Sri Chaitanya IIT Academy.,India.

✪ A.P ✪ T.S ✪ KARNATAKA ✪ TAMILNADU ✪ MAHARASTRA ✪ DELHI ✪ RANCHI

A right Choice for the Real Aspirant

ICON Central Office - Madhapur - Hyderabad

Sec: Sr.Super60_NUCLEUS & STERLING_BT	Paper -1(Adv-2022-P1-Model	Date: 20-08-2023
Time: 09.00Am to 12.00Pm	RPTA-03	Max. Marks: 180

KEY SHEET

MATHEMATICS

1	**0**	2	**10**	3	**7.33 - 7.34**	4	**0**	5	**3**	6	**2**
7	**3**	8	**4.5**	9	**ABC**	10	**ABC**	11	**BCD**	12	**ACD**
13	**ABC**	14	**ABCD**	15	**C**	16	**C**	17	**D**	18	**C**

PHYSICS

19	**1.57**	20	**0.5**	21	**7**	22	**193**	23	**2**	24	**4.05**
25	**0.67**	26	**120**	27	**ABC**	28	**AD**	29	**AB**	30	**AC**
31	**B**	32	**ABC**	33	**D**	34	**A**	35	**B**	36	**C**

CHEMISTRY

37	**2**	38	**6**	39	**6**	40	**4**	41	**9**	42	**10**
43	**3**	44	**4**	45	**ACD**	46	**ACD**	47	**ABCD**	48	**BC**
49	**AB**	50	**BD**	51	**A**	52	**A**	53	**B**	54	**B**

SOLUTIONS
MATHEMATICS

1. Domain of f(x) is $\left(-\frac{\pi}{2},\frac{\pi}{2}\right)-\{0,1,-1\}$

2. Let $t_r=\left(\frac{1}{r(r+1)}\right)^3=\left(\frac{1}{r}-\frac{1}{r+1}\right)^3=\frac{1}{r^3}-\frac{1}{(r+1)^3}-\frac{3}{r(r+1)}\left(\frac{1}{r(r+1)}\right)$

$=\frac{1}{r^3}-\frac{1}{(r+1)^3}-3\left(\frac{(r+1)-r}{r(r+1)}\right)^2, t_r=\frac{1}{r^3}-\frac{1}{(r+1)^3}-3\left(\frac{1}{r^2}+\frac{1}{(r+1)^2}\right)+6\left(\frac{1}{r}-\frac{1}{r+1}\right)$

$\sum_{r=1}^{n}t_r=\lim_{n\to\infty}\left(1-\frac{1}{(n+1)^3}\right)-3\left(\frac{\pi^2}{6}+\frac{\pi^2}{6}-1\right)+6\left(1-\frac{1}{n+1}\right)$

$\lim_{n\to\infty}\sum t_r=10-\pi^2$

3. $f(x)=\dfrac{\sin 3x(2\cos 5x)(\cos x)}{\sin x(2\cos 5x)(\cos 3x)}=\dfrac{\tan 3x}{\tan x}\Big/\cos 5x\neq 0$

$\Rightarrow f(x)=\frac{3-\tan^2 x}{1-3\tan^2 x}$ provided $\tan x\neq 0,\cos 5x\neq 0,\cos 3x\neq 0$

$\Rightarrow$ period is L.C.M of $\pi,\frac{\pi}{5}=\pi$

$f(x)=f(\pi+x), x\neq 0,\frac{\pi}{6},\frac{\pi}{10},\frac{3\pi}{10},\pm\frac{\pi}{2}$

$\Rightarrow$ solution is $\left(-\infty,\frac{1}{3}\right)\cup(3,\infty)-\left\{\frac{\sqrt{5}-3}{\sqrt{5}+1},\frac{\sqrt{5}+3}{\sqrt{5}-1}\right\}$

$a=2-\sqrt{5}, b=\frac{1}{3}, c=3, d=2+\sqrt{5}$

4. $(x+1)^3+(y+1)^3=16$

$y=-1+\left(16-(x+1)^3\right)^{1/3}=f(x)$

$x=-1+\left(16-(y+1)^3\right)^{1/3}$

$\therefore f^{-1}(x)=-1+\left(16-(x+1)^3\right)^{1/3}=g(x)$

$\Rightarrow f(x)=g(x)$

$f(-1+\sqrt[3]{15})=g(-1+\sqrt[3]{15})=0$

$f(x+g(x))\cdot g(x+f(x))=(f(x+f(x)))^2$

$\frac{d}{dx}(f(x+f(x)))^2=2f(x+f(x))$

$f'(x+f(x))\cdot\left(1+f'(x)\right)$

$\frac{d}{dx}(f(x+f(x)))^2$ at $x=-1+\sqrt[3]{15}=0$

5. $f'(x)<0$

$\therefore f\left(x^3+f(x)\right)\le f\left(-f(x)-x^3\right) \quad \Rightarrow x^3+f(x)\ge -f(x)-x^3$

