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_STERLING BT	**JEE-MAIN**	**Date: 14-06-2025**
Time: 09:00AM to 12:00PM	**WTM-34**	**Max. Marks: 300**

KEY SHEET

MATHEMATICS

1	**3**	2	**3**	3	**4**	4	**4**	5	**1**
6	**3**	7	**3**	8	**3**	9	**2**	10	**2**
11	**2**	12	**3**	13	**1**	14	**1**	15	**4**
16	**4**	17	**3**	18	**3**	19	**1**	20	**1**
21	**0**	22	**49**	23	**6**	24	**0**	25	**2**

PHYSICS

26	**2**	27	**2**	28	**1**	29	**2**	30	**4**
31	**3**	32	**3**	33	**2**	34	**3**	35	**1**
36	**3**	37	**2**	38	**3**	39	**1**	40	**2**
41	**1**	42	**3**	43	**4**	44	**1**	45	**2**
46	**2**	47	**2**	48	**6**	49	**15**	50	**24**

CHEMISTRY

51	**1**	52	**3**	53	**3**	54	**1**	55	**3**
56	**1**	57	**1**	58	**1**	59	**2**	60	**1**
61	**2**	62	**2**	63	**3**	64	**4**	65	**3**
66	**3**	67	**3**	68	**1**	69	**4**	70	**4**
71	**4**	72	**2**	73	**3**	74	**1**	75	**5**

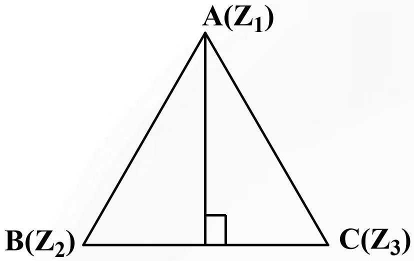
SOLUTION
MATHEMATICS

1. Since, $|x|+|y|=2$

$|z+2i|+|z-2i|=4$

Equation (1) represents square and equation (2) represents line segment solution are $z \pm 2i$.

Hence, the correct answer is (C).

2. 

$D\left(\frac{Z_2+Z_3}{2}\right)$

$$Arg\left\{\frac{(z_2+z_3-2z_1)}{z_3-z_2}\right\} = Arg\,2\left\{\frac{\frac{z_2+z_3}{2}-z_1}{z_3-z_2}\right\} = Arg\left\{\frac{\frac{z_2+z_3}{2}-z_1}{z_3-z_2}\right\} = \frac{\pi}{2}$$

Clearly, $AD \perp BC$

Hence, the correct answer is CD

3. $x^2+x+1=0 \Rightarrow x = w\,or\,w^2$

$Let\,x=w, then\,x+\frac{1}{x}=w+\frac{1}{w}=w+w^2=-1,$

$x^2+\frac{1}{x^2}=w^2+\frac{1}{w^2}=w^2+w=-1,$

$x^3+\frac{1}{x^3}=w^3+\frac{1}{w^3}=1+1=2,$

$x^4+\frac{1}{x^4}=w^4+\frac{1}{x^3}=w+\frac{1}{w}=-1, etc.$

$\therefore\left(x+\frac{1}{x}\right)^2+\left(x^2+\frac{1}{x^2}\right)^2+\left(x^3+\frac{1}{x^3}\right)^2+\ldots\left(x^{27}+\frac{1}{x^{27}}\right)^2$

$=18+9(2)^2=54$

4. $|z_1+z_2+z_3|=|(z_1-1)+(z_2-2)+(z_3-3)+6|$

$\le|z_1-1|+|z_2-2|+|z_3-3|+6$

$\le 1+2+3+6\le 12$

Greatest value of $|z_1+z_2+z_3|$=12

5. $a=\cos\frac{2\pi}{7}+i\sin\frac{2\pi}{7}\Rightarrow a^7=\left(\cos\frac{2\pi}{7}+i\sin\frac{2\pi}{7}\right)^7=\cos 2\pi+i\sin 2\pi=1 \quad ...(1)$

