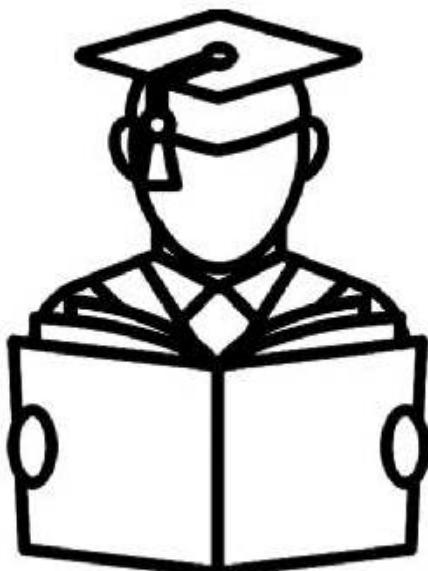


# चौधरी PHOTOSTAT

*"I don't love studying. I hate studying. I like learning. Learning is beautiful."*



*"An investment in knowledge pays the best interest."*

Hi, My Name is

IIT JEE  
(Fiitjee)

# CHEMISTRY - I

- (1) STOICHIOMETRY
- (2) GAS LAWS
- (3) ATOMIC STRUCTURE
- (4) CHEMICAL BONDING
- (5) PERIODIC PROPERTIES
- (6) S-BLOCK ELEMENTS

"प्रियोन ही अजलता का नाम है"  
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Mob. No. 9818909565

occupies 22.4 l. of volume if it is 1 mole.  
 $P = 1 \text{ atm} = 76$   
 $nV = nRT$        $R = \text{Universal gas constant } (8.314 \text{ J/mol K})$   
 $(0.0821 \text{ L atm/mol K})$

## Stoichiometry

★ Mole :-

★ Calculation of moles

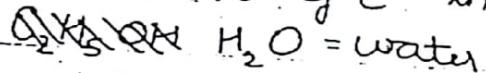
$$(1) \frac{\text{no. of particle}}{N_A} = \text{no. of moles}$$

$$(2) \text{no. of moles} = \frac{\text{weight}}{\text{molecular weight}} \text{ (gm)}$$

$$(3) \text{no. of atom} = \frac{\text{moles of}}{\text{Atomic wt.}} \frac{\text{molecular weight}}{\text{wt}} \text{ (gm)}$$

$$(4) \text{no. of moles} = \frac{\text{vol. of gas at STP}}{22.4} \text{ (l)}$$

(Q-1) Find the no. of  $e^-$  in 4.5 g of water at  $25^\circ C$



$$(A-1) \frac{4.5}{18} \text{ no. of mole}$$

$$\Rightarrow \frac{4.5}{18} \text{ No. atoms} \approx \frac{4.5}{18} \text{ No.} \times 10 \quad [\text{as } 10 \text{ e}^- \text{ are there in every particle}]$$

$$\Rightarrow \frac{4.5}{18} \times 6.02 \times 10^{23} \text{ } e^-$$

$$\Rightarrow 1.5 \times 10^{23}$$

(Q-2) A vessel contains 20 g of dry ice ( $\text{CO}_2$ ). If  $3.01 \times 10^{22}$  particles are withdrawn from the vessel and temp. of vessel is increased ~~such~~ to  $25^\circ C$ . Find the vol of gas at S.T.P.

$$20 = n \cdot 5 \text{ moles}$$

$$\frac{44}{32} \cdot 11 \quad \text{or } \frac{5}{6.022 \times 10^{23}} \text{ particle}$$

$$\left( \frac{5 \times 6.022 \times 10^{22} \times 10}{11} \right) - \left( 3.01 \times 10^{22} \right)$$

$$\Rightarrow 3.01 \times 10^{22} \left[ \left( \frac{5 \times 2 \times 10}{11} \right) - 1 \right]$$

$$\Rightarrow 3.01 \times 10^{22} \left[ \frac{100 - 11}{11} \right]$$

$$\Rightarrow 3.01 \times 10^{22} \times 8.9 \text{ 8.09 particles}$$

$$\Rightarrow 24.35 \times 10^{22} \text{ particles}$$

$$\Rightarrow 2.435 \times 10^{23} \text{ particle}$$

$$2.435 \times 10^{23} \text{ moles}$$

$$6.022 \times 10^{23} \text{ so}$$

~~2.435~~
~~22.4~~

$$\frac{2.435}{6.022} = \frac{v}{22.4} \text{ or } v = 22.4 \times 2.435$$

$$6.022$$

~~2.9740~~
~~1.4870~~
~~54.5440~~

$$\frac{54.5440}{6.022} \text{ ml or } 9.06 \text{ l}$$

~~58.70~~
~~5.561~~

- (Q-3) Find vol of Nitrogen ( $N_2$ ) produced by combustion of an artificial sweetener ( $C_{14}H_{28}N_2O_5$ ) at S.F.P if 100g of it is taken for combustion.