$\Rightarrow f(x)+x^3\ge 0 \quad \Rightarrow 3x^2+6x-1\le 0 \quad$ As $x\in Z, x\in\{-2,-1,0\}$

6. $f(x)=\begin{cases} e^x & , x<0 \\ x+1, & x\ge 0\end{cases}$

$f'(x)=\begin{cases} e^x & , x<0 \\ 1, & x\ge 0\end{cases}$

7. $\left(\lim_{x\to\alpha^+}\left[\frac{\max\left(\tan x,\{x\}\right)}{x-3}\right]\right)+\left(\lim_{x\to\alpha^+}\left[\frac{\min\left(\tan x,\{x\}\right)}{x-3}\right]\right)$

$+\left(\lim_{x\to\alpha^-}\left[\frac{\min\left(\tan x,\{x\}\right)}{x-3}\right]\right)+\left(\lim_{x\to\alpha^-}\left[\frac{\max\left(\tan x.\{x\}\right)}{\tan x}\right]\right)=1+1+0+1=3$

8. $\underset{x\to 0}{Lt}\left(\frac{f(x)-g(x)}{x^2}\right)=\lim_{x\to 0}-\frac{\cos^{-1}\left(e^{\frac{-x^4}{2}}\right)}{x^2}=-1$

$\underset{x\to 0}{Lt}\left(\frac{f(2x)-h\left(x^3\right)}{x^3}\right)=\frac{2x-\sin 2x-Tan^{-1}\left(\frac{2x^3}{1+x^6}\right)}{x^3}=\frac{-2}{3}$

$\underset{x\to 0}{Lt}\left(\frac{3f(x)}{x^3}\right)=\frac{1}{2}$

9. Since $\sec^2\theta>1 \quad \Rightarrow\left[(n+1)\sec^2\theta\right]>\left[n\sec^2\theta\right]$

Hence, f and g are both one-one

Let $k<n\sec^2\theta<k+1$ and $k<m\,\mathrm{cosec}^2\theta<k+1$

$k\cos^2\theta<n<(k+1)\cos^2\theta$ and $k\sin^2\theta<m<(k+1)\sin^2\theta$

Adding given $k<\text{integer}<k+1 \Rightarrow A\cap B=\phi$

Suppose $k\notin A \quad \Rightarrow n\sec^2\theta<k$ and $(k+1)<(n+1)\sec^2\theta$

$\Rightarrow n<k\cos^2\theta$ and $n+1>(k+1)\cos^2\theta$

$\Rightarrow k<(k-n)\mathrm{cosec}^2\theta, k+1>(k-n)\mathrm{cosec}^2\theta$

$\left[(k-n)\mathrm{cos\,ec}^2\theta\right]=k\in B$

10. $2f(x)=f(xy)+f\left(\frac{x}{y}\right);\forall x,y>0$ replace x by y and subtract

$2\left(f(x)-f(y)\right)=f\left(\frac{x}{y}\right)-f\left(\frac{y}{x}\right)$

$f'(x)=\underset{h\to 0}{lt}\frac{f(x+h)-f(x)}{h}=\frac{1}{x} \quad \Rightarrow f(x)=\ln x$

11. A) Let $g(x)=f(f(x))\Rightarrow g'(x)=f'\left(f(x)\right).f'(x)$

$f'(x)=0 \Rightarrow x=1,2 \,\&\, f'\left(f(x)\right)=0$

If $f(x)=1 \Rightarrow f'\left(f(x)\right)=f'(1)=0$

$f(x)=2 \Rightarrow f'\left(f(x)\right)=f'(2)=0$

$\therefore$ the number of values of x for which $y=f(f(x))$ attains local extremum is 4

$$\int_0^{\frac{\left(\alpha+\tan^{-1}\right)}{2}}[\tan x]dx=\frac{\pi}{2}-\tan^{-1}2$$

B)

$$\text{Area }=(2\alpha)\sin\left(\frac{\pi}{2}+\alpha\right)=2\alpha\cos\alpha$$

$$\frac{dA}{d\alpha}=2(-\alpha\sin\alpha+\cos\alpha)=2\sin\alpha(-\alpha+\cot\alpha$$

$$\frac{dA}{d\alpha}=0 \Rightarrow \alpha=\cot\alpha\left\{\because \alpha\in\left(0,\frac{\pi}{2}\right)\right\}$$

C)

Solving given equations, we get

$a\left(x^3-6x^2+12x-8\right)=x^3-12x+16 \Rightarrow a(x-2)^3=(x-2)^2(x+4) \therefore x=2$ is a repeated root and hence the two curves touches each other at $x=2 \forall \; a\in R$

D)

$f^{'}(x)=k(x-1)(x-3)(x-2)^2$ and $k>0 \Rightarrow f(x)=k\int\left(x^2-4x+3\right)\left(x^2-4x+4\right)dx$

$$=k\int x^4+16x^2-8x^3+7\left(x^2-4x\right)+12dx=k\left(\frac{x^5}{5}-2x^4+\frac{23x^3}{3}-14x^2+12x\right)+c$$

$$\because f(0)=2 \Rightarrow c=2 \therefore f(1)=\frac{88}{15} \Rightarrow \frac{88}{15}=k\left(\frac{1}{5}-2+\frac{23}{3}-14+12\right)+c$$

$$\Rightarrow \frac{58}{15}=k\times\frac{58}{15} \Rightarrow k=1 \therefore a_5=\frac{1}{5}$$

