}$, $x\neq 0$ is continuous at $x=0$. Then the value of $f(0)$ is

1) $\log 3$ 2) $\log 3^2$ 3) $\log 2$ 4) $(\log 3)^2$

14. $f(x)=\begin{cases}\frac{1-|x|}{1+x}, & x\neq -1\\ 1, & x=-1\end{cases}$ **then $f([2x])$ where $[\ ]$ represents the greatest integer function is**

1) Discontinuous at $x=-1$
2) Continuous at $x=\frac{1}{2}$
3) Continuous at $x=0$
4) Continuous at $x=1$

15. Let $f(x)=\begin{cases}\frac{x-4}{|x-4|}+a, & x<4\\ a+b, & x=4\\ \frac{x-4}{|x-4|}+b & x>4\end{cases}$ **then $f(x)$ is continuous at $x=4$ when**

1) $a=0,b=0$ 2) $a=1,b=1$ 3) $a=-1,b=1$ 4) $a=1,b=-1$

16. If $f(x)=\frac{x-e^x+Cos2x}{x^2}$, $x\neq 0$ is continuous at $x=0$ then

1) $f(0)=\frac{5}{2}$
2) $[f(0)]=2$
3) $\{f(0)\}=-0.5$
4) $[f(0)]\{f(0)\}=-1.5$

17. Which of the following is true about $f(x)=\begin{cases}\frac{(x-2)}{|x-2|}\left(\frac{x^2-1}{x^2+1}\right), & x\neq 2\\ \frac{3}{5}, & x=2\end{cases}$

1) $f(x)$ is continuous at $x=2$
2) $f(x)$ has removable discontinuity at $x=2$
3) $f(x)$ has non-removable discontinuity at $x=2$

4) Discontinuity at $x = 2$

18. **If** $a < b$ **then** $f(x) = \sqrt{\frac{x-a}{b-x}}$ **is continuous on**

1) (a,b) 2) $[a,b]$ 3) $[a,b)$ 4) $(a,b]$

19. $f(x) = [x^2] - [x]^2$ **is discontinuous on**

1) Z 2) $Z - \{0\}$ 3) $Z - \{1\}$ 4) $Z - \{0,1\}$

20. **The set of values of** x **for which the function** $f(x) = \log\left(\frac{x-1}{x+2}\right)$ **is continuous is**

1) $(-2,-1)$
2) $(-\infty,-2) \cup (0,\infty)$
3) $(-\infty,-2) \cup (1,\infty)$
4) $(-2,-1)$

PHYSICS

SYLLABUS: Oscillations

1. **A simple harmonic oscillator starts from extreme position and covers a displacement is equal to half of its amplitude in a time 't', the further time taken by it to reach mean position is**

1) 2t 2) t 3) $t/\sqrt{2}$ 4) t/2

2. **The minimum phase difference between two SHM's** $y_1 = \sin\frac{\pi}{6}\sin\omega t + \sin\frac{\pi}{3}\cos\omega t$; $y_2 = \cos\frac{\pi}{6}\sin\omega t + \cos\frac{\pi}{3}\cos\omega t$ **is**

1) $\frac{\pi}{3}$ 2) $\frac{\pi}{6}$ 3) $\frac{\pi}{12}$ 4) 0

3. **If the radius of earth shrinks by 0.2% without change in its mass. The time period of oscillation of a simple pendulum**

1) Increases by 0.2% 2) Decreases by 0.2% 3) Increases by 0.1% 4) Decreases by 0.1%

4. **If a simple harmonic motion is represented by** $\frac{d^2x}{dt^2} + \alpha x = 0$**, its time period is**

1) $2\pi\alpha$ 2) $2\pi\sqrt{\alpha}$ 3) $\frac{2\pi}{\alpha}$ 4) $\frac{2\pi}{\sqrt{\alpha}}$

5. **A seconds pendulum is suspended from the roof of a lift. If the lift is moving up with an acceleration 9.8 m/s^2, its time period is**

1) 1 s 2) $\sqrt{2}$ s 3) $\frac{1}{\sqrt{2}}$ s 4) $2\sqrt{2}$ s

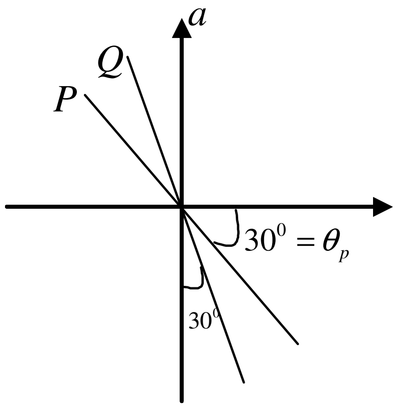
6. **Two masses M and m are suspended together by a massless spring of force constant k. When the masses are in equilibrium, M is removed without disturbing the system. Then the amplitude of oscillation is**

1) Mg/k 2) mg/k 3) (M+m)g/k 4)(M–m)g/k

7. **A particle is executing SHM with a frequency of** $\frac{1}{8}Hz$**. If starts from the mean position at time t=0, the ratio of distances covered by it in 1st and 2nd second is**

1) 1 2) $1/(\sqrt{2}-1)$ 3) $1/(\sqrt{3}-1)$ 4) $\sqrt{2}-1$

8. The acceleration - displacement graph of two particles P and Q executing SHM are represented as shown in the figure. The ratio of time period of P,Q respectively is



1) $\sqrt{3}:1$ 2) $1:\sqrt{3}$ 3) $3:1$ 4) $1:3$

9. The bob of a simple pendulum is displaced from its equilibrium position 'O' to a position 'Q' which is at a height 'h' above Q and then bob is released. Assuming the mass of the bob to be 'm' and time period of oscillation to be 2.0 s, the tension in the string when the bob passes thorough 'O' is

1) $m(g+2\pi^2 h)$ 2) $m(g+\pi^2 h)$ 3) $m\left(g+\frac{\pi^2}{2}h\right)$ 4) $m\left(g+\frac{\pi^2}{3}h\right)$

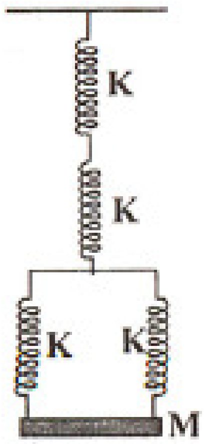
10. Two simple pendulums of length 100m and 121m start swinging together. They will swing together again after

