

DREAMLAND SCHOOL  
CLASS XII  
ENGLISH LANGUAGE  
HOME ASSIGNMENT- 5  
ACADEMIC YEAR- 2020-21

Date-27-04-2020

1. Read the following paragraph and answer the questions which follow:-

After the overthrow of the Nanda Dynasty at Magadha, the Mauryas came to prominence. The history of their rule is completely reliable on account of evidence obtained from a variety of sources. Several religious documents provide various information which has helped historians to reconstruct the events of history in a chronological manner. The *Arthashastra* of Kautilya, for example, has considerable bearing on the developments during their rule. Though there lies a confusion regarding the date of the events which are documented in this book, the historians unanimously agree that certain portions of the text have a Mauryan touch about them and may be taken as its original kernel. The Greek account called *Indica* has also been very crucial in the reconstruction of India's past, written by Megasthenes, it is one of most reliable sources available. According to all the available documents, Chandragupta was the founder of the Mauryan dynasty. He helmed the throne of Magadha at the age of twenty five. Indian tradition system has it that the brahmana Kautilya, also known as Chanakya or Vishnugupta, was his mentor and guide. Although the origin and early life of Chandragupta remain obscure, the Greek accounts add that he moved to the north west India and subdued the Greek garrisons left behind by Alexander.

- I. Give meaning of the following words, as used in the text.
    - Chronological
    - Unanimously
    - Kernel
    - Garrisons
  - II. Answer the following questions.
    - a. How did the Mauryan dynasty come to power? Who was its founder?
    - b. What are the different sources which help in reconstruction of India's past?
    - c. What do we get to know from the document of Megasthenes?
    - d. Who was Vishnugupta?
  - III. Summarize the following passage in approximately 100 words.
2. Fill in the blanks with suitable words.
- I. We must atone \_\_\_\_ our sins
  - II. His house was broken \_\_\_\_.
  - III. I dispense \_\_\_\_ your service immediately.
  - IV. It is impossible to cope \_\_\_\_ with these people.
  - V. Brian asked Julie \_\_\_\_ to dinner and a movie.
  - VI. I called the company \_\_\_\_ but the offices were closed.
  - VII. I do not care \_\_\_\_ his behaviour.
  - VIII. You have to check \_\_\_\_ of the hotel at 11 in the morning.
  - IX. Check \_\_\_\_ the hair on the crazy boy.
  - X. The top and bottom will come \_\_\_\_ if you pull hard enough.

**Business studies**

**Class 12**

**Ch-5 staff training**

Answer the following questions:

Q1: What is training?

Q2: Why training is important?

Q3: What is the need for training in an organization?

Q4: What are the benefits of training?

Q5: What are the different types of training?

**Commerce**

**Class 12**

**Ch-1 business environment**

Answer the following questions:

Q1: What is a swot analysis?

Q2: Explain the term s in swot analysis?

Q3: Explain the term w in swot analysis?

Q4: Explain the term o in swot analysis?

Q5: Explain the term t in swot analysis?

Q6: What swot analysis is important for any organization?

## **Class 12(pol.sci)Monday Class**

### **Chapter:Parliamentary & Presidential Government**

The parliamentary system started in UK & this government is known Westminster Model as Westminster happens to be the address of the British Government. This form of government is also known as responsible government because for all its policies & programmes the Cabinet is responsible to the Parliament. The King happens to be the nominal executive & the real power is in the hands of the Cabinet along with the Prime Minister. The Cabinet formulates all the policies & programmes & gets it approved in the parliament. The king doesn't attend the Cabinet meetings but is being informed about the resolutions taken. There is no separation of powers in UK & all the ministers are members of either house of the Parliament where the Prime Minister belongs to the Lower House. The ministers beside being the head of their respective department also happens to be the active members of their respective House. All acts of the King are in reality the work of the Ministers, they are just performed in the name of the King. The British Prime Minister is the pivot around which the whole administration revolves or works. It is to be noted that the Office of the British PM really rests upon conventions. The ministers are under the Oath of Secrecy & generally all the members are from the same political party which has won the election. The Prime Minister or the Cabinet can advise the Monarch to dissolve the Lower House that is the House of Commons.

#### **Question(Long)**

Discuss thoroughly the British Parliamentary set up.

DREAMLAND SCHOOL  
PSYCHOLOGY - CLASS 12 (2020 – 2021)  
ASSIGNMENT

DATE – 27/04/2020

**CHAPTER – PERSONALITY**

**EXPLANATION-**

**TYPE THEORIES :-**

**1) Kretschmer's Type Theory –**

German psychologist Ernst Kretschmer has attempted to correlate physique and character. From his studies on mental patients, he found that certain body types are associated with particular types of mental disorders. He has classified personalities into four types:

PERSONALITY TYPE	PHYSICAL CHARACTERISTICS	PERSONALITY CHARACTERISTICS
1. <b>Pyknic</b>	Large head, fat	Good natured, jolly, sociable, easy going
2. <b>Asthenic</b>	Lean & thin	Not sociable, shy & reserved, sensitive, pessimistic
3. <b>Athletic</b>	Balanced body	Optimistic, adjusting, energetic, determined, adventurous
4. <b>Dysplastic</b>	Rare & ugly physique, disproportionate body due to hormonal imbalance	Deviant behavior & personality

**KRETSCHMER'S PERSONALITY TYPES & THEIR CHARACTERISTICS**

**2) Friedman's Theory of Type A & Type B Personality-**

Type A and type B personality theory was created by a pair of cardiologists. In the 1950s, **Meyer Friedman** and **RH Rosenman** were researching the possible causes of coronary disease. After a nine-year study of over 3,000 healthy men aged 35-59, Friedman and Rosenman speculated that certain patterns of behaviour carried a higher risk, and devised a method for categorising patients as either type A, type B .

They concluded the following characteristics of type A & type B personality.

TYPE A	TYPE B
<ul style="list-style-type: none"><li>• Free floating hostility</li><li>• Competitive drive</li></ul>	<ul style="list-style-type: none"><li>• Work steadily</li><li>• Enjoy achievements</li></ul>

• Time urgency & impatience	• Flexible in planning & organization
• Ambitious & multitasker	• Often lazy
• Rigidly organized	• Sometimes creative
• Highly status conscious	• Enjoy exploring ideas & concepts
• Sensitive	• More tolerant of others
• Take on more than they can handle	• More relaxed
• Want other people to get to the point	• More reflective
• High achieving workaholics	• Experience lower levels of anxiety
• Push themselves with deadlines	• Display higher levels of imagination & creativity.
• Hate delays	

Unsurprisingly, according to Friedman and Rosenman Type A personality is associated with a high risk of heart disease. Type B personalities report higher levels of life satisfaction and are more likely to be patient and even-tempered.

In addition to Type A & Type B **Morris** has suggested two more types of personality – Type C & Type D

#### CHARACTERISTICS OF TYPE C & TYPE D PERSONALITY

TYPE C	TYPE D
• Co-operative	• Keep negative emotions to one self
• Unassertive	• Likely to experience more health related problems due to suppressed immune system
• Patient	• Prone to depression
• Suppresses negative emotions	
• Compliant to authority	

### 3) Sheldon's Type Theory- ( Somatotypical approach)-

William H. Sheldon's ( 1898-1977) type theory has been derived from an extensive study conducted on 4000 male college students. He mentioned three kinds of basis body structure & physique, viz, Endomorph (soft & round) , Mesomorph (sturdy & muscular) , & Ectomorph ( thin & fragile). These three types as a whole are called Somatotype. He then studied the personality characteristics of each somatotype & reported three personality types , viz, Viscerotonia, Somatotonia, Cerebrotonia- each of which match with a particular somatotype.