~~Chloroform + O<sub>2</sub>  $\xrightarrow{\frac{14}{12}}$~~

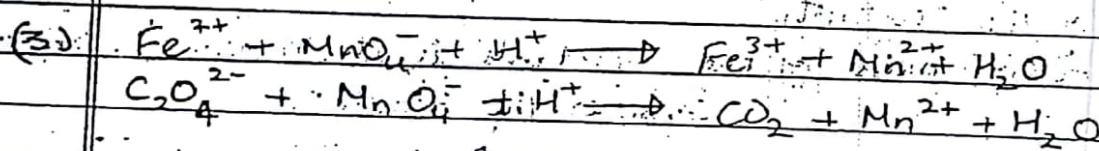
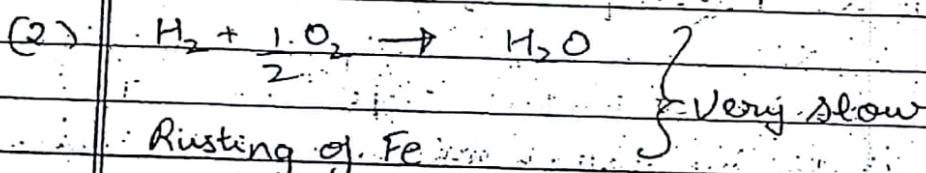
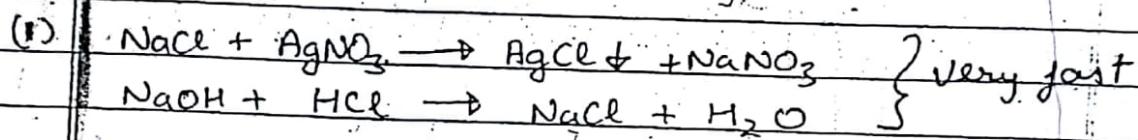


## CHEMICAL KINETICS

Branch of science which deals with rate of reaction and reaction mechanism is known as chemical kinetics.

**★ Types of Reactions on the basis of rate of reaction**

- (1) Very fast reaction
- (2) Very slow reactions
- (3) Moderate reactions



**★ Number of steps involved**

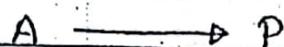
(1) Elementary reaction / Simple reaction / Single step reaction

(2) Non-elementary reaction / Complex reaction

multi-step reaction

**Rate of reaction**

- (1) Average rate of reaction
- (2) Instantaneous rate of "



$$\text{Rate}_{\text{avg}} = \frac{\Delta C}{\Delta t} \quad \left. \begin{array}{l} \{ -\text{ve w.r.t. A} \} \\ \{ +\text{ve w.r.t. P} \} \end{array} \right.$$

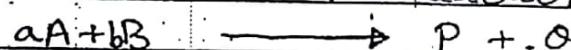
$$\text{gives } \lim_{\Delta t \rightarrow 0} \frac{\Delta C}{\Delta t}$$

$$\Rightarrow \frac{dc}{dt}$$

### Law of mass Action [LOMA]

According to LOMA at constant temperature rate of reaction is directly proportional to the active mass of the reactants

Active mass of the reactants is its molar concentration i.e. consider the reaction



According to law of action

$$\text{Rate} \propto [A]^m [B]^n$$

$$\text{or } r = K [A]^m [B]^n \dots \text{rate law}$$

Where  $K$  = Rate constant / Velocity constant

= Specific reaction Rate

$m$  = order of reaction w.r.t A

$n$  = order of reaction w.r.t B

$m+n$  = overall order

# 3 CHEMISTRY - 3

(1) GOC / ISOMERISM

(2) ELECTROPHILIC AROMATIC SUBSTITUTION

(3) ALKANE / ALKENE / ALKYNE

MR. M. K. JAIN  
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923592 22524201

## General Organic Chemistry

### Factors affecting cleavage of a bond

#### ① Inductive effect

Partial shifting of shared pair of electron due to difference in electronegativity of 2 atoms is known as inductive effect or I effect.