1) the longer pendulum makes 10 oscillations 2) the shorter pendulum makes 10 oscillations
3) the longer pendulum makes 11 oscillations 4) the shorter pendulum makes 20 oscillations

11. The change in the length of a simple pendulum of length 1m, when its period of oscillation changes from 2s to 1.5s is

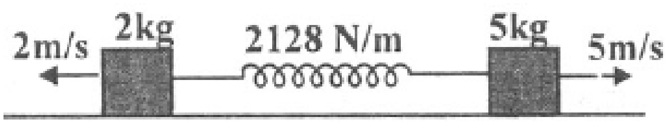
1) increased by $\frac{7}{8}m$ 2) decreased by $\frac{7}{8}m$ 3) increased by $\frac{7}{16}m$ 4) decreased by $\frac{7}{16}m$

12. The frequency of oscillation of the system shown in the figure will be



1) $\frac{1}{2\pi}\sqrt{\frac{k}{M}}$ 2) $\frac{1}{2\pi}\sqrt{\frac{2k}{M}}$ 3) $\frac{1}{2\pi}\sqrt{\frac{k}{5M}}$ 4) $\frac{1}{2\pi}\sqrt{\frac{2k}{5M}}$

13. Two bodies of mass 2 kg. and 5 kg. are attached to the ends of a spring of force constant 2128 N/m. These bodies are given velocities of 2 m/s and 5 m/s in mutually opposite directions. The maximum extension produced in the spring is



1) 0.01 m 2) 0.10 m 3) 0.50 m 4) 0.25 m

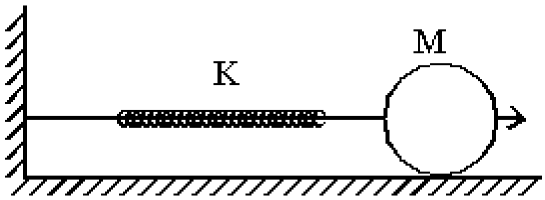
14. Two simple pendulums are drawn to same side from their mean positions and are released simultaneously. Their time periods are 2s and 3s. The phase difference between the pendulums when the longer pendulum completes one oscillation is

1) $\pi/3$rad 2) $\pi/2$rad 3) $2\pi/3$rad 4) πrad

15. A spherical ball of radius r makes small oscillations on a rough concave of large radius R. If it rolls on the surface during its oscillation, its time period is

1) $2\pi\sqrt{\frac{R}{g}}$ 2) $2\pi\sqrt{\frac{5(R-r)}{7g}}$ 3) $2\pi\sqrt{\frac{7(R-r)}{5g}}$ 4) $2\pi\sqrt{\frac{(R-r)}{g}}$

16. A disc of mass M is attached to a horizontal massless spring of force constant K so that it can roll without slipping along a horizontal surface. If the disc is pushed a little towards right and then released, its centre of mass executes SHM with a period of



1) $2\pi\sqrt{\frac{M}{K}}$ 2) $2\pi\sqrt{\frac{3M}{K}}$ 3) $2\pi\sqrt{\frac{M}{2K}}$ 4) $2\pi\sqrt{\frac{3M}{2K}}$

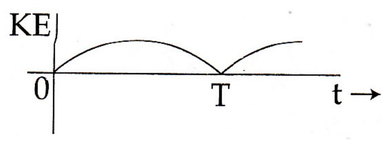
17. The mass and the diameter of a planet are three times the respective values for the Earth. The period of oscillation of a simple pendulum on the Earth is 2 s. The period of oscillation of the same pendulum on the planet would be

1) $\frac{2}{\sqrt{3}}s$ 2) $\frac{3}{2}s$ 3) $\frac{\sqrt{3}}{2}s$ 4) $2\sqrt{3}s$

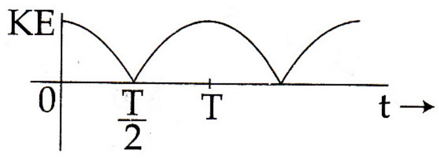
18. A spring whose unstretched lenght is l has a force constat k. The spring is cut into two pieces of unstretched lengths l_1 and l_2 where, $l_1 = nl_2$ and n is an integer. The ratio k_1/k_2 of the corresponding force constants, k_1 and k_2 will be :

1) n^2 2) $\frac{1}{n}$ 3) $\frac{1}{n^2}$ 4) n

19. A particle is executing simple harmonic motion with a time period T. A time t = 0, it is at its position of equilibrium. The kinetic energy - time graph of the particle will look like:



1)



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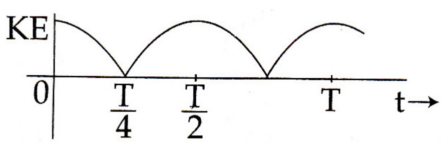

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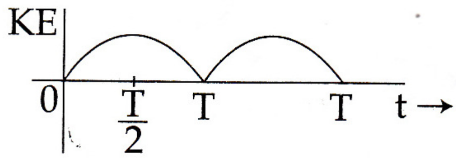
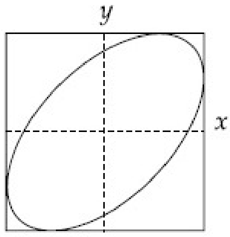
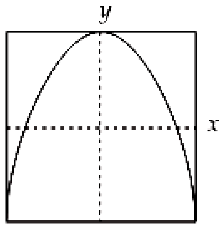
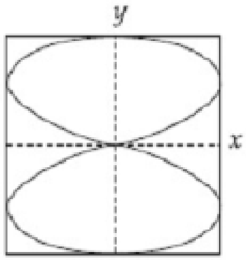


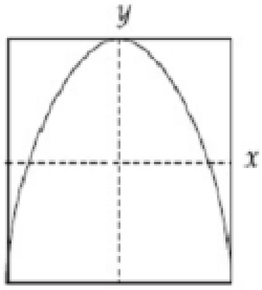
4)

20. x and y displacements of a particle are given as $x(t) = a\sin\omega t$ and $y(t) = a\sin 2\omega t$. Its trajectory will look like :

1) 

2) 

3) 

4) 

CHEMISTRY

SYLLABUS : Atomic structure and Periodic table.