Sheldon's Somatotype	Character	Shape	Picture
Endomorph [viscerotonic]	Relaxed, sociable, tolerant, comfort-loving, peaceful	Plump, buxom, developed visceral structure	
Mesomorph [somatotonic]	Active, assertive, vigorous, combative	Muscular	
Ectomorph [cerebrotonic]	Quiet, fragile, restrained, non-assertive, sensitive	Lean, delicate, poor muscles	

#### SOMATOTYPES & THEIR PERSONALITY TYPES & PERSONALITY CHARACTERISTICS.

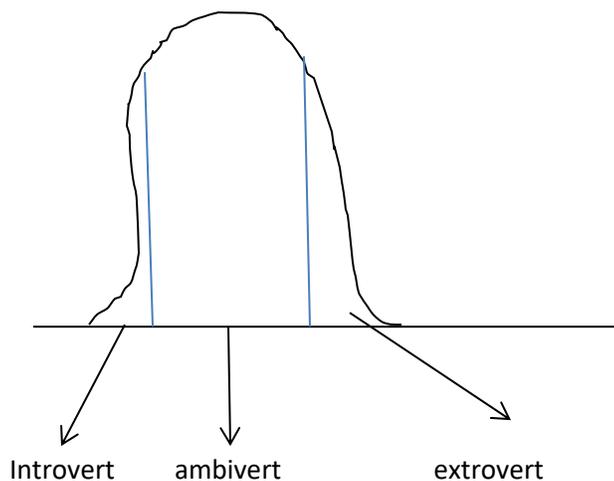
- **USEFULNESS & DANGERS OF CATEGORISING PERSONALITY**

- Type theories try to classify & sort people based on specific personality characteristics.
- Individuals possess a lot of interlinked, overlapping & contrasting characteristics. So it is difficult to typify people under the given two or more types.
- This poses a noticeable danger in identifying people based on a particular type of personality characteristics
- That is why practice of type theory is increasingly becoming obsolete nowadays.
- The psychologists who gave the type theory classify individuals based on body structure, level of social participation, etc which is not accurate.
- For eg – Jung a Swiss psychologist had classified all human beings as either introvert (not much social) or extrovert (shows interest in sociability) participation and interest.
- However in general most human beings may show traits of both the categories at different times & known as ambiverts (a person who has a balance of extrovert and introvert features in their personality).
- This highlights the dangers of categorizing individuals in rigid typological groups as it does not give a proper description of the person.
- Almost every dimension of personality like sociability is distributed according to a normal bell-shaped curve as shown in the figure if people could be categorized into different types.



sociability type distribution

j) But actually people tend to cluster near the middle of the range (showing characters of ambivert). Only few fall at the edges showing characters of introvert or extrovert.



Sociability actual distribution.

#### **ADVANTAGES OF TYPE THEORIES-**

- 1) have their own value in the sense that they were the first attempt to assess personality as well as to identify the characteristics of personality patterns
- 2) they consider human nature as a whole. So to comprehend a persons personality structure entirely is helpful.
- 3) They are the simplistic method for rapid evaluation of an individuals personality characteristics very fast.

#### **DISADVANTAGES OF TYPE THEORIES-**

- 1) As human nature is changeable according to the evaluation process, people cannot be categorized and put under a particular type permanently.
- 2) They are very crude, oversimplified processes of personality profiling.
- 3) Types are discrete, discontinuous, & cannot be put on a continuous scale.
- 4) There are a number of types in typology, some of which are not found in real world.
- 5) Type theories place a great emphasis on the extremes rather than mediocrity of human nature.

### **Assignment 2**

- 1) Explain the dangers of categorizing personality with an example.
- 2) Elaborate the Sheldon's type theory.
- 3) Define-
  - a) Introvert
  - b) Viscerotonia
- 4) Differentiate the personality characteristics of Asthenic & Athletic personality type.

MOUMITA GANGULY

# Commerce Class XII

## Chapter : Management



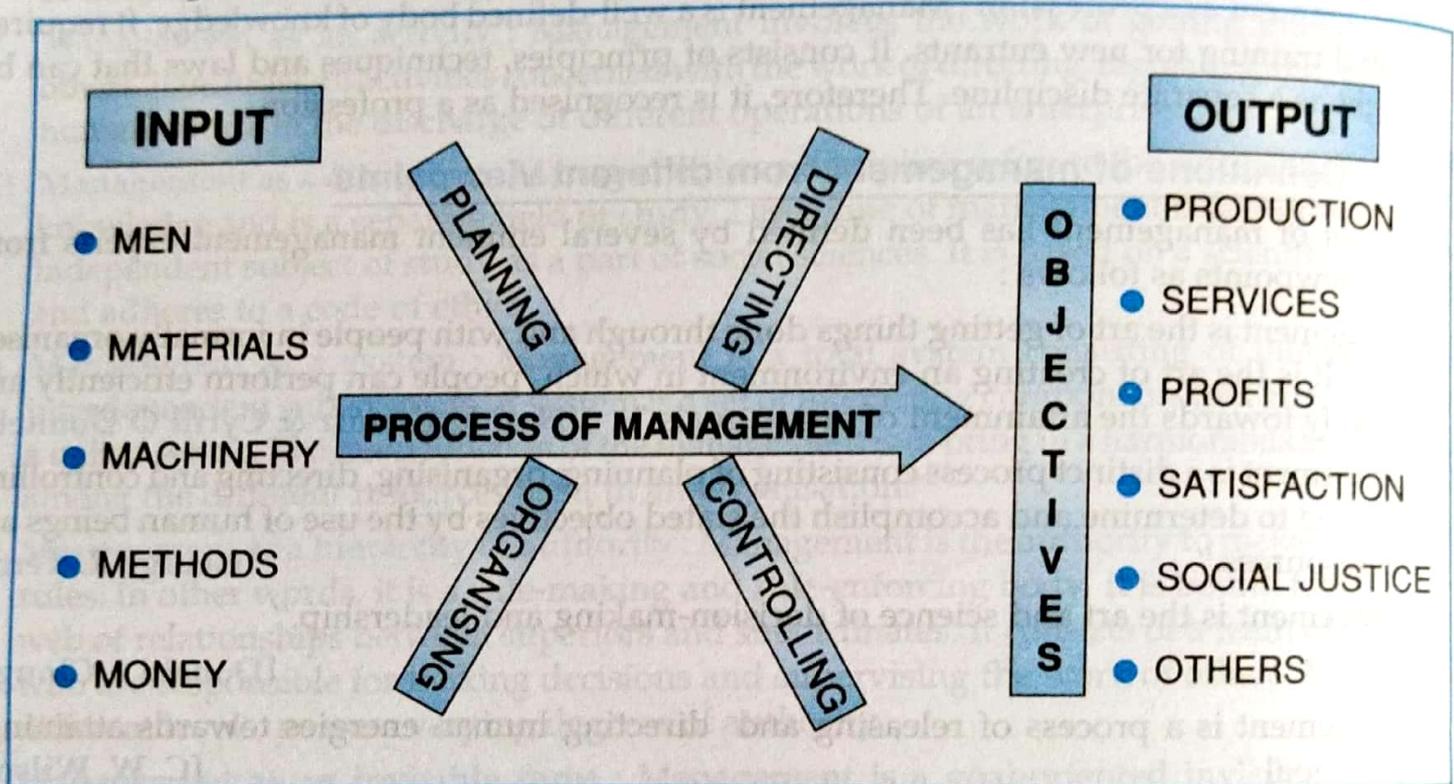
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### 3.2. Definitions of management from different viewpoints

The concept of management has been defined by several eminent management experts from different viewpoints as follows :

- "Management is the art of getting things done through and with people in formally organised groups. It is the art of creating an environment in which people can perform efficiently and effectively towards the attainment of group goals." [Harold Koontz & Cyrill O'Donnell]
- "Management is a distinct process consisting of planning, organising, directing and controlling, performed to determine and accomplish the stated objectives by the use of human beings and other resources." [George R. Terry]
- "Management is the art and science of decision-making and leadership." [Donald J. Clough]
- "Management is a process of releasing and directing human energies towards attaining a definite goal." [C. W. Wilson]
- "Management is the art of directing and inspiring people." [J. D. Mooney & A. C. Railey]
- "Management is the function of executive leadership anywhere." [Ralph C. Davis]
- "Management is the art of knowing exactly what you want men to do and then seeing that they do it in the best and cheapest way." [F. W. Taylor]
- "Management is the process of decision-making and control over the actions of human beings for the purpose of attaining predetermined goals." [Stanley Vance]
- "Management is the process by which managers create, direct, maintain and operate organisations through systematic, co-ordinated and co-operative human efforts." [Dalton E. Mc Farland]
- "Management is the process of getting things done through the agency of a community." [Sir Charles Raynold]
- "Management is a technique by means of which the purposes and objectives of a particular human group are determined, clarified and effectuated." [Elmore Peterson & E.G. Plowman]
- "Management is the art of securing maximum prosperity and happiness for both employer and employee with a minimum of effort." [John F. Mee]
- "Management is the force that integrates human and non-human resources into an effective cooperative unit." [Keith & Gubellini]

Thus, management is all-pervading and is concerned with all the aspects of the working of an enterprise. It is considered as a method, a system, a process, a group, a discipline, etc., which adds effectiveness to human activities. The principles of management are dynamic. These principles change with time and are affected by monetary considerations. Principles of management are also affected by human activities. Management principles which are effective in one situation are also not effective in another situation. Management principles and practices vary with the situation in which the organisation operates.



### 3.3. Characteristics (or features) of management

The important characteristics of management are as follows :

- (i) **Purposive activity** : The purpose of management is always to achieve certain predetermined objectives. The tasks of management are directed towards effectiveness (i.e., economy in the use of resources).
- (ii) **Group activity** : Management is a group activity. An organised group of people work together towards a common goal. It is team work. It co-ordinates the efforts of organisational members to achieve certain predetermined objectives.
- (iii) **Integrating activity** : Management integrates human efforts with non-human resources (like materials, machines, technology, financial resources, etc.). It seeks to harmonise human and non-human resources to achieve predetermined objectives.
- (iv) **Continuous activity** : There is always a continuous need of the solution of problems and improvement in the business. The cycle of management continues to operate so long as there is an organisation.
- (v) **Human activity** : Management is related with human activities. It is the function of getting things done through people. Managerial techniques are used by human beings as tools to achieve predetermined organisational goals.

