

# Railway Exams – General Awareness

## RAILWAY NTPC /GROUP D GENERAL AWARENESS CAPSULE

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## CONSTITUENT ASSEMBLY

- The **Constituent Assembly** was formed on the recommendation of the **cabinet mission** in 1946
- The Constituent Assembly held its first meeting on **December 9, 1946**
- **Dr. Sachchidanand Sinha**, the oldest member was elected as the temporary President of the Assembly
- **Dr. Rajendra Prasad** was elected as the First President of the Assembly
- On December 13, 1946 Jawaharlal Nehru moved the historic Objectives Resolution in the Assembly
- The Preamble to the Indian Constitution is based on the ‘Objectives Resolution’, drafted and moved by Pandit Nehru, and adopted by the Constituent Assembly
- Constituent Assembly as the provisional parliament of India from January 26, 1950 till the formation of new Parliament after the first general elections in 1951–52.
- The total expenditure incurred on making the Constitution amounted to 64 lakhs
- The Constitution as adopted on November 26, 1949, contained a Preamble, 395 Articles and 8 Schedules and 22 parts.
- Dr BR Ambedkar known as chief architect of Indian Constitution
- Chairman of the Constitution Drafting Committee is **Dr BR Ambedkar**
- **Prem Behari Narain Raizada** was the calligrapher of the Indian Constitution. The original constitution was handwritten by him in a flowing italic style.

## FUNCTIONS OF THE CONSTITUENT ASSEMBLY

- It ratified the India’s membership of the Commonwealth in May 1949.

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- It adopted the national flag on July 22, 1947.
- It adopted the national anthem on January 24, 1950.
- It adopted the national song on January 24, 1950.
- It elected Dr Rajendra Prasad as the first President of India on January 24, 1950

## MAJOR COMMITTEES AND ITS CHAIRMEN

- Union Powers Committee – **Jawaharlal Nehru**
- Union Constitution Committee – **Jawaharlal Nehru**
- Provincial Constitution Committee – **Sardar Patel**
- Drafting Committee – **Dr. B.R. Ambedkar**
- Rules of Procedure Committee – **Dr. Rajendra Prasad**
- States Committee – **Jawaharlal Nehru**
- Steering Committee – **Dr. Rajendra Prasad**

## SALIENT FEATURES OF THE CONSTITUTION

- **Longest Written Constitution:** The Indian Constitution is considered to be the longest written constitution in the world. It contains different provisions for states and centre and their inter-relationship. The framers of the Constitution have borrowed provisions from several sources and several other Constitutions of the world.
- **Single Constitution** for both the Centre and the states
- **A unique blend of rigidity and flexibility:** Indian Constitution may be called rigid as well as flexible based on its amending procedure.
- **Article 368** in part XX of the constitution deals with the powers of parliament to amend the constitution and its procedure
- The Supreme Court ruled that the constituent power of Parliament under Article 368 does not enable it to alter the ‘basic structure’ of the Constitution
- The 42nd Amendment Act (1976) known as ‘**Mini-Constitution**’ due to the important and large number of changes made by it in various parts of the Constitution.
- The term **socialist, secular and integrity** added to the Preamble of the Indian Constitution by the **42nd Constitutional Amendment Act of 1976**
- **Parliamentary System of Government:** Parliament controls the functioning of the Council of Ministers, and hence it is called the Parliamentary system.
- India has a Parliamentary Form of Government. India has a Bicameral Legislature with two houses named **Lok Sabha and Rajya Sabha**.

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- **Single Citizenship:** Indian Constitution has the provision for single citizenship provided by the union and recognized by all the states across India.
- The Indian Constitution is federal and envisages a dual polity (Centre and states) it provides for **only a single citizenship**, that is the Indian citizenship
- **Universal Adult Franchise:** The universal adult franchise, which operates with the principle of ‘one person one vote.’ All Indians who are eighteen years of age or above is entitled to vote in the elections. There is no discrimination in voting rights for the citizens of India based on caste, religion, gender, race or status.
- The **voting age** was reduced to **18 years from 21 years** in 1989 by the 61<sup>st</sup> Constitutional Amendment Act of 1988
- **Fundamental Duties:** The Fundamental Duties of citizens were added to the Constitution by the 42nd Amendment in 1976 on the recommendation of the **Swaran Singh Committee**
- **The Part IV-A** of the Constitution (which consists of only one Article—51-A) specifies the eleven **Fundamental Duties**
- **Fundamental Rights:** The Constitution of India asserts the basic principle that every individual is entitled to enjoy certain essential rights. The provisions for Fundamental Rights are mentioned in Part III of the Indian Constitution.
- **Part III** of the Indian Constitution guarantees six **fundamental rights** to all the citizens
  1. Right to Equality (Articles 14–18),
  2. Right to Freedom (Articles 19–22),
  3. Right against Exploitation (Articles 23–24),
  4. Right to Freedom of Religion (Articles 25–28),
  5. Cultural and Educational Rights (Articles 29–30)
  6. Right to Constitutional Remedies (Article 32)
- Fundamental rights can also be suspended during the operation of a National Emergency except the rights guaranteed by **Articles 20 and 21**
- The **Supreme Court** is a federal court, the highest court of appeal, the guarantor of the fundamental rights of the citizens and the guardian of the Constitution.
- **Federal or Unitary:** India is an indestructible Union with destructible states which means it acquires a unitary character during the time of emergency. The Union is not strictly a federal polity but a quasi-federal polity with some vital elements of unitariness.
- **Directive Principles of State Policy:** One of the unique provisions of the Indian Constitution is the Directive Principles of State Policy. These principles are like directives to the government to implement them for establishing social and economic justice in India.

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- **Balancing Parliamentary Supremacy with Judicial Review:** Subject to the provisions of any law made by Parliament or any rules made by the Supreme Court under Article 145, the Supreme Court has the power to review any judgment pronounced or made by it. The independent judiciary in India with the power of judicial review is a prominent feature of our constitution

## Other Important Points

- The **73rd and 74<sup>th</sup> Constitutional Amendment Acts (1992)** have added a third-tier of government.
- The 73rd Amendment Act of 1992 gave constitutional recognition to the panchayats (rural local governments) by adding a new Part IX and a new Schedule 11 to the Constitution.
- The 74th Amendment Act of 1992 gave constitutional recognition to the municipalities (urban local governments) by adding a new Part IX-A and a new Schedule 12 to the Constitution
- The **constitution of India** provides for a parliamentary form of government
- **Article 74 and 75** deals with the parliamentary system at the Centre and article 163 and 164 in the states
- In 1947, Indian Civil Service (ICS) was replaced by IAS and the Indian Police (IP) was replaced by IPS and were recognised by the Constitution as All-India Services
- In 1966, the **Indian Forest Service (IFS)** was created as the third All-India Service
- **Article 312** of the Constitution authorises the **Parliament** to create new **All-India Services** on the basis of a **Rajya Sabha** resolution
- **Article 280** provides for a **Finance Commission** as a quasi-judicial body. It is constituted by the President every fifth year or even earlier

## PARTS OF INDIAN CONSTITUTION

Part	Contains	Articles Covered
PART I	The union and its territory	1 to 4
PART II	Citizenship	5 to 11
Part III	Fundamental Rights	12 to 35
Part IV	Directive Principles of State Policy	36 to 51
Part IV A	Fundamental Duties	51A
Part V	The Union Government	52 to 151
Part VI	The State Governments	152 to 237
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Part IX	The Panchayats	243 to 243-O
Part IX A	The Municipalities	243-P to 243Z-G
Part IX B	The Co-operative Societies	243Z-H to 243-ZT
Part X	The scheduled and Tribal Areas	244 to 244-A
Part XI	Relations between the Union and the States	245 to 263
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Part XIII	Trade and Commerce within the territory of India	301 to 307
Part XIV	Services Under the Union, the States	308 to 323
Part XIV A	Tribunals	323-A to 323-B
Part XV	Elections	324 to 329-A
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Part XXI	Temporary, Transitional and Special Provisions	369 to 392
Part XXII	Short title, Commencement, Authoritative Text in Hindi and Repeals	393 to 395

## IMPORTANT ARTICLES OF THE CONSTITUTION

Articles	Deals with
PART I	The union and its territory
Article 1	Name and territory of the Union
Article 2	Formation of new states and alteration of areas, boundaries or names of existing states

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PART II	Citizenship
Article 5-11	Citizenship
PART III	Fundamentals Rights
Article 13	Laws inconsistent with or in derogation of the fundamental rights
Article 14	Equality before law
Article 15	The State shall not discriminate against any citizen on the ground of religion, race, caste, sex or place of birth
Article 16	Equality of opportunity in matters of public employment
Article 17	Abolition of untouchability
Article 18	Abolition of titles
Article 19	Protection of certain rights regarding freedom of speech, etc
Article 20	Protection in respect of conviction for offences
Article 21	Protection of life and personal liberty
Article 21 A	Right to elementary education
Article 23	Prohibition of traffic human beings and forced labor
Article 24	Prohibition of employment of children in factories, Etc.
Article 25	Freedom of conscience and free profession, practice and propagation of religion
Article 26	Every religious denomination or any of its section shall have the right to manage its religious affairs
Article 29	Any section of the citizens shall have the right to conserve its distinct language, script or culture
Article 30	Right of minorities to establish and administer educational institutions
Article 31 C	Saving of laws giving effect to certain directive principles
Article 32	Remedies for enforcement of fundamental rights including writs
PART IV	Directive principles of state policy

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Article 38	State to secure a social order for the promotion of welfare of the people
Article 40	Organisation of village panchayats
Article 44	Uniform civil code for the citizens
Article 45	Provision for early childhood care and education to children below the age of 6 years
Article 46	Promotion of educational and economic interests of scheduled castes, scheduled tribes and other weaker sections
Article 50	Separation of judiciary from executive
Article 51	Promotion of international peace and security
PART IV A	
Article 51 A	Fundamental duties
PART V	The union
Article 52	The president of India
Article 54	Election of president
Article 61	Procedure for impeachment of the president
Article 63	The vice president of India
Article 64	The vice president of India to be ex officio chairman of the council of states
Article 66	Election of vice president
Article 74	Council of ministers to aid and advise the president
Article 76	Attorney-General for India
Article 79	Constitution of parliament
Article 80	Composition of the Rajya sabha
Article 81	Composition of the Lok sabha
Article 83	Duration of houses of parliament
Article 86	Right of president to address and sent messages to houses

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Article 87	Special address by the president
Article 88	Rights of ministers and attorney general as respects houses
Article 93	The speaker and deputy speaker of the lok sabha
Article 98	Secretariat of parliament
Article 99	Oath of affirmation by members
Article 107	Provisions as to introduction and passing of bills
Article 108	Joint sitting of both houses in certain cases
Article 109	Special procedure in respect of money bills
Article 110	Definition of Money Bills
Article 111	Assent to bills
Article 112	Annual financial statement (Budget)
Article 116	Votes of account, votes of credit and exceptional grants
Article 117	Special provisions as to financial bills
Article 123	Power of president to promulgate ordinances during recess of Parliament
Article 124	Establishment and construction of supreme court
Article 137	Review of judgments or orders by the supreme court
Article 141	Law declared by supreme court to be binding on all courts
Article 143	Power of president to consult Supreme Court
Article 148	Comptroller and auditor-General of India
Article 149	Duties and powers of the comptroller and auditor-general
PART VI	The states
Article 155	Appointment of governor
Article 161	Power of governor to grant pardons, etc., and to suspend, remit or commute sentences in certain cases
Article 163	Council of ministers to aid and advise the governor

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Article 167	Duties of chief minister with regard to the furnishing of information to governor, etc
Article 169	Abolition or creation of legislative councils in states
Article 200	Assent to bills by governor (including reservation for President)
Article 213	Power of governor to promulgate ordinances during recess of the state legislature
Article 226	Power of high courts to issue certain writs
Article 239AA	Special provisions with respect to Delhi
Article 239 to 242	The Union Territories
Article 243 to 243-0	The Panchayats
Article 243-P to 243-ZG	The Municipalities
Article 243 K	State Election Commission
Article 249	Power of Parliament to legislate with respect to a matter in the State List in the national interest
Article 262	Adjudication of disputes relating to waters of inter-state rivers or river valleys
Article 263	Provisions with respect to an inter-state council
Article 265	Taxes not to be imposed save by authority of law
Article 275	Grants from the Union to certain states
Article 280	Finance Commission
Article 300	Suits and proceedings
Article 300 A	Right to property
Article 307	Inter-State Trade and Commerce Commission
Article 311	Dismissal, removal or reduction in rank of persons employed in civil capacities under the Union or a state

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Article 312	All-India Services
Article 315	Public service commissions for the Union and for the states
Article 320	Functions of Public service commissions
Article 323 A	Administrative tribunals
Article 324	Superintendence, direction and control of elections to be vested in an Election Commission
Article 330	Reservation of seats for scheduled castes and scheduled tribes in the House of the People
Article 335	Claims of scheduled castes and scheduled tribes to services and Posts
Article 352	Proclamation of Emergency (National Emergency)
Article 356	Provisions in case of failure of constitutional machinery in states (President's Rule)
Article 360	Provisions as to financial emergency.
Article 365	Effect of failure to comply with, or to give effect to, directions given by the Union (President's Rule)
Article 368	Power of Parliament to amend the Constitution
Article 370	Temporary provisions with respect to the state of Jammu and Kashmir

## SCHEDULES OF THE CONSTITUTION

### FIRST SCHEDULE

1. Names of the States and their territorial jurisdiction.
2. Names of the Union Territories and their extent

### SECOND SCHEDULE

- Provisions relating to the emoluments, allowances, privileges and so on of
  1. The President of India
  2. The Governors of States

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3. The Speaker and the Deputy Speaker of the Lok Sabha
4. The Chairman and the Deputy Chairman of the Rajya Sabha
5. The Speaker and the Deputy Speaker of the Legislative Assembly in the states
6. The Chairman and the Deputy Chairman of the Legislative Council in the states
7. The Judges of the Supreme Court
8. The Judges of the High Courts

## THIRD SCHEDULE

- Forms of Oaths or Affirmations of members of legislatures, ministers and judges

## FOURTH SCHEDULE

- Allocation of seats in the Rajya Sabha to the states and the union territories

## FIFTH SCHEDULE

- Provisions relating to the administration and control of scheduled areas and scheduled tribes

## SIXTH SCHEDULE

- Administration of tribal areas of north-eastern states

## SEVENTH SCHEDULE

- Distribution of powers between the Union and the States government in terms of Union List, State List and Concurrent List.

## EIGHTH SCHEDULE

- Languages recognized by the Constitution. Originally, it had 14 languages but presently there are 22 languages

## NINTH SCHEDULE

- Validation of certain acts and regulations
- This schedule was added by the 1st Amendment (1951)

## TENTH SCHEDULE

- Provisions relating to disqualification of the members of Parliament and State Legislatures on the ground of defection.
- This schedule was added by the 52<sup>nd</sup> Amendment Act of 1985, also known as Anti defection Law

## ELEVENTH SCHEDULE

- Specifies the powers, authority and responsibilities of Panchayats. It has 29 matters.
- This schedule was added by the 73rd Amendment Act of 1992

## TWELFTH SCHEDULE

- Specifies the powers, authority and responsibilities of Municipalities. It has 18 matters
- This schedule was added by the 74th Amendment Act of 1992

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## SOURCES OF THE CONSTITUTION

Sources	Features Borrowed
Government of India Act of 1935	<ul style="list-style-type: none"><li>▪ Judiciary</li><li>▪ Public Service Commissions</li><li>▪ Federal Scheme</li><li>▪ Office of governor</li><li>▪ Emergency provisions</li><li>▪ Administrative details</li></ul>
Constitution of Britain	<ul style="list-style-type: none"><li>▪ Parliamentary government</li><li>▪ Rule of Law</li><li>▪ Legislative procedure</li><li>▪ Single citizenship</li><li>▪ Cabinet system</li><li>▪ Prerogative writs</li><li>▪ Parliamentary privileges and bicameralism</li><li>▪ Office of comptroller &amp; auditor general</li></ul>
Constitution of USA	<ul style="list-style-type: none"><li>▪ Fundamental rights</li><li>▪ Independence of judiciary</li><li>▪ Judicial review</li><li>▪ Impeachment of the president</li><li>▪ Removal of Supreme Court and high court judges</li><li>▪ Post of vice president</li></ul>
Constitution of Ireland	<ul style="list-style-type: none"><li>▪ Directive Principles of State Policy</li><li>▪ Nomination of members to Rajya Sabha</li><li>▪ Method of election of president</li></ul>
Constitution of Canada	<ul style="list-style-type: none"><li>▪ Federation with a strong Centre</li><li>▪ Vesting of residuary powers in the Centre</li><li>▪ Appointment of state governors by the Centre</li><li>▪ Advisory jurisdiction of the Supreme Court.</li></ul>
Australian Constitution	<ul style="list-style-type: none"><li>▪ Concurrent List</li><li>▪ Freedom of trade, commerce and inter course</li></ul>



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	<ul style="list-style-type: none"><li>▪ Joint sitting of the two Houses of Parliament</li></ul>
Weimar Constitution of Germany	<ul style="list-style-type: none"><li>▪ Suspension of Fundamental Rights during Emergency</li></ul>
French Constitution	<ul style="list-style-type: none"><li>▪ Republic and the ideals of liberty, equality and fraternity in the Preamble</li></ul>
South African Constitution	<ul style="list-style-type: none"><li>▪ Procedure for amendment of the Constitution</li><li>▪ Election of members of Rajya Sabha</li></ul>
Japanese Constitution	<ul style="list-style-type: none"><li>▪ Procedure established by Law</li></ul>
Constitution of USSR(Russia)	<ul style="list-style-type: none"><li>▪ Fundamental duties</li><li>▪ The ideal of justice in the Preamble</li></ul>

## PREAMBLE

- The term ‘**preamble**’ refers to the introduction or preface to the Constitution. It consists of the ideals, objectives and **basic principles of the Constitution**. It has great value and has been described as the ‘key to the Constitution’.
- The Preamble to the Indian Constitution is based on the ‘**Objective Resolution**’, drafted by **Jawaharlal Nehru**, which was adopted by the Constituent Assembly on **January 22, 1947**. It has been amended once by the **42nd Constitutional Amendment Act of 1976**, which added three new words - **socialist, secular and integrity**.
- The Preamble begins with the phrase ‘**We, the People of India**’. Thus, we can say that the people of India are the source of our Constitution.
- The Preamble of our Constitution states that India is a **Sovereign Socialist Secular Democratic Republic**. Its aim is to secure to all Indian citizens Social, economic and political justice.
- The objectives stated by the Preamble are to secure **justice, liberty, equality to all citizens and promote fraternity to maintain unity and integrity of the nation**.
- The date is mentioned in the preamble when it was adopted i.e. **November 26, 1949**
- The concept of **Liberty, Equality, and Fraternity** in our **Preamble** was adopted from the French Motto of the **French Revolution in 1789**.

## KEY WORDS IN THE PREAMBLE

- **Key words**-Sovereign, Socialist, Secular, Democratic, Republic, Justice, Liberty, Equality and Fraternity

Sovereign

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- The word '**sovereign**' implies that India is neither a dependency nor a dominion of any other nation, but an independent state. There is **no authority above it**, and it is free to conduct its own affairs (both Internal and external).

## Socialist

- The term Socialist added in the Preamble by 42nd Amendment, 1976. Indian brand of socialism is Democratic Socialism that holds faith in a mixed economy where both the private and public sectors co-exist side by side.

## Secular

- The term Secular was incorporated in the Preamble by 42nd Constitutional Amendment, 1976
- The Indian Constitution embodies the positive concept of secularism ie, all religions in our country have the same status and support from the state

## Democratic

- The term implies that the Constitution of India has an established form of Constitution which gets its authority from the will of the people expressed in an election.

## Republic

- The term indicates that the head of the state is elected by the people.
- A democratic polity can be classified into two categories
  1. Monarchy (Ex: Britain)
  2. Republic (Ex: India, USA).
- In India, the President is the head of the state and he is elected indirectly by the people of India.

## CITIZENSHIP

- The **Constitution of India** provides for a **single** and **uniform citizenship** for the whole of India.
- **Articles 5 to 11** under **Part II** of the Constitution deals with the citizenship.
- **The Citizenship Act of 1955** provides for acquisition and loss of citizenship after the commencement of the Constitution.
- This Act has been amended so far six times by the following Acts:
  1. The Citizenship (Amendment) Act, 1986.
  2. The Citizenship (Amendment) Act, 1992.
  3. The Citizenship (Amendment) Act, 2003.
  4. The Citizenship (Amendment) Act, 2005.
  5. The Citizenship (Amendment) Act, 2015.

6. The Citizenship (Amendment) Act, 2019.

- **Parliament** shall have the power to make any provision with respect to **the acquisition and termination of citizenship** and all other matters relating to citizenship (**Article 11**).
- **Citizens** are full members of the Indian State. They enjoy all civil and political rights
- **Aliens**, on the other hand, are the citizens of some other state and hence, do not enjoy all the civil and political rights. They are of two categories—friendly aliens and enemy aliens. Enemy aliens enjoy lesser rights than the friendly aliens, Eg, they do not enjoy protection against **arrest and detention (Article 22)**
- The Constitution confers the following rights and privileges on the citizens of India (**and denies the same to aliens**):
  1. Right against discrimination on grounds of religion, race, caste, sex or place of birth (Article 15).
  2. Right to equality of opportunity in the matter of public employment (Article 16).
  3. Right to freedom of speech and expression, assembly, association, movement, residence and profession (Article 19).
  4. Cultural and educational rights (Articles 29 and 30).
  5. Right to contest for the membership of the Parliament and the state legislature.
  6. Right to vote in elections to the Lok Sabha and state legislative assembly.

## Acquisition of Citizenship

- According to the Citizenship Act, 1955, the citizenship could be acquired through any of the following methods.
  1. **By Birth:** All persons born in India on or after January 26, 1950 are treated as citizens by birth.
  2. **By Descent:** A person born outside India on or after January 26, 1950 shall be a citizen of India by descent, if his father is a citizen of India at the time of his birth.
  3. **By Registration:** A person can acquire citizenship of India by registration with appropriate authority.
  4. **By Naturalisation:** A foreigners can acquire Indian citizenship, on application for naturalization to the Government of India.
  5. **By Incorporation of Territory:** In the event of a certain territory being added to the territory of India, the Government of India shall specify the persons of that territory who shall be citizen of India

## Loss of Citizenship

- The Citizenship Act of 1955 prescribes three ways of losing citizenship whether acquired under the Act or prior to it under the Constitution, viz, renunciation, termination and deprivation.
  1. **By Renunciation:** It can be voluntarily renounced by a citizen
  2. **By Termination:** When an Indian citizen voluntarily acquires the citizenship of another country, his Indian citizenship automatically terminates. This provision, however, does not apply during a war in which India is engaged.

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3. **By Deprivation:** It is a compulsory termination of Indian citizenship by the Central government, if:
- (i).The citizen has obtained the citizenship by fraud.
  - (ii).The citizen has, within five years after registration or naturalization, been imprisoned in any country for two years.
  - (iii) The citizen has unlawfully traded or communicated with the enemy during a war;

## FUNDAMENTAL RIGHTS

- The **Fundamental Rights** are enshrined in **Part III** of the Constitution from **Articles 12 to 35**.
- **Part III** of the Constitution is rightly described as the **Magna Carta** of India
- **Originally**, the Constitution provided for **seven Fundamental Rights**. The right to property was deleted from the list of Fundamental Rights So at presently only six Fundamental Rights
- The **right to property (Article 31)** was **deleted** from the list of Fundamental Rights by the **44th Amendment Act, 1978**. It is made a legal right under **Article 300-A in Part XII** of the Constitution.
- **Part III** of the Indian Constitution guarantees **six fundamental rights** to all the citizens
  - 1. Right to Equality (Articles 14–18),
  - 2. Right to Freedom (Articles 19–22),
  - 3. Right against Exploitation (Articles 23–24),
  - 4. Right to Freedom of Religion (Articles 25–28),
  - 5. Cultural and Educational Rights (Articles 29–30)
  - 6. Right to Constitutional Remedies (Article 32)
- Fundamental rights can also be suspended during the operation of a **National Emergency except** the rights guaranteed by **Articles 20 and 21**
- **Article 17** abolishes ‘**untouchability**’ and forbids its practice in any form.
- **Article 21 A** declares that the State shall provide free and compulsory education to all children of the age of six to fourteen years. This provision was added by the 86th Constitutional Amendment Act of 2002
- **Article 24** prohibits the employment of children below the age of **14 years** in any factory, mine or other hazardous activities like construction work or railway
- **Article 16** provides for equality of opportunity for all citizens in matters of employment or appointment to any office under the state
- **Article 33** empowers the Parliament to restrict or abrogate the fundamental rights of the members of armed forces, paramilitary forces, police forces, intelligence agencies and analogous forces

**Right to constitutional remedies (Articles - 32)**

# Railway Exams – General Awareness

- A **writ** is an order or command issued by a court in writing under its seal. It is in the nature of a command or prohibition from performing certain acts that are specified in the orders of the court. Both the Supreme Court and the High Courts are empowered to issue five kinds of writs. That is why the **Supreme Court** is called the “**Guardian of the Constitution**”.
- 1. **Habeas Corpus:** Safeguards people from illegal arrests.
- 2. **Mandamus:** It protects the petitioner who requires legal help to get his work done by respective public authorities.
- 3. **Prohibition:** It prohibits a subordinate court from acting beyond its jurisdiction.
- 4. **Certiorari:** It quashes an order issued by a subordinate court by overstepping its jurisdiction
- 5. **Quo Warranto:** It prevents usurpation of public office through illegal manner.
- The **Supreme Court (under Article 32)** and the **high courts (under Article 226)** can issue the writs of habeas corpus, mandamus, prohibition, certiorari and quo-warranto.
- According to **Dr. Ambedkar**, **Article 32** is “**the heart and soul of the Constitution**”.

## DIRECTIVE PRINCIPLES OF STATE POLICY

- The **Directive Principles of State Policy** are enumerated in **Part IV** of the Constitution from **Articles 36 to 51**.
- The framers of the Constitution borrowed this idea from the **Irish Constitution** of 1937, which had copied it from the Spanish Constitution.
- The Constitution of India does not contain any classification of Directive Principles. However, on the basis of their content and direction, they can be classified into three broad categories, viz, **socialistic, Gandhian and liberal-intellectual**. These principles are not enforceable by the courts.
- Dr. B.R. Ambedkar described these principles as ‘**novel features**’ of the Indian Constitution.
- The 86th Amendment Act of 2002 changed the subject -matter of Article 45 and made elementary education a fundamental right under Article 21 A.
- The **Parliament** can **amend** the **Fundamental Rights** for **implementing** the **Directive Principles**, so long as the amendment **does not damage or destroy the basic structure of the Constitution**.

## FUNDAMENTAL DUTIES

- The Fundamental Duties in the Indian Constitution are inspired by the Constitution of former USSR.
- In 1976, the Government of India set up the **Swaran Singh Committee** to make recommendations on fundamental duties. The 42nd Amendment Act of 1976 added some responsibilities of citizens to our

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Constitution called the Fundamental Duties. This amendment added a new part, namely, **Part IVA** to the Constitution.

- **The Part IV-A** of the Constitution (which consists of only one Article—51-A) specifies the eleven **Fundamental Duties**

## LIST OF FUNDAMENTAL DUTIES

- According to **Article 51 A**, it shall be the duty of every citizen of India
  1. To abide by the constitution and respect its ideals and institutions, the National Flag and the National Anthem.
  2. To cherish and follow the noble ideals which inspired the national struggle for freedom
  3. To uphold and protect the sovereignty, unity and integrity of India
  4. To defend the country and render national service when called upon to do so
  5. To promote harmony and the spirit of common brotherhood among all the people of India transcending religious, linguistic and regional or sectional diversities and to renounce practices derogatory to the dignity of women
  6. To value and preserve the rich heritage of our composite culture
  7. To protect and improve the natural environment including forests, lakes, rivers and wildlife, and to have compassion for living creatures
  8. To develop scientific temper, humanism and the spirit of inquiry and reform
  9. To safeguard public property and to abjure violence
  10. To strive towards excellence in all spheres of individual and collective activity, so that the nation constantly rises to higher levels of endeavour and achievement
  11. To provide opportunities for education to his child or ward between the age of six and fourteen years. This duty was added by the 86th Constitutional Amendment Act, 2002.

## EMERGENCY PROVISIONS

### National Emergency (Article 352)

- Emergency due to war, external aggression or armed rebellion (**Article 352**). This is popularly known as **National Emergency**.
- The proclamation of Emergency must be approved by both the Houses of **Parliament within one month** from the date of its issue.
- Emergency approved by both the Houses of Parliament, the emergency **continues for six months**, and can be **extended to an indefinite period** with an approval of the Parliament for every six months

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- A proclamation of emergency may be revoked by the President at any time by a subsequent proclamation. Such a proclamation does not require parliamentary approval.
- Articles 358 and 359 describe the effect of a National Emergency on the **Fundamental Rights**. Article 358 deals with the suspension of the Fundamental Rights guaranteed by Article 19, while Article 359 deals with the suspension of other Fundamental Rights (except those guaranteed by **Articles 20 and 21**).
- This type of emergency has been declared three times so far: in 1962, 1971 and 1975

## State emergency (Article 356)

- Emergency due to the failure of the constitutional machinery in the states (Article 356). This is popularly known as **President's Rule**
- A proclamation imposing President's Rule (Article 356) must be approved by both the Houses of Parliament within **two months** from the date of its issue
- **President's rule (Article 356)** approved by both the Houses of Parliament, the President's Rule continues for **six months**. It can be extended for a **maximum period of three years** with the approval of the Parliament every six months
- A proclamation of President's Rule may be revoked by the President at any time by a subsequent proclamation. Such a proclamation does not require parliamentary approval.
- The State is governed by the Governor on behalf of the President. For the first time, the President's Rule was imposed in **Punjab in 1951**.

## Financial emergency (Article 360)

- **Article 360** empowers the president to proclaim a **Financial Emergency** if he is satisfied that a situation has arisen due to which the financial stability or credit of India or any part of its territory is threatened.
- A proclamation declaring financial emergency must be approved by both the Houses of Parliament within **two months** from the date of its issue.
- Once approved by both the Houses of Parliament, the Financial Emergency **continues indefinitely** till it is revoked.
- A proclamation of Financial Emergency may be revoked by the president at any time by a subsequent proclamation. Such a proclamation does not require parliamentary approval.
- This type of emergency has not been declared in India so far

## OFFICIAL LANGUAGES OF INDIA

- Part XVII of the Indian Constitution deals with the official languages in Article 343 to 351.

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- Article 343 (1) has mentioned that “**The official language of the Union shall be Hindi in Devanagari script. The form of numerals to be used for the official purposes of the Union shall be the international form of Indian numerals.**”
- English is an additional official language for union government along with Hindi
- The Eighth Schedule to the Indian Constitution contains a list of 22 scheduled languages (Originally 14 languages). These are Assamese, Bengali, Bodo, Dogri, Gujarati, Hindi, Kannada, Kashmiri, Konkani, Mathili, Malayalam, Manipuri, Marathi, Nepali, Odia, Punjabi, Sanskrit, Santhali, Sindhi, Tamil, Telugu and Urdu. Sindhi was added by the 21st Amendment Act of 1967; Konkani, Manipuri and Nepali were added by the 71st Amendment Act of 1992; and Bodo, Dogri, Maithili and Santhali were added by the 92nd Amendment Act of 2003.
- The legislature of a state may adopt any one or more of the languages in use in the state or Hindi as the official language of that state. Until that is done, English is to continue as the official language of that state. Under this provision, most of the states have adopted the major regional language as their official language

## AMENDMENT OF THE CONSTITUTION

- Article 368 in Part XX of the Constitution deals with the powers of Parliament to amend the Constitution and its procedure
- The Supreme Court ruled that the constituent power of Parliament under Article 368 does not enable it to alter the ‘basic structure’ of the Constitution (In the 1973, **Kesavananda Bharati Case**, the Supreme Court ruled that Parliament cannot alter the 'basic structure' of the Constitution)
- **The procedures for amendment of the constitution are as follows**
  1. An amendment of the Constitution can be initiated only by the introduction of a bill for the purpose in either House of Parliament and not in the state legislatures.
  2. The bill can be introduced either by a minister or by a private member and does not require prior permission of the president.
  3. The bill must be passed in each house by a special majority, that is, majority by more than 50 percent of the total membership of the house and a majority of two-thirds of the members of the house present and voting. Each house must pass the bill separately.
  4. After duly passed by both the houses of parliament and ratified by the state legislatures wherever necessary, the bill is forwarded to the President for assent. The President must give his assent to the bill.



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He can neither withhold his assent to the bill nor return the bill for reconsideration of the Parliament. After President's assent, the bill becomes an Act (i.e., A Constitutional Amendment Act)

## Types of Amendments

- The constitution can be amended in three ways
  1. Simple majority of the parliament
  2. Special majority of the parliament
  3. Special majority of the parliament and the ratification of half of the state legislatures.

## UNION AND ITS TERRITORY

- Article 1 describes India that is Bharat as a Union of States
- The 100th Constitutional Amendment Act (2015) was enacted to give effect to the acquiring of certain territories by India and transfer of certain other territories to Bangladesh
- Article 3 authorises the Parliament to: form a new state by separation of territory from any state or by uniting two or more states or parts of states or by uniting any territory to a part of any state, increase the area of any state, diminish the area of any state, alter the boundaries of any state, and alter the name of any state
- Andhra Pradesh was the first linguistic state in India by separating the Telugu speaking areas from the Madras state
- The 36th Constitutional Amendment Act (1975) was enacted to make Sikkim a full-fledged state of the Indian Union
- India currently having 28 states and 9 union territories
- In 1987 Goa was conferred a statehood and become a 25<sup>th</sup> state of union of India

## STATES AND ITS FORMATION YEARS

State	Formation years
Andhra Pradesh	1953
Gujarat	1960
Maharashtra	1960
Kerala	1956
Nagaland	1963
Haryana	1966
Karnataka	1956

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Himachal Pradesh	1971
Manipur, Tripura	1972
Meghalaya	1972
Sikkim	1975
Mizoram	1987
Arunachal Pradesh	1987
Goa	1987
Uttarakhand	2000
Chhattisgarh	2000
Jharkhand	2000
Telangana	2014

## SPECIAL PROVISIONS FOR SOME STATES

S.No	States	Articles
1	Jammu and Kashmir	Article 370
2	Maharashtra	Article 371
3	Gujarat	Article 371
3	Nagaland	Article 371-A
4	Assam	Article 371-B
5	Manipur	Article 371-C
6	Andhra Pradesh	Article 371-D and 371-E
7	Sikkim	Article 371-F
8	Mizoram	Article 371-G
9	Arunachal Pradesh	Article 371-H
10	Goa	Article 371-I

## CONSTITUTIONAL BODIES

### 1. ELECTION COMMISSION

- **Article 324** of the Constitution provides that the power of superintendence, direction and control of elections to **parliament, state legislatures, the office of president of India and the office of vice president of India** shall be vested in the election commission.

# Railway Exams – General Awareness

- The Election Commission is a permanent and an independent body established by the Constitution of India. It ensures free and fair elections in the country.
- The president of India appoints Chief Election Commissioner and other Election Commissioners. They hold office for a term of **six years or until they attain the age of 65 years**, whichever is earlier
- The powers and functions of the Election Commission with regard to elections to the Parliament, state legislatures and offices of President and Vice-President can be classified into three categories
  1. Administrative
  2. Advisory
  3. Quasi-Judicial
- It must be noted here that the election commission is not concerned with the elections to **panchayats and municipalities in the states**. For this, the Constitution of India provides for a separate **State Election Commission**. . It conducts elections to Panchayats Bodies and Urban Local Bodies in accordance with **73rd and 74th Constitutional Amendments**.

## 2. UNION PUBLIC SERVICE COMMISSION

- Articles 315 to 323 in Part XIV of the Constitution contain elaborate provisions regarding the composition, appointment and removal of members along with the independence, powers and functions of the UPSC
- A chairman and other members of UPSC appointed by the president of India
- The chairman and members of the Commission hold office for a term of **six years or until they attain the age of 65 years**, whichever is earlier

## 3. STATE PUBLIC SERVICE COMMISSION

- Articles 315 to 323 in Part XIV of the Constitution deal with the composition, appointment and removal of members, power and functions and independence of a SPSC
- A chairman and other members of State Public Service appointed by the governor of the state. They can be removed only by the president
- The chairman and members of the Commission hold office for a term of six years or until they attain the age of 62 years.
- The **Constitution** makes a provision for the establishment of a **Joint State Public Service Commission (JSPSC)** for two or more states. While the **UPSC** and the **SPSC** are created directly by the **Constitution**, a **JSPSC** can be created by an act of **Parliament** on the request of the state legislatures concerned.
- Article 315 - Public Service Commissions for the Union and for the states
- Article 316 - Appointment and term of office of members
- Article 317 - Removal and suspension of a member of a Public Service Commission
- Article 320 - Functions of Public Service Commissions

## 4. FINANCE COMMISSION

- Article 280 of the Constitution of India provides for a Finance Commission as a quasi-judicial body
- Chairman and four other members of Finance Commission to be appointed by the president
- It is constituted by the **president of India every fifth year** or at such earlier time as he considers necessary
- The constitution of India envisages the Finance commission as the balancing wheel of fiscal federalism in India
- Articles Related to Finance Commission  
Article 280- Finance Commission  
Article 281- Recommendations of the Finance Commission

## 5. NATIONAL COMMISSION FOR SCHEDULED CASTES

- The National Commission for Scheduled Castes is a constitutional body. It is directly established by Article 338 of the Constitution.

## 6. NATIONAL COMMISSION FOR SCHEDULES CASTES

- The National Commission for Scheduled Tribes (STs) is a constitutional body. It is directly established by Article 338-A of the Constitution.

## 7. SPECIAL OFFICER FOR LINGUISTIC MINORITIES

- Article 350-B of the Constitution, the office of the Special Officer for Linguistic Minorities was created in 1957. He is designated as the Commissioner for Linguistic Minorities

## 8. COMPTROLLER AND AUDITOR GENERAL OF INDIA

- The Constitution of India (**Article 148**) provides for an independent office of the Comptroller and Auditor General of India
- He is the **guardian of the public purse and controls the entire financial system** of the country at both the levels—the Centre and the state
- The Comptroller and Auditor General of India is appointed by the **president of India**

## 9. ATTORNEY GENERAL FOR INDIA

- The Constitution (Article 76) has provided for the office of the Attorney General for India
- He is the **highest law officer in the country**
- The Attorney General of India is appointed by the **president**. He must be a person who is qualified to be appointed a judge of the Supreme Court
- He has the **right to speak and to take part in the proceedings of both the Houses of Parliament or their joint sitting and any committee of the Parliament** of which he may be named a member **but without a right to vote**

Article 88- Rights of Attorney-General as respects the Houses of Parliament and its Committee

## 10. ADVOCATE GENERAL FOR THE STATE

- The Constitution (Article 165) has provided for the office of the advocate general for the states
- He is the **highest law officer in the state**
- The advocate general of state is appointed by the **governor** of respective state. He must be a person who is qualified to be appointed a judge of a high court.
- He has the right to speak and to take part in the proceedings of both the **Houses of the state legislature or any committee of the state legislature** of which he may be named a member but **without a right to vote**

## NON-CONSTITUTIONAL BODIES

### 1. NITI Aayog

- On the 13th of August, 2014 Government of India scrapped the 65-year-old Planning Commission and announced that it would be replaced by a new body
- **On January 1, 2015**, the NITI Aayog (National Institution for Transforming India) was established
- It is a non-constitutional or extra-constitutional body and a non-statutory body
- NITI Aayog is the premier policy '**Think Tank**' of the Government of India providing both directional and policy inputs
- The **Prime Minister** of India is ex officio chairman of **NITI Aayog**
- Governing Council comprises the Chief Ministers of all the States, Chief Ministers of Union Territories with Legislatures (Delhi and Puducherry) and Lt. Governors of other Union Territories
- Vice-Chairman is appointed by the Prime Minister. He enjoys the **rank** of a **Cabinet Minister**

### 2. NATIONAL HUMAN RIGHTS COMMISSION

- The National Human Rights Commission is a statutory and not a constitutional body
- It was established in 1993 under a legislation enacted by the Parliament namely, **the Protection of Human Rights Act, 1993. This Act was amended in 2006**
- The chairman and members of National Human Rights Commission are appointed by the president of India.
- The chairman and members hold office for a term **of five years or until they attain the age of 70 years. Whichever is earlier.**
- The **chairman should be a retired chief justice of India**, and **members** should be serving or retired judges of the Supreme Court

### 3. STATE HUMAN RIGHTS COMMISSION

- The Protection of Human Rights Act of 1993 provides for the creation of State Human Rights Commission at the state level

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- **Twenty-five states** have constituted the State Human Rights Commissions through Official Gazette Notifications
- The chairperson and members hold office for a term of five years or until they attain the age of 70 years whichever is earlier
- The chairperson and members of a **State Human Rights Commission are appointed by the governor**, they can be **removed only by the President**
- The **chairperson** should be a **retired Chief Justice of a High Court**

## 4. CENTRAL INFORMATION COMMISSION

- The **Central Information Commission** was established by the **Central Government in 2005**
- It was constituted through an Official Gazette Notification under the provisions of the Right to Information Act (2005). It is **not a constitutional body**
- The Commission consists of a Chief Information Commissioner and not more than ten Information Commissioners. They are appointed by the **President of India**.
- Right to Information Act (RTI Act) was passed by Parliament of India on **15 June 2005** and came fully into force on **12 October 2005**.
- The Chief Information Commissioner and an Information Commissioner hold office for a term of **5 years or until they attain the age of 65 years**, whichever is earlier

## 5. STATE INFORMATION COMMISSION

- The **Right to Information Act of 2005** provides for the creation of a State Information Commission at the state level
- All the states have constituted the State Information Commissions through Official Gazette Notifications
- The Commission consists of a State Chief Information Commissioner and not more than ten State Information Commissioners. They are appointed by the Governor of respective states
- The State Chief Information Commissioner and a State Information Commissioner hold office for a term of **5 years or until they attain the age of 65 years**, whichever is earlier

## 6. CENTRAL VIGILANCE COMMISSION

- The Central Vigilance Commission (CVC) is the main agency for preventing corruption in the Central government
- Its establishment was recommended by the **Santhanam Committee** and established in **1964**
- The CVC was neither a constitutional body nor a statutory body. Later in 2003, the Parliament enacted a law conferring statutory status on the CVC
- The CVC is a multi-member body consisting of a Central Vigilance Commissioner and not more than two vigilance commissioners. They are appointed by the president of India
- They hold office for a term of four years or until they attain the age of sixty-five years, whichever is earlier

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## 7. CENTRAL BUREAU OF INVESTIGATION

- The Central Bureau of Investigation (CBI) was set up in 1963 by a resolution of the Ministry of Home Affairs
- CBI founded on **1 April 1963**
- The establishment of the CBI was recommended by the Santhanam Committee on Prevention of Corruption
- The CBI is not a statutory body. It derives its powers from the Delhi Special Police Establishment Act, 1946
- The CBI Academy is located at **Ghaziabad, Uttar Pradesh** and started functioning in **1996**

## 8. LOKPAL AND LOKAYUKTAS

- The Administrative Reforms Commission (ARC) of India (1966–1970) recommended the setting up ‘Lokpal’ and ‘lokayukta’ for the redressal of citizens’ grievances
- Lokpal and Lokayuktas Act (2013) Bill as passed by both Houses has received the assent of the President on 01.01.2014. The Act has been brought into force with effect from 16th January, 2014
- The institution of lokayukta was established first in Maharashtra in 1971

## CENTRAL GOVERNMENT

### PRESIDENT

- The Union executive consists of the President, the Vice-President, the Prime Minister, the council of ministers and the attorney general of India
- The **President** is the head of the Indian State. He is the **supreme commander of the armed forces**.
- He is the **First Citizen of India** and acts as the symbol of Unity, Integrity and Solidarity of the Nation.
- According to **Article 53** of the constitution, the **executive power of the Union shall be vested in the President** which shall be exercised by him directly or through officers subordinate to him in accordance with Constitution
- A **person to be eligible for election as President** should fulfill the following qualifications:
  1. He should be a citizen of India.
  2. He should have completed 35 years of age.
  3. He should be qualified for election as a member of the Lok Sabha.
  4. He should not hold any office of profit under the Union government or any state government or any local authority or any other public authority
- The President is elected by an electoral college in accordance with the **system of proportional representation** by means of **single transferable vote**.
- The **President is elected not directly by the people but by members of electoral college** consisting of
  1. The elected members of both the Houses of Parliament,

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2. The elected members of the legislative assemblies of the states,
  3. The elected members of the legislative assemblies of the Union Territories of Delhi and Puducherry
- The President holds office for a **term of five years**
  - The **oath of office to the President** is administered by the **Chief Justice of India** and in his absence in the presence of the **senior most judge of the Supreme Court**.
  - The **President can resign** from his office at any time by addressing the **resignation letter to the Vice-President**.
  - When a **vacancy occurs in the office of the President** due to his resignation, removal, death or otherwise, the **Vice-President acts as the President** until a new President is elected.
  - In case the office of **Vice-President** is **vacant**, the **Chief Justice of India** or if his office is also vacant, the **senior most judge of the Supreme Court acts as the President** or discharges the functions of the President.
  - He can declare war or conclude peace, subject to the approval of the Parliament
  - **Article 123** of the Constitution empowers the President to promulgate ordinances during the recess of Parliament
  - The **President** has been made only a **nominal Executive**, the real executive being the council of ministers headed by the prime minister.

## FUNCTIONS AND POWERS OF THE PRESIDENT

### EXECUTIVE POWERS

- Article 77 requires that every executive action of the Union shall be taken in the name of the President
- He appoints the Prime Minister and the other members of the Council of Ministers, distributing portfolios to them on the advice of the Prime Minister.
- He is **responsible** for making a wide **variety of appointments**. These include the appointment of Governors of States, the Chief Justice and other Judges of the Supreme Court and high Courts, the Attorney General, the Comptroller and Auditor General, the Chief Election Commissioner and other Election Commissioners the Chairman and other Members of the Union Public Service Commission ,Ambassadors and High Commissioners to other countries
- He can declare any area as scheduled area and has powers with respect to the administration of scheduled areas and tribal areas.

### LEGISLATIVE POWERS

- He inaugurates the session of the Parliament by addressing it after the general election and also at the beginning of the first session each year.
- He may send messages to either House of the Parliament with respect to a bill pending in the House.



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- A **bill passed by the Parliament** can become an act only if it receives the **assent of the President**
- **President terminates** the sessions of both or any of the **Houses of Parliament**. He can even dissolve the **Lok Sabha** before the **expiry of the term** of the House.
- He nominates **12 persons** who are eminent in literature, science, sports, art and social service to the **Rajya Sabha**. He can also nominate **two** persons belonging to Anglo-Indian Community to the **Lok Sabha**
- He **can promulgate ordinances** when the Parliament is not in session. These ordinances must be approved by the **Parliament within six weeks** from its **reassembly**. He can also withdraw an ordinance at any time.

## FINANCIAL POWER

- Annual Budget of the Central Government is presented before the **Lok Sabha** by the **Union Finance Minister** only with the **permission of the President**. He causes to be laid before the Parliament the annual financial statement (the Union Budget)
- Money bills can be introduced in the Parliament only with his prior recommendation.
- He constitutes a **finance commission** after **every five years**.
- The **Constitution of India** places the Contingency Fund of India is at the disposal of the President. No demand for a grant can be made except on his recommendation. He can make advances out of the contingency fund of India to meet any **unexpected expenditure**.

## JUDICIAL POWERS

- Article 72 confers on the President power to grant pardons, reprieves, respites or remissions of punishment, or to commute the sentence of any person convicted of an offence.
- He appoints the Chief Justice and the judges of Supreme Court and high courts.

## MILITARY POWERS

- Article 53(2) lays down that “the supreme command of the Defence Force of the Union shall be vested in the President and the exercise thereof shall be regulated by law”.

## DIPLOMATIC POWERS

- The international treaties and agreements are negotiated and concluded on behalf of the President
- The President appoints Indian diplomats to other countries and receives foreign diplomats posted to India.

## EMERGENCY POWERS

- The President has been empowered by the Constitution to proclaim National Emergency under Article 352, State Emergency under Article 356 and Financial Emergency under Article 360.
- The **emergency powers** of the **President of India** are specified in **Part XVIII** of the Indian Constitution.

## REMOVAL OF THE PRESIDENT

- Article. 61 of the Constitution lays down a detailed procedure for the impeachment of the President.

# Railway Exams – General Awareness

- The impeachment charges can be initiated by **either House of Parliament**. These charges should be signed by one-fourth members of the House (that framed the charges), and a **14 days' notice** should be given to the President.

## VICE-PRESIDENT

- **Article 63** of the constitution provides for a **Vice President** of India. This office has been created to maintain the political continuity of the state.
- The Vice-President of India occupies the second highest office in the country.
- Qualification for the election as Vice President
  1. He should be a citizen of India.
  2. He must have completed the age of 35 years.
  3. He must not hold any office of profit under the Union, State or local Government.
  4. He should have the other qualifications required to become a member of the Rajya Sabha.
- The Vice-President of India is elected by the elected members of both Houses of Parliament by secret ballot on the basis of **proportional representation system**, by means of the **single transferable vote**.
- The **term of office of the Vice President is five years**. He is eligible for re-election.
- The **Vice-President is the ex-officio Chairman of the Rajya Sabha** (Article 64 of the Indian Constitution). He presides over the meetings of the Rajya Sabha.
- He acts as President when a vacancy occurs in the office of the President due to his resignation, removal, and death or otherwise.

## CENTRAL COUNCIL OF MINISTERS

- Article 75 says only that the Prime Minister shall be appointed by the president
- Prime Minister may be a member of any of the two Houses of parliament Lok shaba or Rajya shaba
- Morarji Desai, Charan Singh, V.P. Singh, P.V. Narasimha Rao, H.D. Deve Gowda and Narendra Modi—became Prime Ministers after being Chief Ministers of their respective States
- The **council of ministers headed by the prime minister**
- The Prime Minister is appointed by the President, while the other ministers are appointed by the President on the advice of the Prime Minister
- A person who is **not a member of the Parliament can be appointed as a minister** but he has to get himself elected to the Parliament within **six months**.
- A minister who is a member of one House of Parliament has the right to speak and to take part in the proceedings of the other House also, but he **can vote only in the House** of which he is a member.