Sum of roots $=\alpha+\beta=a+a^2+a^4+a^3+a^5+a^6$

$=\frac{a(1-a^6)}{1-a}=\frac{a-a^7}{1-a}=\frac{a-1}{1-a}=-1 \quad ...(2)$

Product of roots $=\alpha\beta=\left(a+a^2+a^4\right)\left(a^3+a^5+a^6\right)$

$=a^4+a^5+a^7+a^6+a^7+a^9+a^7+a^8+a^{10}$

$=a^4+a^5+1+a^6+1+a^2+1+a+a^3$ $\quad\left(from(1)\right)$

$=3+a+a^2+a^3+a^4+a^5+a^6$

= 3+ (-1) = 2

Therefore, the required equation is $x^2-x(-1)+2=0$

$\Rightarrow x^2+x+2=0$

Hence, the correct answer is (A).

6. $\left|\dfrac{z_1-z_3}{z_2-z_3}\right|=\left|\dfrac{1-i\sqrt{3}}{2}\right|\Rightarrow\left|\dfrac{z_1-z_3}{z_2-z_3}\right|=\sqrt{\dfrac{1}{4}+\dfrac{3}{4}}=1$

Again $\dfrac{z_1-z_3}{z_2-z_3}=\dfrac{1-i\sqrt{3}}{2}$

$\dfrac{z_1-z_3}{z_2-z_3}-1=\dfrac{1-i\sqrt{3}}{2}-1\Rightarrow\dfrac{z_1-z_3}{z_2-z_3}=\dfrac{1-i\sqrt{3}}{2}$

$\left|\dfrac{z_1-z_3}{z_2-z_3}\right|=\left|\dfrac{-1}{2}\dfrac{-i\sqrt{3}}{2}\right|$

$\Rightarrow\left|\dfrac{z_1-z_3}{z_2-z_3}\right|=\sqrt{\dfrac{1}{4}+\dfrac{3}{4}}=1$

$\Rightarrow|z_1-z_3|=|z_2-z_3|$

Therefore, z_1,z_2 *and* z_3 are the vertices of an equilateral triangle

Hence, the correct answer is (C).

7. Let $\alpha=cis\dfrac{2K\pi}{7}(K=0\,to\,6)$

$\left(a^7=1\right)$

$S=\alpha^{2009}+3\alpha^{2010}+5\alpha^{2011}+....+13\alpha^{2015}$

$S=1+3\alpha+5a^2+...+13\alpha^6\,(AGP)$

$\underline{\alpha S=\alpha+3\alpha^2+....+11\alpha^6+13\alpha^7}$

$S(1-\alpha)=1+2\alpha+....+2\alpha^6-13\alpha^7$

$S(1-\alpha)=1+\dfrac{2\alpha\left(1-\alpha^6\right)}{1-\alpha}-13\alpha^7$

$S=\dfrac{-14}{1-\alpha}=\dfrac{-14}{1-cis\dfrac{2K\pi}{7}}=-7\left[1-i\cot\dfrac{K\pi}{7}\right]$

Hence the correct answer is (C).

8. $\log_{\tan 30^0}\left(\dfrac{2|z|^2+2|z|-3}{|z|+1}\right)<-2$

$\Rightarrow\dfrac{2|z|^2+2|z|-3}{|z|+1}>3$

$\Rightarrow\left((|z|-2)(2|z|)+3\right)>0\Rightarrow|z|>2$

Hence the correct answer is (C).