1. The exhausted cation exchange resins are regenerated by passing
1) dilute H_2SO_4 2) Dilute HCl 3) Both 1& 2 4) Dilute $NaOH$

2. Which compounds using for H_2O_2 as stabilizer to check it's decomposition
1) H_3PO_4 2) $NaOH$ 3) Na_2CO_3 4) $CaCO_3$

3. Formula of hyperol is
1) 10v of H_2O_2 2) $H_2O_2+C_2H_5OH$ 3) $H_2O_2+C_6H_5OH$ 4) $\left[CO(NH_2)_2.H_2O_2\right]$

4. Which of the following compound used as tracer
1) H_2O_2 2) D_2O_2 3) H_2O 4) D_2O

5. Which of the following compound used in the synthesis of sodium perborate, percarbonate which are used in high quality detergents
1) H_2O 2) D_2O 3) H_2O_2 4) D_2O_2

6. Weight of H_2O_2 present in 100ml of 2.24vol H_2O_2 is
1) 3.4 2) 34 3) 6.8 4) 68

7. The formula of pyrogallol is
1) $C_6H_5(OH)_3$ 2) $C_6H_4(OH)_2$ 3) $C_6H_3(OH)_3$ 4) C_6H_5OH

8. A metal on combustion in excess air forms x, x upon hydrolysis with water yields H_2O_2 and O_2 along with another product. The metal is
1) Li 2) Mg 3) Rb 4) Na

9. Very pure (99.9) can be made by which of the following processes
1) reaction of methane with steam
2) mixing natural hydrocarbons of high molecular weight
3) electrolysis of water
4) reaction of salt like hydrides with water

10. The solubility of an ionic compound is compared in heavy and simple water. It is
(1) Higher in heavy water (2) Lower in heavy water
(3) Same in heavy water and simple water (4) Lower in simple water

11. Which of the following cannot be reduced by H_2O_2
(1) Ag_2O (2) Fe^{3+} (3) Acidified $KMnO_4$ (4)Acidified $K_2Cr_2O_7$

12. The element whose hydride contains maximum number of hydrogen per atom of the element is
(1) Na (2) O (3) B (4) Si

13. Indicator type silica gel used as a dehumidifier contains
(1) Cu^{2+} ions (2) Ni^{2+} ions (3) Co^{2+} ions (4) Fe^{2+} ions

14. To an aqueous solution of $AgNO_3$ some $NaOH(aq)$ is added, till a brown ppt. is obtained. To this H_2O_2 is added dropwise. The ppt. turns black with the evolution of O_2. The black ppt. is

(1) Ag_2O (2) Ag_2O_2 (3) $AgOH$ (4)None of these

15. Atomic hydrogen reacts with oxygen to give

(1) Almost pure water (2) Almost pure hydrogen peroxide

(3) A mixture of water and hydrogen peroxide (4) None of these

16. The O – H bond energy in water when compared to O – D bond energy in heavy water is

(1) Greater (2) Lesser (3) Equal (4) Two times greater

17. The ratio of densities of hydrogen, deuterium and tritium is

(1) 3 : 2 : 1 (2) 1 : 2 : 3 (3) 3 : 6 : 1 (4) 6 : 2 : 1

18. Which one of the following statement is incorrect?

(1) H_2 reacts with $C\ell_2$ to form $HC\ell$, an electron pair shared between H and $C\ell$

(2) Hydrogen is reduced by sodium to form NaH. An electron is transferred from H to Na

(3) Hydrogen reduced copper (II) oxide to copper and itself gets oxidized to H_2O

(4) Hydroformylation of olefins yields aldehyde which further undergoes reduction to give alcohol

19. Metal hydrides are ionic, covalent or molecular in nature. Among LiH, NaH, KH, RbH, CsH the correct order of increasing ionic character is

(1) LiH > NaH > CsH > KH > RbH (2) LiH < NaH < KH < RbH < CsH

(3) RbH > CsH > NaH > KH > LiH (4) NaH > CsH > RbH > LiH > KH

20. The most abundant and least abundant isotopes of hydrogen respectively are

(1) P, T (2) P, D (3) D, P (4) T, P

SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

SR EAMCET **DPP-10** **Date: 19-04-2020**
Time: 3 Hours

MATHS-A

1) **4**	2) **2**	3) **3**	4) **1**	5) **3**	6) **4**	7) **4**	8) **4**	9) **3**	10) **3**
11) **4**	12) **3**	13) **1**	14) **2**	15) **1**	16) **3**	17) **3**	18) **1**	19) **2**	20) **3**

MATHS-B

1) **2**	2) **4**	3) **2**	4) **2**	5) **3**	6) **2**	7) **2**	8) **4**	9) **2**	10) **1**
11) **3**	12) **3**	13) **4**	14) **3**	15) **4**	16) **4**	17) **3**	18) **3**	19) **3**	20) **3**

PHYSICS

1) **4**	2) **2**	3) **2**	4) **4**	5) **2**	6) **1**	7) **2**	8) **1**	9) **1**	10) **1**
11) **4**	12) **4**	13) **4**	14) **4**	15) **3**	16) **4**	17) **4**	18) **3**	19) **3**	20) **2**

CHEMISTRY

1) **3**	2) **1**	3) **4**	4) **4**	5) **3**	6) **3**	7) **3**	8) **3**	9) **4**	10) **2**
11) **2**	12) **4**	13) **3**	14) **4**	15) **2**	16) **2**	17) **2**	18) **2**	19) **2**	20) **1**

HINTS & SOLUTIONS

MATHS-A

1. $2x+3y=\begin{bmatrix}2 & 3\\ 4 & 0\end{bmatrix}$

$3x+2y=\begin{bmatrix}2 & -2\\ -1 & 5\end{bmatrix}$

On multiplying Eq. (i) by 2, Eq. (ii) by 3 and then subtracting, we get

$\Rightarrow 4x+6y-9x-6y=\begin{bmatrix}4 & 6\\ 8 & 0\end{bmatrix}-\begin{bmatrix}6 & -6\\ -3 & 15\end{bmatrix}$

$=\begin{bmatrix}\frac{2}{5} & \frac{-12}{5}\\ \frac{-11}{5} & 3\end{bmatrix}$

$$=\begin{bmatrix} 2-\frac{4}{5} & 3+\frac{24}{5} \\ 4+\frac{22}{5} & 0-6 \end{bmatrix}=\begin{bmatrix} \frac{6}{5} & \frac{39}{5} \\ \frac{42}{5} & -6 \end{bmatrix}$$

$$\therefore Y=\frac{1}{3}\begin{bmatrix} \frac{6}{5} & \frac{39}{5} \\ \frac{42}{5} & -6 \end{bmatrix}=\begin{bmatrix} \frac{2}{5} & \frac{13}{5} \\ \frac{14}{5} & -2 \end{bmatrix}$$