# Railway Exams – General Awareness

- The total number of ministers, including the Prime Minister, in the **Council of Ministers shall not exceed 15% of the total strength of the Lok Sabha**. This provision was added by the **91st Amendment Act of 2003**
- **Article 75** clearly states that the council of ministers is collectively responsible to the **Lok Sabha**

## PARLIAMENT

- The parliament is the legislative organ of the Union government.
- The Parliament of India consists of three parts, the President, the Council of States (Rajya sabha) and the House of the People (Lok sabha)

## RAJYA SABHA

- The maximum **strength of the Rajya Sabha is fixed at 250**, out of which, 238 are to be the representatives of the states and union territories and 12 are nominated by the president
- Presently the Rajya Sabha has 245 members. Of these, 229 members represent the states, 4 members represent the union territories and **12 members are nominated by the president**
- Members of Rajya Sabha are elected by the elected members of the **‘State Legislative Assemblies’** in accordance with the system of **proportional representation by means of the single transferable vote**. This process of election is called **“indirect election”** as they are not elected by the people directly.
- The Constitution lays down the following qualifications for a person to be chosen a member of the Rajya sabha
  1. He should be a citizen of India.
  2. He should not be less than **30 years of age**.
  3. He should not hold any office of profit under any Government
- The **Fourth Schedule** of the Constitution of India deals with the allocation of seats in the Rajya Sabha to the states and union territories
- The **Rajya Sabha (first constituted in 1952)** is a **continuing chamber**, It is a permanent body and not subject to dissolution. However, one-third of its members retire every second year
- Representation of the People Act (1951) provided that the term of office of a member of the Rajya Sabha is **six years**
- Rajya sabha cannot reject or amend a money bill
- The **vice-president** of India is the **ex-officio Chairman** of the Rajya Sabha
- The **Deputy Chairperson** of the **Rajya Sabha** is elected by the members of the Rajya Sabha.

# Railway Exams – General Awareness

- **Rajya sabha authorise** the Parliament to **create new All-India Services** common to both the Centre and states

## LOK SABHA

- The maximum strength of the Lok Sabha is fixed at 552. Out of this, 530 members are to be the representatives of the states, 20 members are to be the representatives of the union territories and 2 members are to be nominated by the president from the Anglo-Indian community.
- Presently the Lok Sabha has **545 members**. Of these, **530 members** represent the states, **13 members** represent the union territories and **2 Anglo-Indian members** are nominated by the President
- Lok Sabha normal **term is five years** from the date of its **first meeting after the general elections**, after which it automatically dissolves
- The Constitution lays down the following qualifications for a person to be chosen a member of the Lok Sabha
  1. He should be a citizen of India.
  2. He should not be less than 25 years of age.
  3. He should not hold any office of profit under the Union or State Government.
- The **Speaker and deputy speaker of the Lok Sabha** is the presiding officer of the Lok Sabha
- Lok Sabha speaker does not vote in the first instance. But he can exercise a casting vote in the case of a tie. In other words, only when the House is divided equally on any question, the Speaker is entitled to vote. Such vote is called **casting vote**, and its purpose is to resolve a deadlock
- **Lok Sabha speaker** presides over a **joint sitting of the two Houses of Parliament**. Such a sitting is summoned by the President to settle a deadlock between the two Houses on a bill.
- **Lok Sabha speaker** appoints the **chairman of all the parliamentary committees** of the Lok Sabha and supervises their functioning
- Lok Sabha is dissolved; the Speaker does not vacate his office and continues till the newly-elected Lok Sabha meets.
- In the following cases, a **member of Parliament vacates his seat**:
  - House can declare the seat of a member vacant if he is absent from all its meetings for a period of **sixty days without its permission**
  - Person cannot be a member of both the Parliament and the state legislature at the same time. If a person is so elected, his seat in Parliament becomes vacant if he does not resign his seat in the state legislature within **14 days**.
  - If a person is elected to both the Houses of Parliament, he must intimate within **10 days** in which House he desires to serve. In default of such intimation, his seat in the Rajya Sabha becomes vacant

# Railway Exams – General Awareness

## ZERO HOUR

- The **zero hour starts immediately after the question hour** and lasts until the agenda for the day
- It is an **Indian innovation** in the field of parliamentary procedures and has been in existence since **1962**

## IMPORTANT POINTS ABOUT PARLIMENT

- The **Non confidence motion** needs the support of **50 members** to be admitted
- **Ordinary Bill** can be **introduced either in the Lok Sabha or the Rajya Sabha**. It can be introduced either by a minister or by a private member
- **Money bill** can be introduced **only in the Lok Sabha and not in the Rajya Sabha**. It can be introduced only by a **minister**
- Rajya Sabha cannot amend or reject a Money Bill. It should return the bill to the **Lok Sabha within 14 days**, either with recommendations or without recommendations
- The **Speaker of Lok Sabha** presides over a **joint sitting of the two Houses**
- The **final power to decide whether a particular bill is a Money Bill or not** is vested in the **Speaker of the Lok Sabha**.
- The maximum gap between **two sessions of Parliament cannot be more than six months**. In other words, the Parliament should meet at least twice a year
- **Parliament Sessions**
  1. Budget Session- February to May
  2. Monsoon Session- July to September
  3. Winter Session- November to December
- Ganesh Vasudev Mavalankar is first speaker of Lok sabha
- Parliament is also vested with **powers to impeach** the President and to remove Judges of the Supreme Court and High Courts, Chief Election Commissioner and Comptroller and Auditor General of India in accordance with the procedure laid down in the Constitution.

## COMMITTEES OF THE PARLIAMENT

- Broadly, parliamentary Committees are of two kinds - **Standing Committee and Ad Hoc Committees**. The former are permanent (constituted every year or periodically) and work on a continuous basis, while the latter are temporary and cease to exist on completion of the task assigned to them.

## STANDING COMMITTEES

- On the basis of the nature of functions performed by them, standing Committees can be classified into the following six categories:

## 1. Financial Committees

- a) Public Accounts Committee
- b) Estimates Committee
- c) Committee on Public Undertakings

## 2. Departmental Standing Committees (24)

## 3. Committees to Inquire

- a) Committee on Petitions
- b) Committee of Privileges
- c) Ethics Committee

## 4. Committees to Scrutinise and Control

- a) Committee on Government Assurances
- b) Committee on Subordinate Legislation
- c) Committee on Papers Laid on the Table
- d) Committee on Welfare of SC's and ST's
- e) Committee on Empowerment of Women
- f) Joint Committee on Offices of Profit

## 5. Committees Relating to the Day-to-Day Business of the House

- a) Business Advisory Committee
- b) Committee on Private Members' Bills and Resolutions
- c) Rules Committee
- d) Committee on Absence of Members from Sitzings of the House

## 6. House-Keeping Committees or Service Committees

- a) General Purposes Committee
- b) House Committee
- c) Library Committee
- d) Joint Committee on Salaries and Allowances of Members.

## Ad Hoc Committee

- Ad Hoc Committees can be divided into two categories, that is, Inquiry Committees and Advisory Committees.

## SUPREME COURT

- The Supreme Court of India was inaugurated on **January 28, 1950**. It succeeded the Federal Court of India, established under the **Government of India Act of 1935**.

# Railway Exams – General Awareness

- The Supreme Court of India has been established by **Part V, Chapter IV** of the Constitution of India. **Articles 124 to 147** of the Constitution lays down the composition and jurisdiction of the Supreme Court of India.
- **Article 124** states the establishment and constitution of supreme court
- Presently supreme court of 34 judges including chief justice of India
- Indian Constitution has established an **integrated judicial system** with the Supreme Court at the top and the high courts below it
- The single system of courts adopted from the Government of India Act 1935 enforces both central and state laws
- The parliament can increase the number of judges of supreme court of India
- The judges of the Supreme Court are appointed by the president
- Senior most judge of the Supreme Court is appointed to the office of the chief justice of India by president of India
- Supreme court judge holds office until he attains the **age of 65 years**
- The judges of the Supreme Court can resign before their term by giving their **resignation in writing** to the **President**. The **Parliament** also has power to **remove** the Judges by invoking **impeachment** provisions
- Under Article 124 a person to be appointed as a judge of the Supreme Court should have the following qualifications
  1. He should be a citizen of India.
  2. (a) He should have been a judge of a High Court for five years; or  
(b) He should have been an advocate of a High Court for ten years; or  
(c) He should be a distinguished jurist in the opinion of the president.
- Supreme Court is the **guarantor of the fundamental rights of the citizens** and **guardian of the Constitution**
- Under **Article 130** the Constitution declares Delhi as the seat of the **Supreme Court**.
- The Supreme Court of India has more powers than any other Supreme Court in any part of the world.

## JURISDICTION AND POWERS OF SUPREME COURT

- The jurisdiction and powers of the Supreme Court can be classified into the following
  1. Original Jurisdiction.
  2. Writ Jurisdiction.
  3. Appellate Jurisdiction.
  4. Advisory Jurisdiction.
  5. A Court of Record.

## 6. Power of Judicial Review

### ORIGINAL JURISDICTION

- The cases which are brought directly in the first instance to the Supreme Court come under original jurisdiction
- The Supreme Court decides the disputes between
  1. The Centre and one or more states; or
  2. The Centre and any state or states on one side and one or more states on the other; or
  3. between two or more states

In the above disputes the Supreme Court has exclusive original jurisdiction

### WRIT JURISDICTION

- Every individual has the right to move the supreme court directly by appropriate proceedings for the enforcement of his fundamental rights through the issuance of writs

### APPELLATE JURISDICTION

- The Supreme Court is the final appellate court in the country
- The Supreme Court is primarily a court of appeal and hears appeals against the judgments of the lower courts.
  1. Appeals in constitutional matters.
  2. Appeals in civil matters. (Article 133)
  3. Appeals in criminal matters. (Article 134)
  4. Appeals by special leave (Article 136)

### ADVISORY JURISDICTION

- The Constitution (Article 143) authorizes the president to seek the opinion of the Supreme Court. It is duly bound to give its opinion, which is not binding on president

### COURT OF RECORD

- As a court of record, Supreme court has two powers
  1. Judgments, Proceedings and acts of supreme court are recorded for perpetual memory and testimony
  2. It can punish for contempt of court

### POWER OF JUDICIAL REVIEW

- Judicial review is the power of the Supreme Court to examine the constitutionality of legislative enactments and executive orders of both the Central and state governments
- On examination, if they are found to be violative of the Constitution they can be declared as illegal, unconstitutional and invalid by the Supreme Court
- Some of the famous cases in which supreme court used the power of judicial review are  
Golakanath case (1967)  
Bank Nationalization case (1970)



# Railway Exams – General Awareness

Privy purse Abolition case (1971)  
Keshavananda bharati caase (1973)  
Minera mills case (1980)

## STATE GOVERNMENT

### GOVERNOR

- Articles **153 to 167 in Part VI** of the Constitution deal with the state executive
- The governor is the chief executive head of the state. The governor also acts as an agent of the central government
- Governor is appointed by the **president of India**
- The Legislature of a State or a High Court has no role in the removal of a Governor.
- The Constitution lays down only two qualifications for the appointment of a person as a governor
  1. He should be a citizen of India
  2. He should have completed the age of 35 years

Additionally, he should **not belong to the state** where he is appointed.

- A governor holds office for a term of five years from the date on which he enters upon his office. However, this term of five years is subject to the pleasure of the President
- According to **Article 158 (3A)**, where the same person is appointed as Governor of two or more States, the emoluments and allowances payable to the Governor shall be allocated among the States in such proportion as the President may by order determine.

### POWERS AND FUNCTIONS OF THE GOVERNOR

- The Governor is the head of the state executive and he has enormous powers. In the exercise of functions and powers, the Governor, except in certain cases, is to be guided by the aid and advice of the Council of Ministers headed by the Chief Minister (under Article 163).

### EXECUTIVE POWERS

- He appoints the leader of the majority party in the State Legislative Assembly as the Chief Minister of the State.
- He appoints other members of the Council of Ministers on the recommendation of the Chief Minister.
- He acts as the **chancellor of universities** in the state. He also appoints the vice-chancellors of universities in the state.
- He **appoints** the advocate general of a state, state election commissioner and chairman and members of the state public service commission

# Railway Exams – General Awareness

- He directly rules a State when there is the imposition of the President's rule in the State.

## LEGISLATIVE POWERS

- **Under Article 175** Right of the Governor to address and send messages to the house or houses of state legislature
- **Under Article 213** he can promulgate ordinances when the state legislature is not in session. These ordinances must be approved by the state legislature within six weeks from its reassembly
- He can nominate one member to the State Legislative Assembly from the Anglo-Indian Community.
- Every bill passed by the state legislature will become law only after his signature. But, when a bill is sent to the Governor after it is passed by the legislature, he has the options to give his assent to the bill or withhold his assent to the bill or return the bill for the reconsideration of the legislature.

## FINANCIAL POWERS

- **Money bills** can be introduced in the state legislature only with his prior Recommendation
- He can make advances out of the **state Contingency Fund** to meet any unforeseen expenditure.
- He constitutes a **finance commission after every five years** to review the financial position of the panchayats and the municipalities

## JUDICIAL POWERS

- He appoints the advocate -General of the State.
- He makes appointment, postings and promotions of the District Judges in consultation with the State High Court
- He can pardon, commute or reprieve punishment on receipt of appeals for mercy except death sentence.

## STATE COUNCIL OF MINISTERS

- Article 164 clearly states that council of ministers shall be collectively responsible to the state Legislative Assembly
- The chief minister is appointed by the governor. The other ministers are appointed by the governor on the advice of the chief minister
- All the members of the Council of Ministers must be the members of the State Legislature. Those who are not the members at the time of their appointment, must secure their seats in the Legislature within a period of 6 months

## STATE LEGISLATURE

- The state legislature consists of the governor and the legislative assembly
- If the states having bicameral system the state legislature consists of the governor, the legislative council and the legislative assembly
- Some of the states have a unicameral system, while others have a bicameral system

# Railway Exams – General Awareness

- Presently only six states have two Houses (bicameral). These are Andhra Pradesh, Telangana, Uttar Pradesh, Bihar, Maharashtra and Karnataka
- The twenty-two states have unicameral system
- The Constitution provides for the abolition or creation of legislative councils in states. Accordingly, the Parliament can abolish a legislative council or create it
- The legislative assembly consists its **maximum** strength is fixed at **500 and minimum strength at 60**. It means that its strength varies from 60 to 500 depending on the population size of the state
- Arunachal Pradesh, Sikkim and Goa, the minimum number is fixed at 30 and Mizoram is 40 and Nagaland is 46
- Duration of the legislative assembly is **5 years**
- The legislative council is a continuing chamber, it is a permanent body and is not subject to dissolution
- A person must be not less than 30 years of age in the case of the legislative council and not less than 25 years of age in the case of the legislative assembly.
- **Article 169** deals with the creation or abolition of Legislative Council in a State. Article 169 holds that if the state Legislative Assembly passes a resolution by a majority of not less than 2/3rd of the members present and voting and by the majority of total strength of the House, requesting the Parliament to create or abolish the state Legislative council then the **Parliament** may by law provide for the **abolition and creation of the Legislative Council**.
- Presiding officer of legislative assembly is Speaker and a Deputy Speaker
- A Money Bill can be introduced only in the assembly and not in the council. The council cannot amend or reject a money bill. It should return the bill to the assembly within **14 days**

## HIGH COURT

- The high court operates below the Supreme Court but above the subordinate courts
- Presently there are **25 high courts** in the country. Out of them, four are common high courts. Delhi is the only union territory that has a own high court
- The Constitution of India provides for a high court for each state, but the Seventh Amendment Act of 1956 authorised the Parliament to establish a common high court for two or more states or for two or more states and a union territory.
- The judges of a high court are appointed by the President. The chief justice is appointed by the President after consultation with the chief justice of India and the governor of the respective state
- The judges of a high court hold office until he attains the age of **62 years**.
- The President can transfer a judge from one high court to another after consulting the Chief Justice of India

# Railway Exams – General Awareness

- **Parliament** can extend the jurisdiction of a High Court
- **Under Article 226** of the constitution, the High Courts are given powers of issuing writs not only for the enforcement of the Fundamental Rights, but also for other purposes. In exercise of this power, a Court may issue the same type of writs, orders or directions which the Supreme Court is empowered to issue under Article 32.

## CENTRE-STATE RELATIONS

- The Constitution of India, being federal in structure, divides all powers (legislative, executive and financial) between the Centre and the states.
- The Centre-state relations are divided into three parts, which are mentioned below:
  1. Legislative Relations (Article 245-255)
  2. Administrative Relations (Article 256-263)
  3. Financial Relations (Article 268-293)

### Legislative Power Distribution

- Articles 245 to 255 in Part XI of the Constitution deal with the legislative relations between the Centre and the states. These include:
  - Territorial extent of Central and state legislation
  - Distribution of legislative subjects
  - Parliamentary legislation in the state field;
  - Centre's control over state legislation.

### Territorial extent of Central and state legislation:

- The powers are distributed between the union and State governments territorially. The Union Government possess the powers over the entire territory of India while the States have jurisdiction over their own territories.
- The Central Government has extra territorial jurisdiction that means that its laws govern not only persons and property within India but also Indian citizens and their properties located in any corner of the world

### Subject Distribution

- The Constitution distributes the legislative subjects between the Union Government and States in an elaborate scheme. There are three Lists of distribution.
  1. **List I (Union List)** contains the subjects and powers exclusively allotted to the union parliament. There are 100 subjects here including defense, foreign affairs, banking, currency
  2. **List II (State List)** contains the subjects that are exclusively allotted to the State governments. There are 59 items including public order, and police, public health, local government, agriculture, fisheries

# Railway Exams – General Awareness

3. **List III (Concurrent List)** contains 52 items including criminal law and procedure, civil procedure, marriage, education. This list is called as Concurrent List. Both the union and State governments have powers over these subjects. But when there occurs a clash between the union and State governments the law of the parliament will prevail
4. There is also another category called residuary powers. Any subject not mentioned in the above three lists will automatically come under the jurisdiction of the Union Government.

## Administrative Relations

- Articles 256 to 263 in Part XI of the Constitution deal with the administrative relations between the Centre and the states.

## Financial Relations

- Articles 268 to 293 in Part XII of the Constitution deal with Centre-state financial relations.
- Finances are very fundamental in the successful operation of federal system. Indian Constitution distributes financial powers between the union and States in a comprehensive arrangement that is broadly modeled on the 1935 Government of India Act. There are two sources of revenue distributed by the Constitution namely Tax Revenue and Non-tax Revenue.
- The president of India constitutes a Finance Commission once in every five years. The article 280 of the Constitution describes the composition of the Finance Commission

## Venkatachaliah Commission

- The **National Commission to review the working of the Constitution** (NCRWC) also known as Justice **Manepalli Narayana Rao Venkatachaliah** Commission was set up by a resolution of the NDA Government of India led by Atal Bihari Vajpayee on **22 February 2000** for suggesting possible amendments to the Constitution of India.

## INDIAN POLITY ONE LINERS

- An amendment of the constitution may be initiated by the introduction of a bill in either House of Parliament
- The Directive Principles of State Policy has been adopted from Irish Constitution
- Speaker of Lok Sabha has the right to decide whether a Bill is a money bill or not
- Attorney General of India is the first law officer of the country
- The President can advance money to meet unforeseen expenses from the Contingency Fund
- Article 352 of Indian Constitution has the provision for National Emergency

# Railway Exams – General Awareness

- Article 66 deals with the election of the Vice-president
- Parliament can remove the Vice-President from his office
- The salary and allowances of the Governor are charged from the Consolidated Fund of the State
- G V K Rao committee on Panchayat raj is constituted on 1985
- A member of the council of ministers can hold office without being a member of the state legislature for a maximum period of six months
- Six fundamental Rights are mentioned in Indian constitution
- President of India is the executive head of state in India
- Article 124 of the constitution of India provides the composition and jurisdiction of the Supreme Court of India
- Sharad Arvind Bobde is the 47th chief justice of India
- Article 72 deals with the pardoning power of the President
- The impeachment of the President is carried by parliament of India
- Article 56 deals with the tenure of the President
- Article 61 deals with the impeachment of the President
- Supreme Court held that the Preamble is not a part of the constitution in Berubari Union case (1960)
- 42th amendment acts amended the Preamble of the Indian constitution
- In a parliamentary form of Government, the real powers of the state are vested in the Council of ministers headed by the Prime Minister
- The independence of Judiciary in Indian constitution is taken from USA
- Preamble of the constitution describes India as a secular state
- The first Parliamentary Forum on Youth constituted on 2006
- Shri Amitabh Kant is the CEO of NITI Aayog
- **Rajiv Kumar** is the Vice Chairman of NITI Aayog
- Arvind Panagariya was the first Vice Chairman of NITI Aayog
- Think tank of Government of India that replaced the Planning commission is NITI Aayog
- NITI Aayog came into effect from 1 January 2015
- The Panchayat Raj system exists in all the states except Nagaland, Meghalaya and Mizoram and in all the Union territories except Delhi
- The Panchayat Raj system was first adopted by the state of Rajasthan
- The panchayat system was adopted to decentralize the power of democracy
- Part IX of the constitution deals with the panchayat
- Rajasthan was the first state to establish Panchayat raj institutions

# Railway Exams – General Awareness

- Constitution (73rd Amendment) Act, 1992 makes provisions for a 3-tier system of Panchayat Raj for all the States having population of above 20 Lakhs
- NITI Aayog came into effect from 1 January 2015
- The Prime Minister of India is chairman of NITI Aayog
- High courts issue writs under Article 226
- Governor of the state appoints the Lokayukta and Upalokayukta
- Karnataka Lokayukta's office is considered to be the strongest in terms of power and scope
- The fundamental rights are provided in part III of the Indian Constitution
- Article 17 of the Constitution abolishes Untouchability
- Article 14 guarantees equality before law and equal protection of law for all individuals residing within the territory of India
- Articles 25 to 28 contain the right to religious freedom
- **Swaran singh committee** suggested to incorporate fundamental duties in the constitution
- Article 51 A of the Constitution contains fundamental duties
- The fundamental duties are mentioned in Part-IV A of the Constitution
- The fundamental duties are included in the constitution by 42nd Amendment in 1976
- Article 153 of the Constitution deals with the Governor of States
- The Governor of the State can be removed by President of India
- Financial emergency is imposed under Article 360
- National emergency proclamation is issued in Armed rebellion, External aggression and War
- Members of Election Commission are appointed by President of India
- The number of seats reserved for scheduled caste in the Lok sabha is 79
- **President of India** appoints the Chief Election Commissioner of Election Commission
- Article 324 in the Indian Constitution provides for an Election Commission in India
- Article 44 of the Constitution is directed to establish Uniform Civil Code
- Articles 36 to 51 of the Indian Constitution contains Directive principles of State policy
- Directive principles of State Policy is mentioned in of the Indian constitution
- Indian constitution taken the concept of single citizenship from UK
- Article 5 to 11 part II of Indian constitution deals with Citizenship
- Article 148 in the Constitution on India provides for the post of Comptroller and Auditor General of India
- Constitution of India came into effect on 26th January, 1950
- The constitution of India was adopted by the Constituent Assembly on 26th November, 1949
- Right to property according to the constitution is Legal right

# Railway Exams – General Awareness

- The total number of Schedules in the constitution are 12
- The Central Bureau of Investigation (CBI) comes under the administrative control of Department of Personnel and Training (DoPT) of the Ministry of Personnel
- The headquarters of Central Bureau of Investigation (CBI) located in **New Delhi**
- Central Bureau of Investigation (CBI) Academy located in **Ghaziabad**
- Central Bureau of Investigation was established in year of 1963
- Anti-Defection law passed in the year of 1985
- Article 83 lays down the qualifications for membership of the two Houses of Parliament
- The current limit of creamy layer (for OBC) in India to decide the benefits of the reservation is 8 lakhs per annum
- National Commission for Other Backward Class came into effect from 1993
- Procedure for the amendment of the Constitution is taken from **South Africa**
- Farming is mainly served by the Co-operative Societies in India
- State reorganisation committee was appointed on 1953
- Central Vigilance Commission established on 1964
- Central Information Commission is established by the central government under the Right to Information Act 2005
- Article 76 of Indian Constitution dealt with the appointment of attorney general of India
- The Attorney General of India is the highest law officer of the country
- Jawahar Lal Nehru prepared the preamble of the Indian Constitution
- Preamble of the Constitution describes India as a secular state
- Article 368 of Indian constitution deals with constitutional amendments
- 42nd constitutional Amendment of was passed during the emergency
- 92<sup>nd</sup> constitutional amendment Bill added Bodo, Dogri, Maithali and Santhali languages in the 8th schedule of the Indian constitution
- Government of India act 1935 is called the mini constitution of India
- The council of ministers is responsible to the Lok Sabha
- The Ninth Schedule to the Indian Constitution was added by First Amendment
- Ministry of Personnel, Public Grievances and Pensions has the right to remove the incompetent, inefficient and unproductive All India Service officers after 15 years of service
- Article 83 of the Constitution says that Rajya Sabha shall not be dissolute
- The representative from states in Rajya Sabha is elected by the Elected members of the state legislative Assembly



# Railway Exams – General Awareness

- Article 249 of Indian constitution says that Parliament has the power to make laws on any matter in the state list if a proclamation of emergency is in operation
- Article 275 has the provision that the union government will provide grants-in-aid to state government
- Article 280 of the Indian Constitution has the provision of Finance Commission in India
- Joint session of the parliament is arranged under the Article 108
- The Chairman of the National Human Rights Commission (NHRC) must be Retired Judge of Supreme Court
- National Human Rights Commission was established in the year of 1993
- The term of Comptroller and Auditor General of India is 6 years
- Andhra Pradesh was the first linguistic state
- Sarojini Naidu was the first woman governor in independence India
- The Estimates Committee is the largest Committee of the Parliament
- The salaries of the Judges of the Supreme Court drawn from Consolidated Fund
- The strategy of Rolling plan was adopted during prime ministership of Morarji Desai
- Constitution describes India as Union of states
- Right to education is a human right as well as a fundamental right under the Constitution of India
- The United Nations declared 4th week of September is peace week
- The first session of the Constituent Assembly held at New Delhi
- Proclamation of National Emergency automatically suspends Right to freedom
- President decides the number of Judges in a High Court
- Malhotra committee was assigned to recommend reforms in the insurance sector\
- During the proclamation of National Emergency articles 20 and 21 cannot be suspended
- Central pollution control bureau works under Environment and Forest ministry
- The year of the Shimla pact between India and Pakistan is 1972
- Liberty, Equality, Fraternity was a popular slogan of French revolution
- The Union Public Service Commission presents its report to President
- The maximum number of elected members in a State Assembly is 500
- First woman to become a Chief Minister of any State in India is Sucheta Kripalani
- Dr. Rajendra Prasad was the first President of the Indian Union
- Radhakrishnan was the first President of the Indian Union
- Bibek Debroy committee report is related to Restructuring the railways
- Right against exploitation guaranteed that the Constitution prohibits traffic in human beings
- The members of the Rajya Sabha are elected for a term of six years

# Railway Exams – General Awareness

- President in consultation with Election Commission is authorised to decide a dispute regarding the disqualification of members of Parliament
- The Rajya Sabha is a permanent house but one-third of its members retire every two years
- The Supreme Court tender's advice to the President on a matter of law or fact. if he seeks such advice
- The objective of 97th Amendment Act is encourage economic activities of cooperatives which in turn help progress of rural India
- The States Reorganisation Commission was set up in 1953 to consider the demand for linguistic states was headed by Fazl Ali
- The legislative council in a state can be abolished by the Parliament on the recommendation of the state legislative assembly
- The Secretary General of the Lok Sabha, who is the chief of the Lok Sabha Secretariat, is appointed by speaker of Lok sabha
- The Comptroller and Auditor General can be removed from his office before expiry of his term by the President on the recommendation of the Parliament
- The writ of Habeas Corpus is issued in the form of an order calling upon a person who has detained another person to bring that person before court and show authority for such detention
- The Speaker of the Lok Sabha addresses his letter of resignation to the Deputy Speaker of the Lok Sabha
- The Comptroller and Auditor General holds office for a term of six years
- The Government of India instituted Bharat Ratna and Padma Shri awards under Article 18 of the Constitution
- Impeachment proceedings against the President of India can be initiated in either House of Parliament
- The doctrine of judicial review is adopted in India to ensure smooth functioning of the Constitution
- The salary and allowances of the Comptroller and Auditor General are paid out of the Consolidated Fund of India
- The Presiding officer of Rajya sabha is not a member of that house
- The Prime Minister of India occupies a superior position than the British Prime Minister because his office has been created by the Constitution
- In India power of judicial review is restricted because the Constitution is supreme
- The 42nd Amendment increased the term of the Lok Sabha from five years to six years
- The Election Commission of India has a Quasi-Judicial Power
- The President of India is elected through an electoral college consisting of the elected members of Parliament and state legislative assemblies
- Money bills can be introduced in the Parliament only with the prior approval of the President
- The Parliament of India consists of the President, Lok Sabha and Rajya Sabha

# Railway Exams – General Awareness

- The Lok Sabha can be dissolved before the expiry of its term by the President on the advice of the Prime Minister
- The maximum gap between the two sessions of Parliament is six months
- Prime Minister Choudhary Charan Singh never attended the Parliament during his tenure
- The power to form new states or change the boundaries of existing states rests with the Parliament
- The office of the Prime Minister in India has been created by the Constitution
- The government resigns if a no-confidence motion is passed in Lok Sabha
- The pension of the judges of the High Court is charged from the Consolidated Fund of India
- Article 137 of the Constitution permits the Supreme Court to review its own judgement or order
- The Supreme Court of India was set up by the Constitution
- The States Reorganization Act, 1956, divided the entire country into 14 states and 6 union territories
- The titles and special privileges of the former rulers of the princely states were abolished by the 26th Amendment
- The president of India constitutes a Finance Commission once in every five years. The article 280 of the Constitution describes the composition of the Finance Commission. It will have one Chairman and four other members.

## IMPORTANT CONSTITUTIONAL AMENDMENTS

### 1. First Amendment Act 1951

- Added Ninth Schedule to protect the land reform and other laws included in it from the judicial review
- Empowered the state to make special provisions for the advancement of socially and economically backward classes

### 2. Fourth Amendment Act, 1955

- Authorized the state to nationalize any trade

### 3. Seventh Amendment Act 1956

- It was necessitated on account of reorganization of states on a linguistic basis and changed first and fourth schedules
- Provided for the establishment of a common high court for two or more states
- Extended the jurisdiction of high courts to union territories

### 4. Eighth Amendment Act, 1960

- Extended reservation of SC, ST & Anglo Indians in Lok Sabha and the state legislative assemblies for a period of 10 years

### 5. Ninth Amendment Act, 1960

# Railway Exams – General Awareness

- Transferred certain territories to Pakistan following September 1958 Indo-Pak Agreement

## 6. Tenth Amendment Act, 1961

- Incorporated Dadra and Nagar Haveli in the Indian Union

## 7. Twelfth Amendment Act, 1962

- Incorporated Goa, Daman and Diu in the Indian Union

## 8. Thirteenth Amendment Act, 1962

- Gave the status of a state to Nagaland and made special provisions for it

## 9. Fourteenth Amendment Act, 1962

- Incorporated Puducherry in the Indian Union

## 10. Fifteenth Amendment Act, 1963

- Enabled the high courts to issue writs to any person or authority even outside its territorial jurisdiction if the cause of action arises within its territorial limits.
- The retirement age of high court judges from 60 to 62 years

## 11. Seventeenth Amendment Act, 1964

- Amended right to property and Added more provisions in 9th schedule

## 12. Nineteenth Amendment Act, 1966

- Abolished the system of Election Tribunals and vested the power to hear election petitions in the High Courts

## 13. Twenty-First Amendment Act, 1967

- Included sindhi as the 15th language in the Eight Schedule

## 14. Twenty-Second Amendment Act, 1969

- Created a sub state of Meghalaya within Assam

## 15. Twenty-Fifth Amendment Act, 1971

- Curtailed the fundamental right to property

## 16. Twenty-Sixth Amendment Act, 1971

- Abolished titles and special privileges of former rulers of princely states

## 17. Twenty-Seventh Amendment, 1971

- Made certain special provisions for new Union Territories of Arunachal Pradesh and Mizoram

## 18. Thirty-First Amendment Act, 1972

- Increased the number of Lok Sabha seats from 525 to 545

## 19. Thirty-Fifth Amendment Act, 1974

- Terminated the protectorate status of Sikkim and conferred on it the status of an associate state of the Indian Union

## 20. Thirty-Sixth Amendment Act, 1975

- Made Sikkim a full-fledged State of the Indian Union

# Railway Exams – General Awareness

## 21. **Forty-First Amendment Act, 1976**

- Increase in retirement age of members of State Public Service Commission and Joint Public Service Commission from 60 to 62

## 22. **Forty-Second Amendment Act, 1976**

- Added three new words (socialist, secular and integrity) in the Preamble
- Added Fundamental Duties by the citizens (new Part IV A).
- Froze the seats in the Lok Sabha and state legislative assemblies on the basis of 1971 census till 2001
- Provided that the laws made for the implementation of Directive Principles cannot be declared invalid by the courts on the ground of violation of some Fundamental Rights

## 23. **Forty-Fourth Amendment Act, 1978**

- Provided that the fundamental rights guaranteed by Articles 20 and 21 cannot be suspended during a national emergency
- Deleted the right to property from the list of Fundamental Rights and made it only a legal right

## 24. **Fifty-Second Amendment Act, 1985**

- Provided for disqualification of members of Parliament and state legislatures on the ground of defection and added a new Tenth Schedule containing the details in this regard

## 25. **Fifty-Sixth Amendment Act, 1987**

- Goa was made full-fledged State
- Fixed the strength of the Goa Legislative Assembly at a minimum of 30 members

## 26. **Sixty-First Amendment Act, 1989**

- Reduced the voting age from 21 years to 18 years for the Lok Sabha and state legislative assembly elections

## 27. **Sixty-Fifth Amendment Act, 1990**

- Establishment of National Commission for SCs & STs

## 28. **Sixty-Ninth Amendment Act, 1991**

- Special status to the Union Territory of Delhi by designing it as the National Capital Territory of

## 29. **Seventy-First Amendment Act, 1992**

- Included konkani, manipuri and nepali languages in the Eight Schedule

## 30. **Seventy-Third Amendment Act, 1992**

- Granted constitutional status and protection to the panchayat raj institutions
- The Amendment has added a new Part-IX entitled as 'the panchayats' and added new 11<sup>th</sup> Schedule

## 31. **Seventy-Fourth Amendment Act, 1992**

- Granted constitutional status and protection to the urban local bodies
- The Amendment has added a new Part IX-A entitled as 'the municipalities' and a new 12<sup>th</sup> Schedule

## **32. Eighty-Sixth Amendment Act, 2002**

- Made elementary education a fundamental right. The newly-added Article 21-A declares that “the State shall provide free and compulsory education to all children of the age of six to fourteen years in such manner as the State may determine”
- Added a new fundamental duty under Article 51-A which reads— “It shall be the duty of every citizen of India who is a parent or guardian to provide opportunities for education to his child or ward between the age of six and fourteen years”

## **32. Eighty-Ninth Amendment Act, 2003**

- Bifurcated the erstwhile combined National Commission for Scheduled Castes and Scheduled Tribes into two separate bodies

## **33. Ninety-First Amendment Act, 2003**

- The total number of ministers, including the Prime Minister, in the Central Council of Ministers shall not exceed 15% of the total strength of the Lok Sabha
- The total number of ministers, including the Chief Minister, in the Council of Ministers in a state shall not exceed 15% of the total strength of the legislative Assembly of that state

## **34. Ninety-Second Amendment Act, 2003**

- Included four more languages in the Eighth Schedule. They are Bodo, Dogri (Dongri), Mathilli (Maithili) and Santhali

## **35. One Hundredth Amendment Act, 2015**

- Land boundary agreement between India and Bangladesh and Amended 1st schedule of constitution

## **36. 101st Constitution Amendment Act, 2016**

- Goods and Services Tax (GST) has commenced with the enactment of the 101st Constitution Amendment Act, 2016
- Articles 246A, 269A and 279A were added in the constitution

## **37. 102th constitutional amendment Act 2018**

- Grant constitutional status to National Commission on Backward classes

## **38. 103th constitutional amendment Act 2019**

- 10% Reservation for Economically Weaker Section.

# Railway Exams – General Awareness

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## PRE-HISTORIC INDIA

- The period before the development of script is called the pre-historic times. It is also referred to as the Stone Age
- BC (BCE) – Before Common Era
- AD (CE) – Common Eras
- Generally, the period before the invention of script is broadly divided into Stone Age, Bronze Age and Iron Age
  1. Stone Age – the period when stone was mainly used for making implements.
  2. Bronze Age – the period when bronze metallurgy (extraction of metal from ores) developed.
  3. Iron Age – the period when iron was smelted to produce implements.
- The earliest age in history is called Old Stone Age or **Palaeolithic**. This period is divided into
  1. Lower Palaeolithic culture, 2. Middle Palaeolithic culture, 3. Upper Palaeolithic culture
- The first Paleolithic tools were identified in 1860's
- Baghor I and Baghor III of Son Valley in Madhya Pradesh are some of upper Paleolithic sites in India
- The period after the **Palaeolithic** (Old Stone Age) is called the **Mesolithic Age** (Middle Stone Age). The period that followed the Mesolithic is called the **Neolithic Age** (New Stone Age)

## INDUS VALLEY CIVILIZATION

- The **Indus valley civilization** (2550-1750 BC) represents the **Bronze Age culture** (Chalcolithic Age)
- The Indus Civilization represents the first urbanization of Indian history.



# Railway Exams – General Awareness

- Harappa was discovered by “**Dayaram Sahni**” in 1921
- Second site discovered was Mohenjo-Daro by “**RD Bannerjee**” in 1922
- **John Marshall** was the first scholar to use the term “Indus valley civilization”
- Harappa was situated in the bank of **Ravi** River
- Highly efficient Town planning
- The streets were laid at right angles with an elaborate system of covered drains
- The ability of read and write and existence of script
- Iron was not known to the people of Indus valley civilization
- Presence of buildings made of bricks
- Slaves were present in Indus valley Civilization
- The society in Indus valley civilization is **patriarchal**
- The Indus valley people were the earliest to produce cotton
- The people of Indus valley civilization practiced both internal as well as external trade
- One of the sources of Harappan economy was trade and exchange activities. Harappans had close trade contacts with the Mesopotamians and also with various cultures of India
- There is no evidence of coins so barter is assumed to have been the normal method of exchange of goods
- **Lothal** was ancient port of Indus valley civilization. A dockyard structure found here
- The seals found were mostly square in shape and made up of steatite
- Most common animal on seal was unicorn
- **Mohenjo-Daro** means the mound of death
- The Indus people worshipped nature. They worshipped the pipal tree.
- Figures of Mother Goddess have been discovered in large numbers which indicate worship of female deity. The chief male deity was the ‘Pasupathi mahadeva’
- Cremation was the most popular way of the disposal of the dead
- The people of this age believed in life after death

# Railway Exams – General Awareness

- The Indus Valley Civilization declined from about 1900 BCE. Changes in climate, decline of the trade with the Mesopotamia, and the drying of the river and water resources due to continuous drought are some of the reasons attributed by historians for the decline. Invasions, floods and shifting of the river course are also cited as reasons for the ruin of Indus civilization

## Sites and Archaeological Finds

Sites	Archaeological Importance
Harappa	6 Granaries in row, Working floors, Mother Goddess figures, Crucible for bronze
Mohenjo-Daro	Great bath, Great Granery , Bronze image of a nude women dancer, Steatite image of bearded man
Chanhudaro	City of Citadel, Terracotta model of a bullock cart
Lothal	Dockyard, Rice husk, Double burial, Terracotta model of a ship
Surakotada	Bones of horse, Oval grave
Daimabad	Bronze images
Dholavira	Divided into three parts, A large well & a bath
Kalibangan	Mesopotamian cylindrical seal, 7 fire altars

## RIG VEDIC PERIOD (1500 BC – 1000 BC)

- Monarchical form of government with a king known as Rajan and Patriarchal families. Jana was the largest social unit in Rig Vedic times
- The houses of this period were made up of wattle and daub and the life of people was nomadic
- There is no sign of urbanization during this period
- They were a pastoral and cattle-rearing people and They indulged in agriculture.
- Products made out of copper, iron and bronze were in use.
- They had horse chariots.

# Railway Exams – General Awareness

- Cotton and Woollen fabrics were spun and used and Initially trade was conducted through the barter system but later on coins called ‘Nishka’ were in use
- Indira, Agni, and surya were the important gods which were worshipped.
- Tribal institutions like Sabha, Samiti, Vidhata, and Gana were important assemblies
- Women enjoyed respectable position. They were allowed to take part in Sabhas and Samitis
- The cow was considered as a precious asset
- There was no child marriage.
- There is no evidence of practices like sati or purdah
- The society comprised four varnas ,namely Brahmanas,Kshatriya, Vaisya,Shudra
- Types of Vedas are –Rig veda, Sama veda, Yajur veda & Atharva veda
- Rig Vedas is one of the oldest text in the world and it contain 1028 hymns is divided into 10 mandals
- The hymns of Rig Veda were recited by Hotri
- The Sama Veda contains 1549 hymns .It is a collection of melodies.
- The sama veda is important for music
- The Yajur veda is a ritual Veda.
- The Atharva veda is mostly dealing with magic
- The Upanishadas are the texts with high philosophical connotations
- The latest Upanishada was written during the reign Akbar
- The Ramayana written by Valmiki it is known as ‘Adi kavya’. It consists of 24000 shlokas
- The Mahabharata composed by Ved Vyasa is the oldest epics of the world

## MAGADHA EMPIRE

### HARYANKA DYNASTY

#### BIMBISARA (558 BC – 492 BC)

- He was the founder of Haryanka Dynasty
- He followed a policy of conquest and expansion and he annexed Anga
- The first king to have a standing army

# Railway Exams – General Awareness

- Contemporary and follower of the Gautama Buddha
- He had an effective and excellent administrative system. The officers occupying high posts divided into three parts were executive, military and judicial
- He build the city of New Rajagriha

## AJATSHATRU (492 BC - 460 BC)

- He is Son of Bimbisara and Chelana. Ajatshatru killed his father and become a ruler
- **Ajatshatru** convened the First Buddhist Council at Rajagriha just after the death of Buddha in 483 BC
- He annexed Kashi by attacking his maternal uncle Prasenjit, the king of Kosala

## UDAYIN

- Udayin is Shifted the capital from Rajagriha to Pataliputra
- **Nagadasak** was the last ruler of the **Haryanka** dynasty who was replaced by **Sisunga** the Governor of Varanasi
- The Haryanka dynasty was succeeded by the Shishunaga dynasty

## SHISUNAGA DYNASTY (412-344 BC)

- Shisunga Was the Governor of Kasi before becoming king of Magadha and he annexed Avanti and brought an end to the long rivalry between Magadha and Avanti
- **Kalasoka** is Son of Sisunaga. Kalasoka shifted the capital to Pataliputra
- **Kalasoka** conducted the Second Buddhist Council at Vaishali in 383 BC

## NANDA DYNASTY (344-323 BC)

- **Mahapadma Nanda** is called the first historical emperor of India. He murdered **Kalasoka** to become the king.
- He is also called “Sarva Kshatriyantaka” (destroyer of all the kshatriyas)
- He conquered Kalinga
- Mahapadma was succeeded by his eight sons and they were together known as the Navanandas or the nine Nandas
- **Dhana Nanda** was the last ruler of Nanda dynasty

# Railway Exams – General Awareness

- During **Dana Nanda's** reign, **Alexander** invaded north-west India (327–325 BCE).
- Finally **Dhana Nanda** was overthrown by **Chandragupta Maurya**, which led to the foundations of the **Maurya Empire** in Magadha.

## MAURYAN EMPIRE

### Chandragupta

- In a series of battles Chandragupta defeated Dhana Nanda and laid the foundations of the Maurya Empire in about **321 BC**
- He conspired with Chanakya the minister of Nanda to overthrow the last ruler Dhana Nanda
- **Chanakya** (also known as Kautilya) was an Indian statesman and philosopher, chief advisor of the Indian Emperor Chandragupta. He is celebrated as the author of the **Arthashastra**
- The **Arthashastra** was a prescriptive text for good administration
- **Megasthenes** was the Greek ambassador at Chandragupta's court. **Indica** is an account of Mauryan India by the Greek writer Megasthenes
- **Pataliputra** was the great capital city in the Mauryan Empire
- His reign lasted from 321 BC to 297 BC

### Bindusara

- Chandragupta's son Bindusara succeeded him as emperor in 297 BCE.
- Bindusara was known Amitraghata (Slayer of foes)
- His sons were appointed as viceroys of the different provinces of the empire.
- Bindusara had appointed his son Ashoka as the viceroy of Ujjain, the capital of Avanti.

### Ashoka

- Ashoka the Great, was an Indian emperor of the Maurya Dynasty
- Ashoka ascended the throne in 273 BC and ruled up to 232 BC
- Buddhist tradition says Ashoka kills 99 of his brothers to capture the throne
- Ashoka fought the Kalinga War in 261 BC. Kalinga is modern day of Orissa
- After the battle of Kalinga Ashoka became Buddhist being shocked by horrors of the war

# Railway Exams – General Awareness

- For the propagation of Buddhism Ashoka started the institution of Dharmamahamatras
- Ashoka held the third Buddhist council at his capital Pataliputra in 250 BC
- Ashoka spread Buddhism to Sri Lanka and Nepal
- He sent his son **Mahendra** and daughter **Sanghamitra** to the Sri Lanka for spread Buddhism. It is believed that they took a branch of the original Bodhi tree to Sri Lanka
- **Brihadratha** was the last ruler of the Maurya Empire killed by **Pushyamitra Shunga** who founded **Sunga dynasty** in 185 BC

## THE GUPTAS

- After the Mauryan Empire, the Gupta kingdom emerged as a great power. **Sri Gupta** founded the **Gupta dynasty**
- The first ruler of the Gupta Empire was Sri Gupta (240–280 CE) who was succeeded by his son Ghatotkacha. Both Sri Gupta and Ghatotkacha are mentioned as Maharajas in inscriptions. **Chandragupta I**, the son of Ghatotkacha, ruled from 319 to 335 CE and is considered to be the **first great king of the Gupta Empire**

### Samudragupta

- Chandragupta I appointed his son Samudragupta to succeed him in 335 CE
- Samudragupta (335-375 CE) is known as the **Napoleon of India**
- Samudragupta consolidated the empire.
- Samudragupta patronised scholars and poets like Harisena and thus promoted Sanskrit literature. Though an ardent follower of Vaishnavism, he also patronised the great Buddhist scholar Vasubandhu. As a lover of poetry and music, he was given the title “**Kaviraja**”.
- He was a follower of Vaishnavism but was tolerant of other faiths. He gave permission to the king of Sri Lanka, Meghavarna to build a monastery in Bodh Gaya.

### Chandragupta II

- Chandragupta II ruled for 40 years from 375 CE to 415 CE. He came to power after a succession struggle with his brother Rama Gupta. He is also known as **Vikramaditya**
- Capital of Gupta dynasty was Pataliputra.

# Railway Exams – General Awareness

- His other names (as mentioned in coins) include Vikrama, Devagupta, Devaraja, Simha Vikrama, Vikramaditya and Sakari.
- His court had **nine jewels or navratnas**, that is, nine eminent people in various fields of art, literature and science. This included the great Sanskrit poet **Kalidasa**, the Sanskrit scholar Harisena, the lexicographer **Amarasimha**, and the physician **Dhanvantari**.
- **Fahien**, the Buddhist scholar from China, visited India during Chandra Gupta II reign. He records the prosperity of the Gupta Empire
- Chandragupta II was the first Gupta ruler to issue silver coins
- Chandragupta II was succeeded by his son **Kumara Gupta I**, who founded the **Nalanda University**. He was also called **Sakraditya**
- The last great king of the Gupta dynasty was **Skanda Gupta**. The Gupta Empire declined after the death of Skanda Gupta in 467 CE.
- The last recognized king of the Gupta line was Vishnu Gupta who reigned from 540 to 550 CE.
- Gupta period is considered as the Golden Age of India by some historians.

## RISE OF REGIONAL KINGDOMS

### PUSHPABHUTI DYNASTY OR VARDHANA DYNASTY

- The founder of the Vardhana dynasty was Pushyabhuti who ruled from Thaneswar
- **Harshavardhana** (606-647 CE) belonged to the Pushyabhuti dynasty. Harsha shifted his capital from Thanesar to **Kanauj**. Kanauj was located in the rich agricultural region of the western Ganges Plain.
- Bhaga, Hiranya and Bali were the three kinds of tax collected during Harsha's reign. Bhaga was the land tax paid in kind. One-sixth of the produce was collected as land revenue. Hiranya was the tax paid by farmers and merchants in cash
- **Hiuen Tsang** hailed as the prince of pilgrims, visited India during the reign of **Harsha**. Hiuen Tsang spent about five years in the University of Nalanda and studied there. Hieun Tsang recorded the fame of the Nalanda University
- **Banabhatta**, the author of Harshacharita and Kadambari, was a court poet of Harsha

# Railway Exams – General Awareness

- The **Harshacharita** is the biography of Indian emperor Harsha

## THE PALAS

- Gopala founded the pala Empire in 750 CE
- His son Dharmapala (770–815 CE) succeeded him. Dharmapala revived Nalanda university
- Mahayana Buddhism flourished during the Pala reign
- Dharmapala founded the **Vikramshila University**
- The patronage of Palas to Vikramshila and Nalanda universities paved the way for the progress of Buddhist, Jain and Sanskrit literature
- The Pala dynasty was succeeded by Sena dynasty.
- Vijayasena of the Sena dynasty expelled the last pala ruler Madanapala (1130–1150 CE) from Bengal and established Sena dynasty
- Jayadeva (the famous poet of Bengal) was the great court poet of Luxman sena

## THE RASHTRAKUTAS

- The greatest ruler of the dynasty was Dantidurga
- Dantidurga who fixed his capital at Malkhand/Malkhed founded the Kingdom
- The worship of Shiva and Vishnu was popular during the Rashtrakutas reign. The famous rock-cut Shiva temple at Ellora was built by Krishna I (756–775 CE)
- The rock cut shrines at Ellora and Elephanta belong to their period

## THE PRATHIHARAS

- The dynasty was founded by Nagabhatta I. He ruled from 730 CE to 756 CE.
- **Mihir Bhoja** was one of the great rulers for his dynasty. He was a devote of Vishnu and adopted **Adhivaraha** as the title
- The last ruler of this dynasty was Rajyapal who was defeated by Mahmud of Ghazni

## THE DELHI SULTANATE

- Mohammad Ghori invaded India and laid the foundation of the Muslim dominion in India .He may considered the ‘founder of Muslim rule’ in India.



# Railway Exams – General Awareness

- The period between 1206 A.D. and 1526 A.D. in India's history is known as the Delhi Sultanate period.
- During this period of over three hundred years five dynasties ruled in Delhi. These were: The Slave dynasty (1206-90), Khilji dynasty (1290-1320), Tughlaq dynasty (1320-1413), Sayyid dynasty (1414-51), and Lodhi dynasty (1451-1526).