- (vi) **Rational process** : Management deals with the achievement of some clearly defined objectives. Group efforts are directed to achieve a predetermined objective. Management organises, plans, directs and controls an enterprise for the purpose of earning satisfactory profits. Thus, it is a rational process.
- (vii) **Universal process** : The principles and techniques of management are universal in character. They are equally applicable in all types of organisations, such as, business, social, religious, educational, cultural, sports, military, etc. Therefore, wherever there is human activity, there is management.
- (viii) **Social process** : Management aims at the optimum utilisation of scarce resources for the benefit of the community as a whole. The effort of human beings have to be directed, co-ordinated and regulated by the management in order to achieve the desired results. In this sense, management is regarded as a social process.
- (ix) **Distinct process** : Management is a distinct process performed to accomplish predetermined objectives. It is quite distinct from its various functional activities, techniques and procedures. It consists of various functions, such as, planning, organising, staffing, directing, co-ordinating, motivating and controlling.
- (x) **Goal-oriented** : All management activities have to be goal-oriented and result-oriented. Effective management is always 'management by objectives.' Management is concerned with the establishment and accomplishment of some definite goals.
- (xi) **Pervasive** : Management is pervasive in the sense that it is relevant for all organisations, irrespective of the size (small or large), nature (economic, social or political), and location (in rural or urban areas). Moreover, management is applicable at all levels of the organisation.

### Characteristics of Management



- ☞ Purposive activity
- ☞ Group activity
- ☞ Integrating activity
- ☞ Continuous activity
- ☞ Human activity
- ☞ Rational process
- ☞ Universal process
- ☞ Social process
- ☞ Distinct process7
- ☞ Goal-oriented
- ☞ Pervasive
- ☞ Hierarchy of authority
- ☞ Dynamic function
- ☞ Decision-making function
- ☞ Management as a profession

### 3.5. Objectives of management

The following are the main objectives of management :

- (i) **Proper utilisation of resources** : Every management aims at utilising the factors of production properly. Management must increase the productivity of the enterprise by securing best utilisation of its available human and non-human resources. As a result, productivity of resources is increased and wastage of resources is reduced.
- (ii) **Establishing a sound organisation** : Management establishes a sound organisation by dividing the functions among the managers. It co-ordinates the activities of different managers so that their united effort could achieve the objective of the enterprise. It also establishes a clearcut authority-responsibility relationship among the positions held by people.
- (iii) **Helpful in achieving predetermined objectives** : Management provides a dynamic force in helping any enterprise to achieve its objectives. It leads an enterprise towards growth and prosperity by proper planning, organising, directing, etc.
- (iv) **Getting maximum results through minimum effort** : It is the general objective of every management to secure maximum results through minimum effort and resources. The optimum use of men, materials, machines and money will give maximum returns.
- (v) **Securing maximum prosperity for employers and employees** : Management secures maximum prosperity for employers by earning high profits at minimum costs. It also secures maximum prosperity for employees by providing adequate remuneration and other benefits for their services.
- (vi) **Improving productivity and efficiency of the labour force** : Management creates a favourable environment where workers can increase their productivity and efficiency. It always considers labour force more important than other things. It brings about development of human talent by encouraging initiative, skill and technical competence.
- (vii) **Improving discipline and morale** : Management introduces discipline in the conduct of group of individuals through exercise of authority, assignment of responsibility and employing procedures of evaluation and control. It motivates people and ensures high morale by providing various monetary and non-monetary incentives to them.
- (viii) **Rightful decision-making** : Rational management takes right decisions on all matters at the right time. By taking the right decision, it can remove all problems and can run the business on the right track. Management as an all-pervasive process, should make the right approach towards decision-making.
- (ix) **Better life for human beings** : Management ensures a better life for human beings by increasing productivity and employment. It improves the standard of living of the workers by increasing their productivity and earnings. It also improves the standard of living of the consumers by producing new varieties of products and thereby creating new tastes, fashions, etc. Thus, it provides justice for all.
- (x) **Innovation and expansion** : Management creates conditions for expansion and development of the business. Innovation of the new production technique and technology makes business dynamic. It provides new ideas, imagination and vision to the organisation.

### **3.4. Importance (or significance) of management**

The importance of management can be enumerated as follows :

- (i) **Optimum utilisation of resources** : Management utilises human and non-human resources productively. As a result, wastage is eliminated and efficiency is increased. It stimulates the forces of economic growth. It is a catalyst without which no organisation can survive and grow.
- (ii) **Maximum production at minimum cost** : An efficient management leads to reduce cost and increase output through better planning, organising and control. In the present age of cut-throat competition, no business can succeed until and unless it is able to provide quality goods and services at the lowest possible prices. A good management tries to reduce the cost of production by increasing productivity.
- (iii) **Achievement of group objectives** : Management helps in achieving group goals by directing the activities of the managers towards attainment of group objectives. Management makes the people realise the objectives of the group and directs their efforts towards the achievement of group objectives.
- (iv) **Efficient running of business** : Management ensures efficient and smooth running of business through better planning, sound organisation, effective control, etc. It encourages human forces to put in their best performance by improving their skills.
- (v) **Generation of employment opportunities** : Management creates job opportunities by setting up new business houses and by expanding existing business enterprises. Thus, economic and social needs of the employees can be satisfied.
- (vi) **Increase of profits** : Increased profits is the result of either increase in sales revenue or decrease in cost. Management by reducing costs, increases its profits and provides opportunities for further growth and development.
- (vii) **Sound organisational structure** : Management establishes a sound organisation in accordance with the desired objectives. For this purpose, it divides total work into specific jobs and establishes clearcut authority and responsibility relationships among the positions held by people. It encourages the spirit of co-operation, fellow-feeling and mutual understanding among workers.

- (viii) **Improving standard of living** : Management improves the standard of living of the people by providing quality goods and services at the lowest possible prices. Moreover, it provides new products to people with the use of the latest technology.
- (ix) **Quick adjustment with external environment** : An efficient management enables an organisation to adjust with the complex and everchanging external environment. Policies and procedures of management are quickly changed to cope with the changing business environment.
- (x) **Beneficial to society** : Good management techniques make difficult tasks easier and unprofitable jobs more profitable. The management with its creative nature, designs new products, adopts new technology, gives the maximum satisfaction to the customers and to the whole society. Thus, proper management arranges for the production of socially needed essential goods.
- (xi) **Increasing productivity** : Management makes possible increase in the productivity of all factors of production. Management can generate a favourable working environment where the workers can increase their productivity and efficiency.
- (xii) **Innovation and expansion** : Management creates conditions for expansion and development of the business. Innovation of new production technique and technology makes business dynamic. It provides new ideas, imagination and vision to the organisation.
- (xiii) **Maximum satisfaction to workers** : Management places the right people in the right job. Moreover, it provides proper education and training to the employees. This increases the productivity of the workers and gives maximum satisfaction to the workers.
- (xiv) **Right decision at the right time** : An ideal management takes the right decisions on all matters at the right time. By taking the right decisions, it can remove all the problems and can run the business on the right track.

### Importance of Management



- ➡ Optimum utilisation of resources
- ➡ Maximum production at a minimum cost
- ➡ Achievement of group objectives
- ➡ Efficient running of business
- ➡ Generation of employment opportunities
- ➡ Increase of profits
- ➡ Sound organisational structure
- ➡ Improving standard of living
- ➡ Quick adjustment with external environment
- ➡ Beneficial to society
- ➡ Increasing productivity
- ➡ Innovation and expansion
- ➡ Maximum satisfaction to workers
- ➡ Right decision at the right time

## Home assignment :

1. Define the term management.
2. State a few characteristics of management.
3. State the importance of management.

# DREAMLAND SCHOOL

## CHEMISTRY - XII

### Chemical Kinetics

#### LAW OF MASS ACTION

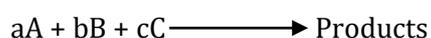


$$\text{Rate} \propto [A]^a [B]^b$$

$$\text{Rate} = K [A]^a [B]^b$$

Law of mass action states that the rate of reaction is directly proportional to the concentration of reacting species raised to the power of stoichiometric coefficients. But this is valid only for elementary reactions.

Let's consider the following reaction:



$$\text{Rate} \propto [A]^p [B]^q [C]^r$$

$$\text{Or, Rate} = k [A]^p [B]^q [C]^r \quad [\text{where, } k \text{ is rate constant}]$$

$$\text{Or, Rate} = k [\text{concentration of reactants}]^n \quad [\text{where, } n = p + q + r = \text{order of the reaction}]$$

$$\text{Or, } k = \text{Rate} / [\text{concentration of reactants}]^n$$

So unit of  $k$  is  $(\text{mol/lit})^{1-n} \text{ time}^{-1}$  or,  $(\text{atm})^{1-n} \text{ time}^{-1}$  (for gaseous substances).