12. A) $f(x)=x-\sin x$

$f^{'}(x)=1-\cos x \qquad f^{'}(x)=0 \Rightarrow 1-\cos x=0 \qquad \Rightarrow \cos x=1$

$x=0,2\pi$

$y=0$ and $y=2\pi$ are two parallel tangents and distance between them $l_1=2\pi$

Also other two parallel tangents are parallel to the line $y=x$

$$f^{'}(x)=1 \Rightarrow 1-\cos x=1 \quad \Rightarrow \cos x=0 \quad \Rightarrow x=\frac{\pi}{2},\frac{3\pi}{2}$$

B) $f(x)+f(1-x)=1$

C) $$\prod_{r=3}^{n}\frac{\left(r^3+3r\right)^2}{r^6-64}=\prod_{r=3}^{n}\frac{r}{r-2}\prod_{r=3}^{n}\frac{r}{r+2}\prod_{r=3}^{n}\frac{r^2+3}{(r+1)^2+3}\prod_{r=3}^{n}\frac{r^2+3}{(r-1)^2+3}$$

So, $P(n)=\frac{n(n-1)}{2}\cdot\frac{12}{(n+1)(n+2)}\cdot\frac{12}{(n+1)^2+3}\cdot\frac{n^2+3}{7} \quad \lim_{n\to\infty}P(n)=\frac{72}{7}$

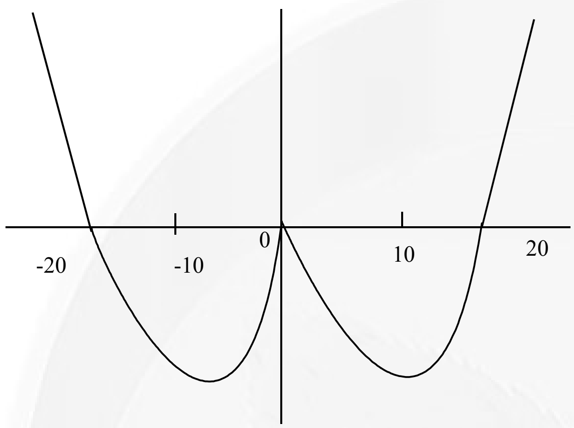
D) $\Rightarrow f(x-2)=f(x+6)$

$f(x)=f(x+8)$

$$f(x)=\begin{cases}3x, & 0\le x<1\\ 4-x, & 1\le x\le 4\end{cases}$$

$$\sum_{r=1}^{2022} f\left(\frac{-r}{2023}\right)+f(2021)+f(2022)+f(2023)+f(2024)=3039$$

13.



14. $f(1-x)=f(1+x)\Rightarrow f'(1+x)=-f'(1-x)$

15. A) $f(x)=||x-6|-|x-8||-\left|x^2-4\right|+3x-|x-7|^3$ is continuous $\forall x\in R$ and not differentiable at x=-2,2,6,7& 8

B) $f(x)=\left(x^2-9\right)\left|x^2+11x+24\right|+\sin|x-7|+\cos|x-4|+(x-1)^{3/5}\sin(x-1)$ is continuous $\forall x\in R$ and not differentiable at $x=-8\,\&\,7$

C) $$f(x)=\begin{cases}(x+1)^{3/5}-\dfrac{3\pi}{2} & : x<-1\\ \left(x-\dfrac{1}{2}\right)\cos^{-1}\left(4x^3-3x\right) & :-1\le x\le 1\\ (x-1)^{5/3} & :1<x<2\end{cases}$$

is continuous not differentiable at x= $-1,-\frac{1}{2}\,\&1$

D) $f(x)=\{\sin x\}\{\cos x\}+\left(\sin^3\pi\{x\}\right)([x]),x\in[-1,2\pi]$

Let $g(x)=\underbrace{(\sin\pi\{x\})([x])}_{\text{cont. at }x-1}\left(\sin^2\pi\{x\}\right)$

$g'\left(I^+\right)=g'\left(I^-\right)$ so differentiable at $x=I$ and for $\{\sin x\}\{\cos x\}$

Doubtful points for non differentiability are $x=0,\frac{\pi}{2},\pi,\frac{3\pi}{2}$

$\because\{\sin x\}-\{\cos x\}$ is discontinuous at $x=0,\frac{\pi}{2},2\pi$

So not differentiable at $x=2n\pi,2n\pi+\frac{\pi}{2}$

16.