## THE SLAVE DYNASTY (1206-90)

- The three important rulers of this dynasty are Qutb-ud-din Aibak, Iltutmish and Balban

### Qutb-ud-din Aibak (1206-1210)

- Qutubuddin Aibak (1206-10) was a slave of Mohammad Ghori and he founded slave dynasty in 1206 AD.
- Qutb-ud-din Aibak reigned for four years (1206 to 1210 CE) and died in 1210 in Lahore in an accident while playing chaugan or polo
- The capital during his reign was not Delhi but Lahore
- Qutub-ud-din Aibak was known as *Lakh Baksh* or giver of *lakhs*
- He begun the construction of Qutub Minar, in the honour of famous Sufi saint Khwaja Qutibuddin Bakhtiyar Kaki

### Iltutmish (1210-36)

- Shams-ud-din Iltutmish, the slave and son-in-law of Qutb-ud-din Aibak, ascended the throne of Delhi setting aside the claim of Aram Shah, the son of Qutb-ud-din Aibak in 1211
- He made Delhi the capital in place of Lahore
- He was a very capable ruler and is regarded as the 'real founder of Delhi sultanate'
- **Iltutmish** was the first to introduce a "Pure Arabic Coin" in India
- He introduced the silver coin (tanka) and copper coin (Jital)
- He completed the construction of Qutub Minar which was started by Aibak.
- Hauz-i-Shamsi is a water storage reservoir or tank built by Iltutmish
- The **Iqtadari system** was introduced in India by Iltutmish
- Iltutmish nominated his daughter Sultana Razia as the successor. She was the first and only Muslim lady who ever ruled India

# Railway Exams – General Awareness

- After Razia, three weak rulers in succession ascended the throne. After them came Ghiyas-ud-din Balban.
- Balban the Sultan of Delhi Sultanate adopted a policy of blood and iron
- Balban established the military department Diwan-i-Arz
- **Kaikubad** came to the throne of Delhi Sultanate after the death of Balban

## THE KHALJI DYNASTY (1290-1320 AD)

- The founder of the Khalji dynasty was Jalaluddin Khalji. He was seventy years old when he came to power.
- He was liberal ruler and adopted the policy of religious toleration
- His son-in-law and nephew was Allauddin Khalji
- Alauddin Khalji maintained a large permanent standing army and paid them in cash from the royal treasury.
- He introduced the system of dagh (branding of horses) and prepared Chehra (descriptive list of soldiers).
- The post of special officier called Mustakharaj was created for the purpose of collection of revenue
- Diwan-i-Riyasat and Shahna-i-Mandi were appointed to regulate the market and prices
- All goods for sale were bought to an open market called Sara-i-Adal
- **Amir khusro** was court poet of Alauddin Khalji
- Amir khusro is known as **parrot of India**
- Alauddin Khalji is responsible for the introduction of postal system in medieval India
- Alauddin Khalji was first sultan of Delhi separated religion from politics
- Alauddin constructed Alai Darwaza the gate way of Qutub Minar in 1311 AD
- Malik Kafur was a slave-general of the Delhi Sultanate ruler Alauddin Khalji. He was captured by Alauddin's general Nusrat Khan during the 1299 invasion of Gujarat
- Malik Kafur was also called “Thousand Dinar Kafur” or Hazar Dinari
- Alauddin's Southern expedition was led by Malik Kafur.
- Successors of Alauddin Khalji were weak rulers. Eventually, in 1320 A.D. the Governor of Punjab Ghazi Malik led a group of nobles, conquered Delhi and captured the throne.
- Ghazi Malik assumed the name ‘Ghiyas-ud-din Tughluq’ at Delhi and founded the Tughluq Dynasty, a dynasty of rulers

## THE TUGHLAQ DYNASTY (1320-1414)

- The founder of the Tughlaq dynasty was Ghiyasuddin Tughlaq.
- Ghiyasuddin Tughlaq created a civil administration code based on Koran
- Ghiyasuddin Tughlaq was succeeded by his son Muhammad-bin-Tughluq
- **Muhammad-bin-Tughluq** attempt to shift the capital from Delhi to **Devagiri**, which he named Daulatabad. The sultan wanted to make Devagiri second capital so that he would be able to control South India better. However, the plan failed, and soon Muhammad realized that it was difficult to rule North India from Daulatabad. He again ordered transfer of capital back to Delhi.
- The sultan created the new department of Agriculture is called Diwan-i-kohi. The main object of the department was to increase the land under cultivation
- The next important experiment of Muhammad was the introduction of token currency
- Muhammad Bin Tughlaq is known as a “Man of Ideas”
- Ibn Battuta was a Moroccan Muslim scholar and traveler, came to India during period of Muhammad Bin Tughlaq
- Muhammad-bin-Tughluq was succeeded by his cousin Feroz shah Tughlaq
- Feroz shah Tughlaq was the first sultan of Delhi first to impose Jaziya. Feroz favored orthodox Islam
- The last Tughlaq ruler was Nasir-ud-din Muhammad Shah (1394–1412), whose reign witnessed the invasion of Timur from Central Asia

## THE SAYYAI DYNASTY (1414–1451)

- Sayyaid dynasty was founded by **Khizr khan** in 1414
- Last sayyaid dynasty sultan was Alam shah

## THE LODI DYNASTY (1451–1526)

- The Lodi Dynasty was established by **Bahlul Lodi** (1451–1489)
- The Lodi dynasty was first afghan dynasty or pathan dynasty in India
- **Sikandar Lodhi** was the son of Bohlol Lodhi

# Railway Exams – General Awareness

- **Agra city was founded by Sikandar Lodhi** and he shifted capital from Delhi to Agra. He reimposed Jaziya tax on non-Muslims. And abolished corn tax
- Ibrahim Lodhi was the last king of Lodhi dynasty and last Sulthan of Delhi.
- At last **Daulat khan Lodhi** the governor of Punjab invited **Babur** to overthrow **Ibrahim Lodhi**. Babur accepted the offer and inflicted a crushing defeat on Ibrahim Lodhi in the first battle of Panipat in 1526. Which resulted in the establishment of Mughal Dynasty in India
- **Ibrahim Lodhi** was the only Sultan who died in battle field
- The official language of Delhi Sultane was Persian

## VIJAYANAGAR EMPIRE (1336–1646)

- The Vijayanagar kingdom was established by the Sangama brothers **Harihara** and **Bukka** in Vijayanagar (present day Hampi) on the south bank of Tungabhadra.
- The Vijayanagar kingdom was successively ruled by four dynasties over a period of more than three hundred years: the Sangama dynasty (1336–1485), the Saluva dynasty (1485–1505), the Tuluva dynasty (1505–1570) and the Aravidu dynasty (1570–1650).
- In 1336 CE Harihara I became the ruler of Sangama Dynasty
- Devaraya II was the greatest ruler of the Sangama dynasty
- Saluva Narasimha founded Saluva dynasty
- Krishnadevaraya of the Tuluva dynasty is considered the greatest of the Vijayanagar kings.
- **Amuktamalyada** (an epic poem on the Tamil woman poet, Andal) is an epic poem in Telugu composed by Krishnadevaraya of the Vijayanagar Dynasty.
- **Ashtadiggajas** is a collective title given to the eight scholars who were in the court of the emperor Sri Krishna Deva Raya. They are
  1. Allasani Peddanna.
  2. Nandi Thimmana.
  3. Madayyagari Mallana.
  4. Dhurjaty.
  5. Ayyalaraju Ramambhadrudu.
  6. Pingali Surana.

# Railway Exams – General Awareness

7. Ramarajabhushanudu.
8. Tenali Ramakrishna.

- Krishna Deva Raya the (1509-1529) Vijayanagar emperor was contemporary of Mughal Emperor Babur (1526-1530)
- Deva Raya II adopted the title Gajabetakara, which literally means "Hunter of elephants"
- The Battle of Talikota (26 January 1565) was fought between the Ramraja of Vijayanagar and an alliance of the Deccan sultanates. This battle is generally considered the signal for the end of Vijayanagar.
- The Aravidu Dynasty was the fourth and last dynasty of Vijayanagara Empire. The empire slowly shrunk and the Aravidu dynasty ended in 1646

## THE MUGHAL EMPIRE

- Babur was the founder of the Mughal Empire which was established in 1526.
- The Mughal Empire declined after the death of Aurangzeb in 1707. The empire formally ended a century and a half later, when power passed to the British crown after the great revolt of 1857.

## BABUR (1526–1530)

- Babur was the founder of Mughal Empire. He defeated Ibrahim Lodi in the First Battle of Panipat (1526) and established the Mughal power in India.
- Babur was a descendant of Timur from his father's side and Genghis Khan from his mother's side
- In 1527, Babur defeated Rana Sangha of Mewar in the Battle of Khanwa near Agra
- In 1528, the Battle of Chanderi was fought between Babur and Medini Rai of Chanderi and in it, Medini Rai got defeated by Babur.
- In 1529, Babur defeated Afghans for the second time in the Battle of Ghagra.
- Tuzuk-i-Baburi or Baburnama is the biography of Babur
- Babur was the first to use the artillery in India
- Babur was the first Mughal ruler to keep in hand the Kohinoor diamond in hand

## HUMAYUN (1530-1540 & 1555-1556)

# Railway Exams – General Awareness

- After the death of Babur his son Humayun ascended the throne.
- His first confrontation was with Sher Khan later known as Sher Shah at Chunar in 1532. Sher Shah defeated Humayun in the Battle of Chausa (1539) as well as in the Battle of Kanauj (1540). After that, he fled from India.
- After Sher Shah's death his weak successors ruled for ten years Humayun invaded and defeated the brothers of Sher Shah and once again became the ruler of India.

## SHER SHAH AND SUR DYNASTY

- Sher Shah Suri was the founder of the Suri Empire
- From the time Humayun abandoned the throne in the Battle of Kanauj to his regaining of power in 1555 Delhi was ruled by Sher Shah of the Sur Dynasty
- Sher Shah Suri divided his whole empire into 47 divisions called 'Sarkar's' and these were again subdivided into small administrative units called 'Parganas'.
- For enhancement of trade and commerce Sher Shah maintained a robust highway system by repairing old roads and laying down new roads
- Sher Shah was responsible for greatly rebuilding and modernizing the Grand Trunk Road
- The fiscal administration for which Akbar and Todar Mal have been so highly praised was largely based on the methods of Sher Shah
- **Sher Shah** is regarded as the **forerunner of Akbar** because Sher Shah introduced many of the administrative reforms that Akbar would consolidate further.
- He started building a new walled city in Delhi, which later came to be known as Purana Qila (Old Fort).
- He built his own mausoleum in **Sasaram**.
- Sher Shah was succeeded by his second son Islam Shah who ruled till 1553. His death at a young age led to a state of confusion about succession. Humayun used this opportunity to regain Delhi and Agra from the Sur rulers.

## EMPEROR AKBAR (1556–1605)

- The eldest son of Humayun, Akbar ascended the throne at the age of 14.

# Railway Exams – General Awareness

- Koronation takes place at kalanaur
- Second Battle of Panipat (1556) was fought between Hemu, who was the general of Mohammad Adil Shah and Bairam Khan (mentor of Akbar). Hemu was defeated in this battle. The second battle of Panipat marked the real beginning of the Mughal Empire
- Initial year of his rule Akbar was first under influence of his reagent Bairam and then under her mother Maham Anga
- The period of influence of Maham Anga on (Akbar 1560-62) known as the period of petticoat Government
- Akbar abolished the practice of enslavement of war prisoners
- Akbar took earnest efforts to win the goodwill of the Hindus. In 1564 Akbar abolished the **jizya** on non-Muslims and the tax on Hindu pilgrims
- Akbar build a new capital city Fatehpur sikri (City of Victory) near Agra
- Akbar **built the Buland Darwaza** to commemorate his victory over Gujarat
- In 1575 Akbur was build a prayer house in Fatehpur sikri known as Ibadatkhana
- In 1852 Akbar founded a new religion for universal peace known as ‘Din-I-Ilahi’. The Din-I- Ilahi ceased to exist after Akbar.
- Akbar introduced the Mansabdari system in his administration. Mansabadari system introduced in 1574
- With the help of Raja Todar Mal, Akbar experimented on the land revenue administration, which was completed in 1580. The land revenue system was called Zabti or Bandobast system or Dahsala System.
- Birbal was an advisor and main commander of army in the court of the Mughal emperor Akbar
- Akbar is the first known person in the world to have devised the ‘ship’s camel’, a barge on which a ship is built
- The **Mahabharata** was translated under the supervision of Abul Faizi, brother of Abul Fazal and a court poet of Akbar
- Tomb of Akbar is located at **Sikandra**

## **JAHANGIR (1605–1627)**

- Akbar was succeeded by his son Salim with the title Nur-ud-din Jahangir

# Railway Exams – General Awareness

- He was famous for his paintings. Period of Jahangir considered as a Golden age of Mughal paintings
- He wrote his Autobiography wrote Tuzuk-i-Jahangiri in Persian.
- For the purpose of justice, he established Zangir-i-Adal.
- He sentenced 5th Sikh Guru Arjun Singh to death
- In 1609 Jahangir received William Hawkins an envoy of King James I of England. Who reached India to obtain trade concession
- In 1615 Sir Thomas Roe Reached court of Jahangir .As a results of his efforts the first English factory was established at **Surat** in Gujarat

## SHAH JAHAN (1627-1658)

- ShahJahan ascended the throne after the death of Jahangir
- ShahJahan's period known as the Golden age of Mughal Architecture
- In 1651 he started the construction of Tajmahal in the memory of his wife completed in 1653
- In 1639 Shah Jahan build his new capital Shah Jahanabad in Delhi and shifted the capital from Agra to there
- Red fort in Delhi build by Shah Jahan
- In 1656 Shah Jahan constructed the Juma masjid
- The famous peacock Throne was built by Shah Jahan
- Aurangzeb imprisoned Shah Jahan and crowned himself as the Mughal emperor. Shah Jahan died broken hearted as a royal prisoner in January 1666 and was buried in the Taj Mahal next to his wife.

## AURANGZEB (1658–1707)

- Aurangzeb Alamgir (Conqueror of the World) ascended the throne in 1658
- Muin-ud-din Muhammad Aurangzeb is the full name of Aurangzeb
- Bibi-ka-maqbara (Tomb of the Lady) located at Aurangabad built by Aurangzeb in the memory of his first and chief wife Dilras Banu Begum
- Moti Masjid in Delhi's Red Fort was built by Aurangzeb
- Aurangzeb re-imposed jizya
- Aurangzeb banned the consumption of alcohol, singing in court



# Railway Exams – General Awareness

- In 1675 Guru Tegh Bahadur was executed under the order of the Aurangzeb

## THE MARATHA EMPIRE

- On 6 June 1674, Shivaji was crowned at Raigarh. He assumed the title of “Chhatrapati” and also assumed the title of ‘Haindava Dharmoddharak’ (Protector of the Hindu faith)
- The English ambassador who had attended the coronation of Shivaji with presents from East India Company at Raigarh was Oxendon
- The Maratha Empire was founded by Shivaji during the reign of Aurangzeb
- The Marathas played a major role in the decline of Mughal power
- Samarth Ramadas was the Guru of Chatrapati Shivaji Maharaj
- **Treaty of Purandar** was signed between **Chatrapati Shivaji Maharaj and Raja Jai Singh in 1665**
- Most of the administrative reforms of Shivaji were based on the practices of the Deccan sultanates. The revenue system of Shivaji was based on that of Malik Ambar of Ahmadnagar.
- The Council of Ministers of Shivaji was known as **Ashta Pradhan**
  1. The Mukhya Pradhan or Peshwa - prime minister , general administration of the Empire
  2. The Amatya or Majumdar - finance minister, managing accounts of the Empire
  3. The Walkia-Nawis-Home Minister
  4. Sumant or Dabir –Foreign Minister
  5. Sachiv or Shuru Nawis- Head of Royal correspondence
  6. Pandit Rao or Danadhyaksha or Sadar- Head of Religious Affairs
  7. Nyayadhish -chief justice
  8. Sari Naubat or senapathi - Commander-in-chief, Managing the forces and defense of the Empire
- The Peshwa or the prime minister was the foremost minister in the Ashta Pradhan. Balaji Viswanath was the first powerful Peshwa .And the office of Peshwa was made hereditary.
- After Balaji Viswanath, his son Baji Rao I was appointed Peshwa in 1720 by Shahu
- Balaji Baji Rao succeeded as the Peshwa after the death of his father Baji Rao I. Known as Nana Sahib, he proved to be a good administrator and an expert in handling financial matters.

# Railway Exams – General Awareness

- Shivaji collected two taxes, **Chauth** and **Sardeshmukhi**, from the adjoining territories of his empire, the Mughal provinces and the territories of the Sultan of Bijapur. **Chauth** was  $\frac{1}{4}$  of the revenue of the district conquered by the Marthas. **Sardeshmukhi** was an additional **10%** of the revenue which Shivaji collected by virtue of his position as Sardeshmukh.
- The centre of the Maratha administration was the Peshwa Secretariat at Poona
- The village was the basic unit of administration and was self-supportive. The Patel was the chief village officer and was responsible for remitting revenue collections to the centre. In towns and cities the chief officer was the Kotwal
- There were two kinds of cavalry in Maratha army system viz. Bargir and the Shiledar
- The Kohinoor diamond and the valuable peacock throne were taken away by Nadir Shah.
- Balaji Vishwanath built naval bases at Konkan, Khanderi and Vijayadurg. Dockyard facilities were also developed
- Nana Phadnavis was called the 'Chanakya of Maratha Politics'
- Baji Rao II was the last Peshwa of Maratha empire

## RELIGIOUS MOVEMENTS (600 BC-400 BC)

- Various religious movements were born and grew up in post Vedic period (6<sup>th</sup> Century BC to 4<sup>th</sup> Century BC)

## BUDDHISM

- Gautama Buddha founder of Buddhism was born in 563 BC at **Lumbinivana** in Kapilavastu in the Sakya Kshatriya clan
- His father **Suddhodhana** was the king of Kapilavastu and mother **Mahamaya** was princess of Kosala dynasty
- Mahaprajapati Gautami was the step mother of Gautama
- He was married to Yasodhara from whom he had a son Rahul
- At the Age of 35 under a **pepal** tree at Uruvella (Bodhi Gaya) on the bank of river Niranjana (Modern name Falgu) attained Nirvana (enlightenment) after 49 days of continuous meditation

# Railway Exams – General Awareness

- Buddha delivered his first sermon at sermon at **Saranath** (Dear park) to his five disciples, this is known as Dharmachakra Pravartana (Turning of the wheel of law )
- He died at the age of 80 in 483 BC at kushinagar. This is known as Mahaparinirvana
- Third Buddhist council was held in 250 BC at Pataliputra under the patronage of King Asoka
- Palas of Bengal & Bihar were last great patrons of Buddhism

## EVENTS ASSOCIATED WITH BUDDHAS'S LIFE

Greats events of Buddha's life	Symbols
Janma (Birth)	Lotus
Mahabhnishkramana ( Renunciation)	Horse
Nirvana (Enlightenment)	Bodhi tree
Dramachakra pravartana (First sermon)	Wheel
Mahaparinirvana (Death)	Stupa

## BUDDHIST ARCHITECTURE

1. Stupa- Relics of the Buddha or some prominent Buddhist monks are preserved
2. Chaitya- Prayer hall
3. Vihara- Residence of monks and ascetics

## BUDDHIST COUNCILS

### FIRST COUNCIL

- The first council was held at Rajgriha in 483 BC. Under the patronage of Ajatshatru (Haryanka Dynasty). It took place just after the death of Lord Buddha

### SECOND COUNCIL

- The second council was held at Vaishali in 383 BC. Under the patronage of King Kalashoka (Shisunaga Dynasty)

### THIRD COUNCIL

- The third council was held at Patalipudra in 250 BC. Under the patronage of Ashoka (Maurya Dynasty)

### FOURTH COUNCIL

# Railway Exams – General Awareness

- The Fourth Buddhist Council was held during the reign of Kanishka(Kushana Dynasty) at Kundalvana in Kashmir in the first century A.D
- During this council the two section of Hinayana Buddhism and Mahayana Buddhism were formed officially

## JAINISM

- Mahavira was born in 540 BC in a village **Kundgrama** near Vaishali in Bihar
- His father **Siddhartha** was the head of the Jnathrika Kshtriya clan under Vajji of Vaishali and his mother **Trishala** was the sister of Chetaka the king of Vaishali
- At the age of 30 after the death of his parents he renounced his family became an ascetic and proceeded in search of truth
- At the age of 42 under a sal tree at Jimbhikagrama on the bank of river Rijupalika, Mahavira attained kaivalya
- He delivered his first sermon at Pava to his 11 disciples also known as 11 Gandharas.
- At the age of 72 in 468 BC he passed away at pavapuri
- According to Jain tradition there were 24 Thirthankaras
- The 24th and last Thirthankara is Mahavira. Symbol is Lion

## THREE JEWELS OF JAINISM

- 1.Right faith
- 2.Right knowledge
- 3.Right conduct

## JAIN COUNCILS

### THE FIRST COUNCIL

- The first council was held at Pataliputra in 367 BC. Under the leadership of Sthulabhadra. This council was patronized by Chandragupta Maurya

### THE SECOND COUNCIL

- It was held at Mathura and was presided by Aryaskandilya

### THE THIRD COUNCIL

# Railway Exams – General Awareness

- It was held at Vallabhai in 455 AD was presided over by Devaradhi Kshamarasana

## ADVENT OF THE EUROPEANS IN INDIA

- Sequence of an establishment of European Companies and year
  1. Portuguese -1498
  2. English East India Company -1600
  3. Dutch East India Company -1602
  4. Danish East India Company -1616
  5. French East India Company -1664

### Portuguese in India

- Portuguese was the first European to come to India. They established trading stations at Cochin, Calicut and Cannanore
- In 1498 CE Vasco da Gama reached Calicut where he was cordially received by King Zamorin the ruler of Calicut.
- In 1505, **Francisco de Almeida** was sent as the first Governor for the Portuguese possessions in India.
- **Francisco de Almeida** had the aim of developing the naval power of the Portuguese in India. His policy was known as the “**Blue Water Policy**”.
- Alfonso de Albuquerque was the second Portuguese Governor in India introduced the ‘Policy of Imperialism’
- Alfonso de Albuquerque (1509-1515), the successor of Francisco de Almeida, was the real founder of the Portuguese empire in India. He captured Goa from the Sultan of Bijapur in November 1510.
- First capital of Portuguese was Cochin. Later Governor Nino de Cunha moved capital from Cochin to Goa in 1530
- The **Portuguese** brought the cultivation of **tobacco** to India.
- Portuguese were intolerant of the existing religions of India and tried to force people to become Christian.

### The Dutch

- In 1602, the United East India Company of Netherlands was formed and it received the sanction of their government to trade in East including India

# Railway Exams – General Awareness

- The Dutch founded their first factory in Masulipatnam, (Andhra Pradesh) in 1605.
- At first, Pulicat was Dutch headquarters. Later, they shifted it to Nagapattinam in 1690. Pulicat served as the Coromandel headquarters of the Dutch East India Company.

## The British

- On 1600, Elizabeth, the Queen of England granted a charter to the governor and company of Merchants of London to trade with East Indies.
- In 1609 Jahangir received William Hawkins an envoy of King James I of England. Who reached India to obtain trade concession
- In 1615 Sir Thomas Roe Reached court of **Jahangir** .As a results of his efforts the **first English factory** was established at **Surat** in Gujarat
- Treaty of Paris (1763) concluded the Seven Years War
- After the Battle of Plassey in 1757 and the Battle of Buxar in 1764, the Company became a political power.
- Fort St George is the first English fortress in India, founded in 1644 at the coastal city of Madras(Modern day chennai)

## The Danes

- On March 17, 1616 the King of Denmark, Christian IV, issued a charter and created a Danish East India Company
- Danish East India company established settlement at Tranquebar (Tamil Nadu) in 1620 and Serampore (Bengal) in 1676

## The French

- The French East India Company was formed in 1664 by Colbert, a Minister of King Louis XIV
- France was the last European country to come India as traders
- In 1668 AD Francois Caron established the first French factory in India at Surat and in 1669 AD Marcara established another French factory at Masaulipatam
- In 1673 AD, the French obtained a village called Pondicherry from Sher Khan Lodi, the ruler of Bijapur. and founded a thriving city on it which later became the main stronghold of the French in India

# Railway Exams – General Awareness

## IMPORTANT EVENTS UNDER GOVERNOR GENERALS OF INDIA

### WARREN HASTINGS (1772-1785)

- Pitt's India Act-1784
- Hastings brought the Dual Government system to an end by enforcing the Regulating Act of 1773
- He founded the Asiatic Society of Bengal with William Jones in 1784
- The Zamindars were given judicial powers and civil and criminal courts were established in each district during his tenure as the Governor General of India
- Treaty of Purandar (1776) between English and Peshwa

### LORD CORNWALLIS (1786-1793)

- Introduced Permanent Settlement of Bengal (1793)
- Introduction of civil services .Cornwallis is called 'the father of civil service in India'
- New Police System was introduced in 1791
- Third Anglo-Mysore War and Treaty of Seringapatam (1792)
- Establishment of Appellate courts and lower grade courts
- Introduced the first Charter Act – 1793

### LORD WELLESLEY (1798-1805)

- Introduced the Subsidiary Alliance system to achieve British Paramountcy (1798)
- Fourth Anglo- Mysore war
- The Treaty of Bassein (1802) with Peshwa
- Described himself a **Bengal Tiger**

### LORD WILLIAM BENTICK (1828-35)

- He was first Governor General of India
- Abolished provincial courts of appeal and circuit set up by Cornwallis, appointment of Commissioners of revenue and circuit
- He carried out social reforms such as abolition of Sati in 1829 with the help of Rajaram Mohan Roy, Suppression of Thuggee

# Railway Exams – General Awareness

- Bentinck placed William Sleeman in charge of the operation to eliminate the Thuggee menace. Between 1831 and 1837 more than three thousand Thugs were convicted.
- Banned female infanticide in 1829
- Macaulay's minutes on education were accepted declaring that English should be the official language of India in 1835

## **LORD AUCKLAND (1836-1842)**

- The first Anglo-Afghan war

## **LORD DALHOUSIE (1848-1856)**

- Lord Dalhousie was one of the chief architects of the British Empire in India.
- During Lord Dalhousie's tenure first Railway line from Bombay to Thane was opened in 1853 and in the same year Calcutta and Agra were connected by telegraph.
- Second Anglo-Sikh war 1849 was fought in which the Sikhs were again defeated and lord Dalhousie annexed the whole of Punjab to the British administration
- He Introduced *Doctrine of Lapse* and captured Satara (1848), Jaipur and Sambhalpur (1849), Udaipur (1852), Jhansi (1853) and Nagpur (1854)
- Satara was the first state to fall under the policy of Doctrine of Lapse
- Established Postal system in India which made communication easier
- Abolished Titles and Pensions and Widow Remarriage Act (1856)
- Made Shimla as the summer capital of British India
- In 1854 Wood's Dispatch was passed which provided the proper system of education from the School to the University
- Established Public Works Department
- Charter Act of 1853

## **THE GREAT REVOLT 1857**

- Revolt of 1857 is an important landmark in the history of India which occurred during the governor-generalship of lord canning



# Railway Exams – General Awareness

- As per the historians it was the Sepoy mutiny, however according to the Indian scholar it was the first war of independence

## CAUSES FOR THE REVOLT

- The result of 1857 was a result of combination of political, economic , socio-religious and military causes

### POLITICAL CAUSES

- The annexation policy of British was one of the major causes for the revolt
- Lord Dalhousie's Doctrine of Lapse had created fear and uneasiness throughout India. According to Doctrine of Lapse an Indian state was annexed by British if the ruler had no natural heir. Satara , Jhansi, Nagpur and sambhalpur were annexed owing to Doctrine of lapse

### ECONOMIC CAUSES

- Heavy taxation, forcibly eviction, discriminatory tariff policy against Indian products
- The Indian weavers and craftsmen were forced to work according to the desires of servants of the company

### SOCIAL AND RELIGIOUS CAUSES

- The racial discrimination by British against Indians, forceful conversion of Christianity and social reforms like abolition of sati in 1829, Legalization of widow remarriage in 1956
- Religious sentiments were aroused when the British imposed taxes on the lands belonging to temples and mosques

### MILITARY CAUSES

- British discriminated against the Indian soldiers and adopted the policy of exclusion in the service conditions and promotion by which the high and key posts were reserved only for the Europeans

### IMMEDIATE CAUSES

- The introduction of Enfield greased rifles whose cartridges were said to have a greased cover made of beef and pork sparked off the revolt
- On 29 March 1857 at Barrakpore near Calcutta, Mangal panday a young Indian Brahmin sepoy from Bengal regiment refused to use greased cartridge. When he was forced by his sergeant he shot him down

# Railway Exams – General Awareness

- The sepoy broke out into open revolt at Meerut in May 1857 they broke open the prisons and released their imprisoned comrades

## MAJOR CENTERS AND LEADERS OF REVOLT 1857

S.No	Centre	Indian leader
1	Delhi	Bahadur shah II
2	Kanpur	Nanasahib and Tantiya Tope
3	Lucknow	Begam hazarat mahal
4	Jhansi	Rani Lakshmi bai
5	Allahabad	Liaquat ali

## CAUSES FOR FAILURE OF THE REVOLT

- South India remained quit and Punjab and Bengal were only marginally affected
- The educated Indians did not support the movement in general
- The revolt was planned throughout the country on May 31,1857 but it broke out prematurely
- The Revolutionaries had no common idea. The Muslims wanted to revive Mughal rule and the Hindus wanted to revive the Peshwa Raj
- The British through their diplomacy of divide and rule prevented most of the Indian rulers to join together for a common cause
- The Indian princes and zamindars either remained loyal or were fearful of British power
- One of the important reasons for the failure of the rebellion was the absence of a central authority

## IMPACT OF THE REVOLT 1857

- The major impact of the revolt was the end of East India Company's rule in India. The administration of India was directly taken by the British crown
- The British Governor-General of India was now also given the title of viceroy of India
- India was pronounced as one of the many crown colonies to be directly governed by the Parliament. The responsibility was given to a member of the cabinet, designated as the Secretary of State for India

# Railway Exams – General Awareness

- Full religious freedom was guaranteed to Indians. Indian were also given assurance that high posts would be given to them without any discrimination
- The revolt aroused national feelings among the people and paved way for the rise of the national movement
- India was pronounced as one of the many crown colonies to be directly governed by the Parliament. The responsibility was given to a member of the cabinet, designated as the Secretary of State for India

## QUEEN VICTORIA'S PROCLAMATION OF 1858

- The proclamation issued by queen victoria is described as the 'Magna Carta' of India.
- A Royal Durbar was held at Allahabad on November 1, 1858. The proclamation issued by Queen Victoria was read at the Durbar by Lord Canning, who was the last Governor General and the first Viceroy of India.

## IMPORTANT EVENTS UNDER VICEROYS OF INDIA

### LORD CANNING (1856-1862)

- First Viceroy and last Governor General of India. And withdraw Doctrine of Lapse
- Revolt of 1857 is took place. Rule of East India Company replaced by rule of crown in 1858 and Queen Victoria proclamation was read by Lord canning at Allahabad
- The Universities of Madras Calcutta and Bombay were established in 1857
- Indian Penal Code – 1860 and Indian council act 1861

### LORD ELGIN

- Establishment of Calcutta High Court Bombay High Court and Madras High Court in 1862

### LORD JOHN LAWRENCE (1864-1869)

- Indian Forest Department was created

### LORD MAYO (1869-1882)

- Establishment of statistical survey of India and for the first time in Indian history a census was held in 1872 First census was conducted in India non-synchronously in different parts.
- Department of Agriculture and commerce was established. Financial decentralization process started in India
- He was the only viceroy to be murdered in office. He was assassinated in Andamans in 1872

### LORD LYTTON

# Railway Exams – General Awareness

- Royal Titles Act of 1876. And the Assumption of the title of empress of India by Queen Victoria
- Vernacular Press Act and Arms Act of 1878
- Appointment of first famine commission in 1878
- Lord Lytton known as the viceroy of reverse character

## **LORD RIPPON (1880-1884)**

- First Factory Act of 1881
- The first synchronous census in India was held in 1881
- Local Self Government was introduced in 1882 .Lord Rippon called the founding father of local self-government
- Division finances of the centre in 1882
- Hunter commission on Education to improve the primary and secondary education
- Ilbert Bill Controversy
- Negotiable Instruments Act (1881)
- Repeal of the Vernacular Press Act (1882)

## **LORD DUFFERIN (1884-88)**

- Third Burmese War (1885-86)
- Foundation of Indian National Congress in 1885

## **LORD LANDSDOWNE (1888-94)**

- Factory Act of 1891 granted weekly holidays and stipulated working hours
- Division of Civil services into Imperial, Provincial and Subordinate services
- Indian councils Act of 1892
- Appointment of Durand Commission and its defined the Durand line between India (now in Pakistan) and Afghanistan in 1893

## **LORD CURZON (1899-1905)**

- Ancient Monuments Preservation Act of 1904.
- The Archaeological survey of India was established

# Railway Exams – General Awareness

- Establishment of Agriculture research Institute at Pusa in Bihar
- Partition of Bengal in 1905
- Appointment of Raleigh Commission to suggest reform regarding universities

## **LORD MINTO (1905-10)**

- Swadeshi movements-1905
- Surat session and Split in the congress-1907
- Minto Morley reforms-1909
- Formation of Muslim League in 1906

## **LORD HARDINGE (1910-16)**

- Transfer of imperial capital Calcutta to Delhi
- Foundation of Hindu Mahasabha in 1915 by Madan Mohan Malaviya

## **LORD CHELMFORD (1916 -21)**

- Gandhi returned to India and founded Sabarmati Ashram in 1916
- Champaran satyagraha in 1917 at chamaparan district of Bihar
- Home Rule leagues -1916
- Luknow pact and reunion of congress in 1916
- The August Declaration of 1917
- Rowlatt Act 1919 and Jallian Walla Bagh Massacre (13 April 1919)
- Khilafat Movement 1919 and Non-cooperation movement started in 1920

## **LORD READING (1921-26)**

- Chauri-Chaura incident on 5th Feb 1922
- Formation of Swaraj party by C.R.Das Motilal Nehru in 1923
- Foundation of Rastriya Swayam Sevak Sangh (RSS) by K.B.Hedgewar (1925)
- Repeal of Rowlatt Act

## **LORD IRWIN (1926-31)**

- Simon commission visited India in 1927.

# Railway Exams – General Awareness

- Dandi march-1930
- Civil disobedience movement-1930
- First Round Table Conference was held 1930. Chaired by then British Prime Minister, **Ramsay MacDonald**
- Gandhi Irwin pact 1931
- In Lahore **session** 1929, **Congress** passed the **Poorna Swaraj** resolution

## **LORD WILLINGDON (1931-36)**

- Second Round Table conference in 1931 and Third Round Table conference in 1932
- Poona pact between Gandhi and Ambedkar in 1932
- Foundation of Socialist Party by Acharya Narendra Dev and Jai Prakash Narayan in 1934
- Govt. of India Act 1935 Passed

## **LORD LINLITHGOW (1936-43)**

- Cripps Mission – 1942
- Quit India movement - 8<sup>th</sup> August 1942
- Formation of Forward Block by on May 3, 1939 by Netaji Subhas Chandra Bose
- August offer by Lord Linlithgow in 1940 and congress rejected this offer at its meeting at Wardha in august 1940

## **LORD WAVELL (1943-47)**

- Cabinet Mission – 1946
- The first meeting of the Constituent Assembly was held on 9<sup>th</sup> December 1946

## **LORD MOUNTBATTEN (1947)**

- He is the last viceroy of India and the first governor general of free India
- Partition of India and Independence
- Indian independence act 1947 by British parliament on 4<sup>th</sup> July 1947

## **IMPORTANT EVENTS OF FREEDOM MOVEMENT IN INDIA**

### **INDIAN NATIONAL CONGRESS**

# Railway Exams – General Awareness

- The Indian national congress was founded in 1885 on the advice of Allan Octavian Hume, a retired English ICS officer
- The first session of the congress was held at Bombay. Chaired by W.C.Bannerjee
- The list of Indian National Congress sessions with their Presidents

Year	Place	President	Importance
1885	Bombay	W C Bannerjee	First session attended by 72 delegates
1886	Calcutta	Dadabhai Naoroji	
1887	Madras	Syed Badruddin Tyabji	First Muslim president
1888	Allahabad	George Yule	
1893	Lahore	Dadabhai Naoroji	
1896	Calcutta	Rahimtullah M. Sayani	National song ‘Vande Mataram’ sung for the first time
1905	Benares	Gopal Krishna Gokhale	Expressed resentment against the partition of Bengal
1907	Surat	Rash Behari Ghosh	Party splits into extremists and moderates
1911	Calcutta	Bishan Narayan Dar	‘Jana Gana Mana’ sung for the first time
1916	Lucknow	Ambica Charan Mazumdar	Lucknow Pact – joint session with the Muslim League
1917	Calcutta	Annie Besant	First woman president of the INC
1924	Belgaum	M K Gandhi	
1925	Kanpur	Sarojini Naidu	First Indian woman president
1928	Calcutta	Motilal Nehru	All India Youth Congress formed
1929	Lahore	Jawaharlal Nehru	Resolution for ‘Poorna Swaraj.’ Civil Disobedience movement for complete independence to be launched, 26 January to be observed as ‘Poorna Swaraj Day’

# Railway Exams – General Awareness

1931	Karachi	Vallabhbhai Patel	Gandhi-Irwin pact endorsed. Gandhi nominated to represent INC in the second round table conference. Adopted a resolution on Fundamental Rights and Duties and provided an insight into what the economic policy of an independent India
1938	Haripura	Subhas Chandra Bose	National planning committee set up under Jawaharlal Nehru
1939	Tripuri	Subhas Chandra Bose	Bose was elected but had to resign since Gandhi supported Pattabhi Sitaramayya. After resignation of bose Rajendra Prasad was appointed
1946	Meerut	Acharya Kripalani	Last session before independence
1948	Jaipur	Pattabhi Sitaramayya	First session after independence

## THE MODERATES

- They believed in peaceful approach to the government to redress the grievances and asking for major reforms
- Surendranath Banarjee, Dadabai naoroji, Pherozeshah Mehta, Gopala Krishna Gokhle and M.G. Ranade were some of the important moderate leaders
- Sir Dadabhai Naoroji Dordi known as the "Grand Old Man of India"
- Naoroji's book **Poverty and Un-British Rule in India** offered a scathing criticism of the economic impact of British rule.
- The demands of moderates were described as "Political Mendicacy"

## EXTREMISTS



# Railway Exams – General Awareness

- Lokmanya Bal Gangadhar Tilak, Bipin Chandra pal, Lala Lajpat Rai, and Arabind Ghoshwere some of the important extremist leaders
- Tilak raised the slogan “Swaraj is my birth right and I shall have it” and he started newspaper “kesari”

## **PARTITION OF BENGAL-1905**

- In 1905 Lord Curzon made the partition of Bengal .He divided Bengal into two parts-East and west parts. Due to the violent criticism and agitation the partition was revoked in 1911
- The intention of Curzon was to suppress the political activities against the British rule in Bengal and to create a Hindu–Muslim divide

## **SWADESHI MOVEMENT-1905**

- The Swadeshi movement sought to oppose British rule and encourage the ideas of self-help, Swadeshi enterprise, national education, and use of Indian languages. To fight for swaraj, the radicals advocated mass mobilization and boycott of British institutions and goods

## **FORMATION OF MUSLIM LEAGUE-1905**

- In 1906 the all India Muslim league was formed under the leadership of Salimullah khan the Nawab of Decca

## **SURAT SPLIT-1907**

- The congress session held in 1907 was a battle ground between the moderates and the extremists over the election of congress president
- Bala Gangadhar Tilak become the leader of Extremists and Gopala Krishna Gokhale become the leader of moderates

## **MINTO MORLEY REFORMS-1909**

- The Minto- Morley Reforms introduced separate electrode for Muslims. The Moderates criticized the reforms

## **THE FIRST WORLD WAR 1914-1918**

- The First World War broke out in 1914. The Indian national congress supported the British hoping that at the end of the war they would be rewarded with self-government

## **THE HOME RULE LEAGUE -1916**

- Bala Gangadhar Tilak formed the Home Rule League in Bombay in 1916

# Railway Exams – General Awareness

- Mrs. Annie Besant started a Home rule League in Chennai. Motilal Nehru and C.R. Das supported the movement

## LUCKNOW PACT 1916

- The moderates and extremists joined together
- The congress and the Muslim League signed a pact agreeing to co-operate with each other in order to achieve self-government
- At this session Nehru met Gandhiji for the first time

## CHAMPARAN SATYAGRAHA

- The Champaran Satyagraha (1917) is considered to be a vital event in the history of India's freedom struggle. It was the first India's Civil Disobedience movement launched by Mahatma Gandhi
- In Champaran in Bihar the **tinkathia** system was practiced. Under this exploitative system the peasants were forced by the European planters to cultivate indigo on three-twentieths of their land holdings. Peasants opposed this **tinkathia** system
- The success of Champaran Satyagraha, followed by his fruitful intervention in Ahmedabad mill strike (1918) and the Kheda Satyagraha (1918) helped Gandhi establish himself as a leader of mass struggle.

## MONTAGUE CHEMSFORD REFORMS ACT OF 1919

- It expanded the legislature at the centre and in the provinces .It introduces Dyarchy in the provinces. It further encouraged the communal, racial and religious interest by allowing the Sikhs, Anglo-Indians and Europeans to send their own separate representatives

## ROWLATT Act 1919

- The British Government passed the Rowlett Act in 1919.It empowered the British Government to arrest anyone without warrant and imprisoned without trial
- Gandhi called it a 'Black Act' and in protest called for a nation-wide satyagraha on 6 April 1919

## JALLIAN WALA BAGH TRAGEDY 1919

- The Jallianwala Bagh massacre took place on **13 April 1919**

# Railway Exams – General Awareness

- General Dyer ordered troops of the British Indian Army to fire their rifles into a crowd of unarmed civilians in Jallianwala Bagh
- Rabindranath Tagore renounced his knighthood in protest against this incident
- Gandhi surrendered his Kaiser-i-Hind medal.

## **KHILAFAT MOVEMENT 1919**

- The Muslims in India protested against the humiliation of the Turkish caliph who was also their religious head
- The Ali brothers-Mohammed Ali and Shaukat Ali and Moulana Abul Kalam Azad organized Khilafat Movement. Gandhiji supported this movement

## **NON-COOPERATION MOVEMENT –(1920-1922)**

- Gandhi decided to start the in co-operation movement at Calcutta conference The movement was started in 1920
- The congress session held in 1921 at Ahmadabad called upon the people not to pay taxes to the Government
- The Non-Cooperation Movement gained momentum through 1921-22. Thousands of students left government controlled schools and colleges. Many lawyers such as Motilal Nehru, C.R. Das, C. Rajagopalachari and Asaf Ali gave up their practices

## **CHAURI CHAURA INCIDENT-1922**

- The Chauri-Chaura incident occurred at Chauri-Chaura in the Gorakhpur district of the Uttar Pradesh in British India on 5 February 1922
- Twenty two policemen were killed on that day
- Mahatma Gandhi called off the Non Cooperation Movement when in February 1922 a crowd of peasants set fire to a police station in Chauri-Chaura

## **THE SWARAJYA PARTY – 1923**

- C.R. Das and Motilal Nehru formed the Swarajya party in 1923
- These leaders wanted to oppose the British Government from within the Legislature

## **SIMON COMMISSION-(1927-1928)**

# Railway Exams – General Awareness

- The British Government appointed a seven member commission under leadership of Sir John Simon in 1927 to enquire in to the working of the Montague Chelmsford Reforms Act of 1919
- Spreads protests all over the country against Simon commission because all the members of this commission were English men It did not have any Indian member
- The Congress at its annual session in Madras in 1927 resolved to boycott the Simon commission. The Muslim league and the Hindu Mahasabha also supported the decision
- Wherever the Commission went there were protests, and black flag marches with the slogan ‘Go Back Simon’.

## **BARDOLI SATYAGRAHA- 1928**

- The Bardoli Satyagraha, 1928 was a movement led by Sardar Vallabhai Patel for the peasants of Bardoli against the unjust raising of taxes.
- Mahatma Gandhi gave the title of **Sardar** to **Vallabhbhai Patel** for his organizational skills in organizing **Bardoli Satyagraha in 1928**

## **THE LAHORE CONGRESS-1929**

- The congress met at Lahore under the President ship of Jawaharlal Nehru in 1929.It declared Purna swaraj or Complete independence for India as its goal
- At midnight on 31,December 1929 the tricolor flag was unfurled on the banks of river Ravi amidst the slogans Vande Mataram, Consequently January 26,1930 was celebrated as independence day all over the country

## **THE SALT SATYAGRAHA- 1930**

- Gandhiji and 78 chosen followers including Sarojini Naidu left Sabarmati Ashram in Ahmadabad to Dandi, on Gujarat coast to break salt laws. This march is popularly known as **Dandi march**

## **GANDHI-IRWIN PACT**

- Lord Irwin held talks with Gandhi which resulted in the **Gandhi–Irwin Pact** on **5 March 1931**. The British agreed to the demand of immediate release of all political prisoners not involved in violence, return of confiscated land and lenient treatment of government employees who had resigned.
- It also permitted the people of coastal villages to make salt for consumption and non-violent picketing.

# Railway Exams – General Awareness

- The Congress agreed to suspend the Civil Disobedience Movement and attend the conference. **Gandhi attended the Second Round Table Conference** which began on 7 September 1931

## THE COMMUNAL AWARD AND POONA PACT OF 1932

- British Prime Minister MC. Donald announced a scheme known as the communal Award in 1932. It provided separate electorates for the minorities and the depressed classes
- The Poona Pact refers to an agreement between B. R. Ambedkar and Mahatma Gandhi in 1932

## THE GOVERNMENT OF INDIA ACT 1935

- The Government of India Act 1935 was one of the important positive outcomes of the Civil Disobedience Movement.
- Some of the features of The government of India Act 1935
  1. Introduced provincial autonomy
  2. Abolished diarchy in the provinces
  3. Established Federal Government at the centre
  4. Provided for the establishment of a federal court to decide conflicts between the provinces and the center
  5. Provided for the establishment of Federal bank
- By this Act Burma was separated from India in 1937

## INDIVIDUAL SATYAGRAHA

- In August 1940 Viceroy Linlithgow made an offer in return for Congress' support for the war effort. However, the offer of dominion status in an unspecified future was not acceptable to the Congress. However, it did not want to hamper the British during its struggle against the fascist forces of Germany and Italy. Hence Gandhi declared limited Satyagraha which would be offered by a few individuals.
- The objective was to convey to the world that though India was opposed to Nazism it did not enter the War voluntarily
- Vinobha Bhave was the first to offer satyagraha on 17 October 1940

## DEMAND FOR PAKISTAN-1940

# Railway Exams – General Awareness

- In march 1940 at the Lahore session of the Muslim League demand for a separate nation of Pakistan was made Muhammad Ali Jinnah put forth the two nation theory

## CRIPPS MISSION-1942

- **Sir Stafford criggs** was sent by the British Government in March 1942 to negotiate with Indian leaders
- Cripps offered Indians Dominion status after the second world war and allowed them to frame a new constitution
- The Cripps Mission offered:
  1. Grant of Dominion Status after the War
  2. Indian Princes could sign a separate agreement with the British implying the acceptance for the demand of Pakistan.
  3. British control of Defence during the War.
- Both the Congress and the Muslim League rejected the proposal. Gandhi called the proposals as a post-dated Cheque on a crashing bank.

## QUIT INDIA MOVEMENT-1942

- The Quit India Resolution was passed by the Congress Working Committee on 8 August 1942 in Bombay demanding immediate withdrawal of British from India
- The historic quit India resolution was passed at Bombay Gandhiji's Memorable Speech "I am not going to be satisfied with anything short of complete freedom. We shall do or die. We shall either free India or die in the attempt

## SUBHAS CHANDRA BOSE & INDIAN NATIONAL ARMY

- Netaji Subhash Chandra Bose is a radical nationalist, with socialist leanings, Bose did not share Gandhi's ideal of ahimsa, though he respected him as the "**Father of the Nation**".
- In 1938 he was elected president of the Indian National Congress
- In 1939 Subhas Chandra Bose became the President of the Congress again by defeating Pattabhi Sitaramayya, the candidate of Gandhi. When Gandhi refused to cooperate, Subhas Chandra Bose resigned his post and the AICC session at Calcutta elected Rajendra Prasad as president.

# Railway Exams – General Awareness

- Bose founded the Forward Bloc.
- He wanted to strike British hard by joining its enemies. In March 1941, he made a dramatic escape from his house in disguise and reached Afghanistan. Initially he wanted to get the support of Soviet Union. After the Soviet Union joined the Allied Powers which included Great Britain, he went to Germany
- In 1943, he came to Singapore took control of the Indian National Army or Azad Hind Fauj. The Indian National Army Captain Lakshmi Sahgal headed it (Azad Hindu Fauj) had earlier been organized by Gen. Mohan Singh with Indian prisoners of war with the support of Japanese in Malaya and Burma. Bose reorganized it into three brigades: Gandhi Brigade, Nehru Brigade and a women's brigade named after Rani of Jhansi
- Subhash Chandra Bose who had given the slogan '**Dilli Chalo**' and was marching with an INA to free India
- Subhash Chandra Bose formed the Provisional Government of Free India in Singapore on October 21, 1943.
- The Axis powers (Germany, Japan and Italy) recognized Bose's Provisional Government as its ally

## RAJAJI FORMULA

- In April 1944, when the Congress leaders were in jail, C.Rajagopalachari put out a proposal to resolve the issue
- It contained the following
  1. Commission to be formed to demarcate the contiguous districts where the Muslims were in absolute majority and a plebiscite of the adult population there to ascertain whether they would prefer Pakistan
  2. In case of a partition there would be a mutual agreement to run certain essential services, like defence or communication
  3. The border districts could choose to join either of the two sovereign states

## WAVELL PLAN

- In June 1945 Lord Wavell called for the Simla conference
- The Wavell Plan proposed the following
  1. Formation of a new Executive Council at the centre in which all the members except the Viceroy and the Commander in Chief would be Indian.

# Railway Exams – General Awareness

2. All portfolios except Defence were to be under the control of Indian members.
3. Equal number of representatives in the council for the caste Hindus and the Muslims and separate representation for the Scheduled Castes
4. Start of discussions for a new constitution.

## **THE CABINET MISSION-1946**

- In March 1946 the cabinet mission visited India to negotiate with Indian leader about transfer of power
- The committee recommended Federal Government .A constitute Assembly should be elected to draw up the future constitution of India

## **DIRECT ACTION CAMPAIGN (August 16, 1946)**

- The Muslim league launched the direct action campaign on Aug 16,1946,Which resulted in heavy communal riots in the country

## **THE INTERIM GOVERNMENT-1946**

- On 2<sup>nd</sup> September 1946, the newly-elected Constituent Assembly formed interim government of India which existed till 15<sup>th</sup> August 1947
- The interim government headed by Jawaharlal Nehru was formed in September 1946.

## **FORMATION OF CONSTITUENT ASSEMBLY (Dec 9, 1946)**

- Constituent Assembly was constituted on 9th December, 1946 and Dr. Rajendra Prasad was elected its president

## **ATTLEE'S ANNOUNCEMENT**

- The Prime Minister Clement Attlee announced on February 20, 1947, that:
  1. The British Government would grant full self-government to British India by June 3, 1948
  2. The future of the Princely States would be decided after the date of final transfer is decided

## **MOUNTBATTEN PLAN OR JUNE 3 PLAN**

- India divided into two separate nations India and Pakistan.
- The Princely states would enjoy the liberty to join either India or Pakistan or ever remain independent.
- August 15, 1947, was date fixed for handing over power to India and Pakistan.