2. $$A=\begin{bmatrix} 0 & a & b \\ -a & 0 & c \\ -b & -c & 0 \end{bmatrix}$$

$$A=\frac{1}{2}\left(A+A^{'}\right)+\frac{1}{2}\left(A-A^{'}\right)$$

$$Q_1=\frac{1}{2}=\begin{bmatrix} 0 & a & b \\ -a & 0 & c \\ -b & -c & 0 \end{bmatrix}+\begin{bmatrix} 0 & -a & -b \\ a & 0 & -c \\ b & c & 0 \end{bmatrix}$$

$$Q_2=\frac{1}{2}\left(A-A^{'}\right)=\begin{bmatrix} 0 & a & b \\ -a & 0 & c \\ -b & -c & 0 \end{bmatrix}$$

$$Q_1Q_2=Q_3$$

3. $\because \left|adj\left(A\right)\right|=\left|A\right|^{n-1}$

$\left|A\right|=14$

$\left|adj\left(A\right)\right|=\left(\left|A\right|\right)^2=\left(14\right)^2$

4. $Q^{2005}=\left(PAP^T\right)\left(PAP^T\right)....\left(PAP^T\right)=PA^{2005}P^T$

$\therefore P^TQ^{2005}P=P^T.PA^{2005}P^T.P=A^{2005}$

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

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

$\Rightarrow A^{2005}=\begin{bmatrix} 1 & 2005 \\ 0 & 1 \end{bmatrix}$

5. We have, $A\left(\alpha,\beta\right)^{'}=A\left(-\alpha,\beta\right)$

Also, $A\left(\alpha,\beta\right).A\left(-\alpha,-\beta\right)=1$

$\Rightarrow A\left(\alpha,\beta\right)^{-1}=A\left(-\alpha,-\beta\right)$

Next $adj\ A\left(\alpha,\beta\right)=\left|A\left(\alpha,\beta\right)\right|A\left(\alpha,\beta\right)^{-1}=e^{\beta}A\left(-\alpha,-\beta\right)$

6. $\begin{bmatrix} a & i \\ i & b \end{bmatrix}.\begin{bmatrix} a & i \\ i & b \end{bmatrix}=\begin{bmatrix} a^2-1 & \left(a+b\right)i \\ \left(a+b\right)i & b^2-1 \end{bmatrix}$

$\therefore a^2-1=a,\ a+b=1$

$a=\frac{1\pm\sqrt{5}}{2},\ b=\frac{1\pm\sqrt{5}}{2}$

7. $A^2 = 4A - 5I$

$A^3 = 11A - 20I$

$A^6 = A^3.A^3 = 44A - 205I$

8. $\det(M_r) = \begin{vmatrix} r & r-1 \\ r-1 & r \end{vmatrix} = 2r - 1$

$\sum_{r=1}^{2007} \det(M_r) = 2\sum_{r=1}^{2007} r - 2007$

$= 2\times\frac{2007\times 2008}{2} - 2007 = (2007)^2$

9. Since, A is idempotent matrix, therefore $A^2 = A$

$\Rightarrow \begin{bmatrix} 2 & -2 & -16-4x \\ -1 & 3 & 16+4x \\ 4+x & -8-2x & -12+x^2 \end{bmatrix} = \begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & x \end{bmatrix}$

On comparing $16 + 4x = 4 \Rightarrow x = -3$

10. $\therefore I + A + A^2 + ...\infty = (I - A)^{-1}$

$= \begin{bmatrix} 2 & -\frac{3}{2} \\ \frac{1}{2} & \frac{1}{2} \end{bmatrix} = \frac{4}{7}\begin{bmatrix} \frac{1}{2} & \frac{3}{2} \\ -\frac{1}{2} & 2 \end{bmatrix} = \frac{2}{7}\begin{bmatrix} 1 & 3 \\ -1 & 4 \end{bmatrix}$

11. Take $\begin{bmatrix} 1 & x & 1 \end{bmatrix}\begin{bmatrix} 1 & 3 & 2 \\ 0 & 5 & 1 \\ 0 & 3 & 2 \end{bmatrix}\begin{bmatrix} 1 \\ 1 \\ x \end{bmatrix} = 0$

$\begin{bmatrix} 1 & 5x+6 & x+4 \end{bmatrix}\begin{bmatrix} 1 \\ 1 \\ x \end{bmatrix} = 0$

$1 + 5x + 6 + x^2 + 4x = 0$

$x^2 + 9x + 7 = 0$

$x = \frac{-9 \pm \sqrt{53}}{2}$

12. **Given** $2x - y = \begin{bmatrix} 3 & -3 & 0 \\ 3 & 3 & 2 \end{bmatrix}$

$2x - y = \begin{bmatrix} 4 & 1 & 5 \\ -1 & 4 & 4 \end{bmatrix}$

Multiply 2 with $4\times -2y = \begin{bmatrix} 6 & -6 & 0 \\ 6 & 6 & 4 \end{bmatrix}$

$5X = \begin{bmatrix} 10 & -5 & 5 \\ 5 & 10 & 0 \end{bmatrix}$

$X = \begin{bmatrix} 2 & -1 & 1 \\ 1 & 2 & 0 \end{bmatrix}$

13. Since, $A = \begin{bmatrix} a & p \\ b & q \\ c & r \end{bmatrix}$, and $A^T = \begin{bmatrix} a & b & c \\ p & q & r \end{bmatrix}$

$$AA^T = \begin{bmatrix} a & p \\ b & q \\ c & r \end{bmatrix} \begin{bmatrix} a & b & c \\ p & q & r \end{bmatrix}$$

$$= \begin{bmatrix} a^2+p^2 & ab+pq & ac+pr \\ ab+qp & b^2+q^2 & bc+qr \\ ac+pr & bc+qr & c^2+r^2 \end{bmatrix}$$