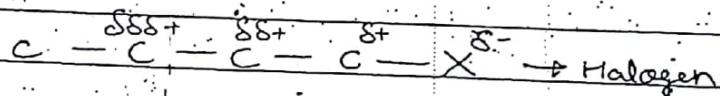
This is of 2 types

→ - I effect

Electron withdrawing group

→ + I effect

Electron releasing group



- Any group which is having more withdrawing power than that of Hydrogen, it will be group with -I effect while it is having less electron withdrawing power than that of hydrogen it will be considered as a group with +I effect i.e. electron releasing.

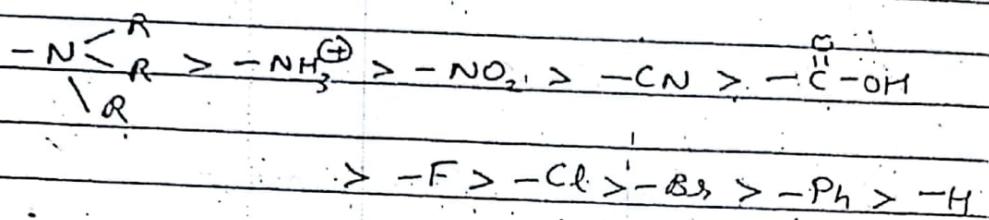
#### Features

- In inductive effect only partial shifting of bond pair takes place i.e. charges will always be partial
- It is a permanent effect, which operates only on sigma electrons
- In inductive effect after shifting of electrons, orbitals remains same
- With increase in distance it decreases rapidly and usually it is ~~inf~~ ineffective after 3-4 carbon atoms

$R = \text{Alkyl group} \Rightarrow \text{Alkane-H}$

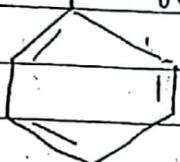
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(5) The relative order of  $-I$  effect

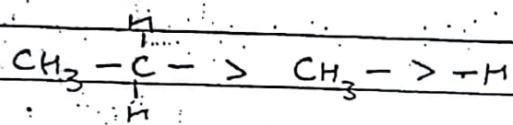
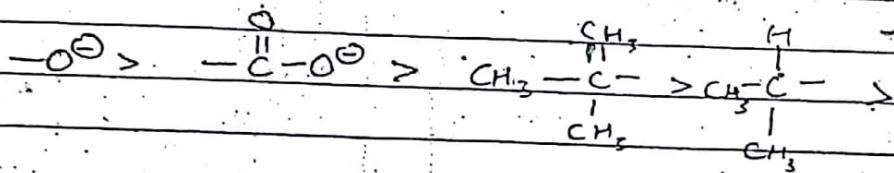


Ph = Phenyl

↑ valency



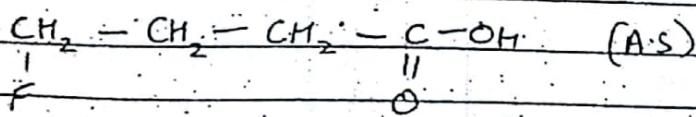
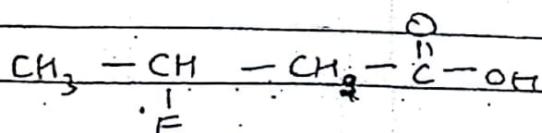
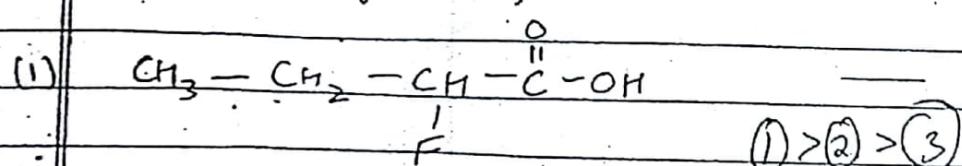
Releasing  $+I$  effect



★ Inductive effect also includes field effect passing through the interaction of solvents as well as interaction of groups through space

Application of inductive effect

Compare the following as mentioned



# CHEMISTRY - 4

- (1) HALOALKANE / ARENE
- (2) ALCOHOL ETHER PHENOL
- (3) KETONES / ALDEHYDE
- (4) CARBOXYLIC ACID
- (5) NITROGEN COMPOUNDS
- (6) GLUCOSE, ETC