$$f(x)f\left(f(x)+\frac{4}{x}\right)=1$$

$$f(x)=\frac{1}{f(t)}\,\text{where}\,t=f(x)+\frac{4}{x}$$

$f(t)\,f\left(f(t)+\frac{4}{t}\right)=1$ replace x by t in the given equation

$$f(x)=f\left(f(t)+\frac{4}{t}\right)=f\left(\frac{1}{f(x)}+\frac{4}{f(x)+\frac{4}{x}}\right)$$

$$x=\frac{1}{f(x)}+\frac{4}{f(x)+\frac{4}{x}} \qquad Put\ f(x)=y$$

$$1=\frac{1}{xy}+\frac{4}{xy+4}$$

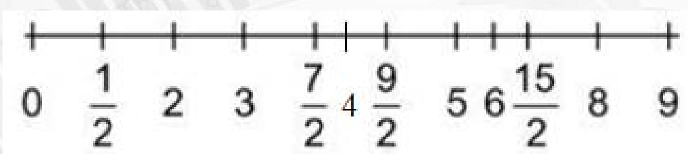
$$(xy)(xy+4)=(xy+4)+4xy$$

$$(xy)^2-xy-4=0$$

$y=f(x)=\frac{1-\sqrt{17}}{2x}$ ($\frac{1+\sqrt{17}}{2x}$ is not allowed as $f(x)$ is increasing in nature)

17.

A)



$$f\left(\frac{x+13}{2}\right)=f\left(\frac{3-x}{2}\right)$$

$$f(x)=f(8-x)$$

$$f'(x)=-f'(8-x)$$

$$f'(2)=-f'(6)=0$$

$$f'(3)=-f'(5)=0$$

$$f'(4)=f'(-4)=0$$

$$f'\left(\frac{9}{2}\right)=-f'\left(\frac{7}{2}\right)=0$$

$$f'(0)=-f'(8);h(x)=\frac{d}{dx}\left(f'(x)f''(x)\right)$$

Clearly: h(x) has minimum 21 zeroes

B) $x^4-7x^2-4x+20=\left(x^2-4\right)^2+(x-2)^2$

$x^4+9x^2+16=\left(x^2+4\right)^2+x^2$

Take the curve $y=x^2$. Both square roots can be interpreted as distances.

C) $x=y=1\Rightarrow f^2(1)+f^2(2023)=2\times f(1)$

$\Rightarrow f(1)=1$

$y=1\Rightarrow f(x).f(1)\neq f(2023/x)f(2023)=2f(x)$

$\Rightarrow f(x)=f(2023)x$

$y\,by\,\dfrac{2023}{x}\Rightarrow f(x)f(2023/x)=1$

$\Rightarrow f(x)=1,\forall x>0$

D) $\lim\limits_{t\to\infty}\dfrac{\sqrt{tx}}{\sqrt{tx^2-3tx+t-1-x}}\tan\left[\sin^{-1}\left(\cos\dfrac{\pi}{6}\right)\right]$

$$\frac{\sqrt{x}}{\sqrt{x^2-3x+1}}=\frac{\sqrt{3}}{1}$$

$$x=3x^2-9x+3$$

$$3x^2-10x+3=0\Rightarrow(3x-1)(x-3)=0\Rightarrow x=\frac{1}{3},3$$

$$\left(8^\alpha+2^\beta-\alpha\beta\right)=8^{\frac{1}{3}}+2^3-1\Rightarrow 2+8-1=9$$

18. A) $f(x)=\cos x\left(\dfrac{1}{1-\cos x}+\dfrac{\cos x}{(1-\cos x)^2}\right)$

$$=\frac{\cos x}{(1-\cos x)^2}$$

$$\lim_{x\to 0}\left[\left((1-\cos x)^2 f(x)\right)^{\frac{1}{\cos x-1}}\right]$$

$$=\lim_{x\to 0}\left[(\cos x)^{\frac{1}{\cos x-1}}\right]=\left[e^{\frac{1}{\cos x-1}(\cos x-1)}\right]=2$$

B) No integral value of x such that $f(x)=0$

C) $f'=2x-4\sin x$

$x=0$ only point of maximum

$g'(x)=6\left(|x|+2\right)\left(|x|-1\right)$

maximum value of $g(x)=5$

D) $x=0=y\Rightarrow f(0)=0$ also differentiate w.r.t x and y and simplifying

$$\frac{f'(x)}{1+f(x)}=\frac{-1}{x+1}\Rightarrow f(x)=\frac{-x}{x+1}$$

PHYSICS

19. Resultant intensity due to S_1 and S_2 is I and adding third to this makes the resultant zero.This implies that intensity due to S_3 alone is I.
Amplitudes of waves reaching P from the three sources S_1, S_2 and S_3 can be written as a, $\sqrt{2}a$ and a respectively. These three waves can produce zero resultant if phase difference between the first and third wave is *pi*/2.