# Railway Exams – General Awareness

- Boundary commission was to be set up under Radcliffe Brown and the award would be announced after the transfer of power.
- Punjab and Bengal Legislative Assemblies would vote on whether they should be partitioned.

## THE INDIAN INDEPENDENCE ACT 1947

- The Indian Independence Act was based on the Mountbatten plan of June 3, was passed by the British parliament on July 5, 1947 and received royal assent on July 18, 1947
- The Act provided for partition of India and the establishment of the two Dominion India and Pakistan.
- Clement Attlee was the British Prime Minister at the time of India got independence

## INDEPENDENCE AND PARTITION

- The Mountbatten Plan was given effect by the enactment of the Indian Independence Act on 18 July 1947 by the British Parliament.
- The Act abolished the sovereignty of the British Parliament over India. India was partitioned into two dominions – India and Pakistan.
- On 15 August 1947 India won independence.

## SOCIAL AND RELIGIOUS REFORMS MOVEMENTS

### BRAHMO SAMAJ-1828

- Raja Ram Mohan Roy was born in 1772 founded Atmiya sabha in Calcutta
- The Atmiya sabha was named Brahmo sabha and finally Brahmo samaj in 1828. He launched a movement for the abolition of sati through his journal sambad kaumudi (1819)

### PRARTHANA SAMAJ-1867

- Atmaram pandurang founded Prarthana samaj in 1867 in Bombay
- This samaj advocated various social reforms.
- This samaj founded night schools, asylum and orphanages and other such institutions for the downtrodden people

### ARYA SAMAJ-1875

- Swami Dayananda saraswathi founded the Arya samaj in 1875. His original name was Mul Shankar

# Railway Exams – General Awareness

- The Arya samaj opposed child marriage, animal sacrifice, idol worship, ritualism and the idea of heaven and hell and the concept of fatalism
- Swami Dayananda saraswathi started the Suddhi movement a ritual to reconvert the Hindus who had been converted to other religions earlier
- Swami Dayananda saraswathi was the first Indian who preached the gospel of ‘Swadeshi’ and ‘India for Indians’. He is often described as the ‘Martin Luther of Hinduism’

## THE THEOSOPHICAL SOCIETY-1875

- It was founded by a Russian Lady Madame Blavatsky and an American Colonel Henry.S. Olcott in USA to preach about God and Wisdom
- Mr. Annie Besant become the president of this society in 1893 and devoted her to the revival of Hindu religion and Indian education. She founded central Hindu college at Benaras. Later it developed into the Benaras Hindu University
- Anne Besant started a newspaper called New India and spread the Theosophical ideas. The headquarters of the Theosophical society is Adyar in Chennai

## RAMAKRISHNA MISSION-1897

- Swami Vivekananda (Originally Narendranath Dutta) founded the Ramakrishna Mission in 1887
- Ramakrishna Mission is a philanthropic, volunteer organization
- Swami Vivekananda attended the parliament of Religions held in Chicago in 1893 and made a phenomenal impression by his speech. He published two papers Prabudha bharat and Udbodhini

## YOUNG BENGAL MOVEMENT

- It was founded by a Henry Vivin Desezio

## SERVENTS OF INDIAN SOCIETY

- It was founded by Gopal Krishna Gokhle in Bombay in 1905

## ALIGARH MOVEMENT

- The Aligarh movement was started by Sir Syed Ahamed khan

# Railway Exams – General Awareness

- Main aim of this movement is to build confidence between the government and the Muslims. Persuade the Muslims to acquire Modern knowledge and English language. Hold back the Muslim from the politics
- Sir Syed Ahamed khan founded the Mohammedan Anglo Oriental College(Also known as Aligarh Muslim University) at Aligarh in 1875

## SATYA SHODHAK SAMAJ

- In 1873 Jyotiba Phule formed the Satya Shodhak Samaj(society of seekers of truth in Maharashtra)

## SELF-RESPECT MOVEMENT

- E.V. Ramasamy (Partyer) started the Self-Respect Movement

## IMPORTANT BATTLES

Name of the battle	Year	Battle between
Battle of Hydaspes	326 BC	Alexander the Great and King Porus
Kalinga war	260 BC	Ashoka and king of kalinga
First battle of Tarain or Thaneswar	1191 AD	Prithiviraj chauhan and Mohd Gori
Second battle of Tarain or Thaneswar	1192 AD	Prithiviraj chauhan and Mohd Gori
First battle of Panipat	1526 AD	Ibrahim Lodhi and Babur
Battle of khanwa	1527 AD	Babur and Rana sunga
Battle of chausa	1539 AD	Mughal emperor Humayun and Sher Shah Suri.
Second battle of Panipet	1556 AD	Akbar and Hemu
Battle of Talikota	1565 AD	Combined force of 4 Muslim rulers of Deccan and Ramraja of Vijayanagar
Battle of Haldighati	1576 AD	Rana pratap and Akbar
Battle of samugarh	1659 AD	Aurangzeb and imperial forces led by Dara
Battle of Plassey	1757 AD	Sirajuddaula and English forces under clive

# Railway Exams – General Awareness

Third battle of panipet	1761 AD	Ahmed shah Abdali and Marathas
Battle of Buxar	1764 AD	Joint forces of Muslim and English forces
Third Mysore war	1790-1792 AD	English forces and Tipu sultan
Fourth Mysore war	1799 AD	English forces and Tipu sultan
Second Sikh war	1848-1849 AD	English forces and Sikhs

## ABBREVIATED OR ALTERNATIVE NAMES OF PERSONALITIES

Abbreviated or alternative names	Original name
Andhra Kesari	T. Prakasam
Badshah Khan	Abdul Ghaffar Khan
Beacon of Light of Asia	Subhash Chandra Bose
Bapu, Mahatma Gandhi	Mohan Das Karam Chand Gandhi
Chacha	Jawahar Lal Nehru
C.R.	C Rajagopalachari
Deenbandhu	C.F. Andrews
Deshbandhu	C.R. Das
Enlightened One, The	Mahatma Buddha
Father of Indian Unrest	Bal Gangadhar Tilak
Father of the Local Self-government	Lord Ripon
Father of the Nation (India)	Mahatma Gandhi
Frontier Gandhi	Abdul Ghaffar Khan
Grand Old Man of India	Dadabhai Naoroji
Gurudev	Rabindranath Tagore
Indian Bismarck	Sardar Vallabhbhai Patel

# Railway Exams – General Awareness

Indian Einstein	Nagarjuna
Indian Napoleon	Samudragupta
J.P.Loknayak	Jayaprakash Narayan
Lal, Bal, Pal	Lala Lajpat Rai, Bal Gangadhar Tilak and Bipin Chandra Pal
Liberator of the Indian Press	Sir Charles Metcalfe
Lion of Punjab (Sher-i-Punjab)	Lala Lajpat Rai
Lokmanya	Bal Gangadhar Tilak
Mahamana	Pt. Mandan Mohan Malaviya
Martin Luther of India	Dayanand Saraswati
Man of Iron/Iron Man of India	Sardar Patel
Netaji	Subhas Chandra Bose
Nightingale of India	Sarojini Naidu
Parrot of India (Tuti-e-Hindustan)	Amir Khusrau
Patriot of Patriots	Subhash Chandra Bose
Punjab Kesari	Lala Lajpat Rai
Scourge of God	Chengiz Khan
Iron Man of India	Sardar Patel

## LIST OF INDIAN MONUMENTS AND THEIR BUILDERS

Monuments	Place	Builders
Agra Fort	Agra Fort	Akbar
Jama Masjid	Delhi	Shahjahan
Deewan-E- Khas	Agra Fort, Agra	Shahjahan
Shish Mahal	Agra	Shahjahan

# Railway Exams – General Awareness

Moti Masjid	Agra Fort	Shahjahan
Taj Mahal	Agra	Shahjahan
Fatehpur Sikri Jodha Bai Palace Birbal Palace Panch Mahal Buland Darwaza	Agra	Akbar
Jantar Mantar	Mathura	Maharaja Sawai Jai Singh II
Rock cut temple	Mamallapuram (Tamil Nadu)	Mahendravarman-I
Shore temple	Mamallapuram (Tamil Nadu)	Mahendravarman-I
Brihadeshwara	Tanjore (Tamil Nadu)	Rajaraja chola I
Gangaikondacholapuram	Gangaikonda cholapuram (Tamil Nadu)	Rajendra I
Hawa Mahal	Jaipur (Rajasthan)	Maharaja Pratap Singh
Vijaya Stambha	Chittorgarh (Rajasthan)	Maharana Kumbha
Dilwara Jain Temple	Mount Abu (Rajasthan)	Vimal Shah
Khajuraho Temples	Madhya Pradesh	Chandellas
Char- Minar	Hyderabad (Telangana)	Quli Qutub Shah
Golconda Fort	Hyderabad (Telangana)	Qutub Shahi rulers
Ajanta Caves	Aurangabad (Maharashtra)	Gupta rulers
Ellora Caves	Maharashtra	Rashtrakuta rulers
Elephanta Caves	Mumbai (Maharashtra)	Rashtrakuta rulers
Vikramasila Monastery	Bihar	Dharma Pala
Nalanda University	Bihar	Kumargupta I
Shalimar Garden	Srinagar (Jammu and Kashmir)	Jahangir

# Railway Exams – General Awareness

Sun Temple (Black pagoda)	Konark (Odisha)	Narsimhadeva I
Jagannath Temple (white pagoda)	Puri (Odisha)	Anantvarman Ganga
Shantiniketan	West Bengal	Rabindra Nath Tagore
Gol Gumbaz	Bijapur, Karnataka	Muhammad Adil Shah
Lal Bagh	Bangaluru (Karnataka)	Hyder Ali
Moti Masjid	Delhi Fort, Delhi	Aurangzeb
Ferozshah Kotla	Delhi	Ferozshan Tughlaq
Qutub Minar	Delhi	Qutubuddin Aibak
Red Fort	Delhi	Shahjahan

## LIST OF IMPORTANT FOREIGN TRAVELLERS OR ENVOYS IN INDIAN HISTORY

Travellers/Envoys	Details
Deimachos	<ol style="list-style-type: none"> <li>1. Greek Ambassador</li> <li>2. <b>Ambassador</b> to the court of the Maurya Empire Bindusara (son of Chandragupta Maurya).</li> </ol>
Megasthenes	<ol style="list-style-type: none"> <li>1. <b>Megasthenes</b> visited India during the reign of Chandragupta Maurya ( Founder of Maurya Empire )</li> <li>2. <b>Indica</b> is the book written by Megasthenes .The book talked about India</li> <li>3. Greek ambassador of Seleucus Nicator</li> </ol>
Fa-Hien	<ol style="list-style-type: none"> <li>1. <i>Fa-Hien</i> was a Chinese Buddhist monk</li> <li>2. He visited India during the reign of Vikramaditya (Chandragupta II)</li> <li>3. He records the prosperity of the Gupta Empire</li> </ol>
Hiuen Tsang	<ol style="list-style-type: none"> <li>1. visited India during the reign of Harshavardhana</li> <li>2. Chinese Buddhist monk</li> <li>3. Hieun Tsang recorded the fame of the Nalanda University</li> </ol>

# Railway Exams – General Awareness

	4. He wrote book 'Si-yu-ki' or 'Record of the Western Countries'.
Ibn Battuta	<ol style="list-style-type: none"> <li>1. He was a Moroccan traveller.</li> <li>2. He visited India during the rule of Mohammed Bin Tughlaq.</li> <li>3. 'RIHLA' is a book written by Ibn Battuta</li> </ol>
Abdur Razak	<ol style="list-style-type: none"> <li>1. Abdur Razzaq was a persian scholar</li> <li>2. He visited during the reign of Dev Raya II of Sangam dynasty of Vijaynagar Empire</li> <li>3. He give a clear account of the Vijaynagar empire and their kingdom</li> <li>4. Ambassador of Shahrukh of Timurid dynasty.</li> </ol>
Al-Biruni	<ol style="list-style-type: none"> <li>1. He was a Persian scholar.</li> <li>2. He wrote a book titled 'Tahqiqi-e-Hind'.</li> <li>3. He was the first Muslim scholar to study India.</li> <li>4. He Came to India along with Mahmud Ghazni during one of his Indian raids.</li> </ol>
Marco Polo	<ol style="list-style-type: none"> <li>1. He was a Foreign envoy and traveller</li> <li>2. He visited Southern India during the reign of Rudramma Devi of Kakatiyas</li> <li>3. He wrote his experiences in his book 'The Book of Sir Marco Polo'. The book explains the economic history of India.</li> </ol>
Nicolo Conti	<ol style="list-style-type: none"> <li>1. He was a Italian merchant</li> <li>2. He visited India during the reign of Devaraya I (Sangama dynasty) of Vijayanagar Empire.</li> </ol>
William Hawkins	<ol style="list-style-type: none"> <li>1. Sir Thomas Roe was the ambassador of King James I of England in 1609.</li> <li>2. He visited India during the reign of Mughal Emperor Jahangir</li> </ol>
Sir Thomas Roe	<ol style="list-style-type: none"> <li>1. Sir Thomas Roe was the ambassador of King James I of England</li> <li>2. He visited India during the reign of Mughal Emperor Jahangir in 1615.</li> <li>3. The object of the mission was to obtain protection for the East India Company's factory at Surat.</li> </ol>



# Railway Exams – General Awareness

## HISTORY ONE LINERS

- **Harshavardhana** started the organization of Kumbh fair at Allahabad
- During **Dana Nanda's** reign, **Alexander** invaded India (327–325 BCE).
- The **Battle of the Hydaspes** was fought in 326 BC between **Alexander the Great** and **King Porus** of the Paurava kingdom (region between Jhelum and Beas)
- The best known of the **Kushanas** was **Kanishka** who was an ardent follower of Mahayana form of Buddhism. **Gandhara art** developed during his period.
- The **Saka** Era was founded by **Kanishka**, the emperor of Kushana Empire from the year **78 A.D.**
- Upnishads are books on **Philosophy**
- **Kanishka** was the first Indian ruler who had territory outside India
- The capital of the early **Chalukyas** was **Badami**
- Lokeshvara temple at Pattadakal in Karnataka built by Chalukya king Vikramaditya II to commemorate his victory over the Pallavas
- The **Nanda dynasty** was ruling at the time of Alexander's invasion
- Swami Vivekananda attended the "Parliament of the World's Religions" in America in the year of 1893
- Maurya Period from 322 BCE to 185 BCE
- Chandragupta was succeeded by his son Bindusara
- Bahmani dynasty (1347–1527) founded by Ala-ud-Din Hassan **Bahman Shah** who was also known as **Hassan Gangu**
- The capital of Bahmani kingdom was **Gulbarga** from 1347 AD to 1425 AD. It was moved to **Bidar** in 1425 AD.
- Sunga Dynasty was from 185 BC to 73 BC
- Mohenjodaro is prominent Harappan site, being surrounded by flood barriers in order to protect it with the aid of UNESCO funds
- **J.B. Kripalani** was the President of the Indian National Congress at the time of Mountbatten Plan was accepted

# Railway Exams – General Awareness

- ‘Saare Jahan Se Acha’ song written by Muhammad Iqbal
- The Indian Trade Union Congress was founded on 31 October **1920** with Lala Lajpat Rai as its **first president**
- Dadabhai Naoroji prepared the first estimates of National income of India
- Samudragupta organised Ashwamedha Yajna in Gupta Period
- Mir Zafar betrayed Siraj-ud-Daulah in the battle of Plassey in 1757
- **Guru Nanak** founded **Sikhs** Religion. His teachings composed in **Adi Granth**
- Guru Ramdas was Founder of Amritsar
- Harihara and Bukka is the founder the Vijayanagar empire in 1336 A.D. on the southern banks of Tungabhadra
- Hampi as the capital city of Vijayanagar empire
- Vijayanagar Empire was ruled by four important dynasties and they are:
  - 1.Sangama
  - 2.Saluva
  - 3.Tuluva
  4. Aravidu
- Krishnadeva Raya from the Tuluva dynasty was the most famous king of the Vijayanagar Empire
- Vikramashila university was founded by Pala king Dharmapala
- Mihira Bhoja was a ruler of the Gurjara-Pratihara dynasty of India
- The period between 1206 AD and 1526 AD in India’s history is known as the Delhi Sultanate period
- The kingdoms of Delhi Sultanate are as follows
  1. Slave dynasty 1206 – 1290
  2. Khilji dynasty 1290 – 1320
  3. Tughlaq dynasty 1321 - 1413
  4. Sayyid dynasty 1414 – 1450
  5. Lodhi dynasty 1451 – 1526

# Railway Exams – General Awareness

- Babur entered India in 1526 and defeated Ibrahim Lodi at the First Battle of Panipat in 1526. Babur was the first Mughal emperor In Indian
- The leader of the Bhakti movement focusing on Lord Rama was Ramananda
- The Red fort of Delhi was constructed during the reign of Shah Jahan
- In 1799 Sawai Pratap Singh constructed Hawa Mahal in Jaipur
- Guru Arjan Dev was the fifth guru of Sikhs
- Chinese Traveller Hiuen Tsang travelled during the reign of Harshvardhana in seventh Century
- The Bangladesh Liberation War ended on 16th December 1971
- .The Sepoy Mutiny started from Meruth on 28th may, 1857
- The battle of Goa was occurred in 1510 between Portuguese Empire and Bijapur Sultanate
- Lothal is located in coastal areas of Gujrat and it was major post city of Indus valley civilization
- Lord William Bentick was the first Governor General of British India
- Sardar Vallabhbhai Patel was the leader of Bardoli Satyagraha
- The Poona pact was signed between Mahatma Gandhi and B.R. Ambedkar on 24th September 1932
- The sati system was abolished by Lord William Bentinck in 1829
- Genghis Khan, founder of the Mongol Empire, invaded Transoxiana in 1219 during his conquest of Khwarezm
- During their rule the British persuaded or forced cultivators to produce jute in Bengal, tea in Assam, sugarcane in Uttar Pradesh, wheat in Punjab, cotton in Maharashtra and Punjab, and rice in Madras
- Indian Mughal paintings originated during the rule of Mughal Emperor, Humayun
- Humayun's Tomb is located in India
- During the Mughal Period the Official and Court language was Persian
- Gol Gumbaz was designed by Yaqut of Dabul
- Shah Jahan was imprisoned for the rest of his life by Aurangzeb
- Simon Commission came to India in 1928 to reform India's constitutional system
- Gol Gumbaz is located in Karnataka

# Railway Exams – General Awareness

- Dhamek Stupa was built by Emperor Ashoka of the Maurya Dynasty
- The first Buddhist Council was held at Rajagriha
- First battle of Panipat was fought between the army of Babur and Ibrahim Lodi in 1526
- The Upanishads are the Source of Hindu Philosophy
- English education was introduced in India by Macaulay
- Mahatma Gandhi gave the title of "Mahamana" to Madan Mohan Malviya
- Lord Lin Lithgow was the Viceroy of the time of Quit India Movement
- Madan Mohan Malaviya take loans for financing "The Hindustan Times" from Punjab national bank
- Rowlatt Act 1919 was enacted during the period of Lord Chelmsford
- In the year of 1991 Soviet Union disintegrate into 15 independent Republics
- Buddha, Dhamma and Sangha together are known as Triratna
- Pulakesin II was the greatest ruler of the Pallavas of Kanchi
- The Uttaramerur inscription provides information on the administration of the Cholas
- The founder of the Lodi Dynasty was Bahlol Lodi
- Iltutmish was the first ruler to issue Pure Arabic coin in India
- The Treaty of Seringapatam is associated with Third Anglo-Maratha War
- The Gandharva School of art is also known as the Buddhist-Roman art
- Muhammad-bin-Tughlaq was the Sultan at Delhi at time of the Vijayanagar empire was founded
- Jawaharlal Nehru established the Indian Civil Liberties Union in 1936
- Mahatma Gandhi gave the title of "Sardar" to Vallabhai Patel
- Flag Satyagraha was held at Nagpur in 1923
- Multan was named by the Arabs as City of gold
- 'Kavirajamarga' the book is written by Amoghvarsha, the Rashtrakuta King
- Uraon tribes is associated with the "Tana Bhagat" movement
- Shaheed Bhagat Singh founded the Naujawan Bharat Sabha

# Railway Exams – General Awareness

- Rashtrakuta King Krishna I built the Kailasanatha Temple at Ellora
- The Battle of Buxar was fought between British East India Company and Mir Qasim
- Lord Lytton passed the Vernacular Press Act and the Arms Act of 1878
- Lord Mayo was the only Viceroy of India to be murdered in office
- In 1939 Subhash Chandra Bose was elected as President of the Congress Party defeating Pattabhi Sitharamayya
- Swaraj is my Birth Right and I shall have it. This was advocated by **Lokmanya Tilak**
- Raja Ram Mohan Roy was the founder of Brahmo Samaj
- The famous book “Gulamgiri” was written by Jyotiba Phule
- Kamarup is an ancient name of Karnataka
- Akbar introduced Mansabdari system in India
- Battle of Talaikota led to the downfall of the Vijayanagar empire
- Harshavardhana shifted his capital from Thanesar to Kannauj
- The first Muslim to be elected President of 'Indian National Congress' was Badruddin Tyabji
- The Ellora caves were designated as a UNESCO World Heritage Site in 1983.
- Rana Sanga has built the Vijay Stambha (Tower of Victory) in Chittorgarh
- Sachindranath Sanyal was sent to the dreaded Cellular Jail in Port Blair for his involvement in Kakori train robbery
- Shah nama written by Ferdowsi
- Ryotwari System was introduced by Thomas Munro in 1820
- The National Archives of India (NAI) is located in New Delhi
- The British officer who ended the menace of **Thuggee** was **William Sleeman**.
- Cornwallis made the Permanent Settlement with the Zamindars of Bengal
- Chittaranjan Das defended Aurobindo Ghosh in the Alipore conspiracy case
- **Dadabhai Naoroji** in his **Poverty and Un-British Rule** in India explained how the English rulers were different from the earlier invaders.

# Railway Exams – General Awareness

- The Battle of Plassey was fought in 1757
- Madam Cama is known as Mother of Indian Revolutionaries
- The leader of revolt of 1857 in Lucknow was Begum Hazrat Mahal
- Lord Cornwallis introduced Permanent Settlement in 1793.
- Lord Wavell convened the ‘Simla Conference’ in 1945
- ‘Individual Satyagraha’ began on 17 October 1940
- The Two Nation Theory was propounded in Lahore Session, 1940 of the Muslim League
- Lord Linlithgow was the Viceroy of India during the Quit India Movement started in 1942
- INA trials held at the Red Fort, New Delhi
- The Cripps Mission visited India during the regime of Lord Linlithgow
- Usha Mehta ran an underground radio station at Bombay during the Quit India Movement
- Indian National Army (INA) was originally founded by Capt. Mohan Singh in Singapore in September 1942 with the help of Japan
- Mahatma Gandhi gave the call ‘Do or Die’ during the Quit India Movement

## General Science and Life Science

### General Science - Physics

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# Railway Exams – General Awareness

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## Units and Measurements

### UNIT

A unit is defined as a standard or fixed quantity of one kind used to measure other quantities of the same kind

- Fundamental units and derived units are the two classifications of units
- **Fundamental units:** Quantities which cannot be expressed in terms of any other physical quantities are called fundamental quantities. The units used to measure the fundamental quantities are called fundamental units  
Example: Length, mass, time, temperature etc.
- **Derived units:** Units which are derived from basic units and bear a constant relationship with fundamental units. Examples are area, volume, pressure, force, etc.

### INTERNATIONAL SYSTEM OF UNITS

In earlier time scientists of different countries were using different systems of units for measurement. Three such systems are CGS, FPS and MKS. Base units for length, mass and time in these systems were as follows

- FPS system: The basic units of length, mass and time are measured in foot, pound and second respectively
- CGS system: The basic units of length, mass and time are measured in centimeter, gram and seconds respectively
- MKS system: The basic units of length, mass and time are measured in metre, kilogram and second respectively
- S.I. units are referred to as Systems International units

### FUNDAMENT UNITS OF FPS, CGS, MKS AND SI UNITS

S.No	Basic quantity	FPS	CGS	MKS	SI Units
1	Length	Foot	Centimetre	Metre	Metre
2	Mass	Pound	Gram	Kilogram	Kilogram

# Railway Exams – General Awareness

3	Time	Second	Second	Second	Second
4	Current	Ampere	Ampere	Ampere	Ampere
5	Temperature	Fahrenheit	Centigrade	Centigrade	Kelvin
6	Light intensity	Candela	Candela	Candela	Candela

## SI BASE QUANTITIES AND UNITS

- There are seven fundamental units in the SI system of units. They are also known as base units

Quantity	SI Unit	Symbol
Length	Metre	M
Mass	Kilogram	Kg
Time	Second	S
Electric current	Ampere	A
Thermo dynamic temperature	Kelvin	K
Amount of substance	Mole	Mol
Luminous intensity	Candela	Cd

## SI DERIVED UNITS

S.No	Quantity	SI Unit
1	Area	Square metre
2	Volume	Cubic metre
3	Velocity	Metre/second
4	Acceleration	Metre/second square
5	Density	Kilogram/metre Cube
6	Work	Joule
7	Energy	Joule
8	Force	Newton
9	Weight	Newton
10	Pressure	Pascal
11	Frequency	Hertz
12	Power	Watt
13	Impulse	Newton-second



# Railway Exams – General Awareness

14	Angular velocity	Radian /second
15	Electric charge	Coulomb
16	Electric potential(voltage)	Volt
17	Capacitance	Farad
18	Inductance	Henry
19	Resistance	Ohm
20	Impedance	Ohm
21	Reactance	Ohm
22	Electrical conductance	siemens
23	Magnetic flux	Weber
24	Magnetic flux density	Tesla
25	Heat	Joule
26	Angle	Radian
27	Radioactivity	Becquerel
28	Luminous flux	Lumen
29	Momentum	kilogram meter per second
30	Torque	Newton metre
31	Specific heat	Joule per kilogram kelvin

## SI Prefixes Used with Units in Physics

- Unit prefixes are the symbols placed before the symbol of a unit to specify the order of magnitude of the quantity. They are useful to express very large and very small quantities. k (kilo) is the unit prefix in the unit, kilometer. A unit prefix stands for a specific positive or negative power of 10

Name	Factor
Femto	$10^{-15}$
Pico	$10^{-12}$
Nano	$10^{-9}$
Micro	$10^{-6}$
Milli	$10^{-3}$
Centi	$10^{-2}$
Deci	$10^{-1}$
Deka	10

# Railway Exams – General Awareness

Hector	$10^2$
Kilo	$10^3$
Mega	$10^6$
Giga	$10^9$
Tera	$10^{12}$
Peta	$10^{15}$

## IMPORTANT POINTS

- 1 fermi =  $10^{-15}$  m
- 1 angstrom =  $1 \text{ \AA} = 10^{-10}$  m
- Speed of the light in vacuum is  $3.00 \times 10^8 \text{ m/s}$
- **Astronomical unit (AU):** It is the mean distance of the centre of the Sun from the centre of the Earth.
- 1 astronomical unit =  $1.496 \times 10^{11}$  m
- **Light year** is a unit of length used to express astronomical distances.
- Light year =  $9.46 \times 10^{15}$  m
- **Parsec:** Parsec is the unit of distance used to measure astronomical objects outside the solar system.
- 1 Parsec =  $3.08 \times 10^{16}$  m
- 1 Parsec = 3.26 light year.
- **Time** is a measure of duration of events and the intervals between them. The SI unit of time is second.
- Heat is a form of energy. Temperature is the degree of hotness or coldness of a body. The relationship for conversion from one temperature scale to the others is

$$\frac{^{\circ}\text{R}}{80} = \frac{^{\circ}\text{C}}{100} = \frac{^{\circ}\text{K} - 273}{100} = \frac{^{\circ}\text{F} - 32}{180}$$

- **Mass:** Mass is the quantity of matter contained in a body. The SI unit of mass is kilogram (kg).  
1 g =  $1/1000 \times 1 \text{ kg} = 0.001 \text{ kg}$   
1 mg =  $1/1000000 \times 1 \text{ kg} = 0.000001 \text{ kg}$   
**1 quintal** =  $100 \times 1 \text{ kg} = 100 \text{ kg}$   
**1 metric tonne** =  $1000 \times 1 \text{ kg} = 10 \text{ quintal}$
- Mass of 1 ml of **water** = 1g  
Mass of 1l of **water** = 1kg  
Mass of the **other liquids** vary with their **density**.
- **Atomic mass unit:** Mass of a proton, neutron and electron can be determined using atomic mass unit (amu).

# Railway Exams – General Awareness

1 amu = (1/12)th of the mass of  $C^{12}$  atom

## Measurement of length

- Metre scale is used for lengths from  $10^{-3}$  m to  $10^2$  m
- Vernier calliper is used for lengths to an accuracy of  $10^{-4}$  m
- Screw gauge and a spherometer can be used to measure lengths as less as to  $10^{-5}$  m

## LIST OF SCIENTIFIC INSTRUMENTS AND THEIR USES

S.No	Instrument	Uses
1	Altimeter	Measures altitude. It's used in aircrafts
2	Ammeter	Measures strength of electric current
3	Anemometer	Used for measuring wind speed and direction
4	Audiometer	Measures Intensity of Sound
5	Barograph	Continuous recording of atmospheric pressure
6	Barometer	Measures atmospheric pressure
7	Binoculars	Optical instrument used for magnified view of distant object
8	Bolometer	To measure heat Radiation
9	Callipers	Measure diameter of thin cylinder or wire
10	Calorimeter	Measures quantities of heat
11	Cardiogram	Traces movements of the heart and recorded on a Cardiograph
12	Colorimeter	Compares Intensity of colours
13	Commutator	Used in generators to reverse the direction of electric current
14	Crescograph	Used to measure the growth of plants
15	Cryometer	Used to measure very low temperatures
16	Dynamometer	Measures electrical power
17	Electroscope	It detects presence of an electric charge
18	Endoscope	To examine internal parts of the body
19	Fathometer	Measure depth of the ocean
20	Galvanometer	Measures electric current
21	Hydrometer	Instrument used for measuring the relative density

# Railway Exams – General Awareness

		of liquids
22	Hygrometer	It measures humidity of air
23	Hydrophone	Measures sound under water
24	Lactometer	It determines the purity of milk
25	Microscope	To obtain a magnified view of small objects
26	Photometer	The instrument Compares the luminous intensity of the source of light.
27	Pyrometer	Measure very high temperature especially in furnaces and kilns
28	Odometer	The instrument used for measuring the distance traveled by a vehicle such as a bicycle or car
29	Ohmmeter	The electrical instrument that measures electrical resistance
30	Periscope	It is used to view object above the sea level
31	Salinometer	It determines the salinity of solutions
32	Sphygmometer	It measures the blood pressure
33	Stroboscope	To view rapidly moving objects
34	Seismograph	The instrument used to detect and record earthquakes
35	Telescope	Used for magnified view of distant objects
36	Spectrometer	Properties of light

## MOTION

- Motion is a change of position it can be described in terms of the distance moved or the displacement.
- When a body does not change its position, with respect to its surroundings, it is said to be at rest. When a body changes its position, with respect to its surroundings, it is said to be in motion
- The motion of an object could be uniform or non-uniform depending on whether its velocity is constant or changing.
- **Uniform motion:** An object is said to be in uniform motion if it covers equal distances in equal intervals of time howsoever big or small these time intervals may be.

# Railway Exams – General Awareness

- **Non-uniform motion:** An object is said to be in non-uniform motion if it covers unequal distances in equal intervals of time.

## Scalar and vector

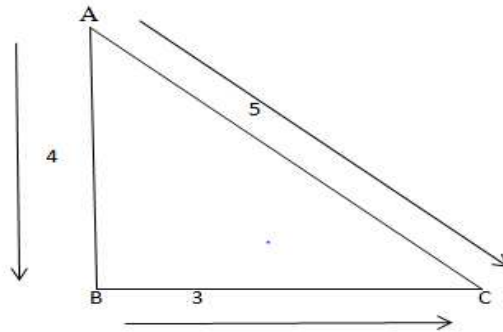
SCALAR	VECTOR
A scalar is a quantity with magnitude only	A vector is a quantity with the magnitude as well as direction
Examples are Length, Area, Distance, Speed, Mass, Density, Pressure, etc..	Examples are Displacement, Velocity, Acceleration, momentum, Force

## Distance and displacement

- **Distance** The actual length of the path travelled by a moving body irrespective of the direction is called the distance travelled by the body. It is measured in metre in SI system. It is a scalar quantity having magnitude only.
- **Displacement:** It is defined as the change in position of a moving body in a particular direction. It is a vector quantity having both magnitude and direction. It is also measured in metre in SI system.

DISTANCE	DISPLACEMENT
Distance of the object can be defined as the complete path travelled by on object during its motion	Displacement of the object can be defined as the overall motion of the object or minimum distance between the starting point of the object and the final position of the object
Distance is a scalar quantity	Displacement is a vector quantity
Distance of the any object does not depend on the direction of its motion	Displacement of the any object depends on the direction of its motion

# Railway Exams – General Awareness



- **Distance** refers to how much ground an object has covered during its motion (A  $\rightarrow$  B  $\rightarrow$  C ) Distance =  $4 + 3 = 7$
- **Displacement** refers to “how far out of place an object is” (A  $\rightarrow$  C ) Displacement = 5
- **Distance** gives the complete information about the path travelled by the object
- **Displacement** does not give the complete information about the path travelled by the object

## Speed, Velocity and Acceleration

- **Speed:** Speed is the rate of change of distance or the distance travelled in unit time. It is a scalar quantity.  
Speed = Distance travelled / Time
- Speed is a scalar quantity and its unit is m/s
- **Velocity:** Velocity is the rate of change of displacement. It is the displacement in unit time. It is a vector quantity.  
Velocity = Displacement / Time
- Velocity is a vector quantity and its unit is m/s
- During **uniform motion** of an object along a straight line, the velocity remains constant with time. In this case, the change in velocity of the object for any time interval is zero.
- During **non-uniform motion**, velocity varies with time. It has different values at different instants and at different points of the path. Thus, the change in velocity of the object during any time interval is not zero. This phenomenon is called acceleration
- **Acceleration :** Acceleration of an object is the change in velocity per unit time
- Unit of acceleration is  $\text{m/s}^2$
- Acceleration is a vector quantity  
Acceleration = Change in velocity / time

# Railway Exams – General Awareness

Acceleration = (Final velocity – Initial velocity) / Time

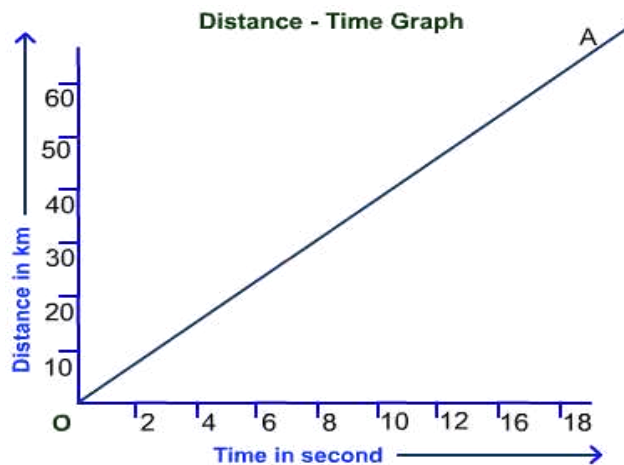
$$a = (v - u) / t$$

**From the above equation**

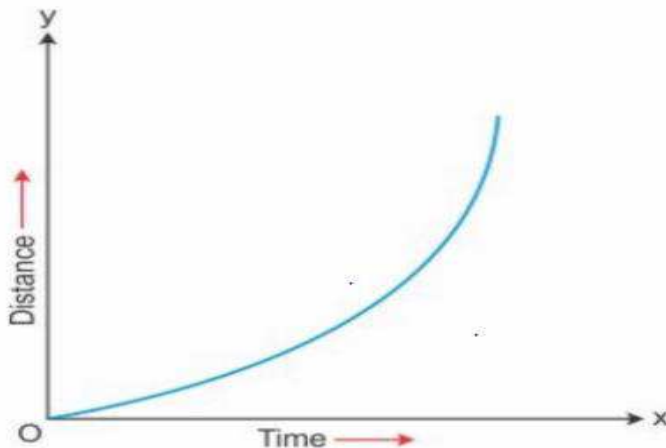
1. If  $v > u$ , i.e. if final velocity is greater than initial velocity, the velocity increases with time and the value of acceleration is positive.
2. If  $v < u$ , i.e. if final velocity is less than initial velocity, the velocity decreases with time and the value of acceleration is negative. It is called negative acceleration. Negative acceleration is called retardation or deceleration

## Graphical Representation of Motion

- The distance – time graph for Uniform motion



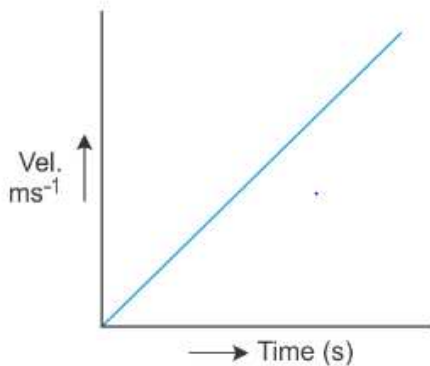
- The distance time graph for Non-uniform motion



# Railway Exams – General Awareness

- **Velocity-time graph for a body having uniform acceleration**

The nature of the graph shows that velocity changes by equal amounts in equal intervals of time. Thus, for all uniformly accelerated motion, the velocity-time graph is a straight line.



- In the case of non-uniformly accelerated motion, velocity-time graphs can have any shape.

## EQUATIONS OF MOTION

- When an object moves along a straight line with uniform acceleration, it is possible to relate its velocity, acceleration during motion and the distance covered by it in a certain time interval by a set of equations known as the **equations of motion**. Such equations are

$$v = u + at$$

$$s = ut + \frac{1}{2} at^2$$

$$2as = v^2 - u^2$$

Where u-is the initial velocity

v-is the final velocity

a -Acceleration

s- Displacement

t=Time of motion

## MOTION OF FREELY FALLING BODY

- When all objects are dropped in the absence of air medium (vacuum), all would have reached the ground at the same time.



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- In air medium, air offers some resistance to the motion of freely falling objects. But, it is negligibly small when compared to the gravitational pull. Hence, they reach the ground at the same time.
- All Objects experiences acceleration during free fall. This acceleration experienced by an object is independent of mass. This means that all objects hollow or solid, big or small, should fall at the same rate.
- The equation of motion for a freely falling body can be obtained by replacing 'a' in equations with g, the acceleration due to gravity. For a freely falling body which is initially at rest,  $u = 0$ . Thus we get the following equations.

$$v = gt$$

$$s = \frac{1}{2} gt^2$$

$$v^2 = 2gh$$

- When we throw an object vertically upwards, it moves against the acceleration due to gravity. Hence, 'a' is taken to be  $-g$  and when moving downwards 'a' is taken as  $+g$

## UNIFORM CIRCULAR MOTION

- If an object moves in a circular path with uniform speed, its motion is called uniform circular motion
- There are many more familiar examples of objects moving under uniform circular motion, such as the motion of the moon and the earth, a satellite in a circular orbit around the earth, a cyclist on a circular track at constant speed and so on

### Important points

- The state of motion of an object is described by its **speed and the direction of motion**. The state of rest is considered to be the state of zero speed. An object may be at rest or in motion both are its states of motion
- When a body is thrown vertically upwards in space, at the highest point, the body has zero velocity but it has acceleration due to the gravity.

## FORCE AND LAWS OF MOTION

### FORCE

- In science, a push or a pull on an object with mass that causes it to change velocity is called a force. Force has **magnitude** as well as **direction**
- Force acting on an object may cause a change in its state of motion or a change in its shape
- Forces applied on an object in the **same direction add to one another**
- Forces act in the opposite directions on an object, the net force acting on it is the difference between the two forces
- **Balanced and unbalanced forces**

Balanced forces do not cause any change in motion whereas unbalanced forces does

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- Objects or things fall towards the earth because it pulls them. This force is called the force of gravity or just gravity
- Force per unit area is called **pressure**
- Body is said to be in equilibrium if sum of all the forces acting on the body is **zero**. In other words if it is at rest or moving with uniform velocity
- **Nuclear force** is the strongest force in nature

## INERTIA

- The inherent property of a body to resist any change in its state of rest or the state of uniform motion, unless it is influenced upon by an external unbalanced force, is known as 'inertia'.

### Types of Inertia

#### Inertia of rest

- The resistance of a body to change its state of rest is called inertia of rest
- **Example:** When you vigorously shake the branches of a tree, some of the leaves and fruits are detached and they fall down

#### Inertia of direction

- The resistance of a body to change its direction of motion is called inertia of direction
- **Example:** When you make a sharp turn while driving a car, you tend to lean sideways

#### Inertia of motion

- The resistance of a body to change its state of motion is called inertia of motion
- **Example:** An athlete runs some distance before jumping. Because, this will help him jump longer and higher.

## LINEAR MOMENTUM

- The product of mass and velocity of a moving body gives the magnitude of linear momentum. It acts in the direction of the velocity of the object.

Linear Momentum = mass  $\times$  velocity

$$p = mv$$

- Linear momentum is a vector quantity.
- The linear momentum measures the impact of a force on a body.

## IMPULSE

- When a force  $F$  acts on a body for a period of time  $t$ , then the product of force and time is known as 'impulse'  
Impulse =  $F \times t$

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## NEWTON'S LAWS OF MOTION

### First Law of Motion

- The first law of motion is stated as **“An object remains in a state of rest or of uniform motion in a straight line unless compelled to change that state by an applied force “**
- All objects resist a change in their state of motion. In a qualitative way, the tendency of undisturbed objects to stay at rest or to keep moving with the same velocity is called inertia. This is why, the first law of motion is also known as the **law of inertia**
- Inertia is the natural tendency of an object to resist a change in its state of motion or of rest. The mass of an object is a measure of its inertia. Its SI unit is kilogram

### Second Law of Motion

- The second law of motion states that **the rate of change of momentum of an object is proportional to the applied unbalanced force in the direction of force**
- The SI unit of force is  $\text{kg m s}^{-2}$ . This is also known as newton and represented by the symbol N. A force of one newton produces an acceleration of  $1 \text{ m s}^{-2}$  on an object of mass 1 kg
- The second law of motion gives a method to measure the force acting on an object as a product of its mass and accelerations

$$\mathbf{F=ma}$$

- The momentum, p of an object is defined as the product of its mass, m and velocity, v. That is  $p=mv$
- Momentum has both direction and magnitude. Its direction is the same as that of velocity, v. The SI unit of momentum is kilogram-metre per second
- Real time example is a fielder pulls his hand backward while catching a cricket ball coming with a great speed to reduce the momentum of the ball with a little delay. In doing so the fielder increases the time during which the high velocity of the moving ball decreases to zero. Thus the acceleration of the ball is decreased and therefore the impact of catching the fast moving ball is also reduced
- In a high jump athletic event the athletes are made to fall either on a cushioned bed or on a sand bed. This is to increase the time of the athlete's fall to stop after making the jump. This decreases the rate of change of momentum and hence the force. This prevents the athlete from getting hurt

### Third Law of Motion

- The third law of motion states **To every action, there is an equal and opposite reaction and they act on two different bodies**
- If a body A applies a force  $F_A$  on a body B, then the body B reacts with force  $F_B$  on the body A, which is equal to  $F_A$  in magnitude, but opposite in direction.  $F_B = -F_{As}$

### Examples

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- Real time example is when a gun is fired it exerts a forward force on the bullet. The bullet exerts an equal and opposite force on the gun. This results in the recoil of the gun . Since the gun has a much greater mass than the bullet, the acceleration of the gun is much less than the acceleration of the bullet
- Third law of motion is another example is when a sailor jumps out of a rowing boat. As the sailor jumps forward, the force on the boat moves it backwards
- When birds fly they push the air downwards with their wings (Action) and the air pushes the bird upwards (Reaction).
- Motion of rocket

## CONSERVATION OF MOMENTUM

- Sum of momenta of the two objects before collision is equal to the sum of momenta after the collision provided there is no external unbalanced force acting on them. This is known as the law of conservation of momentum
- In an isolated system (where there is no external force), the total momentum remains conserved

## ROCKET PROPULSION

- Propulsion of rockets is based on the law of conservation of linear momentum as well as Newton's third law of motion.
- Rockets are filled with a fuel (either liquid or solid) in the propellant tank. When the rocket is fired, this fuel is burnt and a hot gas is ejected with a high speed from the nozzle of the rocket, producing a huge momentum. To balance this momentum, an equal and opposite reaction force is produced in the combustion chamber, which makes the rocket project forward

## PRESSURE

- The effect of force can be measured using a physical quantity called **pressure**. It can be defined as the amount of force or thrust acting perpendicularly on a surface of area of one square meter of a body.  
Pressure = Thrust (or) Force/ Area  
The SI unit of pressure is pascal
- Pressure exerted by a force depends on the magnitude of the force and the area of contact.
- The effect of pressure can be increased by increasing the thrust or by decreasing the surface area of the body

## Atmospheric pressure

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- The amount of force or weight of the atmospheric air that acts downward on unit surface area of the surface of the Earth is known as atmospheric pressure.
- It can be measured using the device called **barometer**.
- The barometer was invented by **Torricelli**.
- Atmospheric pressure **decreases** with **altitude** from the **surface of the Earth**.

## FRICTION

- Frictional force or friction arises when two or more bodies in contact move or tend to move, relative to each other. It acts always in the opposite direction of the moving body. This force is produced due to the geometrical dissimilarities of the surface of the bodies, which are in relative motion
- Friction can be increased by increasing the area of the surfaces in contact
- Friction can produce the following effects.
  1. Friction opposes motion.
  2. It causes wear and tear of the surfaces in contact.
  3. It produces heat.

### Advantages of Friction

- We can hold objects in our hand due to friction.
- We can walk on the road because of friction. The friction between footwear and the ground help us to walk without slipping.
- Writing on the paper with a pen is easy due to friction.
- Automobiles can move safely due to friction between the tyres and the road. Brakes can be applied due to frictional resistance on brake shoes.

## GRAVITATION

All objects in the universe attract each other. This force of attraction between objects is called the gravitational force. Gravitation is a weak force unless large masses are involved

### Centripetal force

- The force that causes acceleration and keeps the body moving along the circular path is acting towards the Centre. This force is called the centripetal ('Centreseeking') force
- The motion of the moon around the earth is due to the centripetal force. If there were no such force the moon would pursue a uniform straight line motion.

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## Centrifugal force

- The force that is felt by an object moving in a curved path that acts outwardly away from the center of rotation
- Centrifugal force acts in a direction which is opposite to the direction of the centripetal force.
- Some of the applications of centrifugal force
  1. Banking of roads.
  2. Washing machine dryer.
  3. Cream separator.

## UNIVERSAL LAW OF GRAVITATION

Every object in the universe attracts every other object with a force which is proportional to the product of their masses and inversely proportional to the square of the distance between them.

$$F = G \frac{Mm}{d^2}$$

$G \rightarrow$  Universal gravitation constant

$G \rightarrow 6.673 \times 10^{-11} \text{ N m}^2 \text{ kg}^{-2}$

- The value of  $G$  was found out by Henry Cavendish (1731 – 1810) by using a sensitive balance
- The force exerted by the earth on the moon is  $2.02 \times 10^{20} \text{ N}$
- Newton's law of gravitation is called universal law of gravitation because it is applicable to all the bodies having mass whether the bodies are big or small or whether the bodies are terrestrial or celestial

## IMPORTANCE OF THE UNIVERSAL LAW OF GRAVITATION

- The force that binds us to the earth.
- The motion of the moon around the earth.
- The motion of planets around the Sun.
- The tides due to the moon and the Sun.

## Acceleration due to gravity

- Whenever an object falls towards the earth acceleration is involved. This acceleration is due to the earth's gravitational force. Therefore this acceleration is called the acceleration due to the gravitational force of the earth or acceleration due to gravity

$$g = GM/R^2$$

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$$G = 6.7 \times 10^{-11} \text{ N m}^2 \text{ kg}^{-2},$$

$$\text{Mass of the earth } M = 6 \times 10^{24} \text{ kg}$$

$$\text{Radius of the earth } R = 6.4 \times 10^6 \text{ m.}$$

From the equation we get  $g$  value

- Value of acceleration due to gravity of the earth,  $g = 9.8 \text{ m/s}^2$
- The earth is not a perfect sphere. The radius of the earth increases from the poles to the equator because value of  $g$  becomes greater at the poles than at the equator.
- Value of  $g$  decreases with the increase of height
- Value of  $g$  decreases with depth and become zero at the center of the earth
- Acceleration experienced by an object is independent of its mass. It means that all objects hollow or solid, big or small, should fall at the same rate

## Mass of the Earth

- Mass of the Earth  $M = g R^2 / G$   
Substituting the known values of  $g$ ,  $R$  and  $G$ , you can calculate the mass of the Earth as  
 $M = 5.972 \times 10^{24} \text{ kg}$

## MASS

- The **Mass** is a measure of the amount of matter in an object and it is a scalar quantity and its SI unit is kilograms
- It remains the same whether the object is on the earth the moon or even in outer space
- The mass of an object is constant and does not change from place to place

## WEIGHT

- The earth attracts every object with a certain force and this force depends on the mass ( $m$ ) of the object and the acceleration due to the gravity ( $g$ )
- The weight of an object is the force with which it is attracted towards the earth

$$W = mg$$

- The SI unit of weight is the same as that of force that is newton (N) and weight is a vector quantity
- Weight depends on its location because  $g$  depends on location
- Acceleration due to gravity of the moon is less than the acceleration due to gravity of the earth because Weight of the object on the moon  $\frac{1}{6}$ <sup>th</sup> of its weight on the earth
- The weight of an object is directly proportional to its mass

$$W \propto m$$

## APPARENT WEIGHT

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- The weight that you feel to possess during up and down motion is not same as your actual weight. Apparent weight is the weight of the body acquired due to the action of gravity and other external forces acting on the body.
- Different possibilities of the apparent weight of the person that arise, depending on the motion of the lift
  1. Lift is moving upward with acceleration → Apparent weight is greater than the actual weight.
  2. Lift is moving downward with acceleration → Apparent weight is lesser than the actual weight.
  3. Lift is at rest → Apparent weight is equal to the actual weight.
  4. Lift is falling down freely → Apparent weight is equal to zero.

## THRUST AND PRESSURE

- The force acting on an object perpendicular to the surface is called thrust.
- In SI units, the unit of thrust is newton (denoted as N)
- The force per unit area acting on an object concerned is called pressure. We can say thrust on a unit area is pressure.  
$$\text{Pressure} = \text{Thrust} / \text{Area}$$
- The unit of pressure is newton per square metre or newton metre<sup>-2</sup> (denoted as Nm<sup>-2</sup>)
- 1 newton per square metre is called as 1 pascal

## PRESSURE IN FLUIDS

- All liquids and gases are fluids.
- A solid exerts pressure on a surface due to its weight. Similarly, fluids have weight, and they also exert pressure on the base and walls of the container in which they are enclosed. Pressure exerted in any confined mass of fluid is transmitted undiminished in all directions.