9. $|z|^3 + 2z^2 + 4\bar{z} - 8 = 0, imaginary\ part\ of\ z\ is\ non-zero$

$Let\ z = x + iy, y \neq 0$

$Put\ |x+iy|^3 + 2(x+iy)^2 + 4(x-iy) - 8 = 0 \Rightarrow x = 1, y^2 = 3$

$I)\ |z|^2 = x^2 + y^2 = 1 + 3 = 4$

$II)\ |z - \bar{z}|^2 = |z + iy - x + iy|^2 = 4y^2 = 12$

$III)\ |z|^2 + |z + \bar{z}|^2 = x^2 + y^2 + |z + iy + x - iy|^2 = x^2 + y^2 + 4x^2 = 5x^2 + y^2 = 5 + 3 = 8$

$IV)\ |z+1|^2 = |z + iy + 1|^2 = \left|1 + i\sqrt{3} + 1\right|^2 = (4+3) = 7$

10. $$Z = \frac{1-i}{\cos\frac{\pi}{3} + i\sin\frac{\pi}{3}} = \frac{i-1}{\frac{1}{2} + \frac{\sqrt{3}}{2}i} = \frac{i-1}{\frac{1}{2} + \frac{\sqrt{3}}{2}i} \times \frac{\frac{1}{2} - \sqrt{\frac{3}{2}}i}{\frac{1}{2} - \sqrt{3/2i}} = \frac{\sqrt{3}-1}{2} + \frac{\sqrt{3}+1}{2}i$$

Apply polar form, $r\cos\theta = \frac{\sqrt{3}-1}{2}; r\sin\theta = \frac{\sqrt{3}+1}{2}$

$Now, \tan\theta = \frac{\sqrt{3}+1}{\sqrt{3}-1}, so, \theta = \frac{5\pi}{12}$

Hence the correct answer is (B).

11. Circle C is $|z| = 5\ as\ |z_1| = |z_2| = |z_3| = 5$

Slope of BC $= \frac{3-5}{4-0} = -\frac{1}{2}$

Slope of Ap=2

Equation of AP: y-4=2(x-3)

$\Rightarrow$ y = 2(x-1)

P lies on circle $x^2 + y^2 = 25$

$\Rightarrow x^2 + (2(x-1))^2 = 25 \Rightarrow 5x^2 - 8x - 21 = 0$

$\Rightarrow x = -7/5\ and\ y = -24/5 \Rightarrow (5x+7)(x-3) = 0$

$\Rightarrow x = -7/5\ \text{point}\ P.y = -24/5$

$\arg(z) = tam^{-1}(24/7) - \pi$

Hence the correct answer is (B)

12. For $|z-1| \leq \sqrt{2}, z$ lies on and inside the circle of radius $\sqrt{2}$ units and centre (1,0).

For S_2

Let z= x+iy

Now, (1-i) (z) = (1-i) (x+iy)

Re ((1-i) z) = x+y

$\Rightarrow$ X+y $\geq$ 1

$\Rightarrow S_1 \cap S_2 \cap S_3$ has infinity many elements

Hence, the correct answer is (C).

13. $\left|\frac{z_1 - 2z_2}{2 - z_1 z_2}\right| = 1, \Rightarrow |z_1 - 2z_2|^2 = |2 - z_1\bar{z}_2|$

$\Rightarrow (z_1 - 2z_2)\left(\overline{z_1 - 2\bar{z}_2}\right) = (2 - z_1\bar{z}_2)\left(\overline{2 - z_1\bar{z}_2}\right)$

$\Rightarrow (z_1 - 2z_2)(\bar{z}_1 - 2\bar{z}_2) = (2 - z_1\bar{z}_2)(2 - \bar{z}_1 z_2)$

$\Rightarrow |z_1|^2+4|z_2|^2=4+|z_1|^2|z_2|^2$

$\Rightarrow |z_1|^2+4|z_2|^2-4-|z_1|^2|z_2|^2=0$

$\left(|z_1|^2-4\right)\left(1-|z_2|^2\right)=0$

Since, $|z_2|\neq 1$. Therefore, $|z_1|^2=4\Rightarrow |z_1|=2$

$\Rightarrow$ Point z_1 lies on the circle of radius 2.