"A Division of <sup>1</sup> <sub>2</sub> <sup>3</sup> <sub>4</sub> <sup>5</sup> <sub>6</sub> <sup>7</sup> <sub>8</sub> <sup>9</sup> <sub>10</sub> <sup>11</sup> <sub>12</sub> <sup>13</sup> <sub>14</sub> <sup>15</sup> <sub>16</sub> <sup>17</sup> <sub>18</sub> <sup>19</sup> <sub>20</sub> <sup>21</sup> <sub>22</sub> <sup>23</sup> <sub>24</sub> <sup>25</sup> <sub>26</sub> <sup>27</sup> <sub>28</sub> <sup>29</sup> <sub>30</sub> <sup>31</sup> <sub>32</sub> <sup>33</sup> <sub>34</sub> <sup>35</sup> <sub>36</sub> <sup>37</sup> <sub>38</sub> <sup>39</sup> <sub>40</sub> <sup>41</sup> <sub>42</sub> <sup>43</sup> <sub>44</sub> <sup>45</sup> <sub>46</sub> <sup>47</sup> <sub>48</sub> <sup>49</sup> <sub>50</sub> <sup>51</sup> <sub>52</sub> <sup>53</sup> <sub>54</sub> <sup>55</sup> <sub>56</sub> <sup>57</sup> <sub>58</sub> <sup>59</sup> <sub>60</sub> <sup>61</sup> <sub>62</sub> <sup>63</sup> <sub>64</sub> <sup>65</sup> <sub>66</sub> <sup>67</sup> <sub>68</sub> <sup>69</sup> <sub>70</sub> <sup>71</sup> 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<sub>633</sub> <sup>633</sup> <sub>634</sub> <sup>634</sup> <sub>635</sub> <sup>635</sup> <sub>636</sub> <sup>636</sup> <sub>637</sub> <sup>637</sup> <sub>638</sub> <sup>638</sup> <sub>639</sub> <sup>639</sup> <sub>640</sub> <sup>640</sup> <sub>641</sub> <sup>641</sup> <sub>642</sub> <sup>642</sup> <sub>643</sub> <sup>643</sup> <sub>644</sub> <sup>644</sup> <sub>645</sub> <sup>645</sup> <sub>646</sub> <sup>646</sup> <sub>647</sub> <sup>647</sup> <sub>648</sub> <sup>648</sup> <sub>649</sub> <sup>649</sup> <sub>650</sub> <sup>650</sup> <sub>651</sub> <sup>651</sup> <sub>652</sub> <sup>652</sup> <sub>653</sub> <sup>653</sup> <sub>654</sub> <sup>654</sup> <sub>655</sub> <sup>655</sup> <sub>656</sub> <sup>656</sup> <sub>657</sub> <sup>657</sup> <sub>658</sub> <sup>658</sup> <sub>659</sub> <sup>659</sup> <sub>660</sub> <sup>660</sup> <sub>661</sub> <sup>661</sup> <sub>662</sub> <sup>662</sup> <sub>663</sub> <sup>663</sup> <sub>664</sub> <sup>664</sup> <sub>665</sub> <sup>665</sup> 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## Alkyl halide, Aryl halide

### Nucleophilic Substitution reaction

The substitution reaction in which the attacking reagent is a nucleophile is called nucleophilic substitution reaction. The

Nucleophilic substitution reactions are classified into 3 types

(1)  $SN^2$  reaction

(2)  $SN^1$  reaction

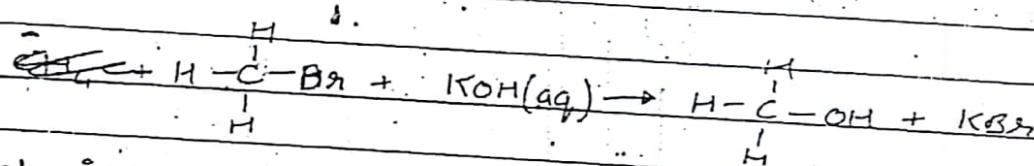
(3)  $SN^0$  reaction

### $SN^2$ reaction

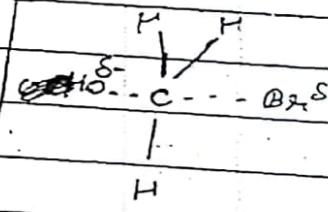
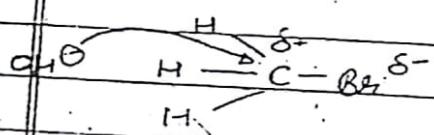
#### Nucleophilic Substitution Bi-molecular reaction

Mechanism

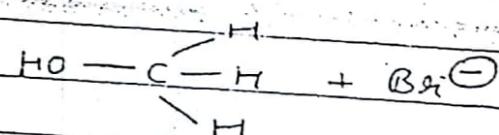
①



#### Mechanism



Transition State



②  $SN^2$  reaction

$SN^2$  Mechanism takes place in 1 step

In  $SN^2$  reaction the nucleophile attacks the atom bonded to the leaving group from the rear/back side of the leaving group.