## Buoyancy

- Buoyancy is the force exerted on an object that is wholly or partly immersed in a fluid
- All objects experience a force of buoyancy when they are immersed in a fluid
- The magnitude of this buoyant force depends on the density of the fluid
- Salt water provides more buoyant force than fresh water, because, buoyant force depends as much on the density of fluids as on the volume displaced.

## Archimedes' Principle

- Archimedes principle states that 'a body immersed in a fluid experiences a vertical upward buoyant force equal to the weight of the fluid it displaces'



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- Archimedes principle has many applications
  - It is used in designing ships and submarines
  - Lactometers which are used to determine the purity of a sample of milk
  - Hydrometers used for determining density of liquids

## Relative Density

- The density of a substance is defined as mass of a unit volume. The unit of density is kilogram per metre cube
- The density of a given sample of a substance can help us to determine its purity.
- Objects having density less than that of the liquid in which they are immersed float on the surface of the liquid
- Density of the object is more than the density of the liquid in which it is immersed then it sinks in the liquid
- The relative density of a substance is the ratio of its density to that of water

$$\text{Relative density} = \frac{\text{Density of a substance}}{\text{Density of water}}$$

- Since the relative density is a ratio of similar quantities, it has no unit.

## Pascal's law

- Pascal's law states that an increase in pressure at any point inside a liquid at rest is transmitted equally and without any change, in all directions to every other point in the liquid.

## The applications of Pascal's law are:

- In automobile service stations, the vehicles are lifted upward using the hydraulic lift which works as per Pascal's law.
- Automobile brake system works according to Pascal's law.
- The hydraulic press is used to compress the bundles of cotton or cloth so as to occupy less space.

## Surface Tension

- Surface tension is the property of a liquid. The molecules of a liquid experience a force, which contracts the extent of their surface area as much as possible, so as to have the minimum value. The amount of force acting per unit length, on the surface of a liquid is defined as surface tension.
- Its unit is  $\text{Nm}^{-1}$ .
- Surface tension is the reason for many events we see in our daily life.
  1. In plants, water molecules rise up due to surface tension. Xylem tissues are very narrow vessels present in plants. Water molecules are absorbed by the roots and these vessels help the water to rise upward due to 'capillarity action', which is caused by the surface tension of water.

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2. During heavy storm, ships are damaged due surface tension of water. By pouring oil or soap powder into the sea, sailors reduce its impact.
3. Water strider insect slides on the water surface easily due to the surface tension of water
4. A falling drop of rain water acquires the spherical shape due to Surface Tension

## Viscosity

- The frictional force acting between the successive layers of the liquid which acts in order to oppose the relative motion of the layer is known as viscous force. Such a property of a liquid is called viscosity.

## WORK AND ENERGY

### WORK

- We define work to be equal to the product of the force and displacement  
$$\text{Work done} = \text{force} * \text{displacement}$$
- Work done by force acting on an object is equal to the magnitude of the force multiplied by the distance moved in the direction of the force. Work has only magnitude and no direction
- Unit of work is newton metre (N m) or joule (J)
- Work done on an object by a force would be zero if the displacement of the object is zero
- The work done by a force can be either positive or negative
- Work done is negative when the force acts opposite to the direction of displacement.
- Work done is positive when the force is in the direction of displacement
- When a body falls freely under gravity then the work done by the gravity is positive

Explanation is

If a force acting on a body has a component in the direction of displacement then the work done by the force is positive because when a body falls freely under the influence of gravity the work done by the gravity is positive

- When a body slides against a rough horizontal surface the work done by friction is negative

Explanation is

When a body slides against a rough horizontal surface its displacement is opposite to that of the force of friction so the work done by the friction is negative

### ENERGY

- Life is impossible without energy
- An object having capability to do work is said to possess energy

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- Unit of energy is joule. Joule is also unit of work
- Various form of energy are Mechanical energy, Electrical energy, Atomic energy, Heat energy, Light energy, Chemical energy and sound energy.
- Energy of one form can be transformed into energy of another form
- The sum of the kinetic and potential energies of an object is called its mechanical energy

## KINETIC ENERGY

- Kinetic energy is the energy possessed by an object due to its motion
- The kinetic energy of an object increases with its Speed
- Example of kinetic energy are Falling coconut, a speeding car, a rolling stone, a flying aircraft, flowing water, blowing wind, a running athlete etc.
- The kinetic energy of a body moving with a certain velocity is equal to the work done on it to make it acquire that velocity
- An object of mass (m) moving with velocity (v) has a kinetic energy of

$$\frac{1}{2}mv^2$$

## POTENTIAL ENERGY

- The energy possessed by a body due to its change in position or shape is called the potential energy
- The potential energy possessed by the object is the energy present in it by virtue of its position or configuration
- An object increases its energy when raised through a height. This is because work is done on it against gravity while it is being raised. The energy present in such an object is the gravitational potential energy.
- The gravitational potential energy of an object at a point above the ground is defined as the work done in raising it from the ground to that point against gravity
- The gravitational potential energy of an object of mass (m) raised through a height (h) from the earth's surface is given by = m g h.
- The work done by gravity depends on the difference in vertical heights of the initial and final positions of the object and not on the path along which the object is moved

## LAW OF CONSERVATION OF ENERGY

According to the law of conservation of energy

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- The energy can neither be created nor destroyed
- Energy can only be transformed from one form to another
- The total energy before and after the transformation always remains constant
- An object of mass ( $m$ ) is made to fall freely from a height ( $h$ ). At the start, the potential energy is  $mgh$  and kinetic energy is zero. Why is the kinetic energy zero. It is zero because its velocity is zero. The total energy of the object is thus  $mgh$ . As it falls its potential energy will change into kinetic energy. If  $v$  is the velocity of the object at a given instant the kinetic energy would be  $\frac{1}{2}mv^2$ . As the fall of the object continues, the potential energy would decrease while the kinetic energy would increase. When the object is about to reach the ground,  $h = 0$  and  $v$  will be the highest. Therefore, the kinetic energy would be the largest and potential energy the least. However, the sum of the potential energy and kinetic energy of the object would be the same at all points

Potential energy + kinetic energy = constant

- The sum of kinetic energy and potential energy of an object is its total mechanical energy

## Rate of Doing Work

- Power is defined as the rate of doing work or the rate of transfer of energy

Power = work/time

- Unit of power is watt
- 1 watt = 1 joule/second or  $1 \text{ W} = 1 \text{ J s}^{-1}$
- The unit joule is too small and hence is inconvenient to express large quantities of energy. We use a bigger unit of energy called kilowatt hour
- $1 \text{ kW h} = 3.6 \times 10^6 \text{ J}$
- The energy used in households, industries and commercial establishments are usually expressed in kilowatt hour.

## SOUND

- Sound is a form of energy which produces a sensation of hearing in our ears. There are also other forms of energy like mechanical energy, light energy, etc.
- Sound is produced due to vibration of different objects
- Sound waves are **longitudinal mechanical** waves
- Sound waves are characterized by the motion of particles in the medium and are called mechanical waves
- The sound of the human voice is produced due to vibrations in the vocal cords

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- The eardrum senses the vibrations of sound it sends the signals to the brain. This process is called hearing.
- The outer ear is called pinna Its collects the sound from the surroundings
- The matter or substance through which sound is transmitted is called a medium. It can be solid, liquid or gas.

## SOUND NEEDS A MEDIUM TO TRAVEL

- Sound is a mechanical wave and needs a material medium like air, water, steel etc.
- Sound **cannot travel through vacuum**

## CHARACTERISTICS OF A SOUND WAVE

Sound wave describe its

- Frequency
- Amplitude
- Speed

## FREQUENCY

- The distance between two consecutive compressions or two consecutive rarefactions is called the wavelength. Its SI unit is metre.
- The number of such oscillations per unit time is the frequency of the sound wave.SI unit is hertz
- Human ear can hear sound of frequency from 20 Hz to 20,000 Hz. Sound with frequency less than 20 Hz is called infrasonic sound. Sound with frequency greater than 20,000 Hz is called ultrasonic sound. Human beings cannot hear infrasonic and ultrasonic sounds.
- Time taken by two consecutive compressions or rarefactions to cross a fixed point is called the time period of the wave.SI unit is second
- Frequency and time period are reciprocal to each other
- Relationship between frequency and time period is

$$v = \frac{1}{T}.$$

- The sensation of frequency commonly referred as the pitch of a sound. Objects of different sizes and conditions vibrate at different frequencies to produce sounds of different pitch.
- A sound of single frequency is called a tone
- When sound waves move from one medium to another medium its wavelength and speed changes but frequency remains unchanged

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## AMPLITUDE

- Magnitude of the maximum disturbance in the medium on either side of the mean value is called the amplitude of the wave.
- The loudness or softness of a sound is determined basically by its amplitude. If the vibration of a particle has large amplitude, the sound will be loud and if the vibration has small amplitude, the sound will be soft
- The amplitude of the sound wave depends upon the force with which an object is made to vibrate. If we strike a table lightly, we hear a soft sound because we produce a sound wave of less energy (amplitude).
- Sound wave source moves away from the source its amplitude as well as its loudness decreases. Louder sound can travel a larger distance as it is associated with higher energy

## SPEED

- Speed of sound is defined as the distance which a point on a wave such as a compression or a rarefaction travels per unit time  
$$\text{Speed} = \text{distance} / \text{time}$$
- The speed of sound remains almost the same for all frequencies in a given medium under the same physical conditions
- Amount of sound energy passing each second through unit area is called the intensity of sound
- The speed of sound decreases when we go from solid to gaseous state. Speed of the sound **maximum in solid** state and **minimum in gaseous state**.
- The **speed of the sound remains unchanged** by the increase or decrease of **pressure**.
- The speed of sound in a medium depends on temperature of the medium. In any medium as we increase the temperature the speed of sound increases
- **Speed of sound** is more in **humid air than dry air** because density of humid air is less than dry air
- The speed of sound depends on the properties of the medium through which it travels
- The sound of thunder is heard a little later than the flash of light is seen. So, we can make out that sound travels with a speed which is much less than the speed of light.
- Sound travels about 5 times faster in water than in air. Since the speed of sound in sea water is very large.
- **Speed of sound in different medium**

Substance	Speed m/s
Aluminium	6420
Nickel	6040
Steel	5960

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Iron	5950
Brass	4700
Glass	3980
Water(sea)	1531
Water(distilled)	1498
Ethanol	1207
Methanol	1103
Hydrogen	1284
Helium	965
Air	346
Oxygen	316
Sulphur dioxide	213

## SONIC BOOM

- When the **speed of any object exceeds the speed of sound** it is said to be travelling at **supersonic speed**. Bullets, jet aircrafts etc. often travel at supersonic speeds. When a sound, producing source moves with a speed higher than that of sound, it produces shock waves in air. These shock waves carry a large amount of energy. The air pressure variation associated with this type of shock waves produces a very sharp and loud sound called the “sonic boom”. The shock waves produced by a supersonic aircraft have enough energy to shatter window glass and even damage buildings.

## REFLECTION OF SOUND

- Sound bounces off a surface of solid or a liquid medium like a rubber ball that bounces off from a wall.
- An obstacle of large size which may be polished or rough is needed for the reflection of sound waves.
- The laws of reflection are:
  - The angle in which the sound is incident is equal to the angle in which it is reflected.
  - Direction of incident sound, the reflected sound and the normal are in the same plane.

## ECHO

- We will hear the same sound again a little later due to the reflection of sound wave is called echo
- To hear a distinct echo the time interval between the original sound and the reflected one must be at **least 0.1s**
- The total distance covered by the sound from the point of generation to the reflecting surface and back should be at least  $340 \text{ ms} - 1 \times 0.1 \text{ s} = \mathbf{34 \text{ m}}$ . Thus, for hearing distinct echoes, the minimum distance of the obstacle from the source of sound must be half of this distance i.e. **17 m**. This distance will change with the temperature of air. Echoes may be heard more than once due to successive or multiple reflections

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## REVERBERATION

- The repeated reflection that results in this persistence of sound is called reverberation
- A sound created in a big hall will persist by repeated reflection from the walls until it is reduced to a value where it is no longer audible. The repeated reflection that results in this persistence of sound is called reverberation.

## USES OF MULTIPLE REFLECTION OF SOUND

- Megaphones or loudhailers, horns, musical instruments such as trumpets and shehanais are all designed to send sound in a particular direction without spreading it in all directions
- Stethoscope is a medical instrument used for listening to sounds produced within the body, mainly in the heart or lungs.
- The ceilings of concert halls conference halls and cinema halls are curved so that sound after reflection reaches all corners of the hall

## RANGE OF HEARING

- The audible range of hearing for average human beings is in the frequency range of 20 Hz – 20 kHz
- Sounds of frequencies below 20 Hz are called infrasonic sound or infrasound
- Frequencies higher than 20 kHz are called ultrasonic sound or ultrasound

## INFRASONIC SOUND

- Sounds of frequencies below 20 Hz are called infrasonic sound or infrasound
- Rhinoceroses communicate using infrasound of frequency as low as 5 Hz
- Whales and elephants produce sound in the infrasound range
- Earthquakes produce low-frequency infrasound before the main shock waves begin which possibly alert the animals

## ULTRASONIC SOUND

- Ultrasonic sound is the term used for sound waves with frequencies greater than 20,000Hz. These waves cannot be heard by the human ear, but the audible frequency range for other animals includes ultrasound frequencies. For example, dogs can hear ultrasonic sound.

## APPLICATIONS OF ULTRASOUND

- Ultrasounds can be used to detect cracks and flaws in metal blocks
- Ultrasonic waves are made to reflect from various parts of the heart and form the image of the heart. This technique is called echocardiography.



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- Ultrasound scanner is an instrument which uses ultrasonic waves for getting images of internal organs of the human body.
- Ultrasound may be employed to break small stones formed in the kidneys into fine grains
- Ultrasounds can be used in cleaning technology. Minute foreign particles can be removed from objects placed in a liquid bath through which ultrasound is passed.
- Porpoises use ultrasound for navigation and location of food in the dark

## SONAR

- SONAR stands for Sound Navigation And Ranging
- Sonar is a device that uses ultrasonic waves **to measure the distance ,direction and speed of underwater objects**
- Sonar consists of a transmitter and a detector and is installed at the bottom of boats and ships.
- The transmitter produces and transmits ultrasonic waves. These waves travel through water and after striking the object on the seabed, get reflected back and are sensed by the detector. The detector converts the ultrasonic waves into electrical signals which are appropriately interpreted. The distance of the object that reflected the sound wave can be calculated by knowing the speed of sound in water and the time interval between transmission and reception of the ultrasound

## STRUCTURE OF HUMAN EAR

- The outer ear is called ‘**pinna**’. It collects the sound from the surroundings. The collected sound passes through the auditory canal.
- At the end of the ear is eardrum or tympanic membrane. When a compression of the medium reaches the eardrum the pressure on the outside of the membrane increases and forces the eardrum inward. Similarly, the eardrum moves outward when a rarefaction reaches it. In this way the eardrum vibrates. The vibrations are amplified several times by three bones (the hammer, anvil and stirrup) in the middle ear.
- The middle ear transmits the amplified pressure variations received from the sound wave to the inner ear.
- In the inner ear, the pressure variations are turned into electrical signals by the cochlea. These electrical signals are sent to the brain via the auditory nerve and the brain interprets them as sound.

## LIGHT

### LIGHT-REFLECTION AND REFRACTION

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- Light is a radiation which makes our eyes able to see the object when light from an object enters our eyes that we see the object. The light may have been emitted by the object, or may have been reflected by it
- Light wave is an **electromagnetic wave**. It has an electric and a magnetic component
- Light is a **transverse wave**
- Light seems to travel in straight lines
- **Opaque objects** do **not allow light** to pass through them
- **Transparent objects** allow light to pass through them and we can see through these objects clearly
- **Translucent objects** allow light to pass through them **partially**
- **Shadows** are **formed** when an **opaque object** comes in the path of light
- Light travels in vacuum with an enormous speed of  $3 \times 10^8$  m s<sup>-1</sup>. The speed of light is different in different media
- Sun light is **white colour**
- Sunlight takes an **average of 8 minutes and 20 seconds** to travel from the **Sun to the Earth**
- White light is composed of **seven colours**.
- Splitting of light into its constituent colours is known as **dispersion**
- Light is reflected from all surfaces
- Any polished or a shining surface acts as a mirror
- An image which can be obtained on a screen is called a **real image**
- An image which cannot be obtained on a screen is called a **virtual image**
- The image formed by a **plane mirror is erect**. It is virtual and is of the same size as the object. The image is at the same distance behind the mirror as the object is in front of it
- In an image formed by a mirror, the left side of the object is seen on the right side in the image, and right side of the object appears to be on the left side in the image
- Visually impaired persons can read and write using the **Braille system**
- Beautiful patterns are formed in a kaleidoscope because of **multiple reflections**
- **Periscope** works on the **Laws of Reflection**

## REFLECTION

- A highly polished surface such as a mirror reflects most of the light falling on it.
- Mirror changes the direction of light that falls on it. This change of direction by a mirror is called reflection of light.
- Any polished or a shiny surface can act as a mirror.

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- Example a shining stainless steel plate or a shining steel spoon can change the direction of light. The surface of water can also act like a mirror and change the path of light.
- Image formed by a **plane mirror** is always **virtual and erect**
- The size of the image is equal to that of the object
- **Want to see full image** in a **plane mirror** a person required a mirror of at least half the object

## LAWS OF REFLECTION

- After striking the mirror the ray of light is reflected in another direction. The light ray which strikes any surface is called the incident ray
- The ray that comes back from the surface after reflection is known as the reflected ray
- **Two laws of reflection are**
  1. The angle of incidence is equal to the angle of reflection.
  2. Incident ray, reflected ray and the normal drawn at the point of incidence to the reflecting surface, lie in the same plane
- These laws of reflection are applicable to all types of reflecting surfaces including spherical surfaces

## SPHERICAL MIRROR

- The reflecting surface of a spherical mirror may be curved inwards or outwards
- A spherical mirror whose reflecting surface is **curved inwards** that is faces towards the center of the sphere is called a **concave mirror**
- A spherical mirror whose reflecting surface is curved **outwards** is called a **convex mirror**



CONCAVE MIRROR



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## CONVEX MIRROR

- Distance between the pole and the principal focus of a spherical mirror is called the focal length
- Radius of curvature is found to be equal to twice the focal length
- The centre of the reflecting surface of a spherical mirror is a point called the pole.

## IMAGE FORMATION BY A CONCAVE MIRROR FOR DIFFERENT POSITIONS OF THE OBJECT

Position of the object	Position of the image	Size of the image	Nature of the image
At infinity	At the focus	Highly diminished	Real and inverted
Beyond center of curvature	Between focus and center of curvature	Diminished	Real and inverted
At center of curvature	At center of curvature	Same size	Real and inverted
Between center of curvature and focus	Beyond center of curvature	Enlarged	Real and inverted
At focus	At infinity	Highly enlarged	Real and inverted
Between pole and Focus	Behind the mirror	Enlarged	Virtual and erect

## NATURE POSITION AND RELATIVE SIZE OF THE IMAGE FORMED BY A CONVEX MIRROR

Position of the object	Position of the image	Size of the image	Nature of the image
At infinity	At the focus Focus behind the mirror	Highly diminished	Virtual and erect
Between infinity and the pole of the mirror	Between pole and Focus behind the mirror	Diminished	Virtual and erect

## USES OF CONCAVE MIRRORS

- Concave mirrors are used in torches, search-lights and vehicles headlights to get powerful parallel beams of light.
- Used as a shaving mirrors to see a larger image of the face.
- Dentists use concave mirrors to see large images of the teeth of patients.
- Concave mirrors are used to concentrate sunlight to produce heat in solar furnaces

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## USES OF CONVEX MIRRORS

- Convex mirrors are commonly used as rear view mirrors in vehicles
- Convex mirrors are installed on public roads as traffic safety device. They are used in acute bends of narrow roads such as hairpin bends in mountain passes where direct view of oncoming vehicles is restricted

## MIRROR FORMULA

The relationship between the object-distance ( $u$ ), image-distance ( $v$ ), and focal length ( $f$ ) of a spherical mirror given by the mirror formula which is expressed as

$$\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$$

## MAGNIFICATION

Magnification is expressed as the ratio of the height of the image to the height of the Object

$$m = \frac{\text{Height of the image (h')}}{\text{Height of the object (h)}}$$

## REFRACTION OF LIGHT

- Refraction of light is the change in direction of a light ray when it travels from one medium to another
- This deviation (change in direction) in the path of light is due to the change in velocity of light in the different medium
- Velocity of light is more in a rarer medium (low optical density) than in a denser medium (high optical density).
- Light does not travel in the same direction in all media. It appears that when travelling obliquely from one medium to another, the direction of propagation of light in the second medium changes. This phenomenon is known as refraction of light
- The coin becomes visible on pouring water into the bowl. The coin appears slightly raised above its actual position due to refraction of light.
- Lemon kept in water in a glass tumbler appears to be bigger than its actual size, when viewed from the sides **due to refraction of light**
- When a ray of light enter one medium to another medium its **phase and frequency do not change** but **wavelength and velocity change**

## LAWS OF REFRACTION OF LIGHT

- Following are the laws of refraction of light.
  - The incident ray, the refracted ray and the normal to the interface of two transparent media at the point of incidence, all lie in the same plane.
  - The ratio of sine of angle of incidence to the sine of angle of refraction is a constant, for the light of a given colour and for the given pair of media. This law is also known as Snell's law of refraction.

(This is true for angle  $0 < i < 90^\circ$ )

If  $i$  is the angle of incidence and  $r$  is the angle of refraction

$$\frac{\sin i}{\sin r} = \text{constant}$$

## REFRACTIVE INDEX

- Refraction of light in a medium depends on the speed of light in that medium. When the speed of light in a medium is more, the bending is less and when the speed of light is less, the bending is more.
- The refractive index of a transparent medium is the ratio of the speed of light in vacuum to that in the medium  
Refractive index = Speed of light in medium 1 / Speed of light in medium 2
- Refractive indices of some common substances are

Substances	Refractive index
Air	1.0003
Ice	1.31
Water	1.33
Alcohol	1.36
Kerosene	1.44
Rock salt	1.54
Diamond	2.42

## LENS FORMULA

- Lens formula gives the relationship between object distance ( $u$ ), image-distance ( $v$ ) and the focal length ( $f$ ).  
The lens formula is

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$$

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## MAGNIFICATION

The magnification is defined as the ratio of the height of the image and the height of the object

$$m = \frac{\text{Height of the image (h')}}{\text{Height of the object (h)}}$$

## POWER OF LENS

- The degree of convergence or divergence of light rays achieved by a lens is expressed in terms of its power
- Power of a lens is defined as the reciprocal of its focal length

$$P = \frac{1}{f}$$

- SI unit of power of a lens is **diopetre**

## TOTAL INTERNAL REFLECTION

- When the angle of incidence exceeds the value of critical angle the refracted ray is impossible. Since  $r > 90^\circ$  refraction is impossible and the ray is totally reflected back to the same medium (denser medium). This is called as total internal reflection.
- Conditions to achieve total internal reflection
  1. Light must travel from denser medium to rarer medium. (Example: From water to air). „
  2. The angle of incidence inside the denser medium must be greater than that of the critical angle.

### Examples of Total Internal Reflection

- **Optical fibres** work on the phenomenon of **total internal reflection**
- Mirage
- Total internal reflection is the main cause for the spectacular brilliance of **diamonds**

## THE HUMAN EYE AND THE COLOURFUL WORLD

- Human eye is one of the most valuable and sensitive sense organs
- Light enters the eye through a thin membrane called the **cornea**
- **Retina** is lens system forms an image on a **light-sensitive screen**
- The human eye forms the image of an object at its **retina**

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- **Iris** is colored part of the eye. It may be blue, brown or green in colour. Every person has a unique colour, pattern and texture. It holds the pupil and also adjust the size of pupil according to the intensity of light
- **Pupil** is black in color and absorbs all the light rays falling on it. It gets constricted when the intensity of light is high. It gets expanded when the intensity of light is low
- **Pupil** is the centre part of the Iris. It is the **pathway for the light** to retina.
- **Ciliary muscles** hold the lens. They adjust the **focal length** of the lens
- **Eye Lens** is the important part of human eye. It is **convex in nature**.
- The ability of the eye to focus on both near and distant objects by adjusting its focal length is called the accommodation of the eye
- The eye lens forms an **inverted real image** of the object on the retina. The retina is a delicate membrane having enormous number of light-sensitive cells. The light-sensitive cells get activated upon illumination and generate electrical signals. These signals are sent to the brain via the optic nerves. The smallest distance at which the eye can see objects clearly without strain is called the near point of the eye or the least distance of distinct vision. For a young adult with **normal vision it is about 25 cm**.
- The farthest point up to which the eye can see objects clearly is called the **far point** of the eye. It is **infinity** for a normal eye

## DEFECTS OF VISION AND THEIR CORRECTION

- A normal human eye can clearly see all the objects placed between 25cm and infinity. But, for some people, the eye loses its power of accommodation. This could happen due to many reasons including ageing. Hence, their vision becomes defective. Let us discuss some of the common defects of human eye.
- There are mainly three common refractive defects of vision
  - Myopia or near-sightedness
  - Hypermetropia or farsightedness,
  - Presbyopia

### MYOPIA

- Myopia is also known as **near-sightedness**
- A person with myopia can see nearby objects clearly but **cannot see distant objects distinctly**.
- The focal length of eye lens is reduced or the distance between eye lens and retina increases.
- In a **myopic eye the image** of a distant object is **formed in front of the retina**
- A **concave lens** of suitable power will bring the image back on to the retina and thus the defect is corrected

### HYPERMETROPIA

- Hypermetropia is also known as **far-sightedness**



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- A person with hypermetropia can see distant objects clearly but cannot see nearby objects distinctly
- The focal length of eye lens is increased or the distance between eye lens and retina decreases. Hence, the near point will not be at 25cm for such eyes and the near point has moved farther. Due to this, the image of nearby objects are formed behind the retina
- In a hypermetropia eye the image of a closeby object are focused at a **point behind the retina**
- This defect can be corrected by using a **convex lens** of appropriate power

## PRESBYOPIA

- The power of accommodation of the eye usually decreases with ageing
- It arises due to the gradual **weakening of the ciliary muscles and diminishing** flexibility of the eye lens
- This defect can be corrected by using a **bi-focal lenses**
- A common type of **bi-focal lenses** consists of both **concave and convex lenses**. The upper portion consists of a concave lens .It facilitates distant vision. The lower part is a convex lens. It facilitates near vision.

## ASTIGMATISM

- In this defect, eye cannot see parallel and horizontal lines clearly. It may be inherited or acquired. It is due to the imperfect structure of eye lens because of the development of cataract on the lens, ulceration of cornea, injury to the refracting surfaces, etc. Astigmatism can be corrected by using cylindrical lenses.

## DISPERSION OF WHITE LIGHT BY A GLASS PRISM

- The angle between its two lateral faces is called the angle of the prism
- The prism has probably split the incident white light into a band of colours
- The various colours seen are Violet, Indigo, Blue, Green, Yellow, Orange and Red
- The **band of the coloured components** of a light beam is called its **spectrum**
- The **splitting of light** into its component colours is called **dispersion**
- Isaac Newton was the first to use a glass prism to obtain the spectrum of sunlight.
- Different colours of light bend through different angles with respect to the incident ray, as they pass through a prism. The **red light bends the least** while the **violet the most**
- **Red light has the longest wavelength** because red **refract least**, while **violet has the shortest** because **violet refract most**
- A **rainbow is scattering of light** a natural spectrum appearing in the **sky after a rain shower** .It is caused by **dispersion of sunlight by tiny water droplets**, present in the atmosphere .A **rainbow is always formed** in a direction **opposite to that of the Sun**. The **water droplets** act like **small prisms**. They refract and disperse

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the incident sunlight, then reflect it internally, and finally refract it again when it comes out of the raindrop. Due to the dispersion of light and internal reflection, different colours reach the observer's eye

## ATMOSPHERIC REFRACTION

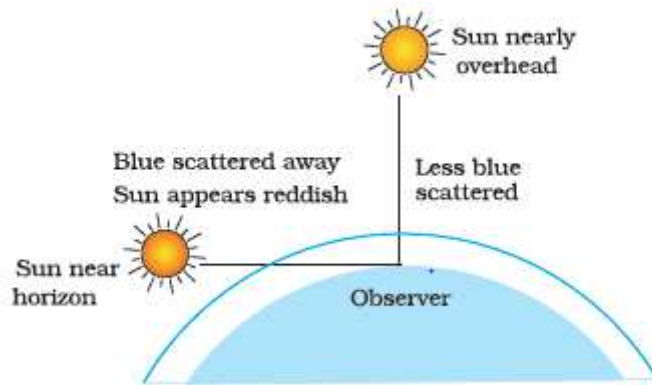
- The **twinkling of a star** is due to atmospheric **refraction** of starlight
- The starlight on entering the earth's atmosphere undergoes refraction continuously before it reaches the earth. The atmospheric refraction occurs in a medium of gradually changing refractive index
- The Sun is visible to us about 2 minutes before the actual sunrise and about 2 minutes after the actual sunset because of **atmospheric refraction**. The apparent flattening of the Sun's disc at sunrise and sunset is also due to the same phenomenon

## SCATTERING OF LIGHT

- When a beam of light interacts with a particle of matter it is redirected in many different directions. This phenomenon is called scattering of light.
- Scattering of light causes the blue colour of sky and the reddening of the Sun at sunrise and sunset

## WHY THE COLOUR OF SKY IS BLUE

- Molecules of air and other fine particles in the atmosphere have size smaller than the wavelength of visible light
- The red light has a wavelength greater than blue light. When sunlight passes through the atmosphere the fine particles in air scatter the blue colour (shorter wavelengths) more strongly than red. The scattered blue light enters our eyes.
- If the earth had no atmosphere, there would not have been any scattering. Then, the **sky would have looked dark**. The sky appears dark to passengers flying at very high altitudes, as scattering is not prominent at such heights.
- The red is least scattered by fog or smoke that is the reason danger signal lights are red in colour
- At noon the Sun appears white as only a little of the blue and violet colours are scattered. Near the horizon most of the blue light and shorter wavelengths are scattered away by the particles. Therefore the light that reaches our eyes is of longer wavelengths. This gives rise to the reddish appearance of the Sun



## ELECTRICITY

### ELECTRIC CURRENT

- Electric current is expressed by the amount of charge flowing through a particular area in unit time.

$$I = \frac{Q}{t}$$

- A continuous and closed path of an electric current is called an electric circuit.
- In electric circuit the direction of electric current is taken as opposite to the direction of the flow of electrons.
- SI unit of electric charge is coulomb
- Coulomb is equivalent to the charge contained in approximately  $6 \times 10^{18}$  electrons
- Unit of electric current is ampere
- An instrument called ammeter measures electric current in a circuit. It is always connected in series in a circuit through which the current is to be measured

### POTENTIAL DIFFERENCE

- Electric potential difference between two points in an electric circuit carrying some current as the work done to move a unit charge from one point to the other
- SI unit of electric potential difference is volt
- Potential difference is measured by means of an instrument called the voltmeter

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- Voltmeter is always connected in parallel across the points between which the potential difference is to be measured

## OHM'S LAW

- The potential difference across the ends of a given metallic wire in an electric circuit is directly proportional to the current flowing through it provided its temperature remains the same. This is called Ohm's law

$$V=IR$$

- Its SI unit is ohm

## RESISTANCE

- Resistance is the property of a substance to oppose to the flow of electric current through it, is called resistance
- The current through a resistor is inversely proportional to its resistance
- Rheostat is used to change the resistance in the circuit
- Motion of electrons through a conductor is opposed by its resistance. Component of a given size that offers a low resistance is a good conductor.
- A component of identical size that offers a higher resistance is a poor conductor
- **Insulator** have a **higher resistance**
- Resistance of the conductor depends on its length, on its area of cross-section, and on the nature of its material. Resistance of a uniform metallic conductor is directly proportional to its length (l ) and inversely proportional to the area of cross-section (A)

$$R = \rho \frac{l}{A}$$

- The **resistance and resistivity** of a material vary with **temperature**
- The metals and alloys have very low resistivity in the range of  $10^{-8}$  ohm to  $10^{-6}$  ohm They are good conductors of electricity
- **Resistivity of an alloy** is generally higher than that of its constituent metals
- Tungsten is used almost exclusively for filaments of electric bulbs
- **Copper and Aluminium** are used in **electrical transmission lines**
- Silver is good conductor of electricity

## RESISTORS IN SERIES

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- The equivalent resistance of several resistors in series is equal to the sum of their individual resistances
- The same current flows through all the loads.
- The voltage across each load is proportional to the resistance of the load.
- The sum of the voltages across each load is equal to the applied voltage
- If resistors in series

$$I = I_1 = I_2 = \dots$$

$$V = V_1 + V_2 + \dots$$

$$R = R_1 + R_2 + \dots$$

- A series circuit connects the components one after the other to form a 'single loop'. A series circuit has only one loop through which current can pass. If the circuit is interrupted at any point in the loop, no current can pass through the circuit and hence no electric appliances connected in the circuit will work. **Series circuits** are commonly used in **devices such as flashlights**.

## RESISTORS IN PARALLEL

- The reciprocal of the equivalent resistance of a group of resistances joined in parallel is equal to the sum of the reciprocals of the individual resistances.
- The current flowing through each load depends upon the resistance of the load.
- The voltage across each load is the same and is equal to the voltage applied to the circuit.
- The total resistance of a parallel connection is always smaller than the smallest resistance in the circuit.
- If resistors in parallel

$$I = I_1 + I_2 + \dots$$

$$V = V_1 = V_2 \dots$$

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \dots$$

- A parallel circuit has two or more loops through which current can pass. If the circuit is disconnected in one of the loops, the current can still pass through the other loop(s). The **wiring in a house** consists of **parallel circuits**.

## CONDUCTANCE

- Conductance of a material is the property of a material to aid the flow of charges and hence, the passage of current in it. The conductance of a material is mathematically defined as the reciprocal of its resistance (R).

## ELECTRICAL POWER

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- Electric power is defined as the rate at which electric energy is dissipated or consumed in an electric circuit  
 $P=VI$
- **SI unit** of electric power is **watt**. One watt of power is consumed when 1 A of current flows at a potential difference of 1 V.

$$1 \text{ W} = 1 \text{ volt} \times 1 \text{ ampere} = 1 \text{ V A}$$

- The unit '**watt**' is very small. Therefore, in actual practice we use a much larger unit called '**kilowatt**'. It is equal to 1000 watts. Since electrical energy is the product of power and time, the unit of electric energy is, therefore, **watt hour (W h)**. One watt hour is the energy consumed when **1 watt of power** is used for **1 hour**.
- The commercial unit of electric energy is kilowatt hour  
 $1 \text{ KWH} = 3.6 \times 10^6 \text{ J}$
- One horse power is equal to 746 watts.

## HEATING EFFECT OF CURRENT

- A source of electrical energy can develop a potential difference across a resistor, which is connected to that source. This potential difference constitutes a current through the resistor. For continuous drawing of current, the source has to continuously spend its energy. A part of the energy from the source can be converted into useful work and the rest will be converted into heat energy. Thus, the passage of electric current through a wire, results in the production of heat. This phenomenon is called **heating effect of current**.
- The heat produced depends on the amount of resistance offered by the wire.
- Copper wire offers very little resistance and does not get heated up quickly. On the other hand, thin a wire of tungsten or nichrome which are used in bulbs offer high resistance and gets heated up quickly. This is the reason why tungsten wire is used in the filaments of the bulbs and nichrome wire is used as a heating element in household heating appliances.
- Heating effect of electric current can be seen in many devices. Some of them are given below
  1. Electric laundry iron
  2. Electric toaster
  3. Electric oven
  4. Electric kettle
  5. Electric heater

## Joule's Law of Heating

- Joule's law of heating  
 $H = I^2 R t$
- Joule's law of heating states that the heat produced in any resistor is:
  1. Directly proportional to the square of the current passing through the resistor.

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2. Directly proportional to the resistance of the resistor.
3. Directly proportional to the time for which the current is passing through the resistor.

## Applications of Heating Effect

### ELECTRIC HEATING DEVICE

- The heating effect of electric current is used in many home appliances such as electric iron, electric toaster, electric oven, electric heater, geyser, etc. In these appliances **Nichrome**, which is an alloy of **Nickel and Chromium** is used as the heating element. Because  
(i) It has high resistivity, (ii) It has a high melting point, (iii) It is not easily oxidized

### FUSE

- Fuse is the most important safety device used for protecting the circuits due to Short circuiting or overloading of the circuits
- The Joule heating that takes place in the fuse melts it to break the electric circuit
- Fuse is a strip of alloy wire which is made up of lead and tin with a very low melting point. This can be connected to the circuit. The fuse is usually designed to take specific amount of current. When current passing through the wire exceeds the maximum limit, it gets heated up. Due to low melting point it melts quickly disconnecting the circuit. This prevents damage to the appliances.
- The fuse wire is usually encased in a cartridge of porcelain or similar material with metal ends.
- The fuse wire is fitted in a porcelain casing because porcelain is an insulator of electricity.
- The fuse wire is connected in series in an electric circuit
- The fuses used for domestic purposes are rated as 1 A, 2 A, 3 A, 5 A, 10 A, etc

### MAGNETIC EFFECTS OF ELECTRIC CURRENT

- A wire or a conductor carrying current develops a magnetic field perpendicular to the direction of the flow of current. This is called **magnetic effect of current**.
- **Electric current carrying wire** behaves like a **magnet**
- The region surrounding a magnet in which the force of the magnet can be detected is said to have a magnetic field
- Magnetic field is a quantity that has both direction and magnitude. Magnetic field lines are closed curves.
- The pattern of the magnetic field around a conductor due to an electric current flowing through it depends on the shape of the conductor. The magnetic field of a solenoid carrying a current is similar to that of a bar magnet
- An electromagnet consists of a core of soft iron wrapped around with a coil of insulated copper wire

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- A current carrying conductor when placed in a magnetic field experiences a force. If the direction of the field and that of the current are mutually perpendicular to each other, then the force acting on the conductor will be perpendicular to both and will be given by Fleming's left hand rule. This is the basis of an electric motor. An electric motor is a device that converts electric energy into mechanical energy.
- Stretch the thumb, fore finger and middle finger of your right hand mutually perpendicular to each other. If the fore finger indicates the direction of magnetic field and the thumb indicates the direction of motion of the conductor, then the middle finger will indicate the direction of induced current. Fleming's Right hand rule is also called 'generator rule'.
- A **generator** converts mechanical energy into electrical energy. It works on the basis of **electromagnetic induction**.
- **Transformer** is a device used for converting low voltage into high voltage and high voltage into low voltage. It works on the principle of **electromagnetic induction**.

## DOMESTIC ELECTRIC CIRCUIT

- The electricity produced in power stations is distributed to all the domestic and industrial consumers through overhead and underground cables
- In India, domestic circuits are supplied with an alternating current of potential 220/230V and frequency 50 Hz
- The electricity is brought to houses by two insulated wires. Out of these two wires, one wire has a **red insulation** and is called the '**live wire**' (or positive). The other wire has a **black insulation** and is called the '**neutral wire**' (or negative).
- The potential difference between the two is 220 V
- It should be noted that all the circuits in a house are connected in parallel, so that the disconnection of one circuit does not affect the other circuit. One more advantage of the parallel connection of circuits is that each electric appliance gets an equal voltage.
- In domestic circuits, a third wire called the **earth wire** having a **green insulation** is usually connected to the body of the metallic electric appliance. The other end of the earth wire is connected to a metal tube or a metal electrode, which is buried into the Earth. This wire provides a low resistance path to the electric current. The earth wire sends the current from the body of the appliance to the Earth, whenever a live wire accidentally touches the body of the metallic electric appliance. Thus, the earth wire serves as a protective conductor, which saves us from electric shocks.



## SOURCES OF ENERGY

- Nature has provide variety of natural sources of energy and energy can be converted from one form to another
- Good source of energy is
  - Which would do a large amount of work per unit volume or mass,
  - Be easily accessible,
  - Be easy to store and transport, and
  - Perhaps most importantly, be economical
  - Less combustile

## SOURCES OF ENERGY

1. Conventional sources of energy
2. Non-conventional sources of energy

## CONVENTIONAL SOURCES OF ENERGY

- Conventional Sources of energy are also called as nonrenewable sources
- Coal, petroleum, Natural gas, Nuclear energy

## NON CONVENTIONAL SOURCES OF ENERGY

- Nonconventional Sources of energy are also called as renewable sources
- Solar energy
- Wind energy
- Tidal energy
- Geothermal energy
- Biomass energy

## FOSSIL FUELS

- The fossil fuels are non-renewable sources of energy
- Air pollution caused by burning of coal or petroleum products. The oxides of carbon, nitrogen and sulphur that are released on burning fossil fuels are acidic oxides. These lead to acid rain which affects our water and soil resources

## NUCLEAR POWER PLANT

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- Nuclear fission reaction is used to generate electricity in nuclear power plants
- overall efficiency of nuclear power plant is 30-40 percent
- Water, heavy water, Graphite used as a moderator
- Function of coolant is to extract heat from reactor

## INVENTIONS AND DISCOVERIES

Inventions	Inventors
Adding machine	Pascal
Aeroplane	Wright brothers
Ball point pen	John Loud
Anemometer	Leon Battista Alberti
Air brake	George Westinghouse
Barometer	Evangelista Torricelli
Bicycle	Macmillan
Calculating machine	Blaise Pascal
Diesel engine	Rudolf Diesel
Electric tram	Fyodor Pirotsky
Dynamite	Alfred Nobel
Dynamo	Michael Faraday
Electric battery	Alessandro Volta
Electricity	Benjamin Franklin
Electric generator	Michael Faraday
Fountain pen	Lewis Edson Waterman
Jet engine	Frank Whittle
Lift or Elevator	Elisha Otis
Lightning conductor	Benjamin Franklin

# Railway Exams – General Awareness

Machine gun	Jordan Gatling
Mercury thermometer	Daniel Gabriel Fahrenheit
Paper clips	Johan Vaaler
Braille	Louis Braille
Radio	Guglielmo Marconi
Radium	Marie curie
Railway engine	George Stephenson
Raman effect	C.V.Raman
Revolver	Samuel Colt
Sewing machine	Thomas Saint
Steam engine	James watt
Telescope	Hans Lippershey
Television	John Logie Baird
X-rays	Wilhelm Conrad Roentgen
Vernier caliper	Pierre Vernier

## PHYSICS ONE LINERS

- In summer, the mirages are seen due to the phenomenon of Total Internal Reflection
- In the visible spectrum Red colour has the longest wavelength.
- Sound travels faster in solids
- Insects can move on the surface of water without sinking due to Surface tension of water
- Liquid droplets isspherical structure due to the surface tension of water
- Light travels in a Straight line
- Water is used as a cooling agent in most of the world’s nuclear power plants
- Working principle of transformer is Mutual Induction
- Distance between Earth and Sun is known as 1 Astronomical unit
- Potential energy of your body is minimum when you on ground
- Radian is the unit of an Angle

# Railway Exams – General Awareness

- Radio waves of constant amplitude can be generated with an Oscillator
- Water moving up a straw is an example of Capillary Action
- Sudden fall in barometer is indication of storm
- Hooke's law is related to Elasticity
- Blue colour of the clear sky is due to scattering of light
- Filament string in an electric bulb is made of Tungsten
- Hydraulic brake used in automobiles is a direct application of Pascal's Law
- The image formed by convex lens in a simple microscope is Virtual & Erect
- Convex mirror is used in motor vehicles near the driver's seat
- From the moon's surface Astronauts see a Black Sky. This is because of Absence of Atmosphere on Moon
- Specific resistance of a wire varies with its material
- Pyrometer is used to measure the temperature of the sun
- Total Internal reflection occurs when light passes from a denser to rarer medium
- Value of Specific Gravity remains same in all system of units
- The speed of sound in air is about 343 metres per second
- During a fog the visibility is reduced because of Scattering of light.
- Weightlessness experienced in a spaceship is due to Absence of Gravity
- SONAR is used to find submerged objects
- Unit of power of lens is Dioptre
- An object has to attain the velocity of 11.2 km/sec to escape from earth's atmosphere
- Angstrom is the measuring unit of length of light waves.
- Weber is the unit of magnetic flux
- Ohm-metre is the unit of specific resistance
- The wavelength of visible spectrum ranges from 390-700 nanometres
- A Washing machine works on the principle of Centrifugation
- Magnifying glass is made of Convex lens
- Magnetite is the only natural magnet
- Nephelometer is used to measure the scattering of light by particles suspended in a liquid
- Fathometer is used to measure depth of ocean
- Dilatometer is used to measure change in volume of substances
- Altimeter is used to measure altitudes in aircrafts
- Red glass is heated in dark room it will seem Green colour
- The value of acceleration due to gravity is maximum at poles

# Railway Exams – General Awareness

- Escape velocity of Moon is 2.38 Km/s
- Resistance of a Conductor is inversely proportional to its Cross Sectional Area and directly proportional to length
- Nuclear Fissions are initiated by Neutrons
- National physical laboratory is located in New delhi
- Higgs boson is known as God particle
- Enrico Fermi is inventor of nuclear reactor
- A viscometer is an instrument used to measure the viscosity of a fluid
- Gold was used in the Rutherford's alpha particle scattering experiment
- Alpha rays have the highest ionising power
- Gamma rays have the highest penetrating power
- SI unit of radioactivity is becquerel
- Hydrogen isotope named as Tritium
- The fuse in an electric circuit is connected in series with live
- Ball pen function on the principle of surface tension and capillarity
- Bat can fly dark because they produce ultrasonic wave
- Infrared rays of the sunlight makes the solar cooker hot
- Centripetal force acts on the body moving in circular path
- Mirage is an optical illusion
- In radio transmission FM stands for Frequency Modulation
- Tidal wave on sea is mainly due to Gravitational effect of moon on earth
- Light year is unit of distance
- A train starts suddenly the passengers bend backwards is example of inertia
- Optical fibre works on the principle of Total internal reflection
- Kepler's law governs motion of planet
- Sparkling of diamond due to total internal reflection
- Reason for a swimming pool appear less deep than actual depth is refraction
- Energy released by the sun and other star due to nuclear fusion
- Microphone converts sound energy into electrical energy
- Law of inertia also called newton first law
- Blue colour of sky due to scattering of light
- If magnet has a third pole then the third pole is called consequent pole
- Astigmatism is corrected by cylindrical lens

# Railway Exams – General Awareness

- Light from laser is monochromatic
- Weight of body maximum at pole
- Microwave is used in oven
- Doppler's effect is related to the change in frequency of sound
- A moving electric charge produces electric and magnetic field
- Black hole theory is given by Stephen Hawking
- Einstein's mass energy equivalence is based on theory of relativity
- Physical quantity which has magnitude and direction and obeys triangle law is called vector quantity
- Hydraulic lift, Hydraulic press and Hydraulic works on Pascal law
- Soap bubble obtains spherical shape due to surface tension
- Red, Green, Blue are primary colours
- Newton's second law of motion gives measure of force
- A clean and dry needle is kept on the surface of water it floats due to surface tension
- A person is not able to see distinct as well as nearby objects is suffering from presbyopia
- Minimum distance required to hear an echo 17 meter
- When a body is moving along a circular path with constant speed work done on it is zero
- Pure water freezes at 32 degrees Fahrenheit
- Recoil of gun is example of conservation of linear momentum
- Archimedes principle is related to laws of floatation
- Odometer is used to measure distance
- Twinkling of star is an example of refraction
- Red light is used in traffic signal because Long wavelength
- Electric bulb filament made of tungsten
- Galvanometer can be converted into voltmeter by connecting High resistance in series
- LASER stands for Light amplification by stimulated emission of radiation
- Fat can be separated from milk by centrifugal force
- Hydrogen bomb is based on nuclear fusion
- Loudness of sound based on amplitude
- At 4 Degree Celsius density of water is maximum
- Stone falling towards earth both stone and earth attract each other
- Soft iron is used to making electromagnet
- Gamma rays have minimum wavelength
- Parsec is a unit of Astronomical distance

# Railway Exams – General Awareness

- Soap bubble appear coloured due to interference
- Longitudinal waves cannot travel through vacuum
- Surface tension is the tendency of liquid surfaces to shrink to have minimum surface area as much as possible.
- Atmospheric pressure can be measured by a device called barometer.
- The barometer was invented by Torricelli
- Friction is the force that opposes the motion of an object.

## General Science - Chemistry

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## CHEMICAL REACTIONS AND EQUATIONS

### CHEMICAL REACTION & EQUATIONS

- A complete chemical equation represents the **reactants**, **products** and their **physical**

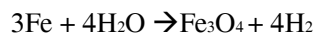
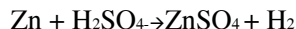
## State symbolically.

- Following observations helps us to determine whether a chemical reaction has taken place
  - Change in state
  - Change in colour
  - Evolution of a gas
  - Change in temperature.
- Some of the **example of chemical reactions** in everyday life
  - Photosynthesis
  - Aerobic Cellular Respiration
  - Combustion of wood
  - Rusting of iron
  - Metathesis
  - Digestion
  - Cooking an egg
  - Souring of milk
  - Rotting bananas
- **Exothermic reactions** are reactions or processes that release energy, usually in the form of heat or light
- Reactions in which **energy is absorbed** are known as **endothermic reactions**.

## BALANCED CHEMICAL EQUATIONS

- Mass can neither be created nor destroyed in a chemical reaction. That is, the total mass of the elements present in the products of a chemical reaction has to be equal to the total mass of the elements present in the reactants
- The number of atoms of each element remains the same, before and after a chemical reaction

Some of the example of balanced equations





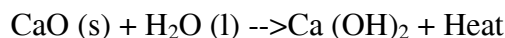
## TYPES OF CHEMICAL REACTIONS

### 1. COMBINATION REACTION

- In a combination reaction two or more substances combine to form a new single Substance.

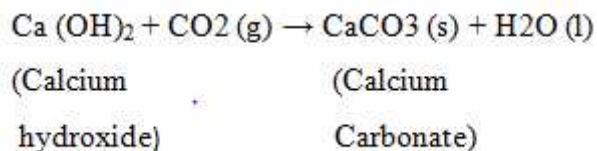
#### Example of combination reaction

- Calcium oxide reacts vigorously with water to produce **slaked lime(calcium hydroxide)** Releasing a large amount of heat



- A solution of **slaked lime** produced by the above reaction is used for **white washing wall**

**NOTE:** **Calcium hydroxide** reacts slowly with the **carbon dioxide** in air to form a thin layer of calcium carbonate on the walls. **Calcium carbonate** is formed after two to three days of **whitewashing** and gives a shiny finish to the walls. It is interesting to note that the **chemical formula** for **marble** is also **CaCO<sub>3</sub>**.



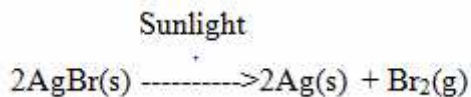
### 2. DECOMPOSITION REACTION

- Decomposition reactions are opposite to combination reactions. In a decomposition reaction, a single substance decomposes to give two or more substances
- In this reaction, you can observe that a single reactant breaks down to give simpler products. This is a decomposition reaction.