#### Order of Reaction

The power to which the concentration term of a particular reaction in the rate law is raised is called the order of reaction with respect to that reactant and the sum of all the powers to which all the concentration terms in the rate law are raised to express the observed rate of reaction is called the overall order of reaction.

For the above example overall order of the reaction,  $n = p + q + r$ .

#### **Characteristics of order:**

1. Order of a reaction is purely an experimental quantity.
2. Order can be fraction or zero.
3. Order can be negative with respect to any one quantity but can not be negative for whole reaction.

#### Molecularity of Reaction

The number of reacting species (atoms, ions or molecules) which must collide simultaneously in order to bring about a chemical reaction is called the molecularity of the reaction.

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## Characteristics of molecularity:

1. It is a whole number.
2. Depending upon molecularity, the reactions are termed as unimolecular, bimolecular etc.
3. Reactions having molecularity more than 3 is remote.
4. It is theoretical quantity.

## Assignment:

1. Write the difference between order & molecularity.
2. Identify the reaction order from the following constants.
  - (i)  $k = 2.3 \times 10^{-5} \text{ Lmol}^{-1}\text{s}^{-1}$
  - (ii)  $k = 3 \times 10^{-4} \text{ s}^{-1}$
3. The conversion of molecules X to Y follows 2<sup>nd</sup> order kinetics. If concentration of X is increased to three times how will it affect the rate of formation of Y?

Ans: 9 times

Soumyajit Setti

# Assignment-6 (Maths)

## Matrix and Determinant class - XII

① Using elementary row transformation, find the inverse of the following matrices:-

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

Solution:-  $A = \begin{bmatrix} -1 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$

We know  $A = IA$ .

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

Applying  $R_2 \rightarrow R_2 + R_1$ ,  $R_3 \rightarrow R_3 + 3R_1$ , we get

$$\begin{bmatrix} -1 & 1 & 2 \\ 0 & 3 & 5 \\ 0 & 4 & 7 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 3 & 0 & 1 \end{bmatrix} A$$

Applying  $R_1 \rightarrow (-1)R_1$ , we get

$$\begin{bmatrix} 1 & -1 & -2 \\ 0 & 3 & 5 \\ 0 & 4 & 7 \end{bmatrix} = \begin{bmatrix} -1 & 0 & 0 \\ 1 & 1 & 0 \\ 3 & 0 & 1 \end{bmatrix} A$$

$R_2 \rightarrow R_2 - R_3$ .

$$\begin{bmatrix} 1 & -1 & -2 \\ 0 & -1 & -2 \\ 0 & 4 & 7 \end{bmatrix} = \begin{bmatrix} -1 & 0 & 0 \\ -2 & 1 & -1 \\ 3 & 0 & 1 \end{bmatrix} A$$

$$R_1 \rightarrow R_1 - R_2, \quad R_3 \rightarrow R_3 + 4R_2$$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & -2 \\ 0 & 0 & -1 \end{bmatrix} = \begin{bmatrix} +1 & -1 & 1 \\ -2 & 1 & -1 \\ -5 & 4 & -3 \end{bmatrix} A$$

$$R_2 \rightarrow R_2 - 2R_3, \quad R_3 \rightarrow (-1)R_3$$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 1 & -1 & 1 \\ 8 & -7 & 5 \\ 5 & -4 & 3 \end{bmatrix} A$$

$$R_2 \rightarrow (-1)R_2$$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 6 & 6 & 1 \end{bmatrix} = \begin{bmatrix} 1 & -1 & 1 \\ -8 & 7 & -5 \\ 5 & -4 & 3 \end{bmatrix} A$$

Hence  $A^{-1} = \begin{bmatrix} 1 & -1 & 1 \\ -8 & 7 & -5 \\ 5 & -4 & 3 \end{bmatrix}$  Ans

Q.12 Find  $A^{-1}$  by elementary row transformation

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

DATE-27.04.2020

CLASS-XII

SUBJECT-PHYSICS

CHAPTER-7.MOVING CHARGES AND MAGNETISM (1<sup>st</sup> CLASS)

- ◆ According to Biot-Savart law or Laplace's law, the magnitude of magnetic field  $\delta \vec{B}$  at a point due to a small element  $\delta l$  of a current carrying wire is,

$$\delta B \propto \frac{I \delta l \sin \theta}{r^2} \quad \text{or,} \quad \delta B = k \frac{I \delta l \sin \theta}{r^2}$$

where  $r$  = distance of the point from the element and  $\theta$  = angle between the current element  $\delta \vec{l}$  and position vector  $\vec{r}$ .

In SI, the conventional form of Biot-Savart law is,

$$\delta B = \frac{\mu_0}{4\pi} \cdot \frac{I \delta l \sin \theta}{r^2} \quad [\mu_0 = \text{magnetic permeability of vacuum} = 4\pi \times 10^{-7} \text{ H} \cdot \text{m}^{-1}]$$

- ◆ The magnetic field at any point near a straight conductor,

$$B = \frac{\mu_0 I}{4\pi r} (\sin \theta_1 + \sin \theta_2)$$

- Magnetic field due to a infinite straight conductor,

$$B = \frac{\mu_0}{4\pi} \cdot \frac{2I}{r}$$

- ◆ Magnetic field at a point on the axis of a circular conductor of  $N$  turns,

$$B = \frac{\mu_0 NI}{2} \cdot \frac{r^2}{(r^2 + x^2)^{3/2}}$$

[where,  $x$  = distance of the point from the centre of the coil]

- ◆ Magnetic field at the centre of a circular conductor of  $N$  turns,

$$B = \frac{\mu_0 IN}{2r} \quad [r = \text{radius of the circle}]$$

- ◆ Ampere's circuital law:  $\oint \vec{B} \cdot d\vec{l} = \mu_0 I$

- ◆ Magnetic field of a long straight thin wire,

$$B = \frac{\mu_0}{2\pi} \cdot \frac{I}{r}$$

- ◆ Magnetic field due to a long, straight solenoid at any point on its axis,

$$B = \mu_0 n I$$

[ $n$  = number of turns per unit length of the solenoid =  $\frac{N}{L}$ ]

- Magnetic field due to a toroid,

$$B = \mu_0 n I$$

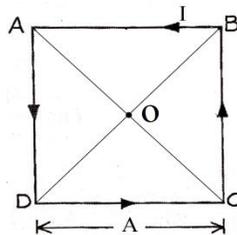
[ $n$  = number of turns per unit length of the toroid =  $\frac{N}{2\pi r}$ ]

DATE-27.04.2020  
CLASS-XII  
SUBJECT-PHYSICS  
ASSIGNMENT-5  
CHAPTER-7.MOVING CHARGES AND MAGNETISM (1<sup>st</sup> CLASS)  
(F.M.-10)

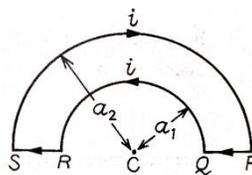
*Answer the following questions*

*(Question No-1 carries 1 mark, 2 carries 2 marks, 3 carries 3 marks, 4 carries 4 marks)*

1. Write the dimensional formula of  $\mu_0$ .
2. Must every magnetic field configuration necessarily have a north pole and south pole? What about the magnetic field of toroid?
3. (i) Write the vector form of Biot-Savart's law.  
(ii) A square frame of side A carries current I. Compute magnetic field at the centre O of the frame as shown in the figure below.



4. (i) The wire-loop PQRSP formed by joining two semi-circular wires  $a_1$  and  $a_2$  carries a current I as shown in the figure below. Find the magnitude and direction of the magnetic field at the centre C.



- (ii) Applying Ampere's circuital law show that magnetic field due to an infinitely long straight current carrying wire is

$$B = \frac{\mu_0}{2\pi} \frac{i}{r}$$

Tanmoy Rana

**N.B: Students are requested to write the assignments of both the Physics teachers separately and mention assignment number properly.**

CLASS XII  
GEOGRAPHY  
CHAPTER: 4

Drainage:

Two broad divisions of drainage of India can be recognised on the basis of their evolution. They are -i) The Himalayan rivers and ii) The peninsular rivers.

**i) The Himalayan River system: -**

The Himalayan River System is also considered as Antecedent drainage system which means a river system originating before a period of uplift and folding of the land as a result of earth movements. The river continues to cut down its valley at approximately the same rate as the uplift and so maintains its general pattern and direction.

The Rivers originating from the Himalayas consists of the following three systems.

1. The Indus drainage system
2. The Ganga drainage system
3. The Brahmaputra drainage system

**1. The Indus River system: -**

This system comprises of the Indus river and its five main tributaries of the Jhelum, the Chenab, the Ravi, the Beas and the Satluj.