14. Since, $E(\theta) = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$

$$E(\alpha) = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$$

and $E(\beta) = \begin{bmatrix} \cos\beta & \sin\beta \\ -\sin\beta & \cos\beta \end{bmatrix}$

$$E(\alpha).E(\beta) = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix} \begin{bmatrix} \cos\beta & \sin\beta \\ -\sin\beta & \cos\beta \end{bmatrix}$$

$$= \begin{bmatrix} \cos\alpha\cos\beta - \sin\alpha\sin\beta & \cos\alpha\sin\beta + \sin\alpha\cos\beta \\ -\sin\alpha\cos\beta - \cos\alpha\sin\beta & -\sin\alpha\sin\beta + \cos\alpha\cos\beta \end{bmatrix}$$

$$= \begin{bmatrix} \cos(\alpha+\beta) & \sin(\alpha+\beta) \\ -\sin(\alpha+\beta) & \cos(\alpha+\beta) \end{bmatrix}$$

$$\therefore E(\alpha).E(\beta) = E(\alpha+\beta)$$

15. Since, $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$

Adj (A) = $\begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$

$$\therefore A.(adjA) = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$$

$$= \begin{bmatrix} \cos^2\theta + \sin^2\theta & -\sin\theta\cos\theta + \sin\theta\cos\theta \\ -\sin\theta\cos\theta + \sin\theta\cos\theta & \sin^2\theta + \cos^2\theta \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\Rightarrow A.(adjA) = 1$$

But $\Rightarrow A.(adjA) = \lambda 1$

$$\Rightarrow \lambda = 1$$

16. $AA = 1$

$$\Rightarrow \begin{bmatrix} \alpha & \beta \\ \gamma & -\alpha \end{bmatrix} \begin{bmatrix} \alpha & \beta \\ \gamma & -\alpha \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} \alpha^2+\beta\gamma & \alpha\beta - \alpha\beta \\ \alpha\gamma - \gamma\alpha & \gamma\beta + \alpha^2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

On comparing the corresponding elements, we have

$$\alpha^2 + \beta\gamma = 1 \Rightarrow \alpha^2 + \beta\gamma - 1 = 0$$

$$\Rightarrow 1 - \alpha^2 - \beta\gamma = 1$$

17. $\begin{bmatrix} 0 & 2y & z \\ x & y & -z \\ x & -y & z \end{bmatrix}' \begin{bmatrix} 0 & 2y & z \\ x & y & -z \\ x & -y & z \end{bmatrix} = 1$

$\Rightarrow \begin{bmatrix} 0+x^2+x^2 & 0+xy-xy & 0-xz+xz \\ 0+yx-yx & 4y^2+y^2+y^2 & 2yz-yz-yz \\ 0-zx+zx & 2yz-yz-yz & z^2+z^2+z^2 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

$\Rightarrow \begin{bmatrix} 2x^2 & 0 & 0 \\ 0 & 6y^2 & 0 \\ 0 & 0 & 3z^2 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

On comparing the corresponding elements, we have

$2x^2 = 1,\ 6y^2 = 1,\ 3z^2 = 1 \Rightarrow x^2 = \frac{1}{2},$

$y^2 = \frac{1}{6},\ z^2 = \frac{1}{3}$

$\Rightarrow x = \pm\frac{1}{\sqrt{2}},\ y = \pm\frac{1}{\sqrt{6}},\ z = \pm\frac{1}{\sqrt{3}}$

18. $(A-I)^3 + (A+I)^3 - 7A = (A)^3 - I^3 - 3AI(A-I) + (A)^3 + I^3 + 3A.I(A+I) - 7A$

$= 2(A)^3 - 3A(A-I) + 3A(A+I) - 7A$

$= 2(I.A) - 3A(-2I) - 7A$

$= 2A + 6A - 7A = 8A - 7A = A$

19. $A + B = \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix} + \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 2 & 1 \end{bmatrix}$

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

$A^2 = A.A = \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}\begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix} = \begin{bmatrix} 0+1 & 0+1 \\ 0+1 & 1+1 \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 1 & 2 \end{bmatrix}$

and $B^2 = B.B = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} = \begin{bmatrix} 0-1 & 0+0 \\ 0+0 & -1+0 \end{bmatrix} = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$

$\therefore A^2 - B^2 = \begin{bmatrix} 1 & 1 \\ 1 & 2 \end{bmatrix} - \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix} = \begin{bmatrix} 2 & 1 \\ 1 & 3 \end{bmatrix}$

and $(A+B)(A-B) = \begin{bmatrix} 0 & 0 \\ 2 & 1 \end{bmatrix}\begin{bmatrix} 0 & 2 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 0+0 & 0+0 \\ 0+0 & 4+1 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 5 \end{bmatrix}$

hence, $(A+B)(A-B) \neq A^2 - B^2$

20. $\cos\alpha = \dfrac{1 - \tan^2\left(\frac{\alpha}{2}\right)}{1 + \tan^2\left(\frac{\alpha}{2}\right)} = \dfrac{1-t^2}{1+t^2}$

$\sin\alpha = \dfrac{2\tan\left(\frac{\alpha}{2}\right)}{1 + \tan^2\left(\frac{\alpha}{2}\right)} = \dfrac{2t}{1+t^2}$

$$=\begin{bmatrix}\frac{1-t^2+2t^2}{1+t^2} & \frac{-2t+t\left(1-t^2\right)}{1+t^2}\\ \frac{-t\left(1-t^2\right)+2t}{1+t^2} & \frac{2t^2+1-t^2}{1+t^2}\end{bmatrix}$$

$$=\begin{bmatrix}\frac{1+t^2}{1+t^2} & \frac{-t\left(1+t^2\right)}{1+t^2}\\ \frac{t\left(1+t^2\right)}{1+t^2} & \frac{1+t^2}{1+t^2}\end{bmatrix}=\begin{bmatrix}1 & -t\\ t & 1\end{bmatrix}$$

$$=\begin{bmatrix}0+1 & -t+0\\ t+0 & 0+1\end{bmatrix}=\begin{bmatrix}1 & -t\\ t & 1\end{bmatrix}$$

On putting the value of t in both equations, we get

$$\begin{bmatrix}1 & -\tan\left(\frac{\alpha}{2}\right)\\ \tan\left(\frac{\alpha}{2}\right) & 1\end{bmatrix}=\begin{bmatrix}1 & -\tan\left(\frac{\alpha}{2}\right)\\ \tan\left(\frac{\alpha}{2}\right) & 1\end{bmatrix}$$

$$\therefore (I-A)\begin{bmatrix}\cos\alpha & -\sin\alpha\\ \sin\alpha & \cos\alpha\end{bmatrix}=I+A$$