14. $\arg(z_1z_2)=Argz_1+Argz_2+2n\pi, n\in I$

15. $w_1=z_ii=(5+4i)i=-4+5i \quad ...(i)$

$w_2=z_2(-i)=(3+5i)(-i)=5-3i \quad ....(2)$

$w_1-w_2=-9+8i$

Principal argument

$=\pi-\tan^{-1}\left(\frac{8}{9}\right)$

16. $z=x+iy$

$$\frac{x+iy-1}{2x+2iy+i}=\frac{(x-1)+iy}{2x+i(2y+1)}\left(\frac{2x-i(2y+1)}{2x-i(2y+1)}\right)$$

$$\frac{2x(x-1)+y(2y+1)}{4x^2+(2y+1)^2}=1$$

$2x^2+2y^2-2x+y=4x^2+4y^2+4y+1$

$x^2+y^2+x+(3/2)y+(1/2)=0$

Circle's centre will be $(-1/2,-3/4)$

Radius = $\sqrt{[(1/4)+(9/16)-(1/2)]}=\sqrt{5}/4$

Diameter = $\sqrt{5}/2$

17. $Z_1=3+2i$

$Z_2-Z_1=Z_1e^{i\left(\frac{\pi}{2}\right)}=(3+2i)i=-2+3i$

$Z_2=Z_1+(-2+3i)=1+5i$

18. $Given\,that, \bar{z}+i\bar{w}=0\Rightarrow \bar{z}+i\bar{w} \quad \Rightarrow \quad z=iw\Rightarrow w=-iz \quad and \quad \arg(zw)=\pi$

$\Rightarrow \quad \arg(-iz^2)=\pi \quad \Rightarrow \arg(-i)+2\arg(z)=\pi$

$\Rightarrow -\frac{\pi}{2}+2\arg(z)=\pi\left[\because \arg(-i)=-\frac{\pi}{2}\right]$

$\Rightarrow \quad \arg(z)=\frac{3\pi}{4}$

19. $z=\frac{3+i\sin\theta}{(4-i\cos\theta)}\times\frac{(4+i\cos\theta)}{4+i\cos\theta}$

As z is purely real

$\Rightarrow 3\cos\theta+4\sin\theta=0$

$\Rightarrow \tan\theta=-\frac{3}{4}$

$\arg(\sin\theta+i\cos\theta)$.

$= \pi + \tan^{-1}\left(\frac{\cos\theta}{\sin\theta}\right)$

$= \theta + \tan^{-1}\left(-\frac{4}{3}\right)$

$= \pi - \tan^{-1}\left(\frac{4}{3}\right)$

20. $w = 1 - \sqrt{3}.i \Rightarrow |w| = 2$

$Now, |z| = \frac{1}{|w|} \Rightarrow |z| = \frac{1}{2}$

$and\ amp(z) = \frac{\pi}{2} + amp(w)$

$\Rightarrow area\ of\ triangle = \frac{1}{2}.OP.OQ$

$= \frac{1}{2}.2.\frac{1}{2} = \frac{1}{2}$

21. arg of positive real number is 0
22. CONCEPTUAL
23. $A : y^2 \le 2x + 3; B : (x+1)^2 + y^2 \ge 1; C : x \le 0$
24. (3, 3) belongs to A nut not B
25. x=ω,ω^2

PHYSICS

26. $T = 2\pi\sqrt{\frac{1}{M \times B_M}} \Rightarrow T \propto \frac{1}{\sqrt{B_H}} \Rightarrow \frac{T_1}{T_2} = \sqrt{\frac{(B_H)_2}{(B_H)_1}} \Rightarrow \frac{60/40}{2.5} = \sqrt{\frac{(B_H)_2}{0.1\times10^{-5}}} \Rightarrow (B_H)_2 = 0.36\times10^{-6}T$

27. $B = \frac{\mu_0}{4\pi}\frac{2M}{x^3}$ *for end – on position*

$U = -\vec{M}.\vec{B} = \frac{\mu_0}{4\pi}\frac{2M^2}{x^3}$

$F = -\frac{dU}{dx} = \frac{-3\mu_0}{4\pi}\frac{2M^2}{x^4}$

Therefore, force between them $\propto x^{-4}$

28. In the usual setting of deflection magnetometer, field due to magnet (F) and horizontal component (H) of earth's field are perpendicular to each other. Therefore, the net field on the magnetic needle is $\sqrt{F^2+H^2}$.