20. $\left(\frac{I_P}{I_{max}}\right)_{\lambda_1} = \cos^2\frac{\phi}{2} = 0.25$

[$\phi =$ phase difference between two waves arriving at P]

$\therefore \quad \cos\left(\frac{\phi}{2}\right) = \frac{1}{2}$

$\Rightarrow \frac{2\pi}{\lambda_1}(\Delta x)_1 = 2\pi/3$

$\Rightarrow (\Delta x)_1 = \lambda_1/3$

Similarly, $\left(\frac{I_P}{I_{max}}\right)_{\lambda 2} = \cos^2\frac{\phi'}{2} = 0.75$

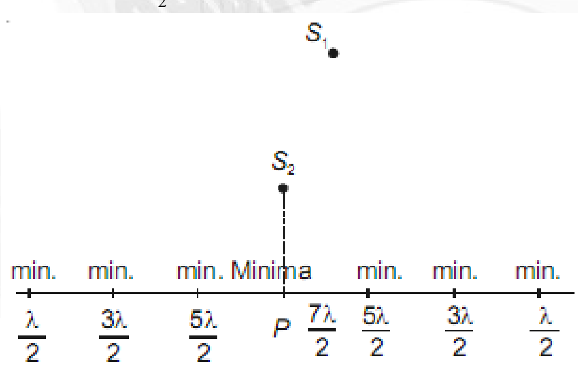
$\therefore \quad \cos\frac{\phi'}{2} = \frac{\sqrt{3}}{2}$

$\phi' = \pi/3$

$\therefore \quad (\Delta x)_2 = \frac{\lambda_2}{6}$

Because $(\Delta x)_1 = (\Delta x)_2$

$\frac{\lambda_1}{3} = \frac{\lambda_2}{6} \Rightarrow \frac{\lambda_1}{\lambda_2} = \frac{1}{2}$

21. 

22. Position of n^{th} order maxima is given by
$d\sin\theta = n\lambda; \quad n = 0, \pm1, \pm2....$
At $\sin\theta = 0.6; d = 0.08\text{mm}; \lambda = 5000\mathring{A}$ we have

$n = \frac{d\sin\theta}{\lambda} = \frac{0.08\times0.6}{5000\times10^{-7}} = 96$

It means there are 96384 maxima in the range $0 < \theta \le \sin^{-1}(0.6)$. By symmetry we have same number of maxima on the other side and there is one central maxima (corresponding to $n = 0$)
Therefore, total number of maxima $= 96 + 96 + 1 = 193$

23. $\left(\frac{\mu_1}{\mu_0}-1\right)t_1=\left(\frac{\mu_2}{\mu_0}-1\right)t_2$

24.

$2(t_1-t_2)=\lambda$

$d=\frac{1}{15}cm$

$\tan\theta=\frac{t_1-t_2}{d}$

25. Let thickness of air gap be t.

On reflection R2 suffers a phase change of π.

$\therefore$ Condition for constructive interference is

$2t=(2n_1+1)\frac{\lambda_1}{2}$ where $\lambda_1=0.4\mu\text{m}$

$\therefore \quad 2t=(2n_1+1)0.2$ ....(1)

For other wavelength

$2t=(2n_2+1)\frac{\lambda_2}{2}$ ....(2)

From (1), $2\times0.5\mu\text{m}=(2n_1+1)\frac{0.4}{2}\mu\text{m}$

$\Rightarrow \quad n_1=2$

According to the question; $\lambda_2>\lambda_1$

(Since $\lambda_1=0.4\mu\text{m}$ is the smallest incident wavelength)

$\therefore \quad n_2<n_1$

$\therefore \quad n_2=1$

$\therefore \quad \lambda_2=\frac{4t}{2n_2+1}=\frac{4\times0.5\mu\text{m}}{3}=0.67\mu\text{m}$

26. Path difference = $\frac{10}{4}t-\frac{\lambda}{2}=n\lambda$

So, minimum thickness is $\frac{\lambda}{5}=120$

27. For maxima $d=n\lambda$.

For minima $d=(n+1/2)\lambda$

For intensity $\frac{3}{4}$ th of maximum $d=\left(n\pm\frac{1}{3}\right)\frac{\lambda}{2}$

28. $\frac{I_{\max}}{I_{\min}}=\frac{\left(\sqrt{I_1}+\sqrt{I_2}\right)^2}{\left(\sqrt{I_1}-\sqrt{I_2}\right)^2}=\frac{9}{1}$

$\Rightarrow\frac{\sqrt{I_1}+\sqrt{I_2}}{\sqrt{I_1}-\sqrt{I_2}}=\frac{3}{1}\Rightarrow4\sqrt{I_2}=2\sqrt{I_1}$

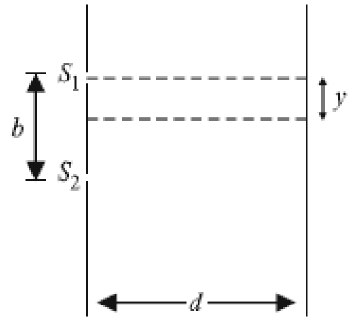
$\Rightarrow\sqrt{\frac{I_1}{I_2}}=\frac{4}{2}\Rightarrow\frac{I_1}{I_2}=4=\frac{a^2}{b^2}$