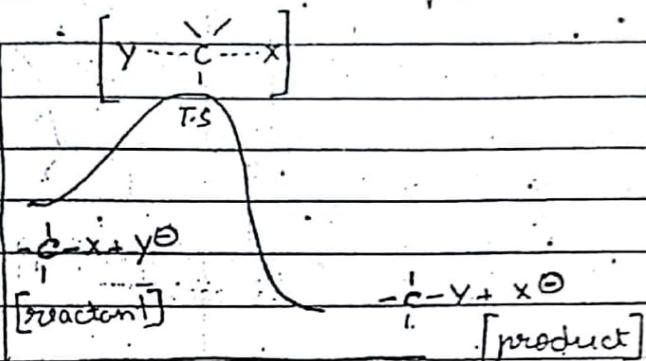
In  $SN^2$  reaction no intermediate is formed

In  $SN^2$  reaction bond breaking and bond making

takes place simultaneously

→  $SN^2$  reaction proceeds through the formation of transition state

(3)



(4) Kinetics of  $SN^2$

→ The rate of  $SN^2$  reaction is directly proportional to the concentration of substrate as well as the concentration of nucleophile

$$\text{Rate} \propto [\text{Substrate}][\text{Nucleophile}]$$

$$\text{or Rate} \propto [CH_3-Br][OH^-]$$

$$\text{Order} = 1 + 1 \Rightarrow 2$$

(5) Stereochemistry of  $SN^2$  reaction

→  $SN^2$  reaction proceed with the complete inversion of configuration. In  $SN^2$  reaction the inversion of configuration takes place because the nucleophile attacks the substrate molecule from the opposite side of the leaving group

→ This is also known as Walden Inversion

# CHEMISTRY - 5

- (1) SALT ANALYSIS
- (2) SOLID STATE
- (3) LIQUID SOLUTION
- (4) ELECTROCHEMISTRY
- (5) SURFACE CHEMISTRY
- (6) CO-ORDINATION COMPOUND
- (7) P-BLOCK
- (8) ORES N METALLURGY

परिवर्तन की सेवना की जूती है ॥  
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Mob. No. 9818909565

MERU JAIN

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# PHYSICS - I.

(1) VECTORS

(2) MECHANICS - I

(3) KINEMATICS

(4) MECHANICS - II

(5) WORK, ENERGY, POWER

"परिषेन ही अक्षरता वा दोनी दी  
**चौदारी PHOTOSTAT**  
JIA SARAI, NEW DELHI - 16  
Mob. No. 9818905565

# PHYSICS - II

(1) CENTRE OF MASS / COLLISION

(2) ROTATION

(3) FLUIDS

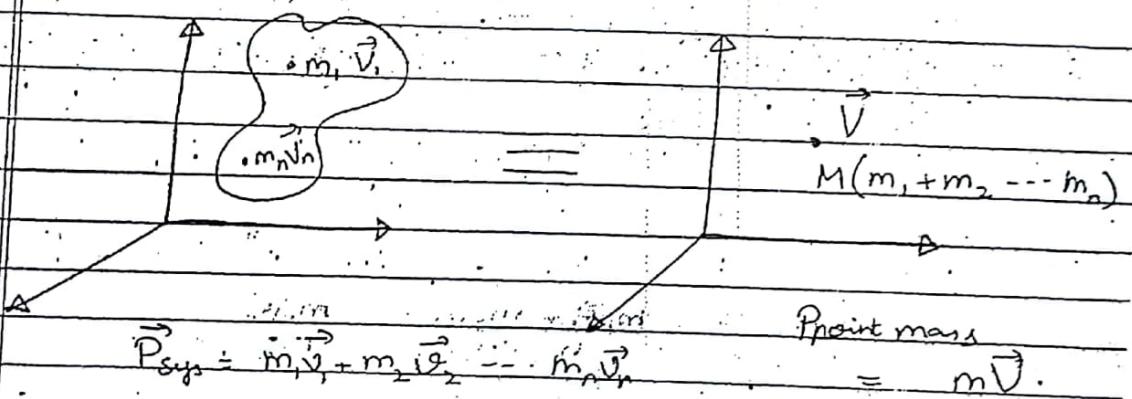
(4) GRAVITATION - I

"विद्या एवं विजय की मात्रा है"  
**धौरेश PHOTOSHAT**  
JIA SARAI, NEW DELHI-16  
Mob. No 9818905455

## CENTRE OF MASS

The concept of centre of mass is an imaginary concept which converts a body into point mass so that all laws of motion and kinematics can be applied for the study of translational motion of a body.