$\therefore T = 2\pi\sqrt{\frac{1}{M\sqrt{F^2+H^2}}}....(i)$

When the magnet is removed,

$T_0 = 2\pi\sqrt{\frac{I}{MH}}....(ii)$

$Also, \frac{F}{H} = \tan\theta$

Dividing (i) by (ii), we get

$\frac{T}{T_0} = \sqrt{\frac{H}{\sqrt{F^2+H^2}}} = \sqrt{\frac{H}{\sqrt{H^2\tan^2\theta+H^2}}} = \sqrt{\frac{H}{H\sqrt{\sec^2\theta}}} = \sqrt{\cos\theta}$

$\Rightarrow \frac{T^2}{T_0^2} = \cos\theta \quad \therefore T^2 = T_0^2\cos\theta$

29. If there is no current in the coil, then the needle would point but due to the magnetic field of the coil, it is pointing north-west. This means the magnetic field due to coil is towards west and it is equal to the horizontal component of earth's magnetic field. So when we reverse the direction of current the magnetic field due to the coil will be towards east and the magnetic needle will point north-east.

30. Magnetic field is a vector quantity at point p two magnetic field ar acting at 90^0

$B_{net} = \sqrt{B_1^2+B_2^2} = \sqrt{\left(\frac{2\mu_0 M}{4\pi d^3}\right)+\left(\frac{\mu_0 M}{4\pi d^3}\right)} = \frac{\mu_0 M}{4\pi d^3}\left(\sqrt{5}\right)$

31. For a short bar magnet in tan A position, $\frac{\mu_0}{4\pi}\frac{2M}{d^3} = H\tan\theta \qquad ...(i)$

When distance is doubled, then new deflection θ' is given by, $\frac{\mu_0}{4\pi}\frac{2M}{(2d)^3} = H\tan\theta' \quad ...(ii)$

$\therefore \frac{\tan\theta'}{\tan\theta} = \frac{1}{8}$

$\Rightarrow \tan\theta' = \frac{\tan\theta}{8} = \frac{\tan 60^0}{8} = \frac{\sqrt{3}}{8} \quad \theta = \tan^{-1} = \left[\frac{\sqrt{3}}{8}\right]$

32. Coercivity of ferromagnet, H= 100 A/m.

$$n \times I = 100 \Rightarrow I = \frac{100}{10^5} = 1mA$$

33. Ratio of magnetic moments of two magnets of equal size when in same and different position is

$$\frac{M_A}{M_B} = \frac{T_d^2 + T_s^2}{T_d^2 - T_s^2} = \frac{v_d^2 + v_s^2}{v_d^2 - v_s^2}$$

$$\frac{M_A}{M_B} = \frac{20^2 + 15^2}{20^2 - 15^2} = \frac{400+225}{400-225}$$

$$M_A : M_B = 25:7$$

34. Torque (τ) acting on magnet (l),

$$\tau_1 = MB\sin\theta$$

Similarly, $\tau_2 = \sqrt{3}MB\sin\theta$

But for equilibrium, $\tau_1 = \tau_2$

$$\therefore MB\sin\theta = \sqrt{3}MB\cos\theta$$

$$\tan\theta = \sqrt{3} = \tan 60^0$$

$$\therefore \theta = 60^0$$

35. M= magnetic moment per unit volume = $\frac{20\times10^{-6}}{\left(1\times10^{-2}\right)^3} JT^{-1}m^{-3} = 20\,J\,T^{-1}m^{-3}$

$H = 60\times10^3\,Am^{-1}$ $\qquad$ $\chi = \frac{M}{H} = \frac{20}{60\times10^3} = 3.3\times10^{-4}$