$\Rightarrow\frac{a}{b}=2$

29. The fringe width does not depend on the angle made by beam, for small angles.

30. Here $y=(2n-1)\frac{\lambda}{2}\frac{D}{d}=(2n-1)\frac{\lambda}{2}\frac{d}{b}$ $(\because d=b \text{ and } D=d)$

But $y=\frac{b}{2}$



$\therefore \frac{b}{2}=(2n-1)\frac{\lambda}{2}\frac{d}{b}$ $\Rightarrow \lambda=\frac{b^2}{(2n-1)d}$ when n = 1, 2 $\lambda=\frac{b^2}{d},\frac{b^2}{3d},\ldots$

31. $I(\phi)=I_1+I_2+2\sqrt{I_1I_2}\cos\phi$

Here, $I_1=1$ and $I_2=41$

At point $A, \phi=\pi/2$

$\therefore I_A=I+4I=5I$

At point B, $\phi=\pi/2$

$\therefore I_B=I+4I-4I=I$

$\therefore I_A-I_B=4I$

32. As $\beta=\frac{\lambda D}{d}$ $\therefore \beta'=\frac{\lambda' D'}{d'}$

If $d'=2d$, we get

$\beta'=\frac{\lambda' D'}{2d}$

To keep β ' and β equal either λ is to be made double or D is to made double.

33. A-q, r, s; B-p; C-s; D-r

(A) $\sqrt{D^2+(2\lambda)^2}-D=\Delta x$

For maximas $\Delta x=n\lambda$

$D^2+(2\lambda)^2=(D+n\lambda)^2$

$4\lambda^2=n^2\lambda^2+2Dn\lambda$

Only two possible values of $n, n=1$,

$D=\frac{3\lambda}{2}; n=2, D=0$

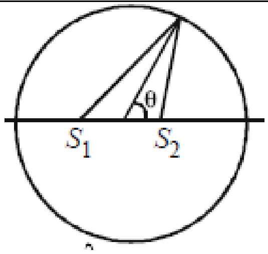
Similarly, for minimas, $\Delta x=(2n-1)\frac{\lambda}{2}$

34. A-s; B-r; C-q; D-p

(B) For maxima, $\Delta x=n\lambda$

$\cos\theta=n$,

Possible values of $n=0,1$



$\cos\theta = 0, \Rightarrow \theta = 90^\circ, 270^\circ$

$\cos\theta = 1, \Rightarrow \theta = 0^\circ, 360^\circ$

$\therefore$ Number of maximas $= 4$

Similarly for minimas, $\Delta x = (2n-1)\dfrac{\lambda}{2}$

35. A-p, q; B-r, s; C-s, t; D-p

(C) Virtual image of S will act as another source

$\Delta x = d\sin\theta, d = 2\lambda$

For maximas, $n\lambda = 2\lambda\sin\theta \Rightarrow \sin\theta = \dfrac{n}{2}$

$n = 0, 1, 2,$

$\theta = 0, 30^\circ, 90^\circ, 150^\circ$

Total maximas possible $= 7$ (centre +3 up +3 down)

(D) $\Delta x = 2\lambda\cos\theta; \theta \le 60^\circ$

For maximas, $\Delta x = n\lambda \Rightarrow \cos\theta = \dfrac{n}{2}; n = 0, 1, 2, \theta \ne 90^\circ$, $\theta = 60^\circ, \theta = 0^\circ$

Total maximas two, For minima, $\Delta x = (2n-1)\dfrac{\lambda}{2};$

$\cos\theta = \dfrac{2n-1}{4}$

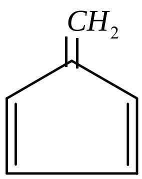
$n = 1, \cos\theta = \dfrac{1}{4}; \theta > 60^\circ; n = 2,$

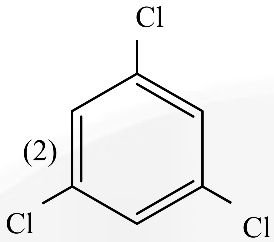
$\cos\theta = \dfrac{3}{4}; \theta < 60^\circ$; No. of possible minimas $= 1$.

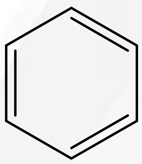
36. A-q; B-s; C-r; D-p

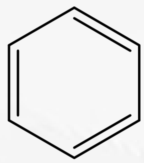
CHEMISTRY

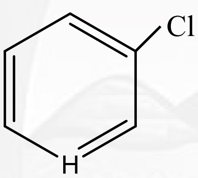
37.