**The Indus:** -The Indus rises in Tibet near Manasrowar Lake and then flows across India and Pakistan to reach the Arabian Sea east of Karachi.

**The Jhelum:**-It rises in a spring at Verinag situated in the South Eastern part of the valley of Kashmir and then it joins the Chenab near Jhang in Pakistan.

**The Chenab:**-The Chenab of Jammu and Kashmir state is known as the Chandrabhaga in Himachal Pradesh.

**The Ravi:**-The source of this river lies near the Rohtang Pass and then it joins the Chenab near Multan in Pakistan.

**The Beas:**-It originates from a place known as Beas Kund near the Rohtang Pass and joins the Satluj near Harike and joins the Satluj near Harike.

**The Satluj:**-It originates from Rakash lake and then join with Indus river.

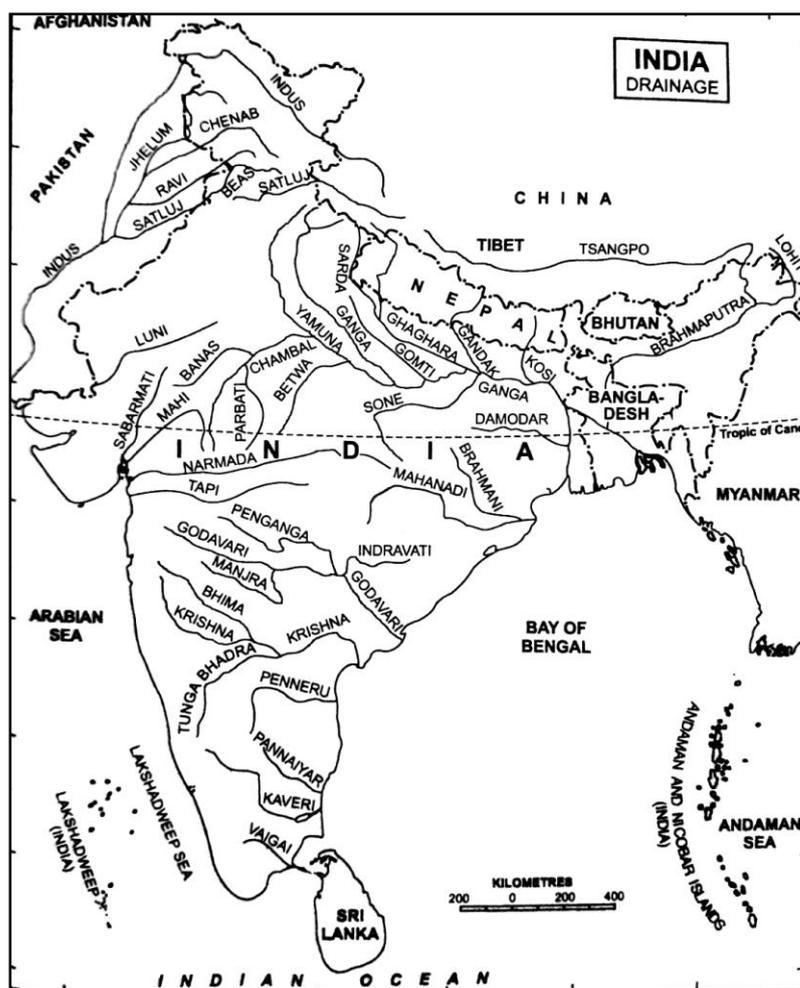
**The Ganga Drainage System:-**

This River system includes the Ganga and its tributaries like the Yamuna the Gomti etc.

**The Ganga:**-The Ganga rises in Garhwal Himalayas in Uttaranchal.It acquire its name after its headstreams -Alaknanda and Bhagirathi Unite at Devaprayag. Near Farakka in West Bengal it divided into stream - Padma and Bhagirathi-Hooghly river.

Here Padma river enters into Bangladesh where it merges with Brahmaputra river and known as Yamuna and Meghna and joints with Bay of Bengal, on the other hand Bhagirathi Hooghly river flows southwards in West Bengal and joins with Bayof Bengal.

**The Yamuna:**- it is the right bank tributary of Ganga and it takes its rise at the Yamunotri



Glacier . It joins the Ganga at Allahabad.

**The Gandak :-**It Rises near Sino- Nepal boundary and drains the central part of Nepal.It joins the left Bank of Ganga at Sonpur.

**The Ghaghara:-**The Ghaghara rises from the Karnali and joins the Ganga near Chhapra.

**The Kosi:-**It drains eastern Nepal and joins the left Bank of Ganga at karagola.

**The Brahmaputra drainage system:-** it originates from Chemayungdung Glacier at the southeast of Manasarowar lake. it is known as tsang Po in Tibet. it is also known as Dihan River in Arunachal Pradesh. in Bangladesh it joins with Ganga and form the world's largest delta. it drains in Bay of Bengal.

**The Peninsular river system:-**

**The Mahanadi:-**The Mahanadi has its source in the Northern foothills of Dandakaranya near Sihawa in Raipur district of Chhattisgarh and flows through Odisha to the Bay of Bengal.

**The Godavari:-**The Godavari is the largest river of Peninsular plateau. It rises in the Nashik district of Maharashtra and joins the Bay of Bengal in Andhra Pradesh.The Godavari is often referred to as Vindhya Ganga aur Dakshina Ganga because of its large size and extent. Pravara, Purna etc are few of its tributaries.

**The Krishna:-**The Krishna rises from a spring near Mahabaleshwar and drains into Bay of Bengal. its main tributaries are Koyana, Bhima, Tungabhadra etc.

**the Cauveri:-** It rises from the Brahmagir range of the Western Ghat and flows to the Bay of Bengal near Kaveripatnam.

**The Narmada:-**It Rises near Amarkantak in Madhya Pradesh and flows to the Arabian Sea.

**The Tapi:-**The Tapi rises from the Betul district of Madhya Pradesh, flows westward parallel to the Narmada and drains into Arabian Sea. Narmada and Tapti are only two rivers which are flowing to westward in the peninsular plateau. Rest of the peninsular rivers are flowing towards the East and drains into Bay of Bengal.

#### Difference Between Himalayan Drainage System And Peninsular River System:-

<b>The Himalayan River Systems</b>	<b>The Peninsular River Systems</b>
1. Some of the longest rivers belong to the Himalayan river system.	1. Peninsular rivers are not as long as the Himalayan rivers.
2. The catchment areas and basins of the Himalayan rivers are very large.	2. The catchment areas and basins of the Peninsular rivers are of comparatively smaller size.
3. Himalayan rivers are larger in number.	3. Peninsular rivers are smaller in number.
4. The Himalayan rivers originate from the snow covered areas and receive water from rainfall as well from snow-melt. Therefore they are perennial.	4. The Peninsular rivers depend entirely upon rain water and are seasonal.
5. The Himalayan rivers form deep gorges.	5. The Peninsular rivers flow in shallow valleys.
6. The Himalayan rivers form river meanders and often change their course.	6. The Peninsular rivers follow more or less straight course and do not change their course.
7. These rivers are useful for irrigation and navigation.	7. These rivers are not much suited for irrigation and navigation.
8. These rivers flow across the young fold mountains and are still in a youthful stage.	8. These rivers have been flowing in one of the oldest plateaus of the world and have reached maturity.
9. These rivers represent antecedent drainage.	9. These rivers represent consequent drainage.
10. The Himalayan rivers form big deltas. The Ganga-Brahmaputra delta is the largest in the world.	10. The Peninsular rivers form comparatively small deltas. Narmada and Tapi form estuaries.

Home assignment 5:-

1. Why is Godavari river often referred to as ' Dakshin Ganga'?
2. Name the two streams which unite at Devaprayag to form into river Ganga.
3. State any two difference between Himalayan river system and Peninsular river system.
4. The rivers of North India are Antecedent in nature. Explain with an example.

# Accountancy Class XII

## Admission of a Partner - Revision

### ILLUSTRATION 1

The following is the Balance Sheet of Ram and Mohan, who share profits in the ratio of 3:2 as on 1st January, 2016:

Liabilities	₹	Assets	₹
Trade payables	15,000	Buildings	18,000
Ram's Capital	20,000	Plant and Machinery	15,000
Mohan's Capital	25,000	Inventories	12,000
		Trade receivables	10,000
		Bank	5,000
	60,000		60,000

On this date Shyam was admitted on the following:

1. He is to pay ₹ 25,000 as his capital and ₹ 10,000 as his share of goodwill for one fifth share in profits.
2. The new profits sharing ratio will be 5:3:2.
3. The assets are to be revalued as under:

	₹
Building	25,000
Plant and Machinery	12,000
Inventories	12,000
Trade receivables (because of doubtful debts)	9,500

4. It was found that there was a liability for ₹ 1,500 for goods received but not recorded in books.

Give journal entries to record the above. Also, give the Balance Sheet of the partnership firm after Shyam's admission.