MATHS-B

1. LHL= $\underset{x\to 0^-}{Lt}\ f(x)=\underset{x\to 0}{Lt}\frac{\sin[\cos h]}{1+[\cos h]}=\frac{\sin(0)}{1+0}$

$=0\left(\because h>0\Rightarrow \cos h<1\right)$

RHL = $\underset{x\to 0^+}{Lt}\ f(x)=\underset{x\to 0}{Lt}\frac{\sin[\cos h]}{1+[\cos h]}=0$

$\therefore \underset{x\to 0}{Lt}\frac{\sin[\cos h]}{1+[\cos h]}=0$

2. $\underset{x\to 0}{Lt}\left[\frac{\tan\left(\pi\sin^2 x\right)}{\pi\sin^2 x}.\pi\left(\frac{\sin^2 x}{x^2}\right)+\frac{x^2}{x^2}-\frac{2|x|\sin\left(x[x]\right)}{x^2}+\frac{\sin^2\left(x[x]\right)}{x^2}\right]$

For RHL, $|x|=x\ and\ [x]=0$

$\therefore RHL=\pi+1$

For LHL, $|x|=-x=-x\ and\ [x]=-1$

So LHL= $\pi+1-2+1=\pi$

LHL $\neq$ RHL $\Rightarrow$ limit does not exist

3. $\underset{x\to 1}{Lt}\frac{\sqrt{\pi}-\sqrt{2\sin^{-1}x}}{\sqrt{1-x}}$ put $\sin^{-1}x=t\Rightarrow x=\sin t$

$=\underset{t\to\frac{\pi}{2}}{Lt}\frac{\sqrt{\pi}-\sqrt{2t}}{\sqrt{1-\sin t}}\ \underset{t\to\frac{\pi}{2}}{Lt}\frac{\pi-2t}{\left(\sqrt{\pi}+\sqrt{2t}\right).\sqrt{1-\sin t}}$

$=\underset{t\to\frac{\pi}{2}}{Lt}\frac{2\left(\frac{\pi}{2}-t\right)}{2\sqrt{\pi}\sqrt{1-\cos\left(\frac{\pi}{2}-t\right)}}=\underset{h\to 0}{Lt}\frac{h}{\sqrt{\pi}.\sqrt{1-\cos h}}=\sqrt{\frac{2}{\pi}}$

4. $\underset{n\to\infty}{Lt}\cos_x^{2n}=\begin{cases}1, where\ \ x=m\pi, & m\in I\\ 0, where\ \ x\neq m\pi, & m\in I\end{cases}$

For $x=10,\ \underset{n\to\infty}{Lt}\cos^{2n}(x-10)=1$ and in all the other cases if zero.

$\therefore \underset{n\to\infty}{Lt}\sum_{x=1}^{20}\cos^{2n}(x-10)=1$

5. Let $f(x)=\ell(x)+g(x)$

$e=2.718,\pi=3.142\ and\ e+\pi=5.86$

$\underset{x\to(e+\pi)+}{Lt}f(x)=\underset{h\to0}{Lt}(e+\pi+h)=\underset{h\to0}{Lt}\left[l(e+\pi+h)+g(e+\pi+h)\right]$

$=\underset{h\to0}{Lt}(6+5)=11(e<e<\pi\pm h<6)$

$\underset{x\to(e+\pi)^-}{Lt}f(x)=\underset{h\to0}{Lt}(e+\pi-h)=\underset{h\to0}{Lt}\left[\ell(e+\pi-h)+g(e+\pi-h)\right]$

$=\underset{h\to0}{Lt}(6+5)=11$

$\therefore \underset{x\to e+\pi}{Lt}f(x)=11$

6. $\underset{x\to0^+}{Lt}\left[\frac{\sin(\operatorname{sgn}(x))}{\operatorname{sgn}(x)}\right]=\underset{x\to0}{Lt}\left[\left(\frac{\sin 1}{1}\right)\right]=0\ use\ \sin(x)=\begin{cases}1 & x>0\\ -1 & x<0\\ 0 & x=0\end{cases}$

$\underset{x\to0^-}{Lt}\left[\frac{\sin(\operatorname{sgn}(x))}{\operatorname{sgn}(x)}\right]=\underset{x\to0}{Lt}\left[\frac{\sin(-1)}{-1}\right]=0$

$\therefore \underset{x\to0}{Lt}\left[\frac{\sin(\operatorname{sgn}(x))}{\operatorname{sgn}(x)}\right]=0$

7. $y=\frac{1}{2}.2Tan^{-1}\left(\frac{y}{x}\right)\Rightarrow x=\frac{\tan y}{y}$

8. $\underset{x\to0}{Lt}\frac{\sin x^2}{\log\left[1-2\sin^2\left(\frac{2x^2-x}{2}\right)\right]}$

$$\underset{x\to0}{Lt}\frac{\left(\frac{\sin x^2}{x^2}\right)\times x^2}{\frac{\log\left[1-2\sin^2\left(\frac{2x^2-x}{x^2}\right)\right]}{\left[-2\sin^2\left(\frac{2x^2-x}{x^2}\right)\right]}-2\sin^2\left(\frac{2x^2-x}{x^2}\right)}$$

$=-\underset{x\to0}{Lt}\frac{2x^2}{(2x^2-x)^2}=-\underset{x\to0}{Lt}\frac{2}{(2x-1)^2}=-2$

9. $\underset{x\to1^+}{Lt}f(x)=\underset{h\to0}{Lt}f(1+h)=0$

10. $\underset{x\to0}{Lt}\left(\frac{\sin x-x}{x^3}\right)^2+\left(\frac{1-\cos x^3}{x^6}\right)=\left(\frac{-1}{6}\right)^2+\frac{1}{2}=\frac{19}{36}$

11. $f(x)=\tan x$ is discontinuous, when $x=(2n+1)\frac{\pi}{2},n\in Z$

$f(x)=x[x]$ is discontinuous when $x=K,K\in Z$

$f(x)=Sin[n\pi x]$ is discontinuous when $n\pi x=K, K\in Z$

Thus all the above functions have finite number of points of discontinuity.

But $f(x)=\frac{|x|}{x}$ is discontinuous when $x=0$ only.

12. $f(x)=\frac{4-x^2}{x(4-x^2)}$

Clearly there are three points discontinuity $0,2,-2$ because $f(x)$ does not exist for these three values.