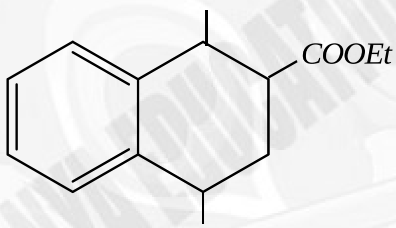
(1) 

(2) 

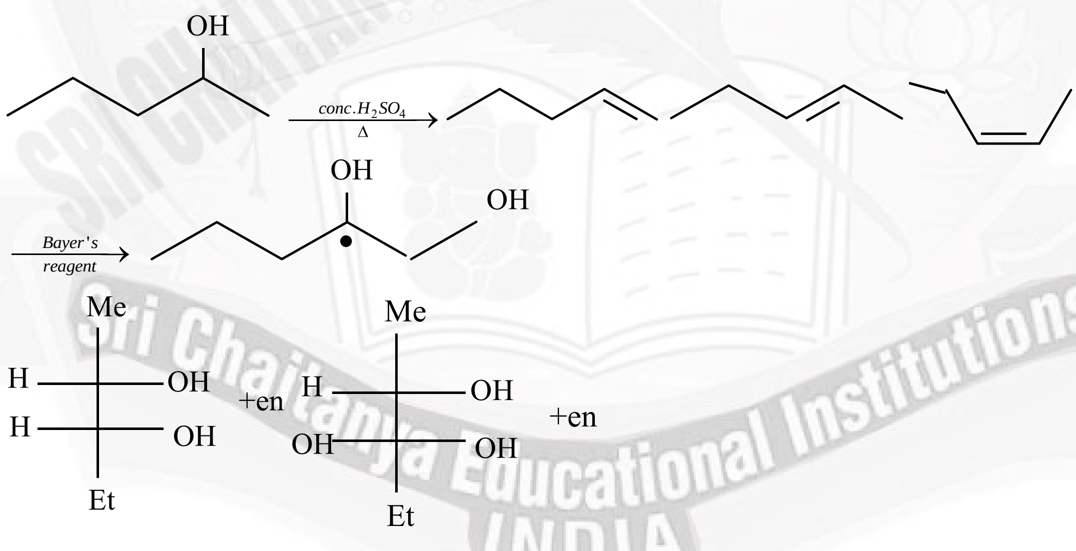
(3) 

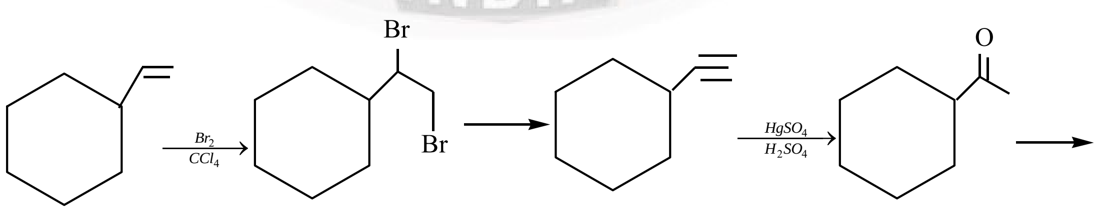
(4) 

(5) 

(6) 

38.

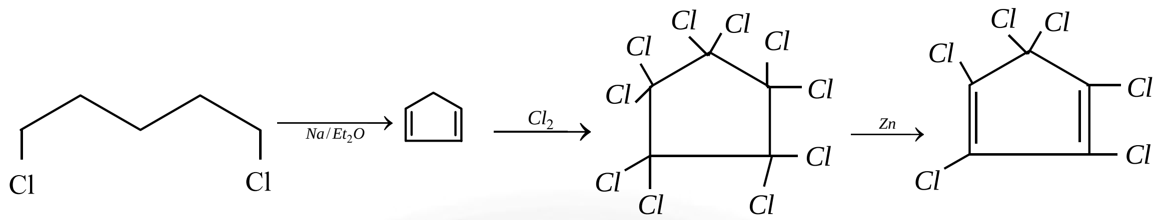




39.

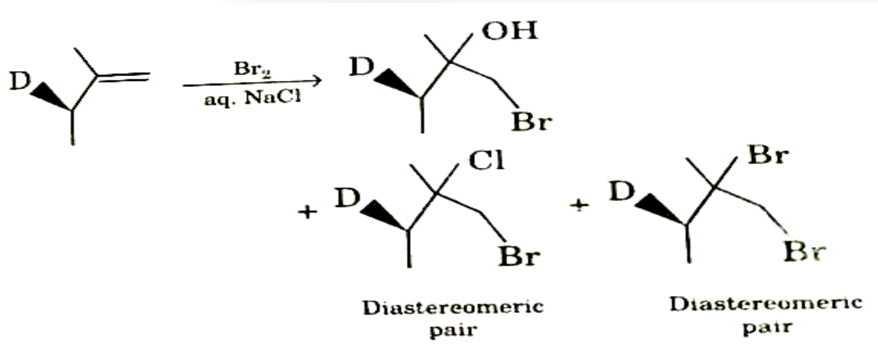
40. OZNALYSIS

41.



$\Rightarrow 6+3=7$

42.

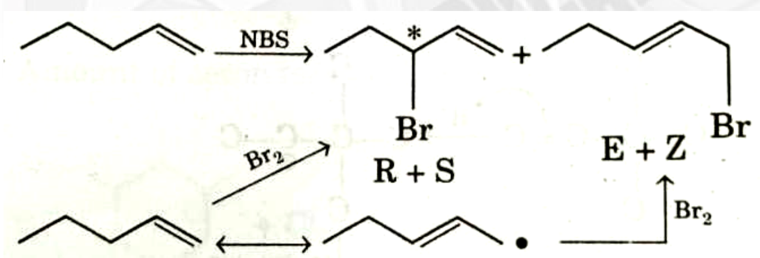


43.