Centre of mass is the point in the space where total mass of the system is considered as to be concentrated and which represents the complete translational motion of the body.



According to definition

$$\vec{P}_{sys} = \vec{P}_{pt. \text{ mas}}$$

$$\Rightarrow M\vec{V} = m_1 \vec{v}_1 + m_2 \vec{v}_2 + \dots + m_n \vec{v}_n$$

$$\vec{V}_{cm} = m_1 \vec{v}_1 + m_2 \vec{v}_2 + \dots + m_n \vec{v}_n / M$$

$$\Rightarrow \vec{V}_{cm} = \frac{\sum m_i \vec{v}_i}{\sum m_i}$$

Velocity of  
centre of mass

# PHYSICS 3

(1) GRAVITATION - II

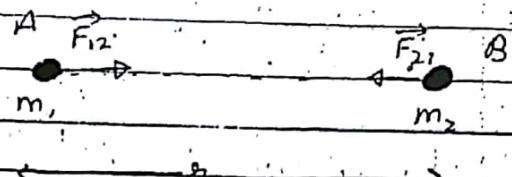
(2) SHM/ELASTICITY

(3) WAVE MOTION

(4) THERMODYNAMICS

॥ परिश्रम की सफलता की बाबी है ॥  
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Motion of 2 point masses under their mutual interaction



$$|\vec{F}_{12}| = |\vec{F}_{21}| = \frac{Gm_1m_2}{r^2}$$

$\vec{F}_{21}$  is acting towards pt mass  $m_1$ ,

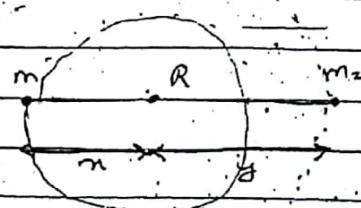
$\vec{r}$  of  $\vec{F}_{21}$  about pt A is zero

Angular momentum of point mass  $m_2$  about Point A is conserved

If 2 point masses are performing motion under the influence their mutual attraction only then the angular momentum of 1 point mass about another point mass remains conserved.

NOTE : This is true for 1 pt mass and spherical body or both spherical body

Circular motion of Binary system



$$x = \frac{m_2 r}{m_1 + m_2}$$

$$y = \frac{m_1 r}{m_1 + m_2}$$

# PHYSICS - 4

(1) ELECTROSTATICS

(2) CURRENT

(3) MAGNETICS

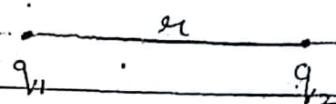
॥ ये दिक्षिण की आवश्यकता को पूर्ण करता है ॥  
**CHHETRI PHOTOSTAT**  
JIA SARAI, NEW DELHI-16  
Mob. No. 9818906565

- \* Charge is quantised
- \* charge is conserved

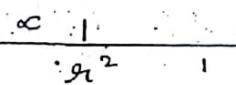
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## Electrostatics

Get Coulomb's law (apply for point charge)



$$|F| \propto q_1 q_2$$



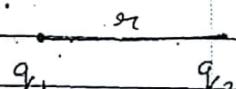
$$|F| = \frac{1}{4\pi\epsilon_0} \frac{q_1 q_2}{r^2} \Rightarrow k \frac{q_1 q_2}{r^2}, \quad k = 9 \times 10^9 \frac{\text{Nm}^2}{\text{C}^2}$$

$\epsilon_0$  = permittivity of free space

$$\epsilon_0 = 8.86 \times 10^{-12}$$

The force on  $q_1$  due to  $q_2$  and vice versa is independent of medium but net force on  $q_1$  is changed.

In a medium



$K = \frac{\epsilon}{\epsilon_0}$  where  $\epsilon$  = dielectric constant of medium

$$|F| = \frac{1}{4\pi\epsilon_0 K} \left( \frac{q_1 q_2}{r^2} \right)$$

$$\therefore |F| = \frac{1}{4\pi\epsilon} \left( \frac{q_1 q_2}{r^2} \right) \quad \text{where } \epsilon = \epsilon_0 K$$

# PHYSICS - S

(1) EMI - AC

(2) OPTICS

(3) WAVE OPTICS

(4) MODERN PHYSICS

11 काला वर्षाकालीन कागज 8  
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# MATHS - I