### SOLUTION

#### Journal Entries

2016		Dr. (₹)	Cr. (₹)
Jan. 1	Bank Account	Dr.	35,000
	To Shyam's Capital Account		35,000
	(Being amount brought in by Shyam for capital and goodwill)		
	Shyam's Capital Account	Dr.	10,000
	To Ram's Capital Account		5,000
	To Mohan's Capital Account		5,000
	(Being Shyam's share of goodwill adjusted to existing partners' capital accounts in the profit sacrificing ratio 1:1)		
	Revaluation Account	Dr.	5,000

To Plant and Machinery Account			3,000
To Provisions for Doubtful Debts Account			500
To Trade payables Account			1,500
(Being recording of the reduction in the value of assets and the liability which had been previously omitted)			
Building Account	Dr.	7,000	
To Revaluation Account			7,000
(Being increase in the value of building brought into account)			
Revaluation Account	Dr.	2,000	
To Ram's Capital Account			1,200
To Mohan's Capital Account			800
(Being profit on revaluation credited to Ram and Mohan in the old profit sharing ratio)			

### Working Note:

Profit sacrificing ratio:

$$\text{Ram} = 3/5 \text{ less } 1/2 = 1/10$$

$$\text{Mohan} = 2/5 \text{ less } 3/10 = 1/10$$

### Balance Sheet of Ram, Mohan and Shyam as at January 1, 2016

Liabilities	₹	₹	Assets	₹	₹
Trade payables		16,500	Buildings		25,000
Capital Accounts :			Plant and Machinery		12,000
Ram	26,200		Inventories		12,000
Mohan	30,800		Trade receivables	10,000	
Shyam	25,000	82,000	Less : Provision for		
			Doubtful Debts	(500)	9,500
			Bank		40,000
		98,500			98,500

### ILLUSTRATION 2

A and B are partners sharing profits and losses in the ratio of 3:2. Their Balance Sheet as on 31.3.2016 is given below:

Liabilities	₹	Assets	₹
Trade payables	50,000	Freehold premises	2,00,000
Capital Accounts:		Plant	40,000
A	2,00,000	Furniture	20,000
B	1,00,000	Office equipment	25,000
		Inventories	30,000
		Trade receivables	25,000
		Bank	10,000
	3,50,000		3,50,000

On 1.4.2016 they admit C on the following terms:

- (1) C will bring ₹ 50,000 as a capital and ₹ 10,000 for goodwill for 1/5 share;
- (2) Provision for doubtful debts is to be made on Trade receivables @ 2%
- (3) Inventory to be written down by 10%.
- (4) Freehold premises is to be revalued at ₹2,40,000, plant at ₹ 35,000, furniture ₹ 25,000 and office equipment ₹ 27,500.
- (5) Partners agreed that the values of the assets and liabilities remain the same and, as such, there should not be any change in their book values as a result of the above mentioned adjustments.

You are required to make necessary adjustment in the Capital Accounts of the partners and show the Balance Sheet of the New Firm.

 **SOLUTION**

**Memorandum Revaluation Account**

Particulars	₹	Particulars	₹
To Provision for Bad Debts A/c	500	By Freehold premises A/c	40,000
To Inventory A/c	3,000	By Furniture A/c	5,000
To Plant A/c	5,000	By Office equipment A/c	2,500
To Profit on Revaluation A/c			
A's Capital-3/5	23,400		
B's Capital-2/5	15,600		
	47,500		47,500
To Freehold premises A/c	40,000	By Provision for Bad Debts A/c	500
To Furniture A/c	5,000	By Inventory A/c	3,000
To Office equipment A/c	2,500	By Plant A/c	5,000
		By Loss on Revaluation A/c	
		A's Capital -12/25	18,720
		B's Capital-8/25	12,480
		C's Capital-5/25	7,800
	47,500		47,500

**Partners' Capital Accounts**

Particulars	A ₹	B ₹	C ₹	Particulars	A ₹	B ₹	C ₹
To A's Capital A/c			6,000	By Balance b/d	2,00,000	1,00,000	-
To B's Capital A/c			4,000	By Bank A/c			60,000
To Loss on revaluation A/c	18,720	12,480	7,800	By C's Capital A/c	6,000	4,000	-
To Balance c/d	2,10,680	1,07,120	42,200	By Profit on revaluation A/c	23,400	15,600	-
	2,29,400	1,19,600	60,000		2,29,400	1,19,600	60,000

**Balance Sheet as at 1.4.2016**

Liabilities	₹	Assets	₹
Trade payables	50,000	Freehold premises	2,00,000
Capital A/c :		Plant	40,000
A	2,10,680	Furniture	20,000
B	1,07,120	Office equipment	25,000
C	42,200	Inventories	30,000
		Trade receivables	25,000
		Bank	70,000
	4,10,000		4,10,000

**? ILLUSTRATION 3**

A and B are partners in a firm, sharing profits and losses in the ratio of 3:2. The Balance Sheet of A and B as on 1.1.2016 was as follows:

Liabilities	₹	Amount ₹	Assets	₹	Amount ₹
Trade payables		17,000	Building		26,000
Bank overdraft		9,000	Furniture		5,800
Capital accounts:			Inventories		21,400
A	44,000		Trade receivables	35,000	
B	36,000	80,000	Less: Provision	(200)	34,800
			Investment		2,500
			Cash		15,500
		1,06,000			1,06,000

'C' was admitted to the firm on the above date on the following terms:

- (i) C is admitted for 1/6 share in the future profits and to introduce a capital of ₹25,000.
- (ii) The new profit sharing ratio of A, B and C will be 3:2:1 respectively.
- (iii) 'C' is unable to bring in cash for his share of goodwill, they decide to calculate goodwill on the basis of C's share in the profits and the capital contribution made by him to the firm.
- (iv) Furniture is to be written down by ₹870 and Inventory to be depreciated by 5%. A provision is required for trade receivables @ 5% for bad debts. A provision would also be made for outstanding wages for ₹1,560. The value of buildings having appreciated be brought upto ₹29,200. The value of investments is increased by ₹450.
- (v) It is found that the trade payables included a sum of ₹1,400, which is not to be paid off.

Prepare the following:

- (i) Revaluation account.
- (ii) Partners' capital accounts.

 **SOLUTION**

**Revaluation Account**

	₹		₹
To Furniture	870	By Building	3,200
To Inventory	1,070	By Trade payables	1,400
To Provision for doubtful debts (₹1,750 - ₹200)	1,550	By Investment	450
To Outstanding wages	1,560		
	5,050		5,050

**Partners' Capital Accounts**

	A ₹	B ₹	C ₹		A ₹	B ₹	C ₹
To A			4,500	By Balance b/d	44,000	36,000	-
To B			3,000	By Cash A/c	-	-	25,000
To Balance c/d	48,500	39,000	17,500	By C (working note 2)	4,500	3,000	-
	48,500	39,000	25,000		48,500	39,000	25,000

**Working Notes:**

1. Calculation of goodwill:

C's contribution of ₹25,000 consists of only 1/6th of capital.

Therefore, total capital of firm should be ₹25,000 × 6 = ₹1,50,000

But combined capital of A, B and C amounts ₹44,000 + 36,000 + 25,000 = ₹1,05,000

Thus, the hidden goodwill is ₹45,000 (₹1,50,000 - ₹1,05,000).

Goodwill will be shared by A & B in their sacrificing ratio.

2. Calculation of sacrificing ratio

Partners	New share	Old share	Sacrifice	Gain
A	$\frac{3}{6}$	$\frac{3}{5}$	$-\frac{3}{30}$	
B	$\frac{2}{6}$	$\frac{2}{5}$	$-\frac{2}{30}$	
C	$\frac{1}{6}$			$\frac{1}{6}$

Therefore, A will get = ₹45,000 ×  $\frac{3}{30}$  = ₹4,500;

B will get = ₹45,000 ×  $\frac{2}{30}$  = ₹3,000; and

C will be debited on account of goodwill = ₹45,000 ×  $\frac{1}{6}$  = ₹7,500

## Unsolved Questions

1. A and B are partners in a firm sharing Profits and Losses in the ratio of 17 : 16. They admit C as a partner on 1st April, 2016 on the basis of his buying 5/17th of A's share and 4/16th of B's share. On 1st April, 2018 they permit C to purchase further 1/12th of their remaining shares. Goodwill is agreed to be valued at 2 years' purchase of the average profits of 3 years immediately before any change. Profits for the 5 years ended 31st March, 2018 are:

Years Ended	31st March, 2014	31st March, 2015	31st March, 2016	31st March, 2017	31st March, 2018
Profits (₹)	61,560	64,520	81,660	94,140	1,15,120

You are required to determine the amount to be paid by C to each partner on both the occasions and their ultimate Profit-sharing Ratio.