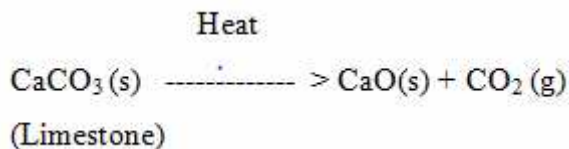


- Decomposition of Silver bromide into silver and chlorine by light.

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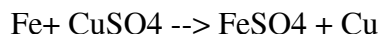


- **Silver bromide** used in black and white **photography**
- Decomposition of calcium carbonate to calcium oxide and carbon dioxide on heating is an important decomposition reaction used in various industries. **Calcium oxide** is called **lime or quick lime**. It has many uses – one is in the **manufacture of cement**. When a **decomposition reaction is carried out by heating**, it is called **thermal decomposition**



### 3. DISPLACEMENT REACTION

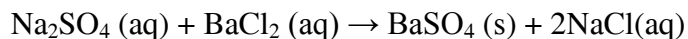
- It is a reaction between an element and a compound. When they react, one of the elements of the compound-reactant is replaced by the element-reactant to form a new compound and an element.



- In this reaction, iron has displaced or removed another element copper from copper sulphate solution. This reaction is known as displacement reaction

### 4. DOUBLE DISPLACEMENT REACTIONS

- When two compounds react, if their ions are interchanged, then the reaction is called double displacement reaction. The ion of one compound is replaced by the ion of the another compound



### PRECIPITATION REACTIONS

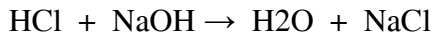
- When aqueous solutions of two compounds are mixed, if they react to form an insoluble compound and a soluble compound, then it is called precipitation reaction. Because the insoluble compound, formed as one of the products, is a precipitate and hence the reaction is so called.

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- Precipitation reactions produce insoluble salts.

## NEUTRALISATION REACTION

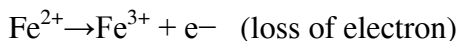
- When an acid and a base react together to form salt and water known as neutralization reaction



## OXIDATION AND REDUCTION

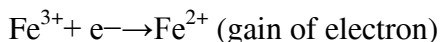
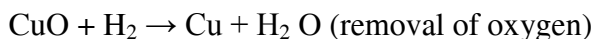
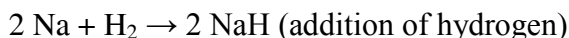
### OXIDATION

- The chemical reaction which involves addition of oxygen or removal of hydrogen or loss of electrons is called oxidation.



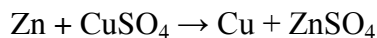
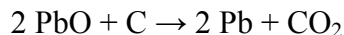
### REDUCTION

- The chemical reaction which involves addition of hydrogen or removal of oxygen or gain of electrons is called reduction.



## REDOX REACTIONS

- Generally, the oxidation and reduction occurs in the same reaction (simultaneously). If one reactant gets oxidized, the other gets reduced. Such reactions are called oxidation-reduction reactions or Redox reactions.



Oxidation	Reduction
Addition of oxygen	Removal of oxygen

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Removal of hydrogen	Addition of hydrogen
Loss of electron	Gain of electron

## OXIDATION AND REDUCTION AGENTS

- Substance that loses oxygen or gains hydrogen is known as an oxidizing agent
- Substance that loses hydrogen or gains oxygen is known as a reducing agent
- Compounds with oxygen atom are called oxidizing agent and compounds with hydrogen atom are called reducing agent
- Some compounds can act as either oxidizing agents or reducing agents. One example is hydrogen gas, which acts as an oxidizing agent when it combines with metals and As a reducing agent when it reacts with non-metals.

## Oxidation reactions in daily life

- The shining surface of metals tarnishes due to the formation of respective metal oxides on their surfaces. This is called corrosion.
- The freshly cut surfaces of vegetables and fruits turn brown after some time because of the oxidation of compounds present in them

## RANCIDITY

- When oils and fats or foods containing oils and fats are exposed to air, they get oxidized due to which the food becomes stale and gives a bad taste or smell. This is called Rancidity.

Following ways to **preventing rancidity**

- Adding antioxidants
- Refrigerating
- Storing food in airtight containers with nitrogen gas

## COMMON NAME AND FORMULA OF CHEMICAL COMPOUNDS

# Railway Exams – General Awareness

Chemical Compounds	Chemical formula	Common names
Calcium oxide	CaO	Quick lime
Calcium hydroxide	Ca(OH) <sub>2</sub>	Slaked lime
Calcium carbonate	CaCO <sub>3</sub>	Limestone
Trichloro Methane	CHCl <sub>3</sub>	Chloroform
Calcium Oxychloride	CaOCl <sub>2</sub>	Bleaching powder
sodium hydrogencarbonate	NaHCO <sub>3</sub>	Baking soda
Sodium carbonate	Na <sub>2</sub> CO <sub>3</sub>	Washing soda
Calcium sulphate hemihydrate	CaSO <sub>4</sub> .1/2H <sub>2</sub> O	Plaster of paris
calcium sulfate dihydrate	CaSO <sub>4</sub> .2H <sub>2</sub> O	Gypsum
Acetic acid	CH <sub>3</sub> COOH	Vinegar
Silicon Oxide	SiO <sub>2</sub>	Sand
Methane	CH <sub>4</sub>	Marsh Gas
Nitrous oxide	N <sub>2</sub> O	Laughing Gas
Deuterium Oxide	D <sub>2</sub> O	Heavy water
Solid Carbondioxide	CO <sub>2</sub>	Dry ice
Calcium Carbonate	CaCO <sub>3</sub>	Chalk
Sulphuric Acid	H <sub>2</sub> SO <sub>4</sub>	Oil of vitriol
Zinc sulphate	ZnSO <sub>4</sub>	White Vitriol
Copper sulphate	CuSO <sub>4</sub> .5H <sub>2</sub> O	Blue Vitriol
Sodium hydroxide	NaOH	Caustic Soda
Potassium carbonate	K <sub>2</sub> CO <sub>3</sub>	Potash Ash
Mercurous chloride	Hg <sub>2</sub> Cl <sub>2</sub>	Calomel
Sucrose	C <sub>12</sub> H <sub>22</sub> O <sub>11</sub>	Sugar

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Silver nitrate	$\text{AgNO}_3$	Lunar caustic
Ethyl Alcohol	$\text{C}_2\text{H}_6\text{O}$	Alcohol
Hydrochloric acid	$\text{HCl}$	Muriatic acid

## CHEMICAL COMPOUNDS AND FORMULA

Chemical Compounds	Chemical formula
Sodium chloride	$\text{NaCl}$
Zinc sulphate	$\text{ZnSO}_4$
Glucose	$\text{C}_6\text{H}_{12}\text{O}_6$
Ferric oxide	$\text{Fe}_2\text{O}_3$
Ferrous sulphate	$\text{FeSO}_4$
Lead oxide	$\text{PbO}$
Lead nitrate	$\text{Pb}(\text{NO}_3)_2$
silver chloride	$\text{AgCl}$
Silver bromide	$\text{AgBr}$
Sodium sulphate	$\text{Na}_2\text{SO}_4$

## CHEMICAL BONDING

Attraction between atoms, ions or molecules that enables the formation of chemical compounds is called chemical bonding

### TYPES OF CHEMICAL BONDING

#### 1. Ionic bond

Chemical bond formed between two atoms due to transfer of electron from one atom to the other atom

#### 2. Covalent bond

A covalent bond is a chemical bond that involves the sharing of electron between two atoms

## 3. Metallic bond

Metallic bond is the force of attraction between metal ions to a number of electrons within its sphere of influence.

## MATTER

- Matter is made up of small particles
- The matter around us exists in three states— solid, liquid and gas.
- The forces of attraction between the particles are maximum in solids, intermediate in liquids and minimum in gases
- The spaces in between the constituent particles and kinetic energy of the particles are minimum in the case of solids, intermediate in liquids and maximum in gases
- Particles of matter are continuously moving, that is, they possess what we call the kinetic energy. As the temperature rises, particles move faster. So, we can say that with increase in temperature the kinetic energy of the particles also increases
- The states of matter are inter-convertible. The state of matter can be changed by changing temperature or pressure.

## DIFFUSION

- The mixing of a substance with another substance due to the motion of its particles is called diffusion. It is one of the properties of material. The diffusion of one substance to another substance goes on until a uniform mixture is formed. Diffusion takes place in gases, liquids and solids. **Diffusion** increases on increasing the temperature of the diffusing substance.

## STATES OF MATTER

- Matter around us exists in three different states— solid, liquid and gas. These states of matter arise due to the variation in the characteristics of the particles of matter

# Railway Exams – General Awareness

## 1. THE SOLID STATE

- Solid have a definite shape, distinct boundaries and fixed volumes, that is, have negligible compressibility. Solids have a tendency to maintain their shape when subjected to outside force. Solids may break under force but it is difficult to change their shape, so they are rigid.

## 2. THE LIQUID STATE

- Liquids have no fixed shape but have a fixed volume. They take up the shape of the container in which they are kept. Liquids flow and change shape, so they are not rigid but can be called fluid
- The rate of diffusion of liquids is higher than that of solids
- Particles move freely and have greater space between each other as compared to particles in the solid state

## 3. THE GASEOUS STATE

- Gases are highly compressible as compared to solids and liquids
- Gases have lower density than other states of matters
- The liquefied petroleum gas (LPG) cylinder that we get in our home for cooking or the oxygen supplied to hospitals in cylinders is compressed gas
- The oxygen supplied to hospitals in cylinders is compressed gas.
- Compressed natural gas (CNG) is used as fuel these days in vehicles.
- The rate of diffusion of gas is higher than that of solids and liquids
- We come to know of what is being cooked in the kitchen without even entering there, the smell of hot cooked food reaches us in seconds because rate of diffusion of gas is higher than that of solids and liquids.

## MATTERS CHANGE ITS STATE?

Water can exist in three states of matter–

- Solid, as ice,
- Liquid, as the familiar water, and
- Gas, as water vapour.



# Railway Exams – General Awareness

## 1. EFFECT OF CHANGE OF TEMPERATURE

Increasing the temperature of solids, the kinetic energy of the particles increases. Due to the increase in kinetic energy, the particles start vibrating with greater speed. The energy supplied by heat overcomes the forces of attraction between the particles. The particles leave their fixed positions and start moving more freely. A stage is reached when the solid melts and is converted to a liquid. The minimum temperature at which a solid melts to become a liquid at the atmospheric pressure is called its **melting point**

- The melting point of ice is 273.15 K

Supply heat energy to water, particles start moving even faster. At a certain temperature, a point is reached when the particles have enough energy to break free from the forces of attraction of each other. At this temperature the liquid starts changing into gas. The temperature at which a liquid starts boiling at the atmospheric pressure is known as its boiling point



- State of matter can be changed into another state by changing the **temperature**

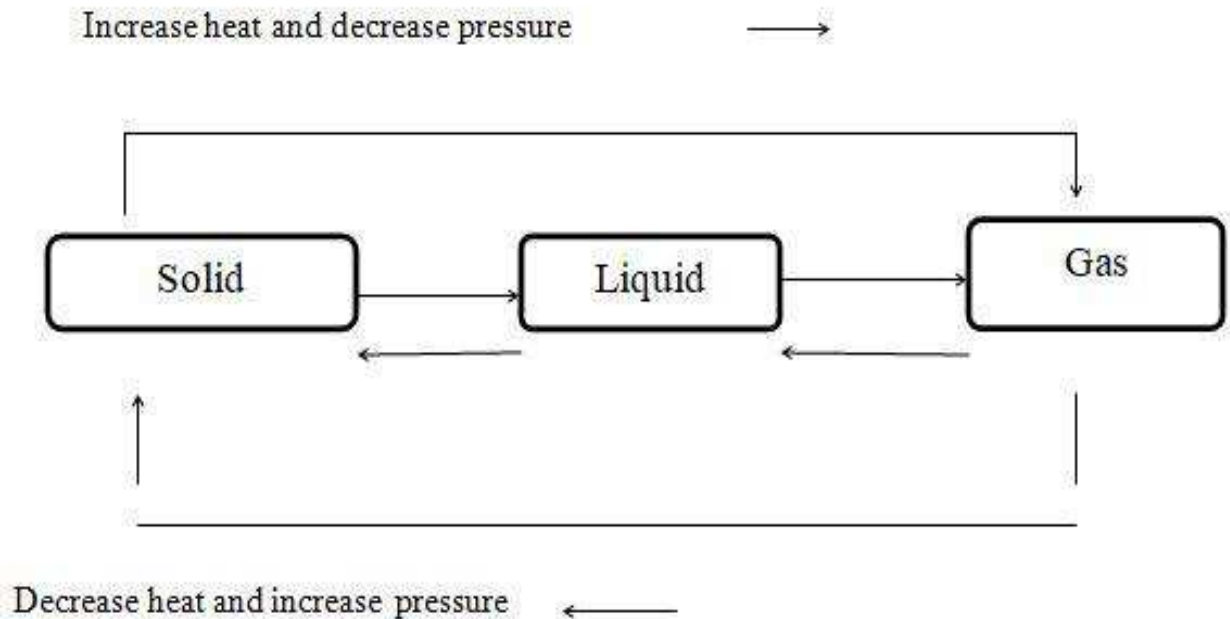
## LATENT HEAT

The heat energy required to convert a solid into a liquid or vapour, or a liquid into a vapour, without change of temperature known as latent heat

## 2. EFFECT OF CHANGE OF PRESSURE

- Increasing or decreasing the pressure can change the state of matter
- Pressure and temperature determine the state of a substance, whether it will be solid, liquid or gas
- Gases can be liquefied by applying pressure and lowering temperature and liquid also convert to solid by applying the pressure and lowering the temperature

# Railway Exams – General Awareness



- Atmosphere (atm) is a unit of measuring pressure exerted by a gas
- The unit of pressure is Pascal ( $1 \text{ atmosphere} = 1.01 \times 10^5 \text{ Pa}$ )

## Solid carbon dioxide

- It is stored under high pressure.
- Solid  $\text{CO}_2$  gets converted directly to gaseous state on decrease of pressure to 1 atmosphere\* without coming into liquid state. This is the reason that solid carbon dioxide is also known as dry ice

## Sublimation

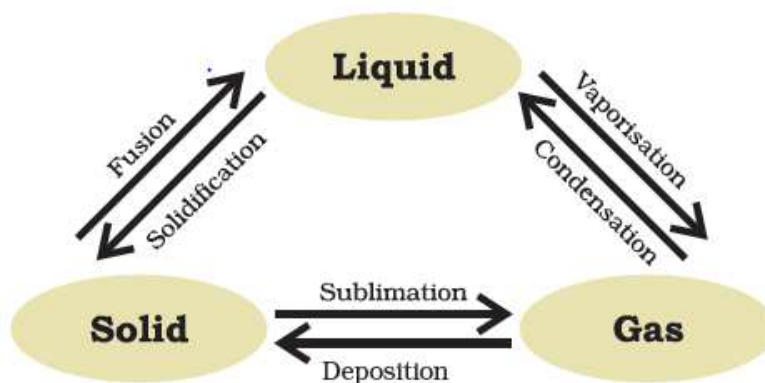
Sublimation is the change of solid state directly to gaseous state without going through liquid state.

## Evaporation

Evaporation is a surface phenomenon. Particles from the surface gain enough energy to overcome the forces of attraction present in the liquid and change into the vapour state.

Rate of evaporation depends upon the surface area exposed to the atmosphere, the temperature, the humidity and the wind speed.

# Railway Exams – General Awareness



## Some measurable quantities and their units

Quantity	Unit
Temperature	Kelvin
Length	Metre
Mass	Kilogram
Weight	Newton
Volume	Cubic Metre
Density	kilogram per cubic metre
Pressure	Pascal

## IS MATTER AROUND US PURE

- Depending upon the chemical composition, matter is classified into elements, compounds and mixtures
- A mixture contains more than one substance mixed in any proportion
- Air is a mixture of nitrogen, oxygen, carbon dioxide, water vapour and other gases. Soil is a mixture of clay, sand and various salts. Milk, ice cream, rock salt, tea, smoke, wood, sea water, blood, tooth paste and paint are some other examples of mixtures. Alloys are mixtures of metals.
- Mixtures can be separated into pure substances using appropriate separation techniques

## TYPES OF MIXTURES

1. Homogeneous mixture
2. Heterogeneous mixture

### Homogeneous mixture

1. A mixture in which the components cannot be seen separately is called a homogeneous mixture.
2. It has a uniform composition and every part of the mixture has the same properties
3. Tap water, milk, air, ice cream, sugar syrup, ink, steel, bronze and salt solutions are homogeneous mixtures

### Heterogeneous mixture

1. A mixture in which the components can be seen separately is called a heterogeneous mixture.
2. It does not have a uniform composition and properties.
3. Soil, a mixture of iodine and common salt, a mixture of sugar and sand, a mixture of oil and water, a mixture of sulphur and iron filings and a mixture of milk and cereals are heterogeneous mixture.

## SOLUTIONS

- A solution is a homogeneous mixture of two or more substances. You come across various types of solutions in your daily life. Lemonade, soda water etc.
- We can also have solid solutions (alloys) and gaseous solutions (air)
- The particles of a solution are smaller than 1 nm ( $10^{-9}$  metre) in diameter. So, they cannot be seen by naked eyes
- Because of very small particle size, they do not scatter a beam of light passing through the solution. So, the path of light is not visible in a solution
- Solution has a solvent and a solute as its components.

## SUSPENSION

- Suspension is a heterogeneous mixture
- The particles of a suspension scatter a beam of light passing through it and make its path visible.
- The particles of a suspension can be seen by the naked eye.

# Railway Exams – General Awareness

## COLLOIDS

- A colloid is a heterogeneous mixture.
- The size of particles of a colloid is too small to be individually seen by naked eyes.
- Colloids are big enough to scatter a beam of light passing through it and make its path visible.

## EXAMPLES OF COLLOIDS

Dispersed phase	Dispersing Medium	Type	Example
Liquid	Gas	Aerosol	Fog, clouds, mist
Solid	Gas	Aerosol	Smoke, automobile exhaust
Gas	Liquid	Foam	Shaving cream
Liquid	Liquid	Emulsion	Milk, face cream
Gas	Solid	Foam	Foam, rubber, sponge, pumice
Solid	Liquid	Sol	Milk of magnesia, mud
Liquid	Solid	Gel	Jelly, cheese, butter
Solid	Solid	Solid Sol	Coloured gemstone, milky glass

## SEPARATING THE COMPONENTS OF A MIXTURE

- Separate the volatile component (solvent) from its non-volatile solute by the method of **evaporation**.

### Applications:

1. Ink is a mixture of a dye in water

- **Centrifugation** is the process by which fine insoluble solids from a solid- liquid mixture can be separated in a machine called a centrifuge. A centrifuge rotates at a very high speed. On being rotated by centrifugal force, the heavier solid particles move down and the lighter liquid remains at the top.

### Applications:

1. Used in diagnostic laboratories for blood and urine tests.
2. Used in dairies and home to separate butter from cream.

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3. Used in washing machines to squeeze out water from wet clothes

- Separation of components of a mixture containing two miscible liquids that boil without decomposition and have sufficient difference in their boiling points this method is called **distillation**

## **Applications:**

1. Salt water turned to fresh water using distillation process
- The **crystallization** method is used to purify solids

## **Applications:**

1. Purification of salt that we get from sea water.
  2. Separation of crystals of alum from impure samples.
- Chromatography is a separation technique. It is used to separate different components of a mixture based on their different solubilities in the same solvent

## **Applications**

1. To separate colours in a dye
2. To separate pigments from natural colours
3. To separate drugs from blood.

## **HOMOGENEOUS & HETEROGENEOUS MIXTURE**

<b>Homogeneous mixture</b>	<b>Heterogeneous mixture</b>
Consists of single phase	Consists of two or more phases
Has the same uniform appearance and composition	Has different non uniform appearance and composition
Components are unrecognizable	Components are recognizable
Examples: Air, saline solution and bitumen	Example: Sand, oil and water

## ATOMS AND MOLECULES

- Antoine L. Lavoisier laid the foundation of chemical sciences by establishing two important laws of chemical combination.

### LAW OF CONSERVATION OF MASS

During a chemical reaction, the sum of the masses of the reactants and products remains unchanged. This is known as the Law of Conservation of Mass

### LAW OF CONSTANT PROPORTIONS

This law was stated by **Proust** as “In a chemical substance the elements are always present in definite proportions by mass”. This Law known as the Law of Definite Proportions or Law of definite proportions.

- Dalton’s atomic theory provided an explanation for the law of conservation of mass and the law of definite proportions.

#### According to Dalton’s atomic theory

- All matter is made of very tiny particles called atoms, which participate in chemical reactions
- Atoms are indivisible particles, which cannot be created or destroyed in a chemical reaction
- Atoms of a given element are identical in mass and chemical properties.
- Atoms of different elements have different masses and chemical properties

## ATOMS

- An atom is the smallest particle of an element that can take part in a chemical reaction
- Atomic radius is measured in nanometers.

$$1/10^9 \text{ m} = 1 \text{ nm}$$

$$1 \text{ m} = 10^9 \text{ nm}$$

- Hydrogen atom is smallest atom of all. Atomic radius of hydrogen atom is  $0.037 \times 10^{-9}$

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Radii	Example
$10^{-10}$	Atom of hydrogen
$10^{-9}$	Molecule of water
$10^{-8}$	Molecule of hemoglobin
$10^{-4}$	Grain of sand
$10^{-3}$	Ant
$10^{-1}$	Apple

## ATOMIC MASS

- Atomic mass is defined as the mass of a single atom of a chemical element
- One atomic mass unit is a mass unit equal to exactly one-twelfth (1/12th) the mass of one atom of carbon-12.

The relative atomic masses of all elements have been found with respect to an atom of carbon-12

## ATOMIC MASS OF SOME ELEMENTS

Element	Atomic mass
Hydrogen	1
Carbon	12
Nitrogen	14
Oxygen	16
Sodium	23
Magnesium	24
Sulphur	32
Chlorine	35.5
Calcium	40

## Avogadro constant



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- The Avogadro constant  $6.022 \times 10^{23}$  is defined as the number of atoms in exactly 12 g of carbon-12.

## THE STRUCTURE OF AN ATOM

- J.J. Thomson was the first one to propose a Model for the structure of an atom.
- Thomson proposed that:
  - (i) An atom consists of a positively charged sphere and the electrons are embedded in it.
  - (ii) The negative and positive charges are equal in magnitude. So, the atom as a whole is electrically neutral
- Rutherford's model of the atom proposed that a very tiny nucleus is present inside the atom and electrons revolve around this nucleus. The stability of the atom could not be explained by this model
- Neils Bohr's model of the atom was more successful. He proposed that electrons are distributed in different shells with discrete energy around the nucleus. If the atomic shells are complete, then the atom will be stable and less reactive.
- Electron was discovered by JJ Thomson
- Proton was discovered by Rutherford

## RUTHERFORD'S ATOMIC MODEL

According to this model:

1. The atom contains large empty space.
2. There is a positively charged mass at the centre of the atom, known as nucleus.
3. The size of the nucleus of an atom is very small compared to the size of an atom.
4. The electrons revolve around the nucleus in close circular paths called orbits.
5. An atom as a whole is electrically neutral, i.e., the number of protons and electrons in an atom are equal.

## BOHR'S MODEL OF AN ATOM

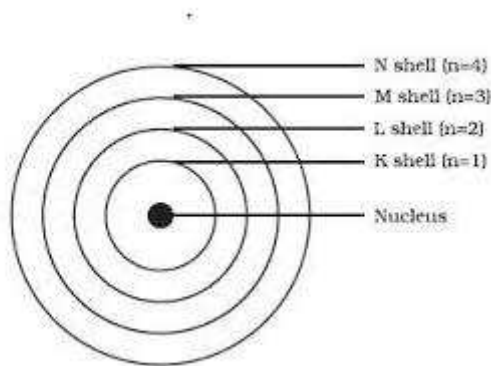
- In order to overcome the objections raised against Rutherford's model of the atom, Neils Bohr put forward the following postulates about the model of an atom:
  1. Only certain special orbits known as discrete orbits of electrons, are allowed inside the atom.
  2. While revolving in discrete orbits the electrons do not radiate energy.
- These orbits or shells are called energy levels

## NEUTRONS

- J. Chadwick discovered the neutron
- Neutrons are present in the nucleus of all atoms, except hydrogen
- Mass of an atom equal to sum of the masses of protons and neutrons present in the nucleus

## ELECTRONS DISTRIBUTED IN DIFFERENT ORBITS (SHELLS)

- Distribution of electrons into different orbits of an atom was suggested by Bohr and Bury.
- Maximum number of electrons present in a shell is given by the formula  $2n^2$   
Where  $n=1,2,3,4,\dots$
- These orbits or shells are represented by the letters K,L,M,N,...
- The maximum number of electrons that can be accommodated in the outermost orbit is 8.
- Electrons are not accommodated in a given shell, unless the inner shells are filled. That is, the shells are filled in a step-wise manner.



## VALENCE ELECTRONS

- **Electrons** present in the outermost shell of an atom are known as the **valence electrons**
- The elements with same number of electrons in the valence shell show similar properties and those with different number of valence electrons show different chemical properties
- Elements, which have 1 or 2 or 3 valence electrons (except Hydrogen), are **metals**.
- Elements with 4 to 7 electrons in their valence shell are **non-metals**.

## VALANCY

- Valency of an element is the combining capacity of the element with other elements and is equal to the number of electrons that take part in a **chemical reaction**
- Valency of the elements having valence electrons **1, 2, 3, 4** is **1, 2, 3, 4** respectively
- Valency of an element with **5, 6 and 7** valence electrons is **3, 2 and 1 (8–valence electrons)** respectively. Because 8 is the number of electrons required by an element to attain stable electronic configuration
- Elements having completely filled outermost shell show **Zero valency**

## ATOMIC NUMBER

- Atomic number of an element is the same as the number of protons in the nucleus of its atom.

## MASS NUMBER

- Mass number of an atom is equal to the number of protons and neutrons in a nucleus

## ISOTOPES

- Two or more forms of an element having the same atomic number, but different mass number are called Isotopes ( $_{17}\text{Cl}^{35}$ ,  $_{17}\text{Cl}^{37}$ ).
- Applications**
  - An isotope of uranium is used as a fuel in nuclear reactors.
  - An isotope of cobalt is used in the treatment of cancer.
  - An isotope of iodine is used in the treatment of goitre.

## ISOBARS

- Atoms of different elements having the same mass number, but different atomic numbers are called Isobars ( $_{18}\text{Ar}^{40}$ ,  $_{20}\text{Ca}^{40}$ ).

## ISOTONES

- Atoms of different elements having the same number of neutrons, but different atomic number and different mass number are called Isotones ( $_{6}\text{C}^{13}$ ,  $_{7}\text{N}^{14}$ ).

## CARBON AND ITS COMPOUNDS

- All living structures are carbon based.
- Carbon is found both in free state as well as combined state in nature
- Earth's crust has only 0.02% carbon in the form of minerals like carbonates, hydro carbonates, coal and petroleum and the atmosphere has 0.03% of carbon dioxide. In spite of this small amount of carbon available in nature
- Both diamond and graphite are formed by carbon atoms they are allotrope of carbon
- The gas/kerosene stove used at home has inlets for air so that a sufficiently oxygen-rich mixture is burnt to give a clean **blue flame**.
- If bottoms of cooking vessels getting blackened, it means that the air holes are blocked and fuel is getting wasted
- Cooking Gas mainly consist of **Butane**
- **Ethanol** is used as a fuel in cars along with petrol
- **Ethyl alcohol** is used as an antiseptic to sterilize wounds and syringes in hospitals
- **Methane** popularly known as marsh gas. Natural consists of over 90 percent methane and some amount of propane and butane
- **Paddy field** is biggest source of methane gas
- **Bio gas** consists of 55to 70 percent methane and 30 to 45 percent carbon
- **Ethylene** used for
  1. Preparation of mustard gas
  2. Preservation and artificial ripening of green fruits
  3. Manufacturing of PVC pipes

## COVALENT BOND

- Carbon always have a covalent bond
- The bond formed by sharing of electrons between two atoms are known as covalent bond
- The boiling and melting points of the carbon compounds is low

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- Most carbon compounds are poor conductors of electricity because they form covalent bond so it does not give rise to free electrons. All electrons are used in making the covalent bond
- **Graphite is a good conductor of heat and electricity** because it has free electrons

## Melting & boiling points compounds of carbon

Compound	Formula	Melting point (K)	Boiling point (K)
Acetic acid	$\text{CH}_3\text{COOH}$	290	391
Chloroform	$\text{CHCl}_3$	209	334
Ethanol	$\text{CH}_3\text{CH}_2\text{OH}$	156	351
Methane	$\text{CH}_4$	90	111

## Allotropes of carbon

- Allotropy is a property by which an element can exist in more than one form that are physically different and chemically similar. The different forms of that element are called its allotropes
- The element carbon occurs in different forms in nature with widely varying physical properties. Both diamond and graphite are formed by carbon atoms, the difference lies in the manner in which the carbon atoms are bonded to one another
- Carbon exists in different allotropic forms and based on their physical nature they are classified as below.

### Crystalline forms of Carbon



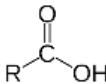
1. Diamond
2. Graphite
3. Fullerene

### Amorphous forms of carbon

1. Charcoal
2. coke
3. Lamp black
4. Gas carbon

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## SOME FUNCTIONAL GROUPS OF CARBON COMPOUNDS

Hetero atom	Class of compounds	Formula of functional group
Cl/Br	Halo- (Chloro/bromo) Alkane	—Cl, —Br (substitutes for hydrogen atom)
Oxygen	1. Alcohol	—OH
	2. Aldehyde	
	3. Ketone	
	4. Carboxylic acid	

## FORMULA OF SATURATED COMPOUNDS OF CARBON AND HYDROGEN'S

No of C atoms	Name	Formula
1	Methane	CH <sub>4</sub>
2	Ethane	C <sub>2</sub> H <sub>6</sub>
3	Propane	C <sub>3</sub> H <sub>8</sub>
4	Butane	C <sub>4</sub> H <sub>10</sub>
5	Pentane	C <sub>5</sub> H <sub>12</sub>
6	Hexane	C <sub>6</sub> H <sub>14</sub>
7	Heptane	C <sub>7</sub> H <sub>16</sub>
8	Octane	C <sub>8</sub> H <sub>18</sub>
9	Nonane	C <sub>9</sub> H <sub>20</sub>

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10	Decane	$C_{10}H_{22}$
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## ETHANOL

- Ethanol is commonly known as alcohol. All alcoholic beverages and some cough syrups contain ethanol. Its molecular formula is  $C_2H_5OH$
- Ethanol and ethanoic acid are carbon compounds of importance in our daily lives
- Ethanol is a liquid at room temperature. Ethanol is commonly called alcohol and is the active ingredient of all alcoholic drinks
- Ethanol is a colourless liquid, having a pleasant smell and a burning taste.
- Ethanol is used as an anti-freeze in automobile radiators
- Ethanol is used in medical wipes, as an antiseptic
- Ethanol is a good solvent, it is also used in medicines such as tincture iodine, cough syrups, and many tonics
- Ethanol is used for effectively killing microorganisms like bacteria, fungi, etc., by including it in many hand sanitizers.

## ETHANOIC ACID

- Ethanoic acid or acetic acid is one of the most important members of the carboxylic acid family. Its molecular formula is  $C_2H_4O_2$ .
- Ethanoic acid is commonly called acetic acid and belongs to a group of acids called carboxylic acids
- 5-8% solution of acetic acid in water is called vinegar and is used widely as a preservative in pickles.
- Ethanoic acid is used in printing on fabrics
- The melting point of pure **ethanoic acid is 290k** and hence it often **freezes during winter**. They look like glaciers, so it is called **glacial acetic acid**

## SOAPS & DETERGENTS

- Soap is a sodium or potassium salt of long chain carboxylic acid
- Soap is effective only in soft water
- Detergent is ammonium or sulphonate salt of long chain of carboxylic acid
- Detergent are effective both soft and hard water

## ORGANIC COMPOUNDS IN DAILY LIFE

- Organic compounds are inseparable in human life
- Various classes of organic compounds and their uses in our daily life as follows:

### Hydrocarbons

1. Fuels like LPG, Petrol, Kerosene.
2. Raw materials for various important synthetic materials.
3. Polymeric materials like tyre, plastic containers.

### Alcohols

1. As a solvent and an antiseptic agent.
2. Raw materials for various important synthetic materials.

### Aldehydes

1. Formaldehyde as a disinfectant.
2. Raw materials for synthetic materials.

### Ketones

1. As a solvent.
2. Stain Remover.

## PERIODIC CLASSIFICATION OF ELEMENTS

- In 1800, there were only 31 known elements. By 1865, their number became 63. Now 118 elements have been discovered.
- Presently, **118** elements are known. All these have different Properties. Out of these 118, only 94 are naturally occurring.
- All the elements are unique in their nature and property. To categorize these elements according to their properties, scientists started to look for a way.
- Scientists made several attempts to classify elements according to their properties Such as Newlands Law of Octaves, Dobereiner triads Law and Mendeleev



## DOBEREINER'S TRIADS LAW

- He tried to arrange the elements with similar properties into groups. He identified some groups having three elements each. So he called these groups 'triads'. Dobereiner showed that when the three elements in a triad were written in the order of increasing atomic masses. The atomic mass of the middle element was roughly the average of the atomic masses of the other two elements
- **Example:** In the triad group (1), arithmetic mean of atomic masses of 1st and 3rd elements,  $(6.9 + 39.1)/2 = 23$ . So the atomic mass of Na (middle element) is 23.

## Limitations

- Dobereiner could identify only three triads from the elements known at that time and all elements could not be classified in the form of triads. ,,
- The law was **not applicable** to elements having **very low and very high atomic mass**.

## Newlands Law of Octaves

- In 1866, John Newlands arranged **56 known elements** in the increasing order of their atomic mass.
- He started with the element having the lowest atomic mass (hydrogen) and ended at thorium which was the **56<sup>th</sup>** element. He found that every eighth element had properties similar to that of the first. This arrangement was known as '**law of octaves**'
- Law of Octaves was applicable only upto calcium, as after calcium every eighth element did not possess properties similar to that of the first.
- Newlands' Law of Octaves worked well with lighter elements only
- Newlands' table was restricted to only 56 elements and did not leave any room for new elements

## Mendeleev periodic table

- At the time of Mendeleev started his work, **63** elements were known. He examined the relationship between the atomic masses of the elements and their physical and chemical properties
- He observed that most of the elements got a place in a Periodic Table and were arranged in the order of their increasing atomic masses

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- Mendeleev's Periodic Table contains vertical columns called 'groups' and horizontal rows called 'periods'
- It has eight vertical columns called 'groups' and seven horizontal rows called 'period'.

## Limitations

- The increasing order of atomic mass was not strictly followed throughout.  
Eg. Co & Ni, Te & I.
- No place for isotopes in the periodic table
- No proper position could be given to the element hydrogen. Non-metallic hydrogen was placed along with metals like lithium (Li), sodium (Na) and potassium (K).

## Modern Periodic Table

- Elements are arranged in order of **increasing atomic number**
- Modern Periodic Law can be stated as follows "The chemical and physical properties of the elements are the periodic functions of their atomic numbers". Based on the modern periodic law, the modern periodic table is derived
- Modern Periodic Table has 18 vertical columns known as groups and 7 horizontal rows known as 'periods'.
- Elements present in any one group have the same number of valence electrons
- The valence of an element is determined by the number of valence electrons present in the outermost shell of its atom
- **Metals** are found on the **left-hand side** of the Periodic Table
- **Non-metals** are found on the **right-hand side** of the Periodic Table
- Modern Periodic Table, a zig-zag line separates metals from non-metals. The borderline elements boron, silicon, germanium, arsenic, antimony, tellurium and polonium are intermediate in properties and are called **metalloids**
- **Halogens** are located on the 17<sup>th</sup> group on the periodic table
- **Noble gases** are located on the 18<sup>th</sup> group on the periodic table
- Based on the physical and chemical properties of elements, they are grouped into various families.

### Groups in modern periodic table

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Group 1	Alkali metals
Group 2	Alkaline earth metals
Group 3 to 12	Transition metals
Group 13	Boron Family
Group 14	Carbon Family
Group 15	Nitrogen Family
Group 16	Oxygen Family (or) Chalcogen Family
Group 17	Halogens
Group 18	Noble gases

Group →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
↓ Period																		
1	1 H																	2 He
2	3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
3	11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
6	55 Cs	56 Ba		72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
7	87 Fr	88 Ra		104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Mc	116 Lv	117 Ts	118 Og
	Lanthanides		57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu	
	Actinides		89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr	

Modern Periodic Table

## Position of hydrogen in the periodic table

- Hydrogen is the lightest, smallest and first element of the periodic table. Its electronic configuration (1s<sup>1</sup>) is the simplest of all the elements.

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- It occupies a unique position in the periodic table. It behaves like alkali metals as well as halogens in its properties
- In the periodic table, it is placed at the top of the alkali metals.
  1. Hydrogen can lose its only one electron to form a hydrogen ion ( $H^+$ ) like alkali metals.
  2. It can also gain one electron to form the hydride ion ( $H^-$ ) like halogens.
  3. Alkali metals are solids while hydrogen is a gas
- The position of hydrogen in the modern periodic table is still under debate as the properties of hydrogen are unique.

## Position of Noble gases in the periodic table

- The elements Helium, Neon, Argon, Krypton, Xenon and Radon of group 18 in the periodic table are called as Noble gases or Rare gases. They are monoatomic gases and do not react with other substances easily, due to completely filled subshells. Hence they are called as inert gases. They are found in very small quantities and hence they are called as rare gases.

## ATOMIC NUMBERS

Atomic number	Symbol	Elements
1	H	Hydrogen
2	He	Helium
3	Li	Lithium
4	Be	Beryllium
5	B	Boron
6	C	Carbon
7	N	Nitrogen
8	O	Oxygen
9	F	Fluorine
10	Ne	Neon

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11	Na	Sodium
12	Mg	Magnesium
13	Al	Aluminum
14	Si	Silicon
15	P	Phosphorus
16	S	Sulfur
17	Cl	Chlorine
18	Ar	Argon
19	K	Potassium
20	Ca	Calcium
21	Sc	Scandium
22	Ti	Titanium
23	V	Vanadium
24	Cr	Chromium
25	Mn	Manganese
26	Fe	Iron
27	Co	Cobalt
28	Ni	Nickel
29	Cu	Copper
30	Zn	Zinc
31	Ga	Gallium
32	Ge	Germanium
33	As	Arsenic
34	Se	Selenium
35	Br	Bromine
36	Kr	Krypton

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37	Rb	Rubidium
38	Sr	Strontium
39	Y	Yttrium
40	Zr	Zirconium
41	Nb	Niobium
42	Mo	Molybdenum
43	Tc	Technetium
44	Ru	Ruthenium
45	Rh	Rhodium
46	Pd	Palladium
47	Ag	Silver
48	Cd	Cadmium
49	In	Indium
50	Sn	Tin
51	Sb	Antimony
52	Te	Tellurium
53	I	Iodine
54	Xe	Xenon
55	Cs	Cesium
56	Ba	Barium
57	La	Lanthanum
58	Ce	Cerium
59	Pr	Praseodymium
60	Nd	Neodymium
61	Pm	Promethium
62	Sm	Samarium

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63	Eu	Europium
64	Gd	Gadolinium
65	Tb	Terbium
66	Dy	Dysprosium
67	Ho	Holmium
68	Er	Erbium
69	Tm	Thulium
70	Yb	Ytterbium
71	Lu	Lutetium
72	Hf	Hafnium
73	Ta	Tantalum
74	W	Tungsten
75	Re	Rhenium
76	Os	Osmium
77	Ir	Iridium
78	Pt	Platinum
79	Au	Gold
80	Hg	Mercury
81	Tl	Thallium
82	Pb	Lead
83	Bi	Bismuth
84	Po	Polonium
85	At	Astatine
86	Rn	Radon
87	Fr	Francium
88	Ra	Radium

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89	Ac	Actinium
90	Th	Thorium
91	Pa	Protactinium
92	U	Uranium
93	Np	Neptunium
94	Pu	Plutonium
95	Am	Americium
96	Cm	Curium
97	Bk	Berkelium
98	Cf	Californium
99	Es	Einsteinium
100	Fm	Fermium
101	Md	Mendelevium
102	No	Nobelium
103	Lr	Lawrencium
104	Rf	Rutherfordium
105	Db	Dubnium
106	Sg	Seaborgium
107	Bh	Bohrium
108	Hs	Hassium
109	Mt	Meitnerium
110	Ds	Darmstadtium
111	Rg	Roentgenium
112	Cn	Copernicium
113	Nh	Nihonium
114	Fl	Flerovium



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115	Mc	Moscovium
116	Lv	Livermorium
117	Ts	Tennessine
118	Og	Oganesson

## COAL AND PETROLEUM

- Coal, petroleum and natural gas are fossil fuels.
- Fossil fuels were formed from the dead remains of living organisms millions of years ago.

### COAL

- It is as hard as stone and is black in colour
- Coal is processed in industry get some useful products such as coke, coal tar and coal gas
- Coke is a tough, porous and black substance. It is an almost pure form of carbon. Coke is used in the manufacture of steel and in the extraction of many metals.
- Coal Tar is a black, thick liquid with an unpleasant smell. Products obtained from coal tar are used as starting materials for manufacturing various substances used in everyday life and in industry, like synthetic dyes, drugs, explosives, perfumes, plastics, paints, photographic materials, Roofing materials.
- Coal gas is obtained during the processing of coal to get coke
- Different types of coals are peat, lignite, bituminous, and anthracite
- Anthracite is one of variety of coal contains the highest percentage of carbon
- Lignite coal is called brown coal, is the lowest grade coal with the least concentration of carbon

### Petroleum and Natural Gas

- Petrol and diesel are obtained from a natural resource called petroleum. Due to its great commercial importance, petroleum is also called black gold.
- Petroleum is a mixture of Hydrocarbon

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- Petroleum is a dark oily liquid. It has an unpleasant odour. It is a mixture of various constituents such as petroleum gas, petrol, diesel, lubricating oil, paraffin wax, etc.
- The process of separating the various constituents/ fractions of petroleum is known as refining
- Natural gas is a very important fossil fuel because it is easy to transport through pipes.
- Natural gas is stored under high pressure as compressed natural gas (CNG). CNG is used for power generation. It is a cleaner fuel.
- Many useful substances are obtained from petroleum and natural gas. These are termed as ‘Petrochemicals’

## Constituents of Petroleum and their Uses below

Constituents of Petroleum	Uses
LPG	Fuel for home and industry
Petrol	Motor fuel, aviation fuel
Lubricating oil	Lubrication
Paraffin wax	Ointments, candles, Vaseline
Bitumen	Paints, road surfacing
Kerosene	Fuel for stoves, lamps and jet aircrafts

## ACIDS, BASES AND SALTS

- **Acids** are **sour** in taste and change the colour of **blue litmus** to **red**, whereas, **bases** are **bitter** and change the colour of the **red litmus** to **blue**
- An acid and a base neutralize each other and form a salt and water. A salt may be acidic, basic or neutral in nature.
- Special types of substances are used to test whether a substance is acidic or basic. These substances are known as indicators. The indicators change their colour when added to a solution containing an acidic or a basic substance. Turmeric, litmus, China rose petal are some of the naturally occurring indicators

## LITMUS

# Railway Exams – General Awareness

- The most commonly used natural indicator is litmus. It is extracted from lichens .It has a mauve (purple) colour in distilled water. When added to an acidic solution, it turns red and when added to a basic solution, it turns blue. It is available in the form of a solution, or in the form of strips of paper, known as litmus paper. Generally, it is available as red and blue litmus paper

## ACIDS

- Acidic nature of a substance is due to the formation of  $H^+$  ions in solution
- When an acid reacts with a metal, hydrogen gas is evolved and a corresponding salt is formed  
 $\text{Acid} + \text{Metal} \rightarrow \text{Salt} + \text{Hydrogen gas}$
- Some metals do not react with acid and liberate hydrogen gas. Example: Ag, Cu.
- When an acid reacts with a metal carbonate or metal hydrogen carbonate, it gives the corresponding salt, carbon dioxide gas and water  
 $Na_2CO_3 + 2HCl \rightarrow 2NaCl + H_2O + CO_2$   
 $NaHCO_3 + HCl \rightarrow NaCl + H_2O + CO_2$
- Acidic solutions in water conduct electricity because they produce hydrogen ions
- Acid is a molecule or ion which is capable of donating proton
- An acid is a substance which can accept the electron
- **Some naturally occurring acids**

Natural source	Acid
Vinegar	Acetic acid
Orange	Citric acid
Tamarind	Tartaric acid
Tomato	Oxalic acid
Sour milk (Curd)	Lactic acid
Lemon	Citric acid
Ant sting	Formic acid
Nettle sting	Formic acid
Apple	Malic acid

# Railway Exams – General Awareness

## Note

- The atmosphere of Venus is made up of thick white and yellowish clouds of sulphuric acid
- The accidental touch of Nettle leaves creates a pain and burning sensation, which is due to inject of Methanoic acid into the skin of the person

## BASE

- Basic nature of a substance is due to the formation of OH<sup>-</sup> ions in solution
- Bases react with metals to form salt with the liberation of hydrogen gas.  
$$\text{Zn} + 2 \text{NaOH} \rightarrow \text{Na}_2 \text{ZnO}_2 + \text{H}_2 \uparrow$$
- Bases react with acids to form salt and water. The reaction between a base and an acid is known as Neutralisation reaction  
$$\text{KOH} + \text{HCl} \rightarrow \text{KCl} + \text{H}_2\text{O}$$
- Basic solution in water conduct electricity because they produce hydroxide ions
- Base is a molecule or ion which is capable of accepting proton
- An base is a substance which can produce the electron

## HOW STRONG ARE ACIDS AND BASE SOLUTIONS

- A scale for measuring hydrogen ion concentration in a solution is called pH scale. The ‘p’ in pH stands for ‘potenz’ in German meaning power. pH scale is a set of numbers from 0 to 14 which is used to indicate whether a solution is acidic, basic or neutral
- The pH of a neutral solution is 7. Values less than 7 on the pH scale represent an acidic solution. As the pH value increases from 7 to 14, it represents an increase in OH<sup>-</sup> ion concentration in the solution, that is, increase in the strength of alkali
  - 1 Acids have pH less than 7
  - 2 Bases have pH greater than 7
  - 3 A neutral solution has pH equal to 7
- Strength of acids and bases depends upon the number of H<sup>+</sup> ions and OH<sup>-</sup> ions produced, respectively. If we take hydrochloric acid and acetic acid of the same concentration, say one molar, then these produce different

# Railway Exams – General Awareness

amounts of hydrogen ions. Acids that give rise to more  $H^+$  ions are said to be strong acids, and acids that give less  $H^+$  ions are said to be weak acids.

Substances	pH values
Human blood	7.35-7.45
Pure water	7
Lemon juice	2.2
Gastric juice	1.2
Milk of magnesia	10
Human urine	6
Beers	4.5
Wines	2.8-3.8
Black coffee	5.2
Milk	6.5 – 6.7
Normal rain	5.6 - 6
Acid rain	4.2-4.4

## IMPORTANCE OF PH IN EVERYDAY LIFE DAY LIFE

- Our body works within the pH range of 7.0 to 7.8. Living organisms can survive only in a narrow range of pH change
- When pH of rain water is less than 5.6, it is called acid rain. When acid rain flows into the rivers, it lowers the pH of the river water. The survival of aquatic life in such rivers becomes difficult.
- Tooth decay starts when the pH of the mouth is lower than 5.5. Tooth enamel, made up of **calcium hydroxyapatite** (a crystalline form of **calcium phosphate**) is the hardest substance in the body. It does not dissolve in water, but is corroded when the pH in the mouth is below 5.5. Using toothpastes, which are generally basic, for cleaning the teeth can neutralise the excess acid and prevent tooth decay

# Railway Exams – General Awareness

- It is very interesting to note that **our stomach produces hydrochloric acid**. It **helps in the digestion of food** without harming the stomach. During indigestion the stomach produces too much acid and this causes pain and irritation. To get rid of this pain, people use bases called **antacids**. These antacids neutralize the excess acid. Magnesium hydroxide (Milk of magnesia), a mild base, is often used for this purpose

## USES OF ACIDS

- **Sulphuric acid** is called **King of Chemicals** because it is used in the preparation of many other compounds. It is used in car batteries also.
- Hydrochloric acid is used as a cleansing agent in toilets.
- Carbonic acid is used in aerated drinks. ,,
- Tartaric acid is a constituent of baking powder
- Citric acid is used in the preparation of effervescent salts and as a food preservative. ,,
- Nitric acid is used in the manufacture of fertilizers, dyes, paints and drugs. ,,
- Oxalic acid is used to clean iron and manganese deposits from quartz crystals. It is also used as bleach for wood and removing black stains. ,,

## USES OF BASES

- Sodium hydroxide is used in the manufacture of soap.
- Magnesium hydroxide is used as a medicine for stomach disorder.
- Ammonium hydroxide is used to remove grease stains from cloths.
- Calcium hydroxide is used in white washing of building.

## SALTS

- Salt is the product of reaction between acids and bases.
- Salts of a strong acid and a strong base are neutral with pH value of 7. On the other hand, salts of a strong acid and weak base are acidic with pH value less than 7 and those of a strong base and weak acid are basic in nature, with pH value more than 7.

# Railway Exams – General Awareness

- Most of the salts are soluble in water. For example, chloride salts of potassium and sodium are soluble in water. But, silver chloride is insoluble in water
- Salt is hygroscopic in nature.

## USES OF SALTS

### COMMON SALT (SODIUM CHLORIDE - NaCl)

- It is used in our daily food and used as a preservative.

### BLEACHING POWDER ( $\text{CaOCl}_2$ )

- For bleaching cotton and linen in the textile industry, for bleaching wood pulp in paper factories and for bleaching washed clothes in laundry.
- Oxidizing agent in many chemical industries.
- To make drinking water free from germs.

### BAKING SODA ( $\text{NaHCO}_3$ )

- The baking soda is commonly used in the kitchen for making tasty crispy pakoras, etc. Sometimes it is added for faster cooking
- Baking soda is also an ingredient in antacids. Being alkaline, it neutralizes excess acid in the stomach and provides relief.
- It is also used in soda-acid fire extinguishers

### WASHING SODA ( $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ )

- Sodium carbonate (washing soda) is used in glass, soap and paper industries.
- It is used in the manufacture of sodium compounds such as borax.
- Sodium carbonate can be used as a cleaning agent for domestic purposes.
- It is used for removing permanent hardness of water.

### PLASTER OF PARIS ( $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$ )

- Plaster of Paris, the substance which doctors use as plaster for supporting Structured bones in the right position.