(1) BASIC MATHS

(2) TRIGONOMETRY

(3) STRAIGHT LINES

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(1) CIRCLES

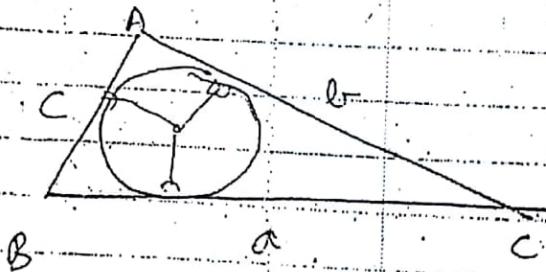
(2) PARABOLA

(3) LOGARITHM

(4) COMPLEX NUMBERS

(5) PROGRESSION & SERIES

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NOTES

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

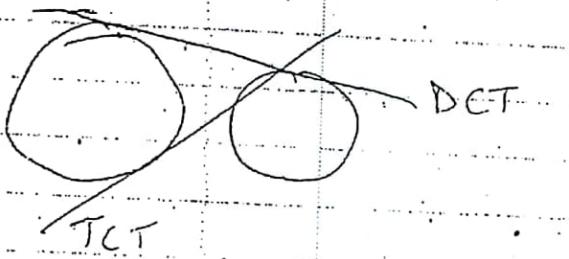
$$\text{Area} = \frac{1}{2} \times AB \times AC \times \sin A$$

radius of incircle  $\equiv \frac{\Delta}{s}$   
where  $\Delta = \text{area}$

$s = \text{semiperimeter}$

Direct common tangents — Tangents to circle lie on the same side of tangent, tangent  $\equiv$  DCT.

Transverse CT — Circle lie on opposite side

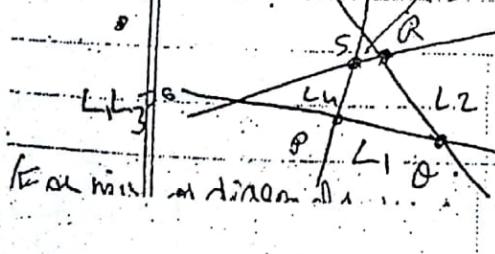


For the circle  $x^2 + y^2 + 2gx + 2fy + c = 0$ , the geometrical meaning of  $c$  is the square of tangent length from origin to circle

In general  $c$  is the power of origin w.r.t the circle. [if origin lies outside]

'Point circle' — The point  $(x_1, y_1)$  is sometimes called a point circle whose centre is the same point and radius  $\equiv 0$ . eq.  $= (x-x_1)^2 + (y-y_1)^2 = 0$

$$c_{\text{pt}} = 0$$



Any path (curve/par of line) passing through the 4 pts of intersection of  $L_1$  &  $L_2$  is of the form  $L_1L_3 + \lambda L_2L_4 = 0$   
 $\lambda = \text{parameter}$ .  $\Gamma_2$  is different.

# **Mathematics**

**(1) Permutation**

**N Combination**

**(2) Binomial Theorem**

**(3) Ellipse**

**(4) Hyperbola**

**(5) SOT**

## **Module-3**

- (Q) Find maximum number of points of intersection of 10 straight lines in a plane

$$\binom{10}{2} \Rightarrow \frac{10 \times 9 \times 8!}{2 \times 1} = 45$$

- (Q) Find number of (i) pt. of int. of with m lines and n circles in every possible

~~$\binom{m}{2}$~~  For line =  $\binom{m}{2} \times 1$

~~For circle =~~

~~for line =  $mC_2 -$~~

~~for circle =  $nC_2 \times 2$~~

~~for line or circle =  $mC_1 \cdot nC_1 \times 2$~~

~~∴ Total =  $mC_2 + nC_2 \times 2 + mC_1 \cdot nC_1 \times 2 -$~~

- (Q) Find no. of rectangle possible on 8x8 chess board

We have to choose 2 vertical lines and 2 horizontal

$$6C_2 + 6C_3 + 6C_4 + \dots + 6C_{64}$$

line

$$9C_2 \cdot 9C_2$$

- (i) No. of squares

$$1 \times 1 \quad 8^2$$

$$2 \times 2 \quad 7^2$$

$$3 \times 3 \quad 6^2$$

$$4 \times 4 \quad 5^2$$

$$5 \times 5 \quad 4^2$$

$$6 \times 6 \quad 3^2$$

$$7 \times 7 \quad 2^2$$

$$8 \times 8 \quad 1^2$$

$$\therefore 204$$

①

(1) FUNCTIONS

(2) LIMITS, CONTINUITY

DIFFERENTIABILITY

(3) AOD

(4) INVERSE TRIGO BASICS

(5) INDEFINITE INTEGRALS

(6) DEFINITE INTEGRALS

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(D)