13. $f(x)$ is continuous at $x=0$

$$\Rightarrow f(0)=\underset{x\to 0}{Lt}\frac{(3^x-1)^2}{Sin\log(1+x)}$$

$$=\underset{x\to 0}{Lt}\frac{\left(\frac{3^x-1}{x}\right)^2}{\left(\frac{Sinx}{x}\right)\left[\frac{\log(1+x)}{x}\right]}=(\log 3)^2$$

14. $f(x)=\begin{cases}\frac{1-|x|}{1+x}, & x\neq -1\\ 1, & x=-1\end{cases}$

$$\begin{cases}1\ , & x<0\\ \frac{1-x}{1+x}, & x\geq 0\end{cases}\ (\because f(-1)=1\,given)\ f([2x])=\begin{cases}\frac{1-[2x]}{1+[2x]}, & [2x]\geq 0\end{cases}$$

$$\begin{cases}1, & [2x]<0\\ 1, & x<0\\ 1, & 0\leq x<\frac{1}{2}\\ 0, & \frac{1}{2}\leq x<1\\ \frac{-1}{3}, & 1\leq x<\frac{3}{2}\end{cases}$$

Clearly $f(x)$ is continuous for all $x<\frac{1}{2}$ and discontinuous at $x=\frac{1}{2},1$

15. $LHL=RHL=f(4)$

$$\underset{x\to 0}{Lt}f(4-h)=\underset{h\to 0}{Lt}f(4+h)=f(4)$$

$$\underset{h\to 0}{Lt}\frac{4-h-4}{|4-h-4|}+a=\underset{h\to 0}{Lt}\frac{4+h-4}{|4+h-4|}=a+b$$

$$\underset{h\to 0}{Lt}\left(\frac{-h}{h}+a\right)=\underset{h\to 0}{Lt}\left(\frac{h}{h}+b\right)=a+b$$

$a-1=b+1=a+b$

$\therefore a=1,\ b=-1$

16. $\underset{x\to 0}{Lt}\dfrac{x-e^{x}+1-(1-Cos2x)}{x^{2}}$

$= \underset{x\to 0}{Lt}\left[\dfrac{x-e^{x}+1}{x^{2}}-\dfrac{(1-Cos2x)}{x^{2}}\right]$

$= \underset{x\to 0}{Lt}\left[\dfrac{(x+1)-\left(1+x+\dfrac{x^{2}}{2}\right)}{x^{2}}-\dfrac{2Sin^{2}x}{x^{2}}\right]=\dfrac{-1}{2}-2=\dfrac{-5}{2}$ hence for continuity $f(0)=\dfrac{-5}{2}$

Now $f\left[(0)\right]=-3,\{f(0)\}=0.5$

Hence $f\left[(0)\right]\{f(0)\}=(-3)(0.5)=-1.5$

17. $\underset{x\to 2+}{Lt}\dfrac{(x-2)}{|x-2|}\left(\dfrac{x^{2}-1}{x^{2}+1}\right)=\underset{x\to 2}{Lt}\dfrac{(x-2)}{(x-2)}\left(\dfrac{x^{2}-1}{x^{2}+1}\right)=\dfrac{3}{5}$

$\underset{x\to 2+}{Lt}\dfrac{(x-2)}{|x-2|}\left(\dfrac{x^{2}-1}{x^{2}+1}\right)=\underset{x\to 2}{Lt}-\dfrac{(x-2)}{(x-2)}\left(\dfrac{x^{2}-1}{x^{2}+1}\right)=\dfrac{-3}{5}$

$LHL\neq RHL$, then the function has non-removable discontinuous at $x=2$

18. Domain of f is (a,b) hence continuous on $[a,b)$

19. $\underset{x\to 0-}{Lt}f(x)=\underset{x\to 0}{Lt}(0-1)=-1$

$\underset{x\to 0+}{Lt}f(x)=\underset{x\to 0}{Lt}(0-0)=0$

$f(x)$ is discontinuous at $x=0$ also discontinuous on z at all integers except '1'

20. Let $(x-1)(x+2)>0\Rightarrow x<-2$ or $x>1$

$\Rightarrow x\in(-\infty,-2)\cup(1,\infty)$

PHYSICS

1. $Y=A\cos\omega t$

$Y=\dfrac{A}{2}$

t=T/6=t(given)

$t^{1}=\dfrac{T}{4}-\dfrac{T}{6}=\dfrac{T}{12}=\dfrac{t}{2}$

2. $y_{1}=\sin\dfrac{\pi}{6}\sin\omega t+\cos\dfrac{\pi}{6}\cos\omega t$

$y_{1}=\cos\left(\omega t-\dfrac{\pi}{6}\right)$

$y_{2}=\sin\dfrac{\pi}{3}\sin\omega t+\cos\dfrac{\pi}{3}\cos\omega t$

$=\cos\left(\omega t-\dfrac{\pi}{3}\right)$

3. $T=2\pi\sqrt{\dfrac{l}{g}}=2\pi\sqrt{\dfrac{lR^{2}}{Gm}}$

$T\propto R$

$\therefore \frac{\Delta T}{T} = \frac{\Delta R}{R}$

4. $\frac{d^2x}{dt^2} = -\alpha x$

a$= -\omega^2 x$

5. T$= 2\pi\sqrt{\frac{l}{g_{eff}}} = 2\pi\sqrt{\frac{l}{g+a}}$

6. $A = \frac{Weight\ of\ removed\ mass}{Spring\ cons\tan t}$

7. $n = \frac{1}{8} Hz$

in one second $S = A\sin\left[\frac{2\pi}{T}\times 1\right] = \frac{A}{\sqrt{2}}$

in two seconds $S_1 = A\sin\left[90^0\right] = A$

$S_2 = S_1 - S$

$\frac{S_1}{S_2} = \frac{A/\sqrt{2}}{\left[A - A/\sqrt{2}\right]} = \frac{1}{\sqrt{2}-1}$

8. $a = \omega^2\theta$

$\frac{a}{\theta} = \frac{4\pi^2}{T^2} = \tan\theta$

$T^2 \alpha \frac{1}{\tan\theta}$

$\frac{T_1^2}{T_2^2} = \frac{\tan\theta_2}{\tan\theta_1}$

$= \frac{\tan 60}{\tan 30}$

$\frac{T_1^2}{T_2^2} = \frac{3}{1}$

$\frac{T_1}{T_2} = \sqrt{3} : 1$

9. $T = mg + \frac{mv^2}{l} = mg + m\left(\frac{2gh}{l}\right)$

$T = 2\pi\sqrt{l/g}$

$2 = 2\pi.\sqrt{l/g}$

$g/l = \pi^2$

$T = mg + 2mh.\pi^2 = m\left(g + 2h\pi^2\right)$

10. $t_{sp} = t_{lp}$

$(n+1)T_{sp} = n(t_{lp})$

$(n+1)\sqrt{l_{SP}} = n\sqrt{l_{LP}}$

11. $T_1^2 - T_2^2 = \frac{4\pi^2}{g}(l_1 - l_2)$

$1.75 = 4(l_1 - l_2)$

12. $n = \frac{1}{2\pi}\sqrt{\frac{k_{eff}}{m}} = \frac{1}{k_{eff}} = \frac{1}{2k} + \frac{1}{k} + \frac{1}{k}$