# Railway Exams – General Awareness

- Plaster of Paris is used for making toys, materials for decoration and for making surfaces smooth

## GYPSUM ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ )

- Manufacture of wallboard, cement, plaster of Paris, soil conditioning, a hardening retarder in Portland cement

## METALS & NON-METALS

- Metals are lustrous whereas non-metals have no lustre. Metals are malleable and ductile. Non-metals do not have these properties.
- Metals are good conductors of heat and electricity but non-metals are poor Conductors.
- On burning, metals react with oxygen to produce metal oxides which are basic in nature. Non-metals react with oxygen to produce non-metallic oxides which are acidic in nature.
- Some metals react with water to produce metal hydroxides and hydrogen gas. Generally, non-metals do not react with water.
- **Metals** react with acids and produce metal salts and **hydrogen gas**. Generally, **non-metals** do not react with **acids**.
- Some metals react with bases to produce hydrogen gas.

## METALS

- Metals, in their pure state, have a shining surface. This property is Called metallic lustre.
- Metals can be beaten into thin sheets. This property is called malleability. **Gold and silver are most malleability metal.**
- Ability of metals to be drawn into thin wires is called ductility. **Gold is the most ductile metal.** You will be surprised to know that a wire of about 2 km length can be drawn from one gram of gold.
- Metals are good conductors of heat and have high melting points. The best conductors of heat are **silver and copper**. Lead and mercury are comparatively poor conductors of heats
- Metals are good conductors of electricity. The **best conductors of electricity is silver**
- When an **acid reacts with a metal, hydrogen gas** is evolved and a corresponding salt is formed  
$$\text{Acid} + \text{Metal} \rightarrow \text{Salt} + \text{Hydrogen gas}$$
- All metals except **mercury exist as solids at room temperature**



# Railway Exams – General Awareness

- **Gallium and cesium have very low melting points.** These two metals will melt if you keep them on your palm
- Alkali metals (**lithium, sodium, potassium**) are so soft that they can be **cut with a knife**. They have low densities and low melting points
- **Concentrated Acid:** It has relatively large amount of acid dissolved in a solvent.
- **Dilute Acid:** It has relatively smaller amount of acid dissolved in solvent.
- Almost all metals combine with oxygen to form metal oxides.  
$$\text{Metal} + \text{Oxygen} \rightarrow \text{Metal oxide}$$
- All metals do not react with oxygen at the same rate. Different metals show different relativities towards oxygen. **Metals such as potassium and sodium react so vigorously.**
- **Metals such as potassium and sodium** react so vigorously that they catch fire if kept in the open. Hence, to protect them and to prevent accidental fires, they are kept immersed in **kerosene oil**.
- **Anodising** is a process of forming a thick oxide layer of aluminium. Aluminium develops a thin oxide layer when exposed to air. This aluminium oxide coat makes it resistant to further corrosion
- **Silver and gold do not react with oxygen** even at **high temperatures**

## When Metals react with Water?

- Metals react with water and produce a metal oxide and hydrogen gas. Metal oxides that are soluble in water dissolve in it to further form metal hydroxide. But all metals do not react with water.  
$$\text{Metal} + \text{Water} \rightarrow \text{Metal oxide} + \text{Hydrogen}$$
$$\text{Metal oxide} + \text{Water} \rightarrow \text{Metal hydroxide}$$
- Metals like **potassium and sodium** react **violently with cold water**. In case of sodium and potassium, the reaction is so violent and exothermic that the evolved hydrogen immediately **catches fire**.
- The **reaction of calcium** with water is **less violent**. The heat evolved is not sufficient for the hydrogen to catch fire. **Calcium starts floating** because the bubbles of hydrogen gas formed stick to the surface of the metal.

# Railway Exams – General Awareness

- **Magnesium does not react with cold water.** It reacts with hot water to form magnesium hydroxide and hydrogen. It also starts floating due to the bubbles of hydrogen gas sticking to its surface.
- Metals like aluminium, iron and zinc do not react either with cold or hot water. But they react with steam to form the metal oxide and hydrogen.
- Metals such as lead, copper, silver and gold do not react with water at all

## When Metals react with Acids?

- Metals react with acids to give a salt and hydrogen gas.  
 $\text{Metal} + \text{Acid} \rightarrow \text{Salt} + \text{Hydrogen}$
- **Hydrogen gas is not evolved** when a metal reacts with **nitric acid**. It is because  $\text{HNO}_3$  is a strong oxidising agent. It oxidises the  $\text{H}_2$  produced to water and itself gets reduced to any of the nitrogen oxides ( $\text{N}_2\text{O}$ ,  $\text{NO}$ ,  $\text{NO}_2$ ). But magnesium (Mg) and manganese (Mn) react with very dilute  $\text{HNO}_3$  to evolve  $\text{H}_2$  gas.
- **Aqua regia** is a freshly prepared mixture of concentrated **hydrochloric acid** and concentrated **nitric acid** in the ratio of **3:1**. Aqua regia is a highly corrosive, fuming liquid. It is one of the few reagents that is able to dissolve **gold and platinum**. It is used for cleaning and refining gold.

## The Reactivity Series

- The reactivity series is a list of metals arranged in the order of their decreasing activities

Symbol	Metal
K	Potassium
Na	Sodium
Ca	Calcium
Mg	Magnesium
Al	Aluminum
Zn	Zinc
Fe	Iron



# Railway Exams – General Awareness

Pb	Lead
H	Hydrogen
Cu	Copper
Hg	Mercury
Ag	Silver
Au	Gold

## LIST OF METAL AND THEIR ORES

METALS	ORES
Sodium	Trona Borax Common salt
Aluminum	Bauxite
Potassium	Nitrate Carnalite
Magnesium	Magnesite Dolomite Epsom salt
Silver	Ruby silver Horn silver
Mercury	Cinnabar
Tin	Cassiterite
Lead	Galena
Gold	Calaverite Silvenites

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Calcium	Dolomite Gypsum Fluorspar Asbestos
Iron	Haemethite Magnetite
Bismuth	Bismuthate

## NON-METALS

- Examples of non-metals are carbon, sulphur, iodine, oxygen, hydrogen, etc.
- **Non-metals are either solids or gases except bromine which is a liquid at room temperature**
- Iodine is a non-metal but it is lustrous
- Carbon is a non-metal that can exist in different forms. Each form is called an allotrope.
- **Diamond, an allotrope of carbon**, is the hardest natural substance known and has a very high melting and boiling point. **Graphite**, another allotrope of carbon, is a conductor of electricity
- Non-metals produce acidic oxides when dissolve in water

## CORROSION

- When a metal is attacked by substances around it such as moisture, acids, etc., it is said to corrode and this process is called corrosion. The **black coating on silver** and the **green coating on copper** are other examples of corrosion

## PREVENTION OF CORROSION

- Rusting of iron can be prevented by painting, oiling, greasing, galvanizing , chrome plating, anodizing or making alloys
- **Galvanization** is a method of protecting steel and iron from rusting by coating them with a thin layer of **zinc**.

## ALLOYING

- Alloying is a very good **method of improving the properties of a metal**.

# Railway Exams – General Awareness

- Alloy is a homogeneous mixture of two or more metals, or a metal and a Non-metal.
- Iron is the most widely used metal. But it is never used in its pure state. This is because pure iron is very soft and stretches easily when hot. But, if it is **mixed with a small amount of carbon**, it becomes hard and strong. When iron is mixed with nickel and chromium, we get stainless steel, which is hard and does not rust.
- Pure gold is very soft. It is, not suitable for making jewelry. It is alloyed with either silver or copper to make it hard.

## IMPORTANT ALLOYS

Alloy	Combinations
Solder	Lead and Tin
Brass	Copper and zinc
Stainless steel	Iron, Chromium and Nickel
Bronze	Copper and Tin
Invar	Iron and Nickel
Constantan	Copper and Nickel
Gun metal	Copper ,tin and zinc
Sterling silver	Silver and copper
German silver	Copper , zinc and Nickel

- An amalgam is an alloy of mercury.
- Electrical conductivity and melting point of an alloy is less than that of pure metals.
- Some alloys have lower melting point than pure metals (Example: Solder is an alloy of lead and tin which has lower melting point than each of the metals).
- Solder is used for welding electrical wires together.
- Alloys do not get corroded or get corroded to very less extent

# Railway Exams – General Awareness

## IMPORTANT CHEMICAL AND ITS USES

Chemical name	Common name	Uses
Aluminium		Used in Heat resistant clothing, Cookware and manufacturing of aircraft
Acetic Acid	Vinegar	Cooking, baking and pickling
Acetylsalicylic Acid	Aspirin	Medical
Argon		Used in incandescent lighting equipment's such as Bulbs, CFLs
Ammonium Phosphate	Fertilizer	Used as a fertilizer in Agricultural
Aluminium potassium Sulphate	Alum	Used in Water Purification ,Some types of Toothpastes and Pickling Agent
Ammonium Nitrate		Fertilizers and Explosives
Bismuth		Fire detection systems and bullets
Calcium Carbonate	LimeStone	Marble, Limestone and Precipitated Chalk
Calcium oxide	Quicklime	Cement Production
Carbon		Graphite, Fossil Fuels, Clay, Charcoal and Diamond
Copper		Manufacturing of Electrical Wires & cables
Glycerin		Making of Skin Products
Ethanol		Antiseptic, Rocket Fuels, Fuel cells and Engine Fuel
Helium		Treating Asthma and Barcode Reading
Lithium		Portable Battery and Making of Optical

# Railway Exams – General Awareness

		devices
Mercury	Quicksilver	Barometers and Thermometer
Sodium Nitrate		Gunpowder making and treating of dentine hypersensitivity
Sulphuric acid	Vitriol	Electrolyte and Industrial Cleaning agent
Zinc		Galvanizing

## CHEMISTRY ONE LINERS

- **Graphite** is used a lubricant in heavy machines
- **Aspirin** is obtained from latex tree
- Ionic compounds conduct electricity when dissolved in water and They are soluble in water and are also crystalline solids
- Father of modern chemistry is **Lavoisier**
- Cathode rays consists beam of **electrons**
- Nucleus of an atom consists of protons and neutrons
- Proton was discovered by **Rutherford**
- A swimmer finds it easier to swim in sea water than plain water because of sea water has **higher density**
- An electric iron has heating element made of **Nichrome**
- Heaviest naturally occurring element of periodic table **uranium**
- Pungent smell of garlic is due to **asulphur** compound
- White phosphorous is stored under water because it is dangerously reactive in air
- **Mercury** is known as quick silver
- Red phosphorous present at the tip of the match stick
- **Magnesium** burns with dazzling white flame
- **Sodium benzoate** Is used as food preservative

# Railway Exams – General Awareness

- **Potassium** is used for the manufacturing of fertilizers
- **Fluorine** is the most electronegative element in of the periodic table
- **Francium** is the most electropositive element in of the periodic table
- Bhopal gas Tragedy of 1984 is related to **Methyl Isocyanate**
- A powerful eye irritate present in smog is **Peroxyacetyl nitrate**
- Plastic is type of polymer
- **Platinum** is known as white gold
- **Petroleum** is a mixture of Hydrocarbon
- Acetyl salicylic acid commonly used as a pain killer
- Iron is commonly used for making an electromagnet
- Halite commonly known as rock salt. Halite is the source of common salt
- **Xenon** is known as a stranger gas
- **Rayon** is known as a artificial silk
- Reinforced glass is used in bullet proof screens
- When quick lime is added to water heat is liberated
- Nail polish remover contains **Acetone**
- **Zeolite** is suitable for water purification
- Silicon used in the manufacture of high voltage insulators
- Chemical name of Green vitriol is **Iron sulphate**
- **Sodium silicate** is chemical name of quartz
- Camphor can easily be purified by the process of sublimation
- The National Chemical Laboratory is located in **Pune**
- Quick silver is another name of **mercury**
- Natural rubber is heated with sulphur in vulcanization process
- Titanium dioxide is the chemical name for marble



# Railway Exams – General Awareness

- Deep blue colour is imparted to glass by the presence of **Cobalt oxide**
- **Anthracite** is one of the varieties of coal that contains the highest percentage of carbon
- **Henri Becquerel** discovered the radioactivity
- Cooking oil can be converted into vegetable ghee by the process of **Hydrogenation**
- **Silver iodide** is used to produce artificial rain
- Lightest element in the universe is **hydrogen**
- Germanium and silicon are most commonly used in semiconductors
- Silver nitrate is commonly used in voting ink. It was first used in India in 1962 in Mysore
- **Hydrogen** is the lowest density element and **Osmium** the highest density element
- Silver bromide is commonly used in photography
- **Tungsten** has the highest melting and boiling point
- **Radon** is the heaviest gas
- **Hydrogen peroxide** is used to restore the colour of old oil paintings
- Ethylene Glycol is used in car radiators as it increases the freezing temperature
- Age of fossils and archaeological excavation is determined by radioactive carbon (C-14)
- Non-stick utensils are made up of Teflon
- Gelatin is used to prevent the melting of ice
- Ferric chloride is used to stop bleeding because it is a strong coagulant
- Barium is responsible for green colour in fireworks
- Liquid hydrogen is used as a rocket fuel
- Fluorescent tubes contain helium gas and neon gas
- Copper is the first metal used by man
- Titanium is called a strategic metal
- Lithium is the lightest metal. It weighs about half as much as water
- Antacid drugs are used to provide relief from burning sensation in the stomach

# Railway Exams – General Awareness

- Backlites used in electrical insulator, switches, handles of cook wares
- Periodic table

Group 13	Boron family
Group 14	Carbon family
Group 15	Nitrogen family
Group 16	Chalcogen family
Group 17	Halogen family
Group 18	Group 18

- Element common to all acids is Hydrogen
- Balloons are filled with Helium
- Most abundant metal in earth's crust is Aluminium
- Carbon occur in the nature in purest form is Diamond
- Gelatine is used to avoid melting of ice
- Tooth enamel is made up of Calcium Phosphate
- **Calcium Phosphate** acid is used in soft drinks
- In the absence of air and under high temperature and pressure the dead organisms are converted into petroleum and natural gas
- Nuclear fuel in the sun is Helium
- Metal constituent of chlorophyll is Magnesium
- **Carbon dioxide** is responsible for the swelling of bread
- Kerosene is a mixture of **Aliphatic hydrocarbons**
- Most of the explosions in mines occurs due to mixing of **Methane with air**

# Railway Exams – General Awareness

- **Titanium** is known as Metal of Future
- Impurity present in ore is Gangue
- Paper is chemically **Cellulose**
- **Xenon** is also known as Stranger Gas
- **Butane** is used in cigarette lighters
- **Metals** are lustrous because they have free electrons
- Noble gases are **Colourless and Odourless**
- Petroleum is found in **Sedimentary Rocks**
- Lead pencil contains **Graphite**
- Platinum is called white Gold
- **Nickle** is used for the synthesis of Vanaspati Ghee
- Ammonia (NH<sub>3</sub>) is synthesized through Haber's process
- Ozone is allotrope of oxygen
- Cesium used in photoelectric cells which is used to convert sunlight into electricity
- **Calcium hydride** is used to prepare fire proof and water proof clothes
- During the process of rusting the weight of iron **Increases** increased due to the weight of oxygen which has combined with the iron
- Fuse wire is made up of Lead and Tin
- Gases used by sea divers for breathing are **Oxygen and Helium**
- **Ozone** blackens silver's shine
- Egg shell is made up of **Calcium Carbonate**
- Acid rain is caused when the air is polluted by Nitrous Oxide & Sulphur dioxide Gases
- Alum is used as a Water Purifier
- Electro negative elements are non-metal
- Lignite known as the brown coal
- Black lung disease occurs in people working in coal mines

# Railway Exams – General Awareness

- Lead pollutes big cities air. Sources of lead is emissions from motor vehicles and industrial sources
- Crook Glass is used to make sun glass
- Acetylsalicylic Acid commonly known as Aspirin
- Barium Hydroxide is known Baryta water
- Benzoic acid is one of the most common preservatives used in food processing industry
- Deuterium is Isotope of hydrogen
- Efficiency of the catalyst depends on its molecular state
- Mine explosions are mostly caused by mixing of Air and Methane
- Natural rubber is a polymer derived from Isoprene
- Iron Pyrite is known as Fools Gold
- Ozone is diamagnetic in nature
- Oxides of metals are alkaline
- Paraffin wax is Saturated hydrocarbon
- Mercury Vapour & Argon is filled inside a Tube light
- Vinegar is an aqueous solution of Acetic acid
- Bee Sting contains a Methanoic Acid
- A Photoelectric cell contains selenium metal
- Zinc Phosphide is used a Rat Poison
- Hydrogen was the first element to be produced after Big Bang
- The nature of saliva is acidic.
- Steel contains 0.1–2 percent carbon
- Commonly used medicine for typhoid is **chloromycetin**.
- The chemical that is used in making artificial rain is **silver nitrate**.
- Aqua regia is a mixture of HCl and  $\text{HNO}_3$
- Hematite is ore of iron
- Acid is used to write on glass- Hydrochloric acid

# Railway Exams – General Awareness

- Calcium and magnesium ion cause hardness of water.
- Pencil “lead” is made up of – Graphite
- The hardest substance available on earth is Diamond
- Lavoisier was the first person to classify elements into metals and non-metal.
- Copper and its alloys are natural antimicrobial material
- Dead organisms are transformed into petroleum and natural gas in **absence of air**
- Alum is commonly used in water purification
- Ozone is Allotrope of Oxygen
- Deuterium is Isotope of Hydrogen
- Biogas chiefly contains Methane
- **Carbon dioxide** is responsible for the swelling of bread
- Chemical name of Picric Acid is Tri Nitro Phenol
- Egg shell is made up of Calcium Carbonate ( $\text{CaCO}_3$ )
- Uses of isotopes

Iron 59	Anemia
Iodine 131	Goitre
Cobalt 60	Cancer
Carbon11	Brain scan

## General Science - Biology

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## INVENTIONS AND DISCOVERIES

Invention	Scientist
Bacteria	Leeuwenhoek
Blood group	Karl Landsteiner
Circulation of blood	William Harvey
Evolution	Charles Darwin
Insulin	Sir Frederick Grant Banting
Laws of heredity	Gregormendel
Penicillin	Alexander fleming
Rabies vaccine	Louis Pasteur
Stethoscope	René Laennec
Structure of DNA	James Watson & Francis Crick

# Railway Exams – General Awareness

Vaccine	Edward Jenner
Vitamins	Casimir Funk and Hopkins
Cell	Robert Hooke
Cell nucleus	Robert Brown
Polio vaccine	Jonas edward Salk
Smallpox vaccine	Edward Jenner
Plague vaccine	Waldemar Mordecai Haffkine
Homeopathy and allopathy	Samuel Hahnemann

## FOOD AND ITS COMPONENTS

- **Food** is the basic necessity of life. Food is defined as any substance of either plant or animal origin consumed to provide nutritional support for an organism.
- It contains essential nutrients that provide energy, helps in normal growth and development, repair the worn out tissues and protect the body from diseases
- The main sources of our food are **plants and animals**
- **Animals** which eat **only plants** are called **herbivores**
- **Animals** which eat **only animals** are called **carnivores**
- Animals which eat **both plants as well as other animals** are called **Omnivores**
- **Bees** collect nectar (sweet juices) from flowers convert it into honey and store it in their hive
- The major nutrients in our food are carbohydrates, proteins, fats, vitamins and minerals. In addition food also contains **dietary fibres and water**.
- **Carbohydrates and fats** mainly provide energy to our body
- Foods containing fats and carbohydrates are also called '**energy giving foods**'.
- Proteins and minerals are needed for the growth and the maintenance of our body
- Our body needs **dietary fibres and water**. **Dietary fibres** are also known as **roughage**. Roughage is mainly provided by plant products in our foods. Whole grains and pulses, potatoes, fresh fruits and vegetables are main sources of roughage. Roughage does not provide any nutrient to our body, but is an essential component of our food

## CARBOHYDRATES

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- Carbohydrates are organic compounds composed of carbon, hydrogen and oxygen. Carbohydrate is an essential nutrient which provides the chief source of energy to the body.
- Glucose, sucrose, lactose, starch, cellulose are examples for carbohydrates.
- Sources of **carbohydrates** are
  - Sweet potato
  - Wheat
  - Rice
  - Potato
  - Sugarcane
  - Papaya
  - Melon
  - Mango
  - Maize

## FATS

- Fat in the diet provides energy. They maintain cell structures and are involved in metabolic functions.
- Essential fatty acids cannot be synthesized in the body and are provided through diet. Essential fatty acids required in human nutrition are omega fatty acids.
- Sources of **fats** are
  - Groundnuts
  - Nuts
  - Eggs
  - Fish
  - Meat

## PROTEINS

- Proteins are the essential nutrients and also the building blocks of the body. Foods proteins are often called ‘body building foods’
- Proteins are made of amino acids.
- Proteins are needed for the growth and repair of our body.
- Sources of **proteins** are
  - Beans
  - Gram
  - Moong
  - Peas



- Soyabeans
- Paneer
- Eggs
- Meat

## VITAMINS

- Vitamins help in protecting our body against diseases. Vitamins also help in keeping our eyes, bones, teeth and gums healthy
- Vitamins are generally categorized into **water soluble vitamins** and **fat soluble vitamins**
- Water Soluble Vitamins: **Vitamins C and B-Complex**
- Fat Soluble Vitamins: **Vitamin A, D, E and K**
- Vitamins help in protecting our body against diseases
- Some sources of **Vitamin A** are
  - Papaya
  - Carrot
  - Mango
  - Milk
  - Fish liver oil
- Some sources of **Vitamin B** are
  - Liver
  - Wheat
  - Rice
- Some sources of **Vitamin C** are
  - Orange
  - Tomato
  - Guava
  - Green Chilli
  - Lemon
  - Amla
  - kiwi
- Some sources of **Vitamin D** are
  - Fish
  - Liver
  - Egg

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- Mushrooms
- **Vitamin K** is found in Green leafy vegetables
- **Vitamin D** presence in sunlight
- **Vitamin C** gets easily **destroyed** by **heat** during **cooking**
- The vitamin which is generally excreted by **humans in urine** is **Vitamin C**
- Liver damage is caused due to the overdose of **Vitamin B3**
- Vitamin B6, B9 and B12 are essential for brain health and are also called as brain vitamins
- First **artificially synthesized** Vitamin is **Vitamin C**
- Vitamin helps **immunity of body** is **Vitamin C**
- **Vitamin B12** contain **cobalt**

## VITAMIN AND CHEMICAL NAME

Vitamin	Chemical name
Vitamin A	Retinol
Vitamin B1	Thiamine
Vitamin B2	Riboflavine
Vitamin B5	Pantothenic Acid
Vitamin B6	Pyridoxine
Vitamin B3	Niacin or Nicotinic Acid
Vitamin B7	Biotin
Vitamin B9	Folic Acid
Vitamin B12	Cobalamin
Vitamin C	Ascorbic Acid
Vitamin D	Calciferol
Vitamin E	Tocopherol
Vitamin K	Phylloquinone

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## DISEASES /DISORDERS CAUSED BY DEFICIENCY OF VITAMINS AND MINERALS

- Deficiency of one or more nutrients in our food for a long time may cause certain diseases or disorders

Vitamins	Diseases/Disorders
Vitamin A	Night-blindness
Vitamin C	Scurvy
Vitamin D	Rickets, Osteomalacia
Vitamin E	Heart problems, Hemolysis and sterility, Reproductive Failure, Red Blood Cell Destruction, Peripheral Neuropathy
Vitamin K	Non clotting of blood, haemorrhage
Vitamin B1	Beriberi
Vitamin B2	Ariboflavinosis
Vitamin B3	Pellagra
Vitamin B5	Paresthesia, Acne
Vitamin B6	Pink eye, Epilepsy, Depression and confusion, microcytic anemia
Vitamin B7	Growth & Neurological Disorders in Infants, hallucination,dermatitis
Vitamin B9	Macrocytic Anaemia, Deficiency during pregnancy is associated with birth defects
Vitamin B12	MacrocyticAnaemia, Memory Loss, Pernicious Anaemia
Calcium	Bone and tooth decay
Iodine	Goiter
Iron	Anaemia
Potassium	High Blood Pressure, Respiratory Depression, Paralysis,

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	Arrhythmia
Protein	Kwashiorkor
Protein and Energy	Marasmus

## CONSERVATION OF PLANTS AND ANIMALS

- Deforestation means clearing of forests and using that land for other purposes
- Deforestation increases the temperature and pollution level on the earth. It increases the level of carbon dioxide in the atmosphere. Ground water level also gets lowered
- Wildlife sanctuary, national park and biosphere reserve are names given to the areas meant for conservation and preservation of forest and wild animals
- Satpura National Park is the first Reserve Forest of India. The finest Indian teak is found in this forest
- Biodiversity refers to the variety of living organisms in a specific area.
- Plants and animals of a particular area are known as the flora and fauna of that area.
- **Endemic species** are those species of **plants and animals** which are **found** exclusively in a **particular area**. They are not naturally found anywhere else. A particular type of animal or plant may be endemic to a zone, a state or a country
- Migration is the phenomenon of movement of a species from its own habitat to some other habitat for a particular time period every year for a specific purpose like breeding
- Reforestation is the restocking of destroyed forests by planting new trees
- An **ecosystem** is made of all the plants, animals and microorganisms in an area along with non-living components such as climate, soil, river deltas etc.
- **Project Tiger** was launched by the government to protect the tigers in the country. **Launched in 1973**
- **Project Elephant** was launched in 1992 by the Ministry of Environment and Forests, Government of India
- **Chipko Movement** is primarily a forest conservation movement. The word ‘Chipko’ means ‘to stick’ or ‘to hug’. Sunderlal Bahuguna was the founder of this movement. It was started in 1970s with the aim of protecting and conserving trees and preserving forest from being destroyed.

## ENDANGERED SPECIES

- **Endangered species** are those which are facing the **danger of extinction**.
- It is reported that nearly 132 species of plants and animals are critically endangered in India. Snow leopard, Bengal tiger, Asiatic lion, Purple frog and Indian giant squirrel are some of the endangered animals in India.

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- **Red Data Book** contains a record of **endangered species**. Red Data Book is maintained internationally by International Union for Conservation of Nature. India also maintains Red Data Book for plants and animals found in India

## WILDLIFE SANCTUARY

- Areas where animals are protected from any disturbance to them and their habitat
- Wildlife Sanctuaries provide protection and suitable living conditions to wild animals.
- People living in wildlife sanctuaries are allowed to do certain activities such as grazing by their livestock, collecting medicinal plants, firewood, etc.
- Controlled interference like tourist activity is also allowed.

## NATIONAL PARK

- Areas reserved for wild life where they can freely use the habitats and natural resources
- Human activities such as grazing, poaching, hunting, capturing of animals, collection of firewood, medicinal plants, etc. are not allowed

## BIOSPHERE RESERVE

- Large areas of protected land for conservation of wild life, plant and animal resources and traditional life of the tribals living in the area
- The biosphere reserves help to maintain the biodiversity and culture of that area.

## **THE FUNDAMENTAL UNIT OF LIFE**

- All organisms are made of smaller parts called organs. Organs are made of still smaller parts. The smallest living part of an organism is a cell
- **Cells were first** observed in **cork** by **Robert Hooke** in 1665.
- Cells **without well organised nucleus**, i.e. lacking nuclear membrane, are called **prokaryotic cells**. Examples are bacteria and blue green algae
- The cells which **have definite nucleus** with a nuclear membrane are designated as **eukaryote**. All organisms other than bacteria and blue green algae are called **eukaryotes**
- The smallest cell is 0.1 to 0.5 micrometre in **bacteria**. The largest cell measuring 170 mm × 130 mm is the egg of an **ostrich**
- The number of cells present in different organisms may vary. Organisms may be either unicellular (single cell) or multicellular. Organisms such as Bacteria, Amoeba, Chlamydomonas, and Yeast are unicellular. On

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the other hand, organisms such as Spirogyra, Mango, and Human beings are multicellular. (i.e) made up of a few hundreds to millions of cells

- Plant cells have two unique components such as cell wall and chloroplasts compared to animal cells.
- The cell has three main parts: (i) the cell membrane, (ii) cytoplasm which contains smaller components called organelles, and (iii) the nucleus.

## CELL MEMBRANES

- This is the outermost covering of the cell that separates the contents of the cell from its external environment. The plasma membrane allows or permits the entry and exit of some materials in and out of the cell
- Compounds called proteins and phospholipids make up most of the cell membrane
- The proteins are found around the holes and help move molecules in and out of the wall

## CELL WALL

- Plant cells in addition to the plasma membrane have another rigid outer covering called the cell wall. The cell wall lies outside the plasma membrane
- The plant cell wall is mainly composed of cellulose. Cellulose is a complex substance and provides structural strength to plants
- Cell wall **absent** in **animal cell**

## NUCLEUS

- The cell nucleus acts like the brain of the cell. It help control the eating ,movement and reproduction
- Nucleus is separated from the cytoplasm by a membrane called the **nuclear membrane**
- The nucleus contains chromosomes which are visible as rod-shaped structures only when the cell is about to divide
- **Chromosomes** are composed of **DNA and protein**
- Chromosomes contain information for inheritance of characters from parents to next generation in the form of DNA (Deoxyribonucleic Acid) molecules
- Functional segments of DNA are called genes
- Gene is a unit of inheritance in living organisms
- **Chromosomes** are usually found in **pairs**
- Human beings probably have **46 chromosomes(23 pair)**
- Peas have 12, a dog has 78 chromosomes

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- The nucleus plays a central role in cellular reproduction the process by which a single cell divides and forms two new cells
- Organisms, whose cells lack a nuclear membrane, are called prokaryotic. Organisms with cells having a nuclear membrane are called eukaryote

## CYTOPLASM

- It is the jelly-like substance present between the cell membrane and the nucleus
- Various other components or organelles of cells are present in the cytoplasm
- The cytoplasm is the fluid content inside the plasma membrane. It also contains many specialised cell organelles. Each of these organelles performs a specific function for the cell
- Important examples of cell organelles are endoplasmic reticulum, Golgi apparatus, lysosomes, mitochondria and plastids. They are important because they carry out some very crucial functions in cells.

## ENDOPLASMIC RETICULUM

- It is a network of tulsular membranes connected at one end to the nucleus and on the other to the plasma membranes
- The ER membrane is similar in structure to the plasma membrane. There are two types of ER– rough endoplasmic reticulum (RER) and smooth endoplasmic reticulum (SER)
- The **ribosomes** which are present in all active cells are the sites of **protein manufacture**
- The **manufactured proteins** are then sent to various places in the cell depending on need, using the **endoplasmic reticulum**

## GOLGI APPARATUS

- The material synthesized near the ER is packaged and dispatched to various targets inside and outside the cell through the Golgi apparatus. Its functions include the storage, modification and packaging of products in vesicles
- The **Golgi apparatus** is also involved in the **formation of lysosomes**

## LYSOSOMES

- **Lysosomes** are a kind of waste **disposal system** of the cell. These help to keep the cell clean by digesting any foreign material as well as worn-out cell organelles.
- Foreign materials entering the cell such as bacteria or food as well as old organelles end up in the lysosomes which break complex substances into simpler substances.

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- When the cell gets damaged lysosomes may burst and the enzymes digest their own cell. Therefore lysosomes are also known as the ‘**suicide bags**’ of a cell.

## MITOCHONDRIA

- **Mitochondria** are known as the **powerhouses** of the cell
- Mitochondria have two membrane coverings. The outer membrane is porous while the inner membrane is deeply folded. These folds increase surface area for ATP generating chemical reactions
- The energy required for various chemical activities needed for life is released by mitochondria in the form of **ATP (Adenosine triphosphate)** molecules. ATP is known as the energy currency of the cell. The body uses energy stored in ATP for making new chemical compounds and for mechanical work.
- Mitochondria are absent in bacteria and the red blood cells of mammals and higher animal
- Mitochondria are strange organelles in the sense that they have their **own DNA and ribosomes**. Therefore, mitochondria are able to **make some of their own proteins**.

## PLASTIDS

- Plastids are **present only in plant cells**
- There are two types of plastids – **chromoplasts (coloured plastids)** and **leucoplasts (white or colourless plastids)**
- Chromoplasts containing the pigment chlorophyll are known as chloroplasts.
- Chloroplasts are important for photosynthesis in plants. Chloroplasts also contain various yellow or orange pigments in addition to chlorophyll
- Chromoplast impart colour to flowers and fruits
- Leucoplasts are primarily organelles in which materials such as starch, oils and protein granules are stored
- The primary function of **leucoplasts** is **storage**
- The internal organisation of the Chloroplast consists of numerous membrane layers embedded in a material called the stroma. These are similar to mitochondria in external structure
- Like the mitochondria, plastids also have their own DNA and ribosomes.

## VACUOLES

- Vacuoles are storage sacs for solid or liquid contents
- Vacuoles are small sized in animal cells while plant cells have very large vacuoles
- Most mature plant cells have a large central vacuole that helps to maintain the turgidity of the cell and stores important substances including wastes



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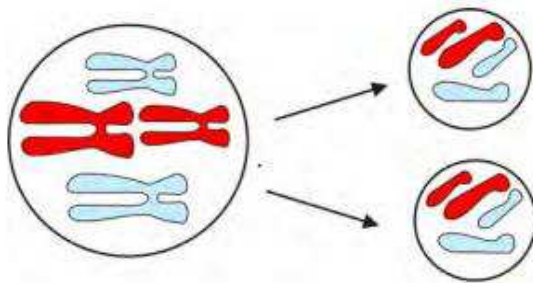
- In plant cells vacuoles are full of cell sap and provide turgidity and rigidity to the cell. Many substances of importance in the life of the plant cell are stored in vacuoles. These include amino acids, sugars, various organic acids and some proteins. In single-celled organisms like Amoeba, the food vacuole contains the food items that the Amoeba has consumed. In some unicellular organisms, specialised vacuoles also play important roles in expelling excess water and some wastes from the cell.

## CELL DIVISION

- New cells are formed in organisms in order to grow, to replace old, dead and injured cells, and to form gametes required for reproduction. The process by which new cells are made is called cell division.
- There are two main types of cell division are mitosis and meiosis

## MITOSIS

- The process of cell division by which most of the cells divide for growth is called mitosis. Each cell called mother cell divides to form two identical daughter cells.
- The daughter cells have the same number of chromosomes as mother cell. It helps in growth and repair of tissues in organisms



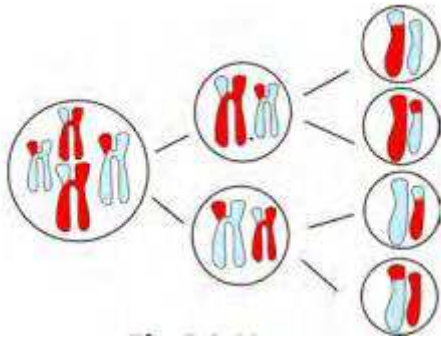
## **SIGNIFICANCE OF MITOSIS**

- This equational division results in the production of diploid daughter cells ( $2n$ ) with equal distribution of genetic material (DNA).
- In multicellular organisms growth, organ development and increase in body size are accomplished through the process of mitosis.
- Mitosis helps in repair of damaged and wounded tissues by renewal of the lost cells

## MEIOSIS

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- Cell divides by meiosis it produces four new cells instead of just two. The new cells only have half the number of chromosomes than that of the mother cells



## SIGNIFICANCE OF MEIOSIS

- The constant number of chromosomes in a given species is maintained by meiotic division.
- Genetic variation is produced due to crossing over within the species which is transmitted from one generation to next generation.

## TISSUE

- A group of cells that are similar in structure and/or work together to achieve a particular function forms a tissue.
- The study of tissue is known as histology

## PLANT TISSUE

- Plants are composed of three major organ groups roots, stems and leaves. These are comprised of tissue working together for a common function
- Plant tissues are of two main types – **meristematic** and **permanent**
- **Meristematic tissue** is the dividing tissue present in the growing regions of the plant
- **Permanent tissues** are derived from **meristematic tissue** once they lose the ability to divide. They are **classified as simple and complex tissues**
- Parenchyma, collenchyma and sclerenchyma are three types of simple tissues.
- Xylem and phloem are types of complex tissues

## MERISTEMATIC TISSUE

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- The growth of plants occurs only in certain specific regions. This is because the dividing tissue, also known as meristematic tissue.
- Meristems are actively dividing tissues of the plant, that are responsible for primary (elongation) and secondary (thickness) growth of the plant.
- Depending on the region where they are present, meristematic tissues are classified as apical, lateral and intercalary.

## **Apical meristem**

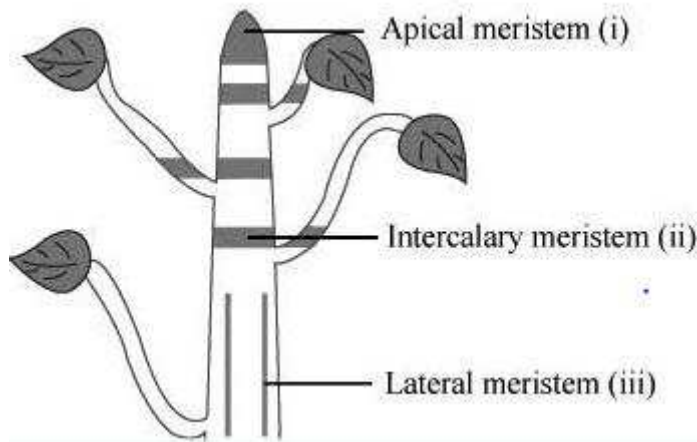
- Apical meristem is present at the growing tips of stems and roots and increases the length of the stem and the root. This is also called primary growth

## **Intercalary meristem**

- It is located in between permanent tissues
- Intercalary meristem seen in some plants is located near the node

## **Lateral meristem**

- This consists of cells which mainly divide in one place and cause the organ to increase in diameter and growth. It occurs beneath the bark of the tree in the form of cork cambium and in form of vascular cambium



## **PERMANENT TISSUE**

- Plant tissue are characterized and classified according to their structure and function.
- These tissues can be simple consisting of single cell type. They can also be complex consisting of more than one cell type

## **SIMPLE PERMANENT TISSUES**

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- Simple tissues are homogeneous tissues composed of structurally and functionally similar cells.
- Simple permanent tissue types are
  1. Parenchyma
  2. Collenchyma
  3. Sclerenchyma

## PARENCHYMA

- Parenchyma are simple permanent tissues composed of living cells.
- It occurs in all soft parts of plants like cortex of roots and is meant for storage of food and provides turgidity to softer parts of plants
- The parenchyma stores food
- In potato, parenchyma vacuoles are filled with starch. In apple, parenchyma stores sugar
- Certain parenchymatous tissues contain chloroplast and perform photosynthesis, and then it is called chlorenchyma
- In aquatic plants, large air cavities are present in parenchyma to help them float. Such a parenchyma type is called aerenchyma
- The outermost protective layer of plants is made up of specially modified parenchyma. These cells are without intercellular spaces

## COLLENCHYMA

- Collenchyma is a living tissue found beneath the epidermis.
- Collenchyma allows bending of various parts of a plant like tendrils and stems of climbers without breaking. It also provides mechanical support.
- It occurs in hypodermis of stem and petiole and around veins
- Generally it is absent in root, leaves and monocot stems

## SCLERENCHYMA

- Sclerenchyma consists of thick walled cells which are often lignified. Sclerenchyma cells are dead and do not possess living protoplasts at maturity. Sclerenchyma cells are grouped into fibres and sclereids
- Sclerenchyma is the tissue which makes the plant hard and stiff. We have seen the husk of a coconut. It is made of sclerenchymatous tissue. The cells of this tissue are dead

## COMPLEX PERMANENT TISSUE

- Complex tissues are made of more than one type of cells. All these cells coordinate to perform a common function.

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- Xylem and phloem are examples of such complex tissues.

## XYLEM

- Xylem performs the function of conduct of water and minerals upwards from the roots to the stem and leaves
- Xylem consists of tracheids, vessels, xylem parenchyma and xylem fibres
- Tracheids and vessels have thick walls, and many are dead cells when mature. Tracheids and vessels are tubular structures. This allows them to transport water and minerals vertically.
- **Xylem fibres:** These cells are elongated, lignified and pointed at both the ends. Xylem fibres provide mechanical support to the plant
- **Xylem parenchyma:** These are living and thin walled cells. The main function of xylem parenchyma is to store starch and fatty substances.

## PHLOEM

- Phloem transports food from leaves to other parts of the plant.
- Phloem is made up of five types of cells: sieve cells, sieve tubes, companion cells, phloem fibres and the phloem parenchyma
- Except phloem fibres, other phloem cells are living cells
- **Phloem parenchyma:** The phloem parenchyma are living cells which have cytoplasm and nucleus. Their function is to store food materials.

## ANIMAL TISSUES

- The structure of animal tissue is directly related to its function. Tissue is groups of cells with a basic structure and function
- Blood and muscles are both examples of tissues found in our body.
- On the basis of the functions they perform we can think of different types of animal tissues, such as epithelial tissue, connective tissue, muscular tissue and nervous tissue.
- Blood is a type of connective tissue, and muscle forms muscular tissue.

## EPITHELIAL TISSUE

- The covering or protective tissues in the animal body are epithelial tissues. Epithelium covers most organs and cavities within the body. . It also forms a barrier to keep different body systems separate.
- Epithelial tissue cells are tightly packed and form a continuous sheet.

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- Anything entering or leaving the body must cross at least one layer of epithelium. As a result, the permeability of the cells of various epithelia plays an important role in regulating the exchange of materials between the body and the external environment and also between different parts of the body.
- Depending on shape and function, epithelial tissue is classified as squamous, cuboidal, columnar, ciliated and glandular

## CONNECTIVE TISSUE

- It is one of the most abundant and widely distributed tissue. It provides structural frame work and gives support to different tissues forming organs. It prevents the organs from getting displaced by body movements.
- **Blood** is a type of **connective tissue**.
- Blood has a fluid (liquid) matrix called plasma in which red blood corpuscles (RBCs) white blood corpuscles (WBCs) and platelets are suspended. The plasma contains proteins, salts and hormones
- Blood flows and transports gases, digested food, hormones and waste materials to different parts of the body.
- Lymph is a colourless fluid filtered out of the blood capillaries. It consists of plasma and white blood cells. It mainly helps in the exchange of materials between blood and tissue fluids
- **Bone** is another example of a **connective tissue**
- It is a strong and nonflexible tissue
- Bone cells are embedded in a hard matrix that is composed of calcium and phosphorus compounds
- Areolar connective tissue is found between the skin and muscles, around blood vessels and nerves and in the bone marrow. It fills the space inside the organs, supports internal organs and helps in repair of tissues
- Two bones can be connected to each other by another type of connective tissue called the **ligament**. This tissue is very elastic. It has considerable strength.
- **Tendons** connect muscles to bones and are another type of connective tissue. Tendons are fibrous tissue with great strength but limited flexibility
- Another type of **connective tissue cartilage**, has widely spaced cells. Cartilage smoothens bone surfaces at joints and is also present in the nose, ear, trachea and larynx. We can fold the cartilage of the ears
- **Adipose tissue:** Its occurrence is below is below skin, between internal organs and in the yellow bone marrow. Its main function is to storage of fat and to conserve heat.

## MUSCULAR TISSUE

- Striated, unstriated and cardiac are three types of muscle tissues

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- Muscular tissue consists of elongated cells, also called muscle fibres. This tissue is responsible for movement in our body
- **Skeletal muscle:** These muscles are attached to the bones and are responsible for the body movements and are called skeletal muscles.
- Muscles present in our limbs move when we want them to, and stop when we so decide. Such muscles are called voluntary muscles. These muscles are also called skeletal muscles as they are mostly attached to bones and help in body movement
- **Smooth muscle:** These muscles are spindle shaped with broad middle part and tapering ends. There is a single centrally located nucleus. These fibrils do not bear any stripes or striations and hence are called non-striated. They are not under the control of our will and so are called involuntary muscles.
- The movement of food in the alimentary canal or the contraction and relaxation of blood vessels are involuntary movements. Smooth muscles or involuntary muscles control such Movements. They are also found in the iris of the eye in ureters and in the bronchi of the lungs
- **Cardiac muscle:** It occurs only in the heart. The contraction and relaxation of the heart muscles help to pump the blood and distribute it to the various parts of the body

## NERVOUS TISSUE

- Nervous tissue is made of neurons that receive and conduct impulses.
- The signal that passes along the nerve fibre is called a nerve impulse. Nerve impulses allow us to move our muscles when we want to. The functional combination of nerve and muscle tissue is fundamental to most animals. This combination enables animals to move rapidly in response to stimuli
- The brain, spinal cord and nerves are all composed of the nervous tissue. The cells of this tissue are called nerve cells or neurons. A neuron consists of a cell body with a nucleus and cytoplasm

## **BLOOD**

- **Blood pH** value is **7.4**.so it is considered a **base in nature**
- Blood is fluid **connective tissue**
- Quantity of blood in the human body is **7%** of the total weight
- There is an average of **5-6 litres** of blood in human body.
- Blood also fights against infection and regulates temperature
- Blood consists of two parts .They are **plasma and blood corpuscles**
- The human groups was discovered by **Karl Landsteine**
- O- is called as the Universal Donor

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- AB+ is called as the Universal Receiver
- Blood group A has antigen A and no antibody
- Blood group B has antigen B and no antibody
- Blood group AB has both antigen A and antigen B
- Blood group O has both A and B antibody
- **Heparin** is an anticoagulant that prevents the formation of **blood clots**
- Blood flows and carries various substances from one part of the body to the other. For example, it carries oxygen and food to all cells. It also collects wastes from all parts of the body and carries them to the liver and kidney for disposal

## PLASMA

- Plasma is a liquid part of blood. It constitutes 60 percent part of the blood
- Plasma carries water, salts and enzymes
- Its main function is transport of nutrients, hormones, and proteins to the parts of the body that need it
- Fibrinogen and protein is extracted out of plasma the remaining plasma is called serum

## BLOOD CORPUSCLES

- It constitutes 40 percent part of the blood
- Three parts of blood corpuscles are
  1. Red blood cell or erythrocyte
  2. White blood cell or Leucocytes
  3. Platelets or Thrombocytes

## RED BLOOD CELL OR ERYTHROCYTES

- It is formed in bone marrow
- Nucleus absent in RBC
- RBC destruction takes place in spleen so it called Graveyard of RBC
- Life span of RBC is 20 to 120 days
- It contains hemoglobin. Due to presence of hemoglobin the colour of blood is red
- The iron compound of haematin is found in hemoglobin
- Function of RBC is to carry oxygen to all cells of the body and bring back the carbon dioxide
- Anemia disease is caused due to the deficiency of hemoglobin



## WHITE BLOOD CELL OR LEUCOCYTES

- Nucleus present in WBC
- It is formed in bone marrow, Lymph node and sometimes in liver and spleen
- Life span of WBC is 2 to 3 days
- The ratio of WBC and RBC is 1:600
- White cells are the primary defense against infection. WBC is essential for good health
- Leukemia causes due to increasing WBC
- Leukopenia causes due to decreases WBC

## PLATELETS OR THROMBOCYTES

- Platelets found only in blood of human and other mammals
- It is formed in bone marrow
- Nucleus absent in platelets
- Role of platelets is to help in clotting of blood
- There are about 2,50,000 – 4,00,000 platelets / cubic mm of blood.
- Life span of platelets is 8–10 days
- Thrombocytopenia: Decrease in the number of thrombocytes

## BLOOD VESSELS

- Blood vessels are a network of branched tubes that transport blood. There are three types of blood vessels namely arteries, veins and capillaries

### Arteries

- They are thick and elastic vessels that carry blood away from the heart to various organs of the body. All arteries carry oxygenated blood except the **pulmonary artery** which carry **deoxygenated blood** from the heart (right ventricle) to the lungs.

### Veins

- Veins are thin and non-elastic vessels that transport blood to the heart from the different organs. All veins carry deoxygenated blood except the pulmonary vein which carry oxygenated blood from the lungs to the heart.

### Capillaries

- Capillaries are narrow tubes formed by branching of arterioles which then unite to form the venules and veins. They are about 8  $\mu\text{m}$  in diameter. Capillaries are formed of single layer of endothelial cells.

## FUNCTIONS OF BLOOD

- Transport of respiratory gases (Oxygen and CO<sub>2</sub>).

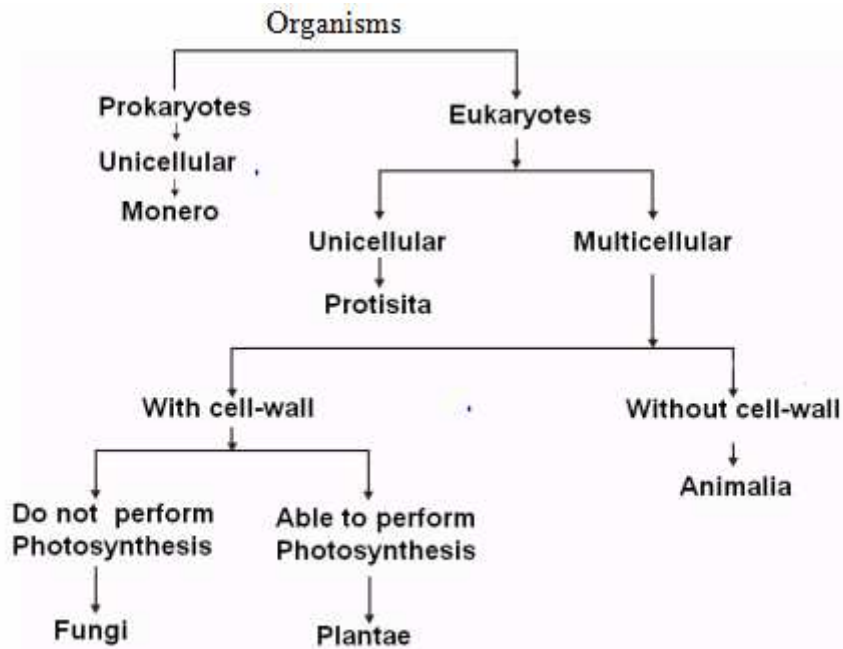
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- Transport of digested food materials to the different body cells.
- Transport of hormones.
- Transport of nitrogenous excretory products like ammonia, urea and uric acid.
- It is involved in protection of the body and defense against diseases.
- It acts as buffer and also helps in regulation of pH and body temperature.
- It maintains proper water balance in the body

## DIVERSITY IN LIVING ORGANISMS

- Classification helps us in exploring the diversity of life forms.
- The major characteristics considered for classifying all organisms into five major kingdoms are:
  1. Whether they are made of prokaryotic or eukaryotic cells
  2. Whether the cells are living singly or organised into multi-cellular and thus complex organisms
  3. Whether the cells have a cell-wall and whether they prepare their own food.
- All living organisms are divided on the above bases into five kingdoms, namely Monera, Protista, Fungi, Plantae and Animalia.
- The classification of life forms is related to their evolution.
- Plantae and Animalia are further divided into subdivisions on the basis of increasing complexity of body organisation.
- The binomial nomenclature makes for a uniform way of identification of the vast diversity of life around us.
- The binomial nomenclature is made up of two words – a generic name and a specific name
- The system of scientific naming or nomenclature we use today was introduced by **Carolus Linnaeus**
- **Carolus Linnaeus** called as father of taxonomy

# Railway Exams – General Awareness



The five kingdom classification

## MONERA

- Prokaryotic (organisms do not have a defined nucleus), Unicellular.
- These organisms do not have a defined nucleus or organelles, nor do any of them show multi cellular body designs.
- The mode of nutrition of organisms in this group can be either by synthesising their own food (autotrophic) or getting it from the environment (heterotrophic).
- Some of them have cell walls while some do not
- This group includes bacteria (heterotrophic), blue-green algae or cyanobacteria (autotrophic), and mycoplasma

## PROTISTA

- This group includes unicellular eukaryotic organisms
- Their mode of nutrition can be autotrophic or heterotrophic
- Examples are unicellular algae, diatoms and protozoans (Paramecium, Amoeba, Euglena)

## FUNGI

- These are heterotrophic eukaryotic organisms

# Railway Exams – General Awareness

- Mostly multicellular but sometimes unicellular
- They have cell walls made of a tough complex sugar called chitin
- Source of food is
  - **Saprophytes** these organisms use decaying material for food
  - They are called **parasites**-organisms live inside body of other living organism to have food and can be disease causing
- Examples are yeasts, molds and mushrooms.