2. A and B are partners sharing profits in the ratio of 3 : 2. They admit C into the firm for 3/7th share in profits which he takes 2/7th from A and 1/7th from B and brings ₹ 10,000 as premium out of his share of ₹ 16,000. Pass Journal entries for the above.
3. On the admission of Rao, it was agreed that the goodwill of Murty and Shah should be valued at ₹ 30,000. Rao is to get 1/4th share of profits. Previously Murty and Shah shared profits in the ratio of 3 : 2. Rao cannot bring his share of Goodwill. Give Journal entries in the books of Murty and Shah when: (i) there is no Goodwill Account; (ii) Goodwill appears at ₹ 10,000.
4. Following is the Balance Sheet of the firm, Ashirvad, owned by A, B and C who share profits and losses of the business in the ratio of 3 : 2 : 1:

**BALANCE SHEET**  
as at 31st March, 2018

Liabilities	₹	Assets	₹
Capital A/cs:		Furniture	95,000
A	1,20,000	Business Premises	2,05,000
B	1,20,000	Stock-in-Trade	40,000
C	<u>1,20,000</u>	Debtors	28,000
Sundry Creditors	20,000	Cash at Bank	15,000
Outstanding Salaries and Wages	7,200	Cash in Hand	4,200
	<u>3,87,200</u>		<u>3,87,200</u>

On 1st April, 2018, they admit D as a partner on the following conditions:

- (i) D will bring ₹ 1,20,000 as his Capital and also ₹ 30,000 as Goodwill premium for a quarter of the share in the future profit/loss of the firm.
- (ii) The values of the fixed assets of the firm will be increased by 10% before the admission of D.
- (iii) The future profits and losses of the firm will be shared equally by all the partners.

Show Journal entries, Revaluation Account, Partners' Capital Accounts and the opening Balance Sheet of the new firm to include the above-mentioned transactions assuming that the conditions were duly satisfied.

**DREAMLAND SCHOOL**  
**CLASS XII (session 2020-21)**  
**BIOLOGY HOME WORK-3B**

**Chapter 7: EVOLUTION(Contd..)**

**Quick review of the content**

**How might life have arisen on Earth?**

In the 1920s, Russian scientist A.I Oparin and English scientist J. B. S. Haldane both separately proposed what's now called the **Oparin-Haldane hypothesis**: that life on Earth could have arisen step-by-step from non-living matter through a process of “**gradual chemical evolution.**”

Oparin and Haldane thought that the early Earth had a reducing atmosphere, meaning an oxygen-poor atmosphere in which molecules tend to donate electrons. Under these conditions, they suggested that:

- Simple inorganic molecules could have reacted (with energy from lightning or the sun) to form building blocks like amino acids and nucleotides, which could have accumulated in the oceans, making a "primordial soup."
- The building blocks could have combined in further reactions, forming larger, more complex molecules (polymers) like proteins and nucleic acids, perhaps in pools at the water's edge.
- The polymers could have assembled into units or structures that were capable of sustaining and replicating themselves. Oparin thought these might have been “colonies” of proteins clustered together to carry out metabolism, while Haldane suggested that macromolecules became enclosed in membranes to make cell-like structures.

What is hot-dilute soup?

The sea became a '**hot dilute soup**' containing large populations of organic monomers and polymers. Haldane envisaged that groups of monomers and polymers acquired lipid membranes, and that further developments eventually led to the first living cells.

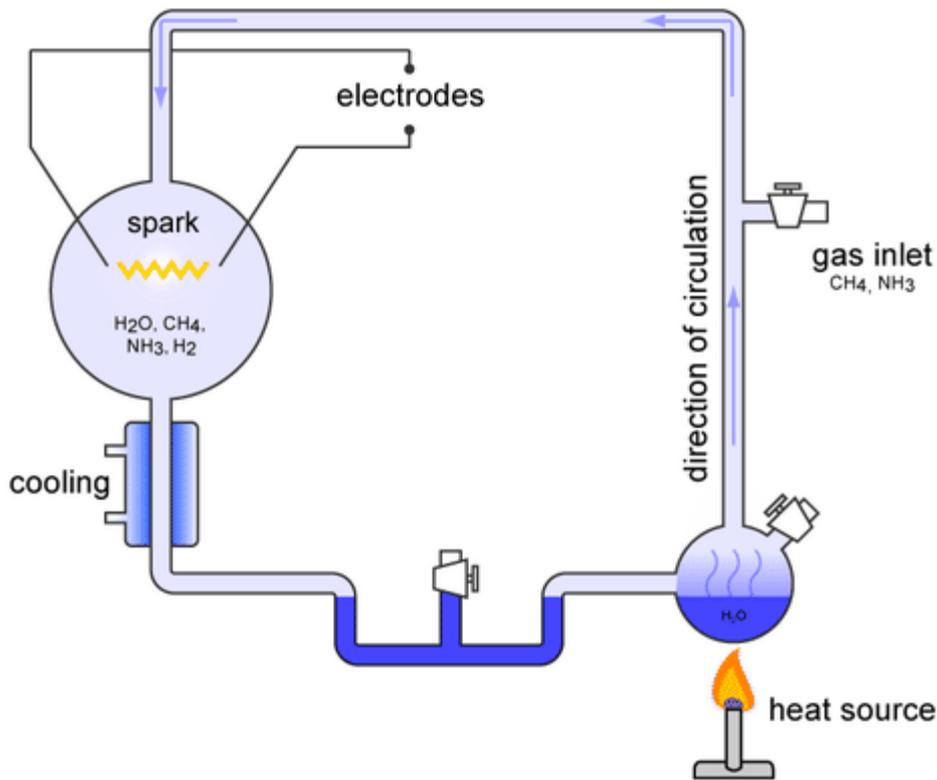
**From inorganic compounds to building blocks**

In 1953, Stanley Miller and Harold Urey did an experiment to test Oparin and Haldane's ideas.

They found that organic molecules could be spontaneously produced under reducing conditions thought to resemble those of early Earth.

Miller and Urey built a closed system containing a heated pool of water and a mixture of gases (methane, ammonia, hydrogen gases and water vapour) that were thought to be abundant in the atmosphere of early earth .

To simulate the lightning that might have provided energy for chemical reactions in Earth's early atmosphere, Miller and Urey sent sparks of electricity through their experimental system.



After letting the experiment run for a week, Miller and Urey found that various types of amino acids, sugars, lipids and other organic molecules had formed.

Large, complex molecules like DNA and protein were missing, but the Miller-Urey experiment showed that at least *some* of the building blocks for these molecules could form spontaneously from simple compounds.

However, one recent study using a different approach (not an approach similar to Miller and Urey) found that RNA nucleotides could be formed from inorganic components under conditions thought to resemble those of early Earth<sup>9</sup>start superscript, 9, end superscript.

From these experiments, it seems reasonable to imagine that at least some of life's building blocks could have formed abiotically on early Earth. However, exactly how (and under what conditions) remains an open question.

## From building blocks to polymers

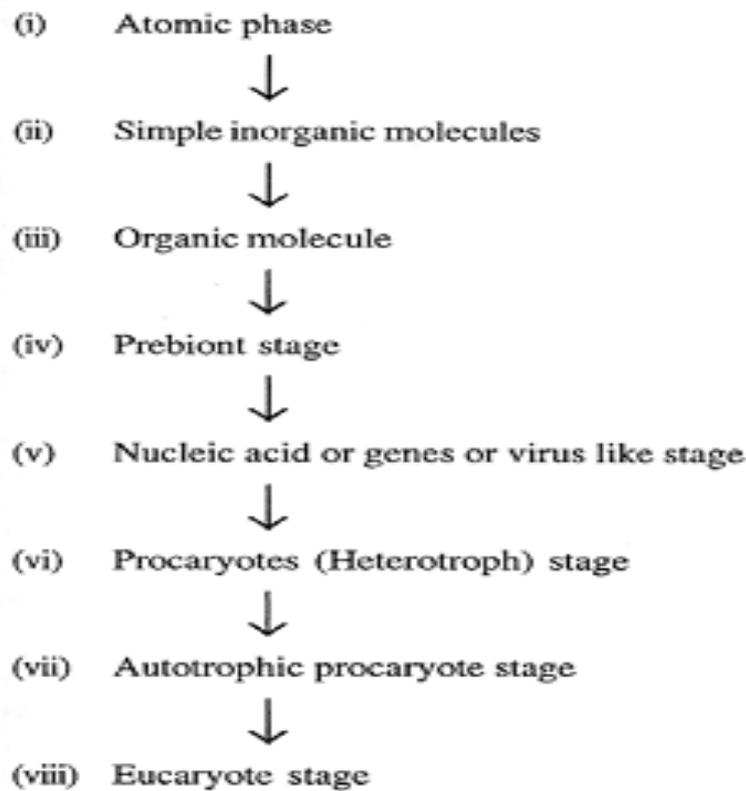
How could monomers (building blocks) like amino acids or nucleotides have assembled into polymers, or actual biological macromolecules, on early Earth? In cells today, polymers are put together by enzymes.

But, since the enzymes themselves are polymers, this is kind of a chicken-and-egg problem!