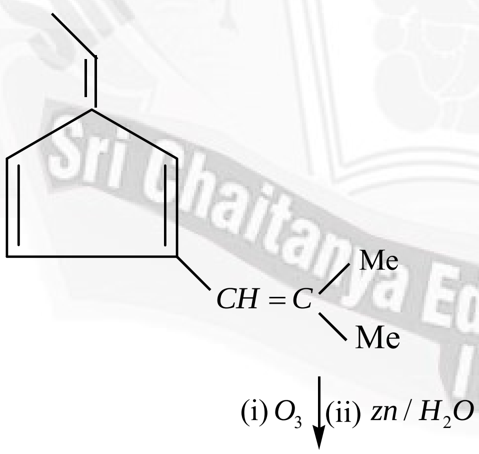
$26g \rightarrow 6\,mole$

$13g \rightarrow 3\,mole$

44.

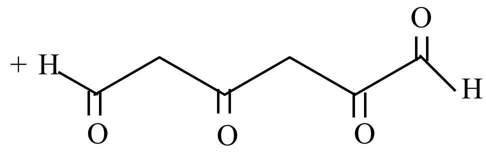


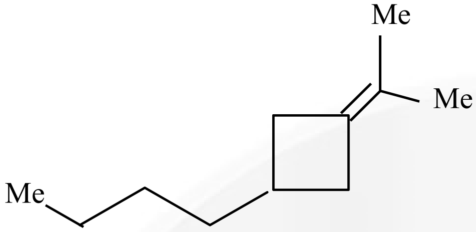
45.



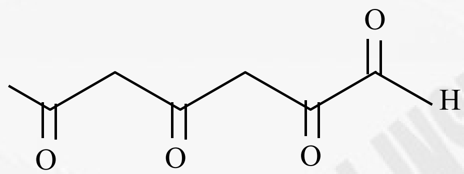
a)

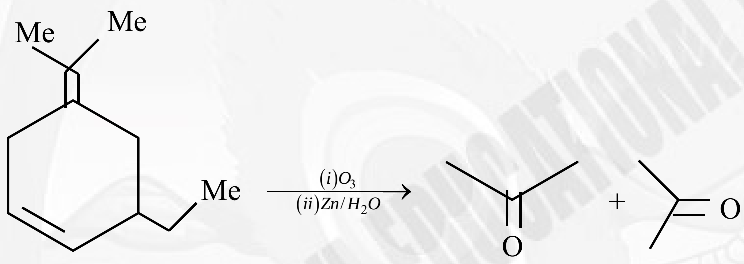
$$CH_3-CHO+CH_3-\overset{\overset{\displaystyle O}{||}}{C}-CH_3$$

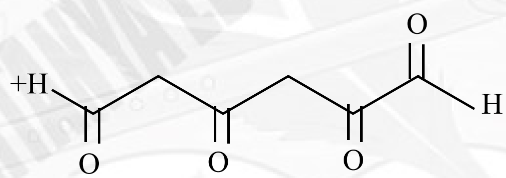


c) 

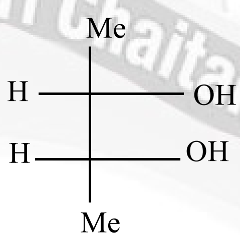
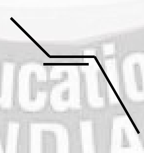
$(i)O_3 \downarrow (ii)Zn/H_2O$

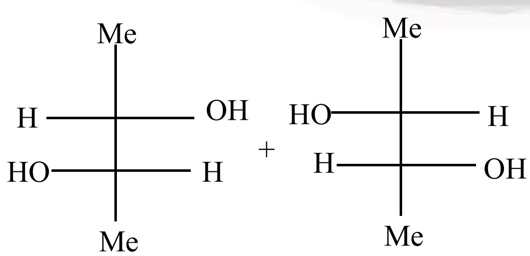
$Me-CHO+Me-\underset{\underset{OH}{||}}{C}-Me+H$ 

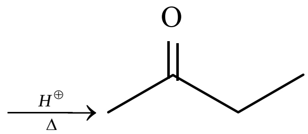
d) 



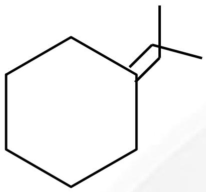
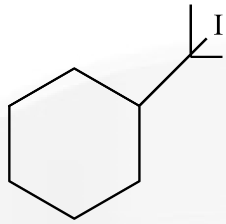
46. Free radical dimarisation
47. Addition reaction
48. Nucleophillic substitution followed by addition

49. (Z) is  (C) is 

(D) is 

C to Z is stereo, selective D 

50.

(a)  (c) 

51. Addition reaction
52. Addition reaction
53. Addition reaction
54. Addition reaction