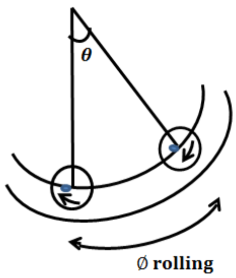
13. $E_1 = E_2$

$\frac{1}{2}m_1u_1^2 + \frac{1}{2}m_2u_2^2 = \frac{1}{2}m_1(0)^2 + \frac{1}{2}m_2(0)^2 + \frac{1}{2}KX^2$

14. $\omega_1 t_1 \sim \omega_2 t_2 = \frac{2\pi}{T_1}t \sim \frac{2\pi}{T_2}t$

$2\pi\left(3/2 \sim 3/3\right) = \pi$

15.



For 'ϕ' is angle of rotation of sphere on rolling

'θ' is the angular displacement obtained

$\because$ Arc = (Radius) angular displacement

$r.\phi = (R-r)\theta$

$\theta = \frac{r}{R-r}.\phi \to (1)$

$\because Torque\ \tau = I\alpha$

$= mg\sin\theta.r$

$I\alpha = mg\sin\theta.r$

$I\alpha = mg\theta.r$

$\because I = \frac{7}{5}mr^2$ *for solid sphere about diameter* $\frac{7}{5}mr^2\omega^2\phi = mg\theta.r$

$\frac{7}{5}r\omega^2\phi = g.\frac{r}{R-r}\phi$

$\frac{7}{5}\omega^2 = \frac{g}{R-r}$

$\omega = \sqrt{\frac{5g}{7(R-r)}} \Rightarrow T = 2\pi\sqrt{\frac{7(R-r)}{5g}}$

16. $T=2\pi\sqrt{\frac{M\left(1+\frac{k^2}{R^2}\right)}{k}}$

17. $T=2\pi\sqrt{\frac{l}{g}}$

$\frac{T_1}{T_2}=\sqrt{\frac{g_2}{g_1}}$

$T_2=2\sqrt{\frac{g_1}{g_2}}$

$g_2=\frac{3GM}{(3R)^2}=\frac{g}{3}$

$T_2=2\sqrt{3}s$

18. $k_1=\frac{C}{\ell_1}$

$k_2=\frac{C}{\ell_2}$

$\frac{k_1}{k_2}=\frac{C\ell_2}{\ell_1 C}\ell_2=\frac{\ell_2}{n\ell_2}=\frac{1}{n}$

19. At t = 0 KE is maximum
A $t=T/4$ KE is zero
KE oscillates with time period $\frac{T}{2}$

20. $x=a\sin wt$, $y=a\sin 2wt$

$y=2a\sin wt\cos wt$, $y=2x\sqrt{1-\frac{x^2}{a^2}}$

$y=\frac{2}{a}x\sqrt{(a-x)(a+x)}$

CHEMISTRY

1. The exhausted cation exchange
resins are regenerated by passing dilute
H_2SO_4 or dilute HCl through it and
exhausted anion exchange
resins area regenerated by passing dilute
$NaOH(or)Na_2CO_3$
2. Small amounts of urea , acid glycol,
Alcohol, acetanilide H_3PO_4 used as stabilisers
3. Hyperol
$(CO(NH_2).H_2O_2)$
$(CO(NH_2).H_2O_2)$
4. D_2O used as tracer compound for studying
The mechanism of reactions

5. H_2O_2 used in the preparation of sodium
Percarbonate, perborate

6.

$\frac{V}{11.2}$	$\frac{M}{1}$	$\frac{\%(w/r)}{3.4}$

$11.2v \rightarrow 1M$

$\frac{2.24\times1}{11.2} = 2\times10^{-1}$

$0.2M$

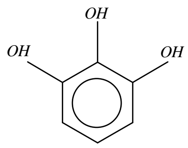
$M = \frac{w}{Gmw} \times \frac{1000}{v(inml)}$

$\Rightarrow 0.2 = \frac{w}{34} \times \frac{1000}{1000}$

$weight\,of\ H_2O_2 = 34\times0.2$

$= 6.8gr$

7. pyrogallol



$1,2,3try\ hydroxybezene$

$(pyrogallol)$

$formula \rightarrow C_6H_3(OH)_3$

8. large cations through lattice energy
Effects $RbO_2(X)\,gets$ easily hydrolysed
By water to form the hydroxide $H_2O_2\ and\ O_2$
Reactions are $Rb + O_2 \rightarrow RbO_2(X)$
$2RbO_{2(X)} + 2H_2O \rightarrow 2RbOH + H_2O_2 + O_2$

9. Hydrides are instant source
of hydrogen of high purity.
They react with H_2O forming H_2gas

10. (b) The solubility of an ionic compound is more in simple water and less in heavy water.

11. (b) H_2O_2 cannot reduce Fe^{3+}. All other compounds are reduced by H_2O_2.

12. (d) Hydride of $Si(SiH_4)$ contains more hydrogen atoms than hydrides of $Na(NaH), O(H_2O), B(BH_3)$.

13. (c) Indicator type of gel used as a dehumidifier contains CO^{2+} ions, when dry it is blue in colour and on absorbing moisture it becomes pink.

14. (d) $2AgNO_3(aq) + 2NaOH(aq) \rightarrow$

$$\underset{\text{Brown ppt.}}{Ag_2O(s)} + H_2O(l) + 2NaNO_3(aq)$$

$$Ag_2O(s) + H_2O_2(aq) \rightarrow H_2O(l) + O_2(g) + \underset{\text{Black ppt.}}{2Ag(s)}$$

The finely divided Ag is black in colour.

15. (b) Atomic hydrogen reacts with oxygen to give almost pure hydrogen peroxide.

$2[H] + O_2 \rightarrow H_2O_2$