36. $From\ B = \frac{\Delta v}{\Delta l} = \frac{(0.2-0.1)\times10^{-4}}{0.2-0.1\sin 30^0}T = 2\times10^{-4}T$

37. $Given: Frequency\ v = \frac{3}{2\pi}\times10^{12}\,Hz; direction = \frac{\hat{i}+\hat{j}}{\sqrt{2}}. The Beam\ is\ poalarised\ along\ \hat{k}\ direction.$

Direction of magnetic field $\vec{B} = \left(\frac{\hat{i}+\hat{j}}{\sqrt{2}}\times\hat{k} = \frac{-\hat{j}}{\sqrt{2}} + \frac{\hat{i}}{\sqrt{2}}\right)$

Therefore, direction $\vec{B} = \left(\frac{\hat{i}+\hat{j}}{\sqrt{2}}\right)$

Now from wave equation, we have

$$B = B_0\cos(kr - \omega t); \omega = 2\pi v = 2\pi\times\frac{3}{2\pi}\times10^{12}\,Hz = 3\times10^{12}\,Hz$$

$$Now, k = \frac{\hat{i}+\hat{j}}{\sqrt{2}}; B_0 = \frac{\varepsilon_0}{C}\left(\frac{\hat{i}+\hat{j}}{\sqrt{2}}\right)$$

Therefore, $B = \frac{\varepsilon_0}{C}\left(\frac{\hat{i}+\hat{j}}{\sqrt{2}}\right)\cos\left[10^4\left(\frac{\hat{i}+\hat{j}}{\sqrt{2}}\right).r - \left(3\times10^{12}\right)t\right]$

38. Conceptual

39. A magnetic field is produced by the motion of electric charge. Since motion is relative, the magnetic field is also relative.

40. Magnetic field due to bar magnets exerts force on moving charges only. Since the charge is at rest, zero force acts on it.

41. The core of an electromagnet should be such that it gets magnetized easily. Also, it loses magnetism easily as soon as the magnetizing field is removed. Soft iron has this property. So, soft iron is used as the core electromagnet. So, the assertion is true. Coercivity is a measure of the ability of a ferromagnetic substance to withstand external magnetic field without becoming demagnetized. For soft iron, it should be very low. Coercivity is low for soft iron. So, reason is also true. Also, reason properly explains the assertion.

42. $c\phi = BINA$

$\phi = \left(\frac{BNA}{c}\right)I$

Using iron core value of magnetic-field increases. So, deflection increases for the same current. Hence, sensitivity increases. Soft iron can be easily magnetized or demagnetized.

$\therefore$ correct option is (C).

43. option (A)

$\left(\mu_0 I^2\right) = \left[M^1 L^1 T^{-2}\right], \left[E_0 V^2\right] = \left[M^1 L^1 T^{-1}\right]$

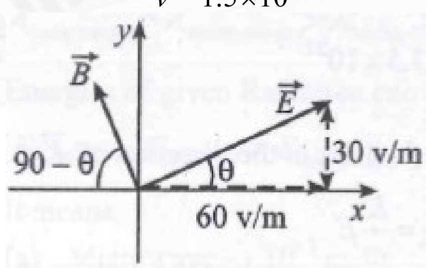
Option (C)

$[I] = [A] \Rightarrow [\varepsilon_0 c V] = [A]$

44. $\vec{E} = (60\hat{x} + 30\hat{y})\sin\left[\left(2\pi ft - \frac{2\pi}{\lambda}z\right)\right]Vm^{-1}$ $\quad E_0 = \sqrt{60^2 + 30^2} = 30\sqrt{5}V/m$ $\quad f = 5\times10^{14}$

Speed of light in dielectric medium,

$v = \frac{5\times10^{14}}{10^7/3} = 1.5\times10^8 m/s$ $\quad \mu = \frac{c}{v} = \frac{3\times10^8}{1.5\times10^8} = 2$