Monomers may have been able to spontaneously form polymers under the conditions found on early Earth. For instance, in the 1950s, biochemist Sidney Fox and his colleagues found that if amino acids were

heated in the absence of water, they could link together to form proteins<sup>10</sup>. Fox suggested that, on early Earth, ocean water carrying amino acids could have splashed onto a hot surface like a lava flow, boiling away the water and leaving behind a protein.

## Sequence of events in generation of life on earth



## Some important definitions

### Microspheres and Coacervates

- **Microspheres:** in water, short chains of amino acids can gather into tiny droplets
- **Coacervates:** composed of molecules of different types, including amino acids and sugars, gather into tiny droplets



Coacervates

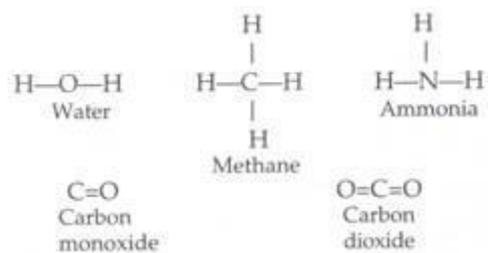


**protobiont.** Noun. (plural **protobionts**) An aggregation of organic molecules, surrounded by a membrane, that abiotically coalesces into resemblances of living matter; thought to be the precursors of prokaryotic cells.

**Various steps of modern theory are:**

**A. Chemogeny (Chemical Evolution):**

**(a) Conditions on the primitive earth**, about 4 billion years ago, were such which favoured the chemical evolution. When the surface temperature of earth was less than 100°C. Its atmosphere had nitrogen in the form of ammonia ( $\text{-NH}_3$ ), carbon in the form of methane ( $\text{-CH}_4$ ) and oxygen in the form of water vapours ( $\text{H}_2\text{O}$ ) but there was no free oxygen so the primitive atmosphere was “reducing”. These compounds were called protoplasmic compounds.



**(b) As the earth cooled down, it developed a solid crust** which later formed depressions and elevations. Meanwhile, the atmospheric water vapours condensed and finally came to the surface as rain. Water collected in the depressions, dissolved the minerals like chloride and phosphates and finally formed large sized water bodies called oceans.

**(c) Formation of simple organic compounds:**

As the earth surface cooled to 50-60°C, molecules and minerals present in water bodies combined and recombined in various ways through the processes of condensation, polymerisation and oxido-reduction to form simple organic compounds like alcohols, aldehydes, glycerol, fatty acids, purines, pyrimidines, simple sugars (e.g. ribose, deoxyribose, glucose, etc.) and amino acids.

These organic compounds accumulated in the water bodies because their degradation was very slow in the absence of any consumer or enzyme catalysts or absence of oxygen. Such transformation is not possible in the present oxidising atmosphere because oxygen or micro- consumers will decompose or destroy the living particles that may arise by mere chance.

**d) Formation of complex organic compounds:**

Simple organic compounds showed chance chemical reactions and polymerisation to finally form complex organic compounds like polysaccharides, fats, nucleotides, nucleic acids, polypeptides etc.

## Formation of protobionts:

**For the origin of life, following three conditions must be fulfilled:**

- (i) There must be a continuous supply of self-' producing molecules, called replicators.
- (ii) Copying of these replicators must have been subject to mutation (change).
- (iii) The system of replicators must have required a continued supply of free energy and their partial isolation from the general environment.

Main factor responsible for mutations in the replicators (prebiotic molecules) was probably thermal motions induced by high temperature while the partial isolation has been attained within their aggregates. Oparin and Sydney Fox proposed that complex organic compounds synthesized abiogenetically on the primitive earth later tended to accumulate and formed large colloidal cell-like aggregates called protobionts.

Such first non-cellular forms of life probably originated 3 billion years back. These would have giant molecules containing RNA, protein, polysaccharides etc. These aggregates can separate combinations of molecules from the surroundings and can maintain an internal environment.

But their main drawback was that they were unable to reproduce. These microscopic, spherical, stable and motile aggregates were called coacervates (L. *acervus* = pile — Fig. 7.4) by Oparin and microspheres by Sydney Fox.

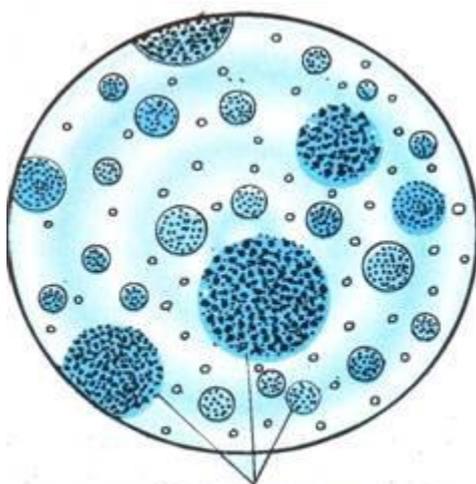


Fig. 7.4. Coacervate particles.

As these coacervates do not have lipid outer membrane and cannot reproduce, they fail to fulfill the requirements as a candidate of probable precursors of life. Microspheres became successful and multiplied as these had the power of growth and division (budding, fragmentation and binary fission-Fig. 7.5).

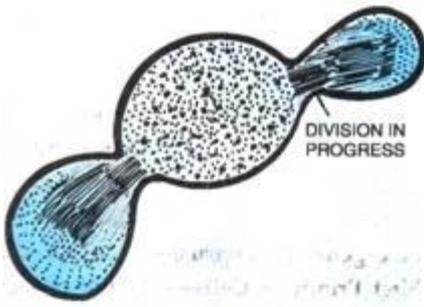


Fig. 7.5. A dividing coacervate.

### ***B. Biogeny (Formation of Primitive Life):***

As the cellular physiology is the outcome of enzymatic activity, so the enzymes must have developed before the cells. Gradually the gene aggregates became surrounded by a complex system of enzymes which formed the cytoplasm. These enzymes could have combined the nitrogen bases, simple sugars and phosphates into the nucleotides.

### ***C. Cognogeny (Nature of Primitive Life and Its Evolution):***

The natural selection operated even at the time of origin of life. Continued selection of more successful eobionts accompanied with the perfection of membrane system probably led to the formation of first cell.

Earliest cells were anaerobic (obtained energy by fermentation of some organic molecules as no oxygen was available), prokaryotic (with nucleoid as in bacteria) and chemoheterotrophic (derived readymade food from existing organic molecules).

These started deriving nutritive organic compounds from the primitive seas as their building blocks and energy sources. So these cells grew to enormous size. To restrict their size, chemoheterotrophs started cell-mitosis and so increased their number.

To cope with the depleting supply of organic compounds, some of these chemoheterotrophs evolved into anaerobic, prokaryotic and chemoautotrophs. These started synthesizing their own organic food from inorganic compounds in the presence of chemical energy (also from degradation of inorganic compounds) and enzymes e.g., sulphate-reducing bacteria, nitrifying bacteria, iron-bacteria etc. Main force for this kind of evolution was proposed to be of mutations.

Facing the problem of increasing deficiency of inorganic compounds, some of the chemoautotrophs developed porphyrins and bacteriochlorophyll (green photosynthetic pigment) and started photosynthesis (synthesis of carbohydrate). This led to the evolution of anaerobic, prokaryotic and photoautotrophs. These evolved about 3500-3800 million years ago.

First photoautotrophs were anoxygenic as these did not use water as a raw material in photosynthesis. Later, these developed true chlorophyll and started using the water as a reagent so  $O_2$  was evolved in the process of photosynthesis. First oxygenic and aerobic

photoautotrophs were cyanobacteria which are believed to evolve about 3,300 – 3,500 million years ago.

Similarly, J.W. Schopf (1967) reported the presence of 22 amino acids in a 3000 million old rock while oldest micro-fossil belong to blue green algae, namely *Archaespheroids barbertonensis*, about 3.3 to 3.5 billion years ago.

For long period, the dominant and perhaps the only forms of life on the earth were bacteria, moulds and cyanobacteria. Gradually, blue-green algae evolved into other forms of algae. It is estimated that eukaryotes developed around 1600 million years back.

First eukaryotes evolved through either mutation in prokaryotes (Raff and Mahler, 1972) or symbiotic association of different prokaryotes (Margulis, 1970). Later many types of algae, fungi, protozoans and other living organisms were developed.

### **ASSIGNMENT**

1. State theories of Oparin and Haldane.
2. Explain the simulation experiment of Miller and Urey. Justify the name
3. Write difference between Microsphere and protobionts.
4. Write in a flow chart the sequence of origin of cell.

**(NOTE-STUDENTS ARE REQUESTED TO WRITE THE ASSIGNMENTS OF BOTH THE BIOLOGY TEACHERS IN SEPARATE COPY, ALSO GIVE THE ASSIGNMENT NUMBER PROPERLY THAT IS GIVEN AT THE BEGINNING.)**

Madhubanti Banerjee