Find the solution of

$$(1) \quad (n-1)^{1/2} (n-4) \geq 0 \quad n > 1 \quad \frac{(n-1)}{(n+5)(n-2)^2} \geq 0$$

$$+ \begin{matrix} 1 \\ -5 \end{matrix} \begin{matrix} + \\ 3 \end{matrix} \begin{matrix} - \\ 4 \end{matrix}$$

$$(2) \quad (n^2-n+1)(n-1)^5 \leq 0 \quad n \in [1, 3] \cup [4, \infty) \\ (n-2)^3 \quad (n-1)^5 \leq 0 \quad n \in [1, 2)$$

$$(3) \quad \frac{(1-n)(n-1)}{(n+1)(n-2)} \geq 0$$

$$n > 1 \quad (n-1)^2(n-1) \geq 0$$

$$(n+1)(n-2)$$

$$+ \begin{matrix} - \\ - \end{matrix} \begin{matrix} - \\ 1 \end{matrix} \begin{matrix} + \\ 2 \end{matrix}$$

$$n \leq 1 \quad (n+1)^2(n-1) \leq 0$$

$$(n+1)(n-2)$$

$$+ \begin{matrix} + \\ 1 \end{matrix} \begin{matrix} - \\ 1 \end{matrix} \begin{matrix} + \\ 2 \end{matrix}$$

$$n \notin (2, \infty) \cup \{1\} \quad \therefore (2, \infty)$$

Find the solution of the inequality

$$(1) \quad \int (n-1)(n+5) \geq -n-3$$

$$(n-1)(n+5) \geq (n+3)^2$$

$$n \leq -3 \quad \text{and} \quad n \geq 1 \quad [\text{always valid}]$$

$$n \leq -5$$

$$\int (n-1)(n+5) \geq -n-3$$

$$(n-1)(n+5) \geq (n+3)^2$$

$$\text{so } n \leq -7$$

$$(-\infty, -7) \cup [-1, \infty)$$

(1) AREA

(2) DIFFERENTIAL EQUATION

(3) PROBABILITY

(4) DETERMINANTS

(5) MATRICES

(6) VECTORS & 3-D

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रामेश्वरी फोटोसेट

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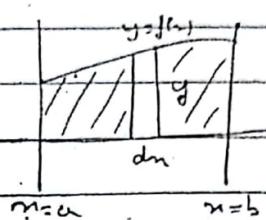
# AREA

Area -

area between  $y = f(x)$

$x = a$  and  $x$ -axis

$$A = \int_a^b |f(x)| dx$$

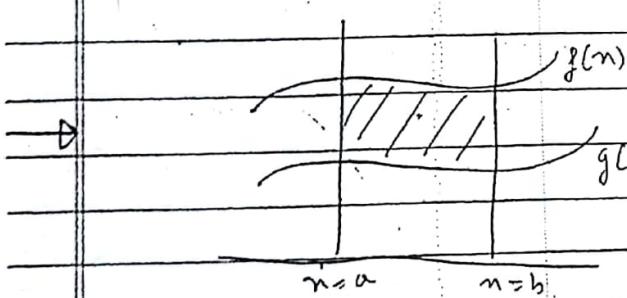
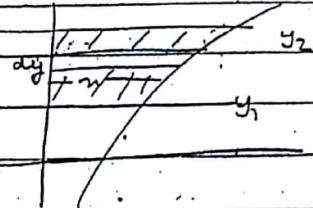


area b/w  $y = f(x)$

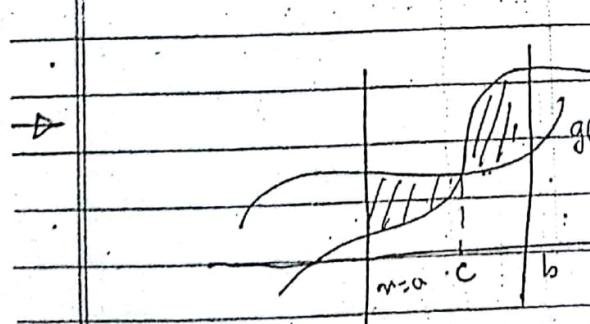
$$y = y_1$$

$$y = y_2$$

$$A = \int_{y_1}^{y_2} f(x) dy$$



$$\text{Area} = \int_a^b |f(x) - g(x)| dx$$



$$\text{Area} = \int_c^b |f(x) - g(x)| dx$$

$$= \int_a^c g(x) - f(x) dx$$

$$+ \int_c^b f(x) - g(x) dx$$