Also, $v = \frac{E_0}{B_0}$

$\Rightarrow B_0 = \frac{E_0}{v} = \frac{30\sqrt{5}}{1.5\times10^8} = 2\sqrt{5}\times10^{-7}Wbm^{-2}$ $\tan\theta = \frac{30}{60} = \frac{1}{2} \Rightarrow \theta = \tan^{-1}\frac{1}{2}$

The wave is polarized in xy-plane with polarization angle $\tan^1\frac{1}{2}$ with respect to x-axis

$\left(B_0\right)_x = B_0\sin\theta = 2\sqrt{5}\times10^{-7}\times\frac{1}{\sqrt{5}} = 2\times10^{-7}Wbm^{-2}$ $\left(B_0\right)_y = B_0\cos\theta = 2\sqrt{5}\times10^{-7}\times\frac{2}{\sqrt{5}} = 4\times10^{-7}Wbm^{-2}$

45. In magnetic meridian $3 = 2\pi\sqrt{\frac{I}{MB_e}}$......(1)

In horizontal plane $3\sqrt{2} = 2\pi\sqrt{\frac{I}{MH}}$.....(2)

$\therefore \frac{3}{3\sqrt{2}} = \sqrt{\frac{H}{B_e}} = \sqrt{\frac{B_e\cos\theta}{B_e}} \Rightarrow 0 = 60^0$

46. $M_1B_1\sin 30 = M_2B_2\sin 60 \Rightarrow \frac{M_1}{M_2} = \frac{\sqrt{3}}{1} = \frac{\sqrt{2n-1}}{1}; n = 2$

47. m s Δθ =E …….. (1) Energy loss per unit volume per cycle = $10^{-2}\times 50$

Heat produced in 1 min per value $= 10^{-2}\times 50\times 60 = \frac{30}{4.2}cal$

$\Rightarrow \theta = \frac{30}{4.2} \therefore \theta = 8.1^0 C = \sqrt{8^y} + 0.1 \therefore y = 2$

48. Conduction current density, $J_c = \frac{E}{\rho} = \frac{V}{\rho d}$

Displacement current density, $J_d = \frac{1}{A}\frac{dq}{dt} = \frac{C}{A}\frac{dV_c}{dt} = \frac{\varepsilon}{d}\frac{dV_c}{dt}$

As $J_c = 10^x J_d$

$\frac{V_0\sin 2\pi ft}{\rho d} = 10^x \times \frac{80\varepsilon_0}{d}V_0(2\pi f)\cos 2\pi ft$

$\tan\left(2\pi\times\frac{900}{800}\right) = 10^x \times \frac{40}{9\times 10^9}\times 900$

X= 6

49. Amplitude of electric field € and Magnetic field (B) of an electromagnetic wave are related by the relation $\frac{E}{B} = c \Rightarrow E = Bc$

$\Rightarrow E = 5\times 10^{-8}\times 3\times 10^8 = 15N/C$

$\Rightarrow \vec{E} = 15\hat{i}V/m$

50. $f = 5\times 10^8 Hz$

EM wave is travelling towards positive y-direction.

$\vec{C} = 3\times 10^8\hat{y}$ $\vec{B} = 8.0\times 10^{-8}\hat{z}T$

$\vec{E} = \vec{B}\times\vec{C} = (8\times 10^{-8}\hat{z})\times(3\times 10^8\hat{y}) = 24\hat{x}V/m$

CHEMISTRY

51. S_N1 reaction undergoes through more stable carbocation

52. $CH_3CH_2CH_2Br \xrightarrow{AgCN} CH_3CH_2CH_2-NC$

$CH_3CH_2CH_2Br \xrightarrow{KNO_2} CH_3CH_2CH_2-ONO$

53. High concentration nucleophile favours S_N2 mechanism. Racemisation occurs in S_N1 mechanism

54. Due to partial double bond nature, Vinyl and aryl halides do not undergo nucleophilic substitution easily

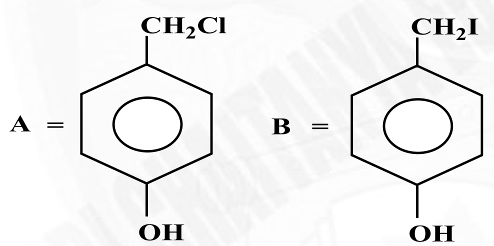
55. A, C and D undergoes S_N1 reaction

56. Conceptual

57. $B.P: CH_3-CH_2-CH_2-CH_2-Br > CH_3-\underset{Br}{\underset{|}{CH}}-CH_2-CH_3 > CH_3-\underset{Br}{\underset{|}{\overset{CH_3}{\overset{|}{C}}}}-CH_3$

58. Conceptual

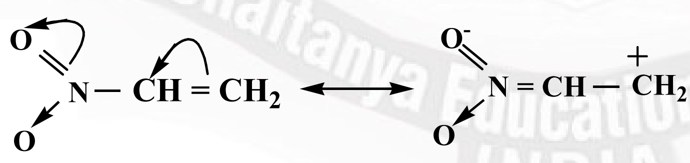
59. Alkyl fluorides are prepared by Swart's reaction

60. 

61. Inversion takes place in S_N2 reaction

62. S_N1 reaction occurs through formation of stable carbocation

63. Releasing groups favours S_N1 reaction and with drawing groups favours S_N2 reaction

64. 

65. Conceptual

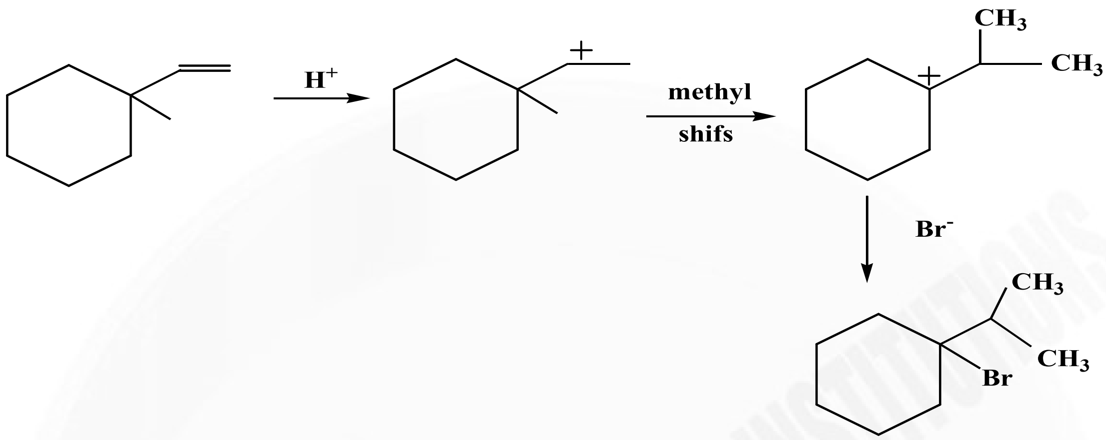
66. It is Finkelstein reaction

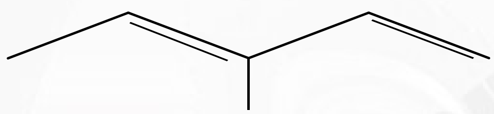
67. $C_2H_5Cl \xrightarrow{aq\,KOH} C_2H_5OH$

68. $A: CH_3-CH=CH_2; B: CH_3-CH_2-CH_2-Br; C: n-hexane$

69. The major product is $CH_3-\underset{CH_3}{\overset{Br}{\underset{|}{\overset{|}{C}}}}-CH_2-CH_3$

70.



71. P is 

72. only two moles of AgCl ppt is formed

73. A, B and D encourages S_N2 mechanism

74. Only 'C" gives saytzeff's product

75. D, E, F, G and H undergoes $S_N1$reaction with more rate than isopropyl chloride