## PLANTAE

- These are multicellular eukaryotes with cell walls
- They are autotrophs and use chlorophyll for photosynthesis
- They have cell wall
- Classification among plants depends on whether the plant body has well differentiated, distinct parts. Body is differentiated into leaves, stems, roots, flower, etc.
- There are two types of vascular tissues present in the plants: Xylem helps the transport of water. Phloem helps the transport of food.
- Reproduction through seeds or spores:
  - Phanerogamae: Plants with seeds are called phanerogamae .Contains embryo with stored food and they are multicellular.
  - Cryptogamae: Plants with spores are called cryptogamae .Contains only naked embryo and they are generally unicellular.Those with hidden reproductive organs
- Plants are divided into five groups: Thallophytes, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms

## THALLOPHYTA

- Plants that do not have well-differentiated body design fall in this group
- The plants in this group are commonly called algae
- No vascular tissue present and reproduce through spores
- These plants are predominantly aquatic
- Examples are Spirogyra, Ulothrix, Cladophora, Ulva and Char

## BRYOPHYTA

- These are called the amphibians of the plant kingdom
- The plant body is commonly differentiated to form stem and leaf-like structures.

# Railway Exams – General Awareness

- There is no specialized tissue for the conduction of water and other substances from one part of the plant body to another
- Examples are moss (Funaria) and Marchantia

## PTERIDOPHYTA

- The plant body is differentiated into roots, stem and leaves
- Vascular tissues present.

## GYMNOSPERMS

- The plants of this group bear naked seeds without fruits or flowers
- Usually perennial, evergreen and woody
- Examples are pines and deodar

## ANGIOSPERMS

- These are also called flowering plants
- The seeds develop inside an ovary which is modified to become a fruit
- Plant embryos in seeds have structures called cotyledons. Cotyledons are called ‘seed leaves’ because in many instances they emerge and become green when the seed germinates
- The angiosperms are divided into two groups on the basis of the number of cotyledons present in the seed
- Plants with seeds having a single cotyledon are called monocotyledonous or monocots
- Plants with seeds having two cotyledons are called dicots

## ANIMALIA

- These include all organisms which are multicellular eukaryotes without cell walls.
- They are heterotrophs.
- Animals are divided into ten groups: Porifera, Coelenterata, Platyhelminthes, Nematoda, Annelida, Arthropoda, Mollusca, Echinodermata, Protochordata and Vertebrata

## PORIFERA

- The word Porifera means organisms with holes. These are non-motile animals attached to some solid support. There are holes or ‘pores’, all over the body. These lead to a canal system that helps in circulating water throughout the body to bring in food and oxygen
- These animals are covered with a hard outside layer or skeleton. The body design involves very minimal differentiation and division into tissues

# Railway Exams – General Awareness

- Examples: Euplectella, Sycon, Spongilla

## COELENTERATA

- Coelenterates are aquatic organisms, mostly marine and few fresh water forms.
- Hydra, Jellyfish and sea anemones are common examples

## NEMATODA

- The nematode body is also bilaterally symmetrical and triploblastic. However, the body is cylindrical rather than flattened. There are tissues, but no real organs, although a sort of body cavity or a pseudocoelom, is present.
- Some **examples** are Ascaris, Wuchereria

## PLATYHELMINTHES

- The body is bilaterally symmetrical, meaning that the left and the right halves of the body have the same design
- Some examples are free-living animals like planarians, or parasitic animals like liver flukes

## ANNELIDA

- Annelid animals are also bilaterally symmetrical and triploblastic, but in addition they have a true body cavity
- These animals are found in a variety of habitats– fresh water, marine water as well as land.
- Earthworms and leeches are familiar examples

## MOLLUSCA

- In the animals of this group, there is bilateral symmetry.
- They have an open circulatory system and kidney-like organs for excretion. There is a foot that is used for moving around.
- **Examples** are snails and mussels

## ARTHROPODA

- This is probably the largest group of animals.
- These animals are bilaterally symmetrical and segmented. There is an open circulatory system, and so the blood does not flow in well-defined blood vessels. The coelomic cavity is blood-filled. They have jointed legs (the word ‘arthropod’ means ‘jointed legs’).
- Some familiar examples are prawns, butterflies, houseflies, spiders, scorpions and crabs

## PROTOCHORDATA

- These animals are bilaterally symmetrical, triploblastic and have a coelom

# Railway Exams – General Awareness

- Protochordates are marine animals.
- Examples are Balanoglossus, Herdmania and Amphioxus

## VERTEBRATA

- These animals have a true vertebral column and internal skeleton, allowing a completely different distribution of muscle attachment points to be used for movement.
- Vertebrates are bilaterally symmetrical, triploblastic, coelomic and segmented, with complex differentiation of body tissues and organs
- Vertebrates are grouped into six classes.
  1. Cyclostomata
  2. Pisces
  3. Amphibia
  4. Reptilia
  5. Aves
  6. Mammalia

## CYCLOSTOMATA

- Cyclostomes are jawless vertebrates. They are characterised by having an elongated eel-like body, circular mouth, slimy skin and are scaleless
- Petromyzon (Lamprey) and Myxine (Hagfish) are **examples**.

## PISCES

- These are **fish**. They are exclusively aquatic animals. Their skin is covered with scales/ plates. They **obtain oxygen dissolved in water** by using **gills**.
- They are **cold-blooded** and their **hearts** have only **two chambers**, unlike the four that humans have. They lay eggs.

## AMPHIBIA

- These animals differ from the fish in the lack of scales, in having mucus glands in the skin, and a three-chambered heart. **Respiration** is through either **gills or lungs**.
- They lay eggs. These animals are found both in water and on land. Frogs, toads and salamanders are some examples
- Frogs, toads and salamanders are some **examples**

## REPTILIA

- These animals are cold-blooded, have scales and breathe through lungs. While most of them have a **three-chambered heart**, **crocodiles** have **four heart chambers**

# Railway Exams – General Awareness

- They lay eggs with tough coverings and do not need to lay their eggs in water, unlike amphibians. Snakes, turtles, lizards and crocodiles fall in this category

## AVES

- These are warm-blooded animals and have a four-chambered heart. They lay eggs
- They **breathe** through **lungs**. All birds fall in this category

## MAMMALIA

- Mammals are warm-blooded animals with four-chambered hearts. They have mammary glands for the production of milk to nourish their young.
- Their skin has hairs as well as sweat and oil glands.
- Mammalia: Human, Cat, Whale, Rat, Bat

## CLASSIFICATION AND EVOLUTION

- All living things are identified and categorized on the basis of their body design in form and function
- The classification of life forms will be closely related to their evolution
- Charles Darwin first described this idea of evolution in 1859 in his book “The Origin of Species”

## HEREDITY AND EVOLUTION

- Transmission of character from one generation to next generation is called heredity
- The of Genetics was coined by W.Watson
- Gregar mental was the first gave the idea of heredity based on his experiment. He is also known as father of Genetics
- Mental chosen pea plant for his experiment
- Human have 23 pair of chromosomes in which 22 pair are autosomes one pair is sex chromosomes
- In human male sex chromosome is XY and female sex chromosome is XX

## **LIFE PROCESSES**

- Maintenance of life requires processes like nutrition, respiration, transport of Materials within the body and excretion of waste products

## AUTOTROPHIC NUTRITION

- Carbon and energy requirements of the **autotrophic organism** are fulfilled by **photosynthesis**
- Autotrophs take in substances from the outside and convert them into stored forms of energy



# Railway Exams – General Awareness

- The carbohydrates which are not used immediately are stored in the form of starch, which serves as the internal energy reserve to be used as and when required by the plant
- Carbon dioxide and water is converted into carbohydrates in the presence of sunlight and chlorophyll. Carbohydrates are utilized for providing energy to the plant

## NUTRITION IN PLANT

- All organisms need food and utilize it to get energy for growth and maintenance of their body
- **Green plants** synthesize food for themselves by the process of **photosynthesis**. They are **autotrophs**.
- A few plants and all animals are dependent on others for their nutrition and are called heterotrophs
- Heterotrophic organisms include animals and fungi
- Plants use simple chemical substances like carbon dioxide, water and minerals for the synthesis of food.
- **Chlorophyll, water, carbon dioxide and sunlight** are the essential requirements for photosynthesis.
- Complex chemical substances such as carbohydrates are the products of photosynthesis.
- **Solar energy** is absorbed by the **chlorophylls** present in **leaves/plants**.
- **Oxygen** is produced **during photosynthesis**.
- **Oxygen released** in photosynthesis is utilised by living organisms for their survival
- **Many fungi derive nutrition from dead and decaying matter**. They are **saprotrophs**
- Plants like Cuscuta are parasites. They take food from the host plant. Cuscuta does not contain chlorophyll
- **Algae** can prepare their own **food** by **photosynthesis**. They contain **chlorophyll** which gives them the **green colour**
- Green plants are **green** because they contain a **chlorophyll**
- Metal constituent of **chlorophyll** is **Magnesium**

## PHOTOSYNTHESIS

- Photosynthesis is the process by which plants, some bacteria and some protists use the energy from sunlight to produce sugar which cellular respiration converts into ATP, the fuel used by all living things. The conversion of solar energy into usable chemical energy is associated with the actions of the green pigment chlorophyll. The following events occur during this process
- The following events occur during Photosynthesis
  1. Absorption of light energy by chlorophyll.
  2. Conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen
  3. Reduction of carbon dioxide to carbohydrates.

# Railway Exams – General Awareness



- Six molecules of water plus six molecules of carbon dioxide produce one molecule of sugar plus six molecules of oxygen
- Desert plants take up carbon dioxide at night and prepare an intermediate which is acted upon by the energy absorbed by the chlorophyll during the day
- **Leaves are the food factories of plants**
- Carbon dioxide from air is taken in through the tiny pores present on the surface of leaves. These pores are surrounded by guard cells. Such pores are called stomata
- Likewise oxygen produced during photosynthesis can only pass out of the leaf through the opened stomata
- Unfortunately for the plant while these gases are moving between the inside and outside of the leaf a great deal of water is also lost
- **Rate of photosynthesis** takes place **maximum in red and blue light** and **photosynthesis** doesn't take place in green light
- Chlorophyll the green pigment common to all photosynthetic cells absorbs all wavelengths of visible light except green which it reflects to be detected by our eyes
- Water used in photosynthesis is taken up from the soil by the roots in terrestrial plants. Other materials like nitrogen, phosphorus, iron and magnesium are taken up from the soil
- Plant transport systems will move energy stores from leaves and raw materials from roots
- The **xylem** moves **water** and **minerals** obtained from the **soil**
- **Phloem transports** products of photosynthesis from the leaves where they are synthesized to other parts of the plant

## HETEROTROPHIC NUTRITION

- A few plants and all animals are dependent on others for their **nutrition** and are called **heterotrophs**
- The form of nutrition differs depending on the type and availability of food material as well as how it is obtained by the organism
- Some organisms break-down the food material outside the body and then absorb it. Examples are fungi like bread moulds, yeast and mushrooms

# Railway Exams – General Awareness

- Parasites derive nutrition from plants or animals without killing them. This is called parasitic nutritive strategy. This parasitic nutritive strategy is used by a wide variety of organisms like cuscuta (amar-bel), ticks, lice, leeches and tape-worms.
- Animal nutrition includes nutrient requirement, mode of intake of food and its utilisation in the body
- The breakdown of complex components of food into simpler substances is called digestion
- The mode of taking food into the body varies in different organisms. Bees and humming-birds suck the nectar of plants, infants of human and many other animals feed on mother's milk

## NUTRITION IN HUMAN BEINGS

- We take in food through the mouth digest and utilise it.
- The food passes through a continuous canal which begins at the **buccal cavity** and ends at the **anus**
- The canal can be divided into various compartments. These parts together form the alimentary canal (digestive tract):
  1. The buccal cavity.
  2. Foodpipe or oesophagus
  3. Stomach
  4. Small intestine
  5. Large intestine ending in the rectum
  6. The anus
- The inner walls of the stomach and the small intestine, and the various glands associated with the canal such as salivary glands
- The **liver** and the **pancreas** secrete **digestive juices**
- The digestive tract and the associated glands together constitute the digestive system.

## THE MOUTH AND BUCCAL CAVITY

- Food is taken into the body through the mouth. The process of taking food into the body is called ingestion
- Our mouth has the salivary glands which secrete **saliva**. . The **saliva contains an enzyme called salivary amylase** that breaks down **starch which is a complex molecule to give simple sugar**. The food is mixed thoroughly with saliva and moved around the mouth while chewing by the muscular tongue.

## THE FOODPIPE/OESOPHAGUS

- The swallowed food passes into the foodpipe or oesophagus
- Food is pushed down by movement of the wall of the foodpipe

# Railway Exams – General Awareness

## THE STOMACH

- The digestion in stomach is taken care of by the gastric glands present in the wall of the stomach. These release **hydrochloric acid** a protein digesting enzyme called **pepsin** and **mucus**
- The hydrochloric acid creates an acidic medium which facilitates the action of the enzyme pepsin
- The mucus protects the inner lining of the stomach from the action of the acid under normal conditions
- The acid kills many bacteria that enter along with the food and makes the medium in the stomach acidic and helps the digestive juices to act
- The **digestive juices** break down the **proteins** into simpler substances
- The exit of food from the stomach is regulated by a sphincter muscle which releases it in small amounts into the small intestine

## THE SMALL INTESTINE

- The small intestine is highly coiled and is about 7.5 metres long
- The length of the small intestine differs in various animals depending on the food they eat.
- **Herbivores** eating grass need a longer small intestine to allow the cellulose to be digested.
- Meat is easier to digest hence carnivores like tigers have a shorter small intestine.
- **Liver secretes bile juice that is stored in a sac called the gall bladder.** The bile plays an important role in the digestion of fats
- **The pancreas secretes pancreatic juice** which contains enzymes like **trypsin** for digesting proteins and lipase for breaking down emulsified fats
- The walls of the small intestine contain glands which secrete intestinal juice. The enzymes present in it finally convert the proteins to amino acids
- The **villi are richly supplied with blood** vessels which take the absorbed food to each and every cell of the body

## LARGE INTESTINE

- The **large intestine** is wider and shorter than small intestine. It is about **1.5 metre** in length
- Its function is to **absorb water** and some **salts** from the undigested food material
- The rest of the material is removed from the body via the anus. The exit of this waste material is regulated by the anal sphincter

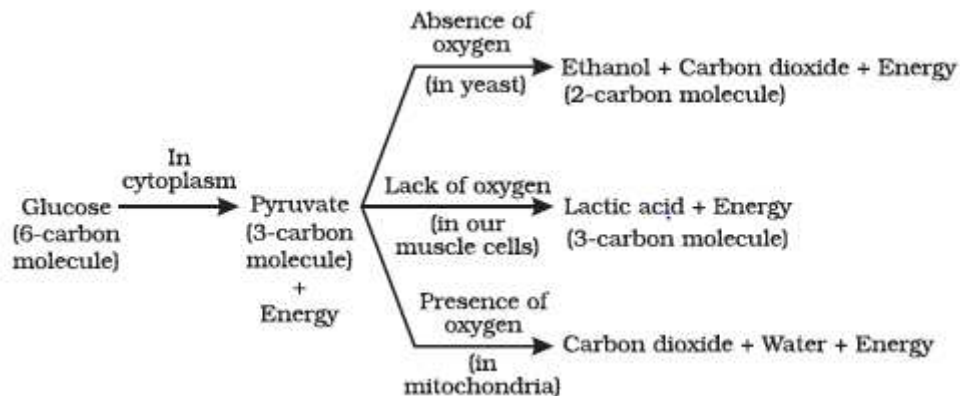
## DIGESTION IN GRASSEATING ANIMALS

# Railway Exams – General Awareness

- The grazing animals like cows, buffaloes and deer are known as **ruminants**. They quickly ingest swallow their leafy food and store it in the rumen. Later the food returns to the mouth and the animal chews it peacefully
- The grass is rich in cellulose type of carbohydrate. In ruminants like cattle, deer, etc., bacteria present in rumen helps in digestion of cellulose
- Amoeba ingests its food with the help of its false feet or pseudopodia. The food is digested in the food vacuole

## RESPIRATION

- Respiration is essential for survival of living organisms. It releases energy from the food
- Each cell of an organism performs certain functions such as nutrition, transport, excretion and reproduction. To perform these functions the cell needs energy
- All living organisms respire to get energy from food.
- In the cell, the food (glucose) is broken down into carbon dioxide and water using oxygen. When breakdown of glucose occurs with the use of oxygen it is called aerobic respiration.
- **Food can be broken down without using oxygen. This is called anaerobic respiration**
- Break down of glucose a six carbon molecule into a three-carbon molecule called pyruvate. This process takes place in the cytoplasm
- Breakdown of pyruvate using oxygen takes place in the mitochondria.



- Organisms such as **yeast** that can survive in the **absence of air**. They are called **anaerobes**. They respire **anaerobically** and during this process yield alcohol. Because they used to make wine and beer
- Our muscle cells can also respire anaerobically but only for a short time when there is a temporary deficiency of oxygen. During heavy exercise, fast running, cycling, walking for many hours or heavy weight lifting, the demand for energy is high

# Railway Exams – General Awareness

- Hot water bath or massage improves circulation of blood. As a result the supply of oxygen to the muscle cells increases.
- The energy released during cellular respiration is immediately used to synthesise a molecule called ATP which is used to fuel all other activities in the cell. In these processes, ATP is broken down giving rise to a fixed amount of energy which can drive the endothermic reactions taking place in the cell.
- Respiration may be aerobic or anaerobic. **Aerobic respiration** makes more energy available to the organism.

## BREATHING

- In human beings air is taken into the body through the nostrils. The air passing through the nostrils is filtered by fine hairs that line the passage.
- Rings of cartilage are present in the throat. These ensure that the air passage does not collapse.
- The taking in of air rich in oxygen into the body is called inhalation and giving out of air rich in carbon dioxide is known as exhalation.
- During inhalation our lungs expand and then come back to the original state as the air moves out during exhalation.
- In earthworm the exchange of gases occurs through the moist skin. In **fishes** it takes place through **gills** and in **insects through the tracheae**.
- In a plant the roots take in air present in the soil. Leaves have tiny pores called stomata through which they exchange gases. The breakdown of glucose in the plant cells is similar to that in other living beings.
- Terrestrial animals can breathe the oxygen in the atmosphere but animals that live in water need to use the oxygen dissolved in water.
- The rate of breathing in aquatic organisms is much faster than that seen in terrestrial organisms.
- In human beings, the respiratory pigment is haemoglobin which has a very high affinity for oxygen. This pigment is present in the red blood corpuscles.

## TRANSPORTATION

### TRANSPORTATION IN HUMAN BEINGS

- Blood is the fluid which flows in blood vessels.
- It transports substances like digested food from the small intestine to the other parts of the body. It carries oxygen from the lungs to the cells of the body. It also transports waste for removal from the body.
- One type of cells are the red blood cells (RBC) which contain a red pigment called haemoglobin. Haemoglobin binds with oxygen and transports it to all the parts of the body and ultimately to all the cells.
- The blood also has white blood cells (WBC) which fight against germs that may enter our body.

# Railway Exams – General Awareness

- The clot is formed because of the presence of another type of cells in the blood called platelets

## HEART

- The heart is an organ which beat continuously to act as a pump for the transport of blood
- The human heart is four chambered
- The two upper chambers are called the atria and the two lower chambers are called the ventricles
- The carbon dioxide rich blood has to reach the lungs for the carbon dioxide to be removed, and the oxygenated blood from the lungs has to be brought back to the heart. This oxygen rich blood is then pumped to the rest of the body
- The separation of the right side and the left side of the heart is useful to keep oxygenated and deoxygenated blood from mixing
- Arteries carry oxygen-rich blood from the heart to all parts of the body. Blood emerges from the heart under high pressure .the arteries have thick, elastic walls
- Veins are the vessels which carry carbon dioxide-rich blood from all parts of the body back to the heart. They do not need thick walls because the blood is no longer under pressure
- The force that blood exerts against the wall of a vessel is called blood pressure.
- The normal systolic pressure is about **120 mm of Hg** and diastolic pressure is **80 mm of Hg**
- Amphibians or many reptiles have **three-chambered hearts**
- Fishes have only two chambers to their hearts
- The human heart has **four chambers**. Two atria and two ventricles
- **Pulmonary veins** transport oxygenated blood to the heart from the lungs.
- **Pulmonary arteries** move deoxygenated blood from the heart to the lungs
- **Lymph** carries digested and absorbed fat from intestine and drains excess fluid from extra cellular space back into the blood.

## TRANSPORTATION IN PLANTS

- **Plant transport systems** will move **energy stores from leaves** and **raw materials from roots**. These two pathways are constructed as independently organised conducting tubes. One, **the xylem moves water and minerals obtained from the soil**. The other, **phloem transports products of photosynthesis from the leaves** where they are synthesised to other parts of the plan
- A lot of water is lost by plants in the form of vapour through stomata during transpiration

## EXCRETION

# Railway Exams – General Awareness

- The biological process involved in the removal of these harmful metabolic wastes from the body is called excretion
- The parts involved in excretion form the excretory system

## EXCRETION IN HUMAN BEINGS

- The excretory system of human beings includes a pair of **kidneys**, a pair of **ureters**, a **urinary bladder** and a **urethra**
- Urine produced in the kidneys passes through the ureters into the urinary bladder where it is stored until it is released through the urethra
- In human beings excretory products in the form of soluble nitrogen compounds are removed by the nephrons in the kidneys.
- The purpose of making **urine** is to filter out **waste products from the blood**. Nitrogenous waste such as urea or uric acid are removed from blood in the kidneys
- An adult human being normally passes about 1–1.8 L of urine in 24 hours. The urine consists of 95% water, 2.5% urea and 2.5% other waste products
- The **nephron** is **functional unit** of the **kidney**

## EXCRETION IN PLANTS

- Plants use a variety of techniques to get rid of waste material. For example, waste material may be stored in the cell-vacuoles or as gum and resin, removed in the falling leaves, or excreted into the surrounding soil.

## CONTROL AND COORDINATION

- Control and coordination are the functions of the nervous system and hormones in our bodies.
- The responses of the nervous system can be classified as reflex action, voluntary action or involuntary action.

## ANIMALS – NERVOUS SYSTEM

- Nervous tissue is made up of an organized network of nerve cells or neurons and is specialized for conducting information via electrical impulses from one part of the body to another
- The responses of the nervous system can be classified as reflex action, voluntary action or involuntary action
- The nervous system gets information from our sense organs and acts through our muscles
- The nervous system is made up of nervous tissues. It is formed of three distinct components namely the neurons, neuroglia and nerve fibres.
- Nervous system controls and coordinates the activities of our body.



# Railway Exams – General Awareness

- Nervous tissue is made up of an organised network of nerve cells or neurons, and is specialised for conducting information via electrical impulses from one part of the body to another
- Neuron is the structural and functional unit of the cell and has three parts- cyton, dendrites and axon
- A receptor is a cell or group of cells that receives the stimuli. An effector is a part of the body which can respond to a stimulus according to the instructions from the brain or the spinal cord.

## HUMAN BRAIN

- The brain and spinal cord constitute the central nervous system. They receive information from all parts of the body and integrate it.
- The brain is broadly divided into three regions: forebrain, midbrain and hindbrain.
- The **forebrain** mainly consists of cerebrum. The midbrain does not have any further divisions. The hindbrain consists of three centres called pons, cerebellum and medulla.
- The **fore-brain** is the main thinking part of the brain. It has regions which receive sensory impulses from various receptors. Separate areas of the fore-brain are specialised for hearing, smell, sight and so on
- Cerebrum is the largest portion forming nearly two-third of the brain.
- **Cerebrum** holds your memories, allows you to plan, enables you to imagine and think.
- The sensation of feeling full is because of a centre associated with hunger, which is in a separate part of the fore-brain
- Many of these involuntary actions are controlled by the mid-brain and hind-brain.
- All the involuntary actions including blood pressure, salivation and vomiting are controlled by the **medulla** in the hind-brain
- **Midbrain** connects the forebrain to the hindbrain
- **Thalamas** present in cerebral medulla is a major conducting centre for sensory and motor signaling. It act as a relay centre
- **Hypothalamus** lies at the base of the thalamus. **Hypothalamus** controls sleep and wake cycle of the body. It also controls the urges for eating and drinking. It control involuntary functions like hunger, sexual desire anger, fear, thirst.
- Think about activities like walking in a straight line, riding a bicycle, picking up a pencil. These are possible due to a part of the hind-brain called the **cerebellum**.
- **Cerebellum** is responsible for precision of voluntary actions and maintaining the posture and balance of the body.
- **Pons** is a bridge of nerve fibre that connects the lobes of cerebellum. It relay signals between the cerebellum, spinal cord, midbrain and cerebrum. It controls respiration and sleep cycle
- Spinal cord is lower part of brain which control reflex center

# Railway Exams – General Awareness

- Spinal cord originates from medulla
- A delicate organ like the brain, which is so important for a variety of activities, needs to be carefully protected. For this, the body is designed so that the brain sits inside a bony box

## COORDINATION IN PLANTS

- Animals have a nervous system for controlling and coordinating the activities of the body. But plants have neither a nervous system nor muscles.
- Coordination is the ability to use different parts of the plant together, smoothly and efficiently. In plants, coordination is due to the result of a chemical system, wherein plant hormones have a major role.
- The control and coordination system in plants is done by plant hormones. They affect the growth of a plant in one or the other aspect. The growth of a plant is divided in three stages:
  1. Cell division
  2. Cell enlargement
  3. Cell differentiation
- Plant hormone not only controls these stages of plant growth but also promotion of breaking of dormancy, falling of leaves, fruit growth, ripening of fruits, ageing of plants etc

## PLANT HORMONES

- Chemical coordination is seen in both plants and animals.
- There are five major classes of plant hormones. They are:
  1. Auxins
  2. Cytokinins
  3. Gibberellins
  4. Absciscic Acid (ABA)
  5. Ethylene
- **Growing plants** detect light a hormone called auxin synthesized at the shoot tip helps the **cells** to grow **longer**.
- Gibberellins are the most abundantly found plant hormones .Gibberellins example of plant hormones like auxins help in the **growth** of the **stem**

### **Cytokinins**

- **Cytokinins** promote cell division and it is natural then that they are present in greater concentration in areas of rapid cell division such as in fruits and seeds. Cytokinin is found abundantly in liquid endosperm of coconut.
- Cytokinin also causes cell enlargement.

### **Ethylene**

# Railway Exams – General Awareness

- **Ethylene** is a gaseous plant hormone. It is a growth inhibitor.
- It is mainly concerned with maturation and ripening of fruits. Maximum synthesis of ethylene occurs during ripening of fruits like apples, bananas and melons
- It is used ripening of fruits

## **Abscisic acid**

- **Abscisic acid** (ABA) is a growth inhibitor which regulates abscission and dormancy. It increases tolerance of plants to various kinds of stress. So, it is also called as stress hormone. It is found in the chloroplast of plants.

## **HORMONES IN ANIMALS**

- **Adrenaline hormone** is secreted from the **adrenal glands**
- Adrenaline is secreted directly into the blood and carried to different parts of the body. The target organs or the specific tissues on which it acts include the heart
- **Iodine** is necessary for the **thyroid gland** to make **thyroxin hormone**. Thyroxin regulates carbohydrate, protein and fat metabolism in the body so as to provide the best balance for growth
- In case iodine is deficient in our diet, there is a possibility that we might suffer from goitre. One of the symptoms in this disease is a swollen neck.
- **Growth hormone** is one of the hormones secreted by the **pituitary**. As its name indicates, growth hormone regulates growth and development of the body. If there is a deficiency of this hormone in childhood it leads to dwarfism
- **Insulin** is a hormone which is produced by the **pancreas** and helps in regulating **blood sugar levels**. If it is not secreted in proper amounts, the sugar level in the blood rises causing. It **leads to diabetes**.
- Testosterone hormone secreted in males and oestrogen in females
- **Important hormones and their functions**

S.No	Hormone	Endocrine Gland	Functions
1	Growth hormone	Pituitary gland	Stimulates growth in all organs
2	Thyroxin	Thyroid gland	Regulates metabolism for body growth
3	Insulin	Pancreas	Regulates blood sugar level
4	Testosterone	Testes	Male sex hormone
5	Oestrogen	Ovaries	Development of female sex organs, regulates menstrual cycle, etc

# Railway Exams – General Awareness

6	Adrenaline	Adrenal gland	
7	Releasing Hormones		Stimulates pituitary gland to release hormones

## Note:

- The pituitary gland regulates and controls other endocrine glands and so is called as the “Master gland”
- The adrenal glands are located above each kidney. They are also called supra renal glands

## HOW DO ORGANISMS REPRODUCE

- Reproduction, unlike other life processes, is not essential to maintain the life of an individual organism.
- Reproduction involves creation of a DNA copy and additional cellular apparatus by the cell involved in the process.
- Various organisms use different modes of reproduction depending on their body design
- There are two modes by which animals reproduce.
  - (i) Sexual reproduction, and
  - (ii) Asexual reproduction

## ASEXUAL REPRODUCTION

- Unicellular organisms cell division or fission leads to the creation of new individuals Example for **fission** is **Amoeba**
- Formation of a daughter individual from a small projection, the bud, arising on the parent body is called budding. Asexual reproduction takes place through **budding** in **yeast**
- Organisms such as hydra can regenerate if they are broken into pieces. They can also give out buds which mature into new individuals. In Hydra a bud develops as an outgrowth due to repeated cell division at one specific site.
- In algae breaking of the filament into many fragments is called **fragmentation**. Each fragment at least have one cell. Example is **spirogyra**
- **Vegetative propagation**: The vegetative part of plant (root, stem, leaf or bud) gets detached from the parent body and grows into an independent daughter plant. Roots, stems and leaves of some plants develop into new plants through vegetative propagation.
- The individual is cut or broken up into many pieces many of these pieces grow into separate individuals. For example simple animals **like Hydra and Planaria** can be cut into any number of pieces and each piece grows into a complete organism. This is known as **regeneration**

# Railway Exams – General Awareness

- Asexual reproduction occurs by spore formation. This is the most common method of asexual reproduction in **fungi and bacterias**

## SEXUAL REPRODUCTION

- Sexual reproduction involves two individuals for the creation of a new individual.
- Sexual reproduction involves the fusion of male and female gametes
- The sexual mode of reproduction incorporates such a process of combining DNA from two different individuals during reproduction
- DNA copying mechanisms creates variations which are useful for ensuring the survival of the species. Modes of sexual reproduction allow for greater variation to be generated.

## SEXUAL REPRODUCTION IN FLOWERING PLANTS

- **Flower** is the **reproductive** part of a **plant**. The reproductive parts of **angiosperms** are located in the **flower**
- **Stamens** and **pistil** are the reproductive parts of a flower which contain the germ-cells
- **Stamen** is the male reproductive part and it produces pollen grains that are yellowish in colour.
- **Pistil** is present in the centre of a flower and is the **female** reproductive part
- A pistil consists of stigma, style and ovary. Ovary contains one or more ovules
- Flowers which contain either only pistil or only stamens are called **unisexual flowers**
- **Corn, papaya and cucumber** produce unisexual flowers
- Flowers which contain both **stamens and pistil** are called **bisexual flowers**
- **Mustard, Hibiscus, rose and petunia** have bisexual flowers
- The ovary contains ovules and each ovule has an egg cell. The male germ-cell produced by pollen grain fuses with the female gamete present in the ovule. This fusion of the germ-cells or fertilisation gives us the zygote which is capable of growing into a new plant
- Reproduction in flowering plants involves transfer of pollen grains from the anther to the stigma which is referred to as pollination.
- In self-pollination pollen grains are transferred from the anther to the stigma of the same flower
- In cross-pollination pollen grains are transferred from the anther of one flower to the stigma of another flower of the same kind
- Pollination takes place in plants with the help of wind, water and insects
- After the pollen lands on a suitable stigma, it has to reach the female germ-cells which are in the ovary
- The process of fusion of male and female gametes to form a zygote is called **fertilisation**.
- In sexual reproduction a male and a female gamete fuse to form a **zygote**.

# Railway Exams – General Awareness

- The **zygote** divides several times to form an embryo within the ovule
- The **zygote** develops into an **embryo**
- The **ovule develops a tough coat** and is gradually converted into a **seed**. The ovary grows rapidly and ripens to form a fruit.
- The seed contains the future plant or embryo which develops into a seedling under appropriate conditions. This process is known as germination.

## SEXUAL REPRODUCTION IN HUMAN BEINGS

- Reproduction resulting from the fusion of male and female gametes is called sexual reproduction.
- Fertilisation that takes place inside the female body is called internal fertilisation. This is observed in human beings and other animals such as hens, cows and dogs.
- Fertilisation that takes place outside the female body is called external fertilisation. This is observed in frogs, fish, starfish, etc
- Animals such as human beings, cows and dogs which give birth to young ones are called **viviparous animals**.
- Animals such as hen, frog, lizard and butterfly which lay eggs are called **oviparous animals**.
- Organs of the reproductive system are divided into primary and secondary (accessory) sex organs.
- Primary reproductive organs include the gonads (Testes in male and Ovaries in female).

## MALE REPRODUCTIVE SYSTEM

- The male reproductive system in human beings consists of testes which produce sperms, vas deferens, seminal vesicles, prostate gland, urethra and penis.
- The formation of germ-cells or sperms takes place in the testes.
- Testes are located outside the abdominal cavity in scrotum because sperm formation requires a lower temperature than the normal body temperature.
- The role of the **testes** is secretion of the hormone **testosterone**.
- The sperms formed are delivered through the vas deferens which unites with a tube coming from the urinary bladder. Along the path of the vas deferens, glands like the prostate and the seminal vesicles add their secretions so that the sperms are now in a fluid which makes their transport easier and this fluid also provides nutrition
- The urethra thus forms a common passage for both the sperms and urine.
- The sperms are tiny bodies that consist of mainly genetic material and a long tail that helps them to move towards the female germ-cell

## FEMALE REPRODUCTIVE SYSTEM

# Railway Exams – General Awareness

- The female reproductive system in human beings consists of ovaries, fallopian tubes, uterus and vagina.
- The **ovary** produces female gametes called ova.
- **Oestrogen** is female sex hormones. Oestrogen regulates **menstrual cycle**
- The ovaries contain thousands of immature eggs.
- The egg is carried from the ovary to the womb through a thin oviduct or fallopian tube
- The two oviducts unite into an elastic bag-like structure known as the uterus. The uterus opens into the vagina through the cervix.
- Sexual reproduction in human beings involves the introduction of sperm in the vagina of the female. Fertilisation occurs in the **fallopian tube**.
- During fertilisation the nuclei of the sperm and the egg fuse to form a single nucleus. This results in the formation of a fertilised **egg or zygote**
- The stage of the embryo in which all the body parts can be identified is called a **foetus**.
- **Uterus** is the part where development of the baby takes place.
- The uterus prepares itself every month to receive and nurture the growing embryo. The lining thickens and is richly supplied with blood to nourish the growing embryo.
- The embryo gets nutrition from the mother's blood with the help of a special tissue called placenta.
- The developing embryo will also generate waste substances which can be removed by transferring them into the mother's blood through the placenta.
- The development of the child inside the mother's body takes approximately **nine months**.
- If the **egg** is not fertilized it lives for about **one day**. Since the ovary releases one egg every month, the uterus also prepares itself every month to receive a fertilised egg. Thus its lining becomes thick and spongy. This would be required for nourishing the embryo if fertilisation had taken place. Now, however, this lining is not needed any longer. So, the lining slowly breaks and comes out through the vagina as blood and mucous. This cycle takes place roughly every month and is known as menstruation. It usually lasts for about two to eight days.
- Menstruation occurs in **28 day cycles**
- Contraception to avoid pregnancy can be achieved by the use of condoms, oral pills, copper-T and other methods

## LIST OF HUMAN DISEASES CAUSED BY BACTERIA, VIRUS, FUNGI, AND PROTOZOA

### DISEASE CAUSED BY VIRUSES

# Railway Exams – General Awareness

- **Chicken pox** :It is caused by Varicella-zoster virus.
- **Small Pox** : It is caused by Variola virus.
- **Common Cold** : It is caused by Rhinovirus.
- **AIDS** (Acquired ImmunoDeficiency Syndrome) :It is caused by Human Immunodeficiency Virus (HIV).
- **Measles** :It is caused by Measles virus.
- **Mumps** :It is caused by Mumps virus.
- **Rabies** : It is caused by Rabies virus (Rhabdoviridae family).
- **Dengue fever** :It is caused by Dengue virus
- **Influenza**: It is caused by H1N1 virus

## DISEASE CAUSED BY BACTERIA

- **Whooping Cough**: It is caused by a bacterium called Bordetella pertussis.
- **Diphtheria**: It is caused by Coryne bacterium diphtheriae.
- **Cholera**: It is caused by Vibrio cholerae.
- **Leprosy** : It is caused by Mycobacterium leprae.
- **Pneumonia**: It is caused by Streptococcus pneumoniae.
- **Tetanus** : It is caused by Clostridium tetani.
- **Typhoid** : It is caused by Salmonella typhi.
- **Tuberculosis** : It is caused by Mycobacterium tuberculosis.
- **Plague** : It is caused by Yersinia pestis

## DISEASE CAUSED BY PROTOZOAN

- **Malaria**: It is spread by Anopheles mosquitoes. The Plasmodium parasite that causes malaria
- **Amoebic dysentery**: It is caused by Entamoebahistolytica.
- **Sleeping sickness**: It is caused by Trypanosomabrucei.
- **Kala-azar**: It is caused by Leishmaniadonovani

## DISEASE CAUSED BY FUNGI

- **Ringworm**: Three different genera of fungi namely Epidermophyton, Microsporum andTrichophyton cause ringworm.

## DISEASE CAUSED BY WORMS



# Railway Exams – General Awareness

- **Tapeworm** : They are intestinal parasites. It cannot live on its own. It survives within the intestine of an animal including human.
- **Filariasis** : It is caused by thread.
- **Pinworm** : It is caused by small, thin, white roundworm called *Enterobius vermicularis*.

## PLANT DISEASES

### VIRAL DISEASES

- Mosaic disease of tobacco: It is caused by Tobacco mosaic virus
- Bunchy top of banana: This disease is caused by banana virus

### BACTERIAL DISEASE

- Wilt of potato: It is caused by *Pseudomonas solanacearum* bacteria
- Bacterial blight of rice: This disease caused by *Xanthomonas oryzae*
- Black arm of cotton: This disease caused by *Xanthomonas* bacteria
- Citrus canker: The factor of this disease is *Xanthomonas citri* bacteria

### FUNGAL DISEASE

- Rust of wheat is a disease caused by fungi *Puccinia*
- Damping off of seedling is caused by fungus *Pythium debaryanum*
- Red root of sugarcane is caused by fungus *Colletotrichum falcatum*

## SCIENTIFIC NAMES OF PLANTS, FRUITS AND VEGETABLES

Common Name	Scientific Name
Mango	<i>Mangifera indica</i>
Lemon	<i>Citrus Limonium</i>
Bamboo	<i>Bamboosa aridinarifolia</i>
Banyan	<i>Ficus benghalensis</i>
Banana	<i>Musa paradisiacum</i>
Cucumber	<i>Cucumis sativus</i>

# Railway Exams – General Awareness

Guava	Psidiumguajava
Orange	Citrus aurantium
Watermelon	Citrulluslanatus
Pineapple	Ananascomosus
Tomato	Lycopersicanesculentum
Soybean	Glycine Max
Sandalwood	Santalum album
Rice	Oryza sativa
Spinach	Spinaciaoleracea
Potato	Solanumtubersum
Onion	Allium cepa
Pepper	Capsicum Annum
Mustard	Brassica Juncea
Neem	Azadhirachtaindica
Drumstick	Moringaoleifera
Corn	Zea Mays
Carrot	Daucascarota
Capsicum	Capsicum fruitscence
Ginger	Zingiberofficinale
Brinjal	Solanummelongena
Turmeric	Curcuma longa
Pea	Pisumsativum
Coriander	Coriandrumativum
Carrot	Daucuscarota
Rose	Rosa
Sugarcane	Saccharum

# Railway Exams – General Awareness

Sunflower	Helianthus annuus
Tea	Camellia sinensis
Tulsi	Ocimumtenuiflorum

## IMPORTANT BRANCHES OF SCIENCE

- Study of Bones is called – **Osteology**
- Study of Soils is called – **Pedology**
- Branch of science dealing with Urinary system is called – **Urology**
- Study of Viruses is called – **Virology**
- Study of resistance of body against infection (immunity) is called – **Immunology**
- Study of Muscles is called – **Myology**
- Study of development of Embryos is called – **Embryology**
- Study of Insects is called – **Entomology**
- Study of the Nervous system, its functions and its disorders is called – **Neurology**
- Branch of Biology dealing with the phenomena of Heredity is called – **Genetics**
- Study of causes of Diseases is called – **Etiology**
- Study of Ears and their diseases is called – **Otology**
- Study of Condition and Structure of Earth is called – **Geology**
- Study of Kidneys and its function is called – **Nephrology**
- Study of Birds is called – **Ornithology**
- Study of Fossils is called – **Palaeontology**
- Study of Female Reproductive System is called – **Gynaecology**
- Study of production of Three Dimensional Image using Laser is called – **Holography**
- Study of Snakes is called – **Serpentology**
- Production of Raw Silk by rearing of Silk Worms is called – **Sericulture**
- Study of Algae is called – **Phycology**
- Study of diseases, symptoms, cause and remedy is called – **Pathology**
- Study of Serum is called – **Serology**
- The Breeding, Rearing, and Transplantation of Fish is called – **Pisciculture**
- Study of Eyes and its diseases is called – **Ophthalmology**
- Study of Heavenly bodies is called – **Astronomy**

# Railway Exams – General Awareness

- Study of bacteria and the diseases caused by them is called – **Bacteriology**
- Science dealing with the origin and development of mankind is called – **Anthropology**
- Study of cells is called – **Cytology**
- Science dealing with the functions and the diseases of heart is called – **Cardiology**
- Study of skin is called – **Dermatology**
- Study of Blood Vascular System is called – **Angiology**
- Study of Fungi and fungus diseases is called – **Mycology**
- Study of Tumors is called – **Oncology**
- Study of Liver and its diseases is called – **Hepatology**
- Study of fungi is called – **Mycology**
- Study of silk worm breeding – **Sericulture**
- Study of bodily diseases – **Pathology**
- Study of poisons - **Toxicology**

## BIOLOGY ONE LINERS

- Glucose is stored in the form of Glycogen in Animals.
- Ascariasis is caused by Round Worm
- BCG vaccination (Bacillus Calmette Guérin) gives immunity from Tuberculosis.
- Blood groups were discovered by Karl Landsteiner
- The first successful heart transplant in India was performed by Dr. Panangipalli Venugopal
- The polio vaccine was discovered by Jonas Salk
- Companion cells are unique to Angiosperms
- DNA stands for Deoxyribonucleic Acid.
- Endocrine glands are also known as Ductless Glands.
- The Small Pox vaccine was discovered by Edward Jenner
- Deficiency of iodine leads to Goiter.
- First vaccine produced by bio-technology was used against Hepatitis-B virus
- Turmeric is obtained from Stem of a Plant.
- Genes are made by Polynucleotides.
- Haematopoiesis occurs in Bone marrow.
- Leprosy is also known as Hansen's disease.
- A human skull has 22 Bones.

# Railway Exams – General Awareness

- Deposition of Lactic Acid in the muscles leads to a feeling of fatigue in Humans
- BCG is the first vaccine injected into a newly born baby.
- Food poisoning is caused by Clostridium botulinum.
- Alcoholic drink contains Ethyl Alcohol
- Progesterone hormone is used as an oral contraceptive.
- The longest and largest bone in the human body is Femur.
- Iron is present in hemoglobin.
- The PH value of human blood is 7.4
- The plants grow under water stress conditions are called Xerophytes
- During photosynthesis, Solar Energy is converted to Chemical energy.
- Stapes is the smallest bone in the human body.
- The study of Trees is called Dendrology.
- Charles Darwin proposed the Theory of natural selection
- Turpentine oil is obtained from Resin from Pines.
- Upper most layer of skin is Epidermis
- Magnesium found in Chlorophyll.
- Chloroplast is called as kitchen of plant cell.
- Lysosome is known as ‘Suicidal bags of cell’
- 120mm/80mm is systolic and diastolic pressure in a healthy man
- Dermatology is the study of Human Skin
- RBC's count in the blood is increased when a person is having Polycythemia.
- Insulin regulates the amount of glucose in the blood.
- Hydrogen gas used for making vegetable ghee.
- Liver is the largest gland in the human body.
- The smallest functional unit of a kidney is Nephron.
- James D. Watson, a Nobel Prize winning scientist is expert in the field of Genetics.
- Polio is caused by a Virus.
- The flow of energy in the Energy Pyramid is always Upwards.
- Saliva helps in the digestion of Starch.
- Y chromosome is used for sex determination test.
- The bio-gas used for cooking is a mixture of Methane & Carbon dioxide.
- The yellow colour of the human feces is a result of the pigment called Urobilin.
- Sulphur dioxide causes the most serious health hazards.

# Railway Exams – General Awareness

- Vitamin K is required for the synthesis of Prothrombin.
- Chloroquine is used in anti-malarial drug.
- Dental cavities are caused because of the deficiency of Fluorine.
- Penicillin is extracted from fungus
- elements increases the
- Boron increase the absorption of water and calcium in plants
- Lymphocytes helps in blood circulation
- Our bones and teeth are generally made of Tricalcium phosphate
- Angora wool is extracted from rabbit
- Pituitary gland is located in brain
- Onion is a modified form of stem
- The pollination of maize takes place by pollination by air
- X-rays are not able to capture clear picture of intestine because radiologists do not take direct X-ray photographs of intestine.
- Exobiology deals with the study of life in other planets and space
- The disease caused by Asbestos is Emphysema
- Dehydration in human body is caused due to the loss of water
- Ostrich is the largest living bird in the world
- The age Of trees is determined by its growth rings
- Kidney disease in man is caused by the pollutant Cadmium
- Maximum photosynthetic activity occurs in blue and red region of light
- AIDS virus has single-stranded RNA
- A breath test used by traffic police to check drunken driving used in potassium dichromate-sulphuric acid
- Typhoid fever is caused by bacteria
- Pathogenic bacteria secrete Antigens
- Kolkata is the Botanical Survey of India headquartered
- Sweetex used by the diabetic patients has energy content of Zero calories
- The element which is the most abundant in the human body is Oxygen
- Oxygen liberated during photosynthesis is coming from water
- Eugen Steinach discovered sex hormones.
- Fermentation is a process of decomposition of organic compound by enzymes
- Amniocentesis is a method for determination of fetal health conditions
- During photosynthesis the liberated gas is oxygen

# Railway Exams – General Awareness

- Penicillin is a first antibiotic
- Virus contains a Protein and lipid
- The sex of a child is determined before birth by fetus of mother
- The Theory of Evolution was put forward by Charles Darwin
- The total number of vertebrae in a human being is 33
- On the average 65 percentage of human body has the element of oxygen
- BCG vaccination is to be given to a newborn child within 48 hours
- The hybrid between horse and donkey is called Mule
- Glaucoma is a disease of the eyes
- The chemical used for destroying Fungi in water tanks is Copper sulphate
- Watson and Crick discover chemical structure of DNA
- Darwin finches refer to a group of Birds
- The tissue in man where no cell division occurs afterbirth is nerves
- Ketone bodies is an abnormal constituent of urine
- At very high altitude the Red Blood Corpuscles In the human body will increase in size
- A test tube baby means fertilisation in vitro and then transplantation in the uterus.
- The metal present in insulin is zinc
- Roundworm Is a human parasite found in the Large intestine
- Milk is a rich source of Vitamin B12
- Number of chromosomes in human body is 46
- xerophthalmia Is a deficiency disease caused by lack of Vitamin A
- A synthetic compound inhibiting the growth of bacteria is called antibiotic
- Carbohydrate is stored in the body as glycogen
- Amylase was the first enzyme isolated in pure crystalline form
- Process of digestion is helped by Enzyme
- Kidney excretes water ,fat and various catabolic wastes
- 8 second required for a heartbeat
- An ant can see the objects all around it due to the presence of Compound eyes
- Taenia sodium (Tape worm) lives as a parasite in Intestine of man/woman
- Eyes of potato are useful for Vegetative propagation
- Ginger is a stem and not a root because It has nodes and internodes
- Pregnant women usually become deficient in Calcium and Iron
- Thalassemia is a hereditary disease. It affects blood

# Railway Exams – General Awareness

- Jaundice affect Liver
- Adrenal is correlated with blood pressure
- Tuberculosis spreads through milk
- Study of field crops is called Agronomy
- Carrot is orange in colour because it contains carotene
- Full form of the infectious disease SARS is Severe Acute Respiratory Syndrome
- Founder of Homeopathy is Samuel Hahnemann
- Development of an egg without fertilization is called Parthenogenesis
- Literal meaning of the term “Homo Sapiens” is Man-The Wise
- Respiration is oxidation
- During photosynthesis green plants absorb carbon dioxide
- Adrenaline hormones is released in excess quantity during excitement
- Skin of human body is first highly affected by nuclear radiation
- M.R.I. stands for Magnetic Resonance Imaging
- The language used In writing the scientific name of animals is Latin
- Fluid part of blood devoid of corpuscles is called serum
- Vitamin – K can be synthesized by Liver
- The medical term used for the sleeplessness is Insomnia
- The causative agent of Tuberculosis is Mycobacterium
- The enzyme that is present in the saliva of man is Amylase
- Blood cancer is otherwise called as Leukaemia
- Dengue fever, Malaria and Filariasis are mosquito borne disease
- Earthworm Is called farmer’s friend
- The term gene was coined by W. L. Johanssen
- Protein following is most important for the growth of children up to the age of 14
- Study of newly born up to the age of 3 months is called Neonatology
- The colour of human skin is produced by Melanin
- Jaundice is a symptom of disease of Liver
- The vaccination against small pox involves the introduction of weakened germs
- Deficiency of Vitamin B6 in man causes Anemia
- Washing of peeled vegetables removes the vitamin C
- A man with colour blindness will see red as Green
- The number of chambers in a human heart is Four



# Railway Exams – General Awareness

- The metal which is a constituent of vitamin B12 is Cobalt
- The vitamin that helps to prevent infections in the human body is Vitamin C
- Tetanus is caused by Clostridium
- Maximum harm to a tree is caused by loss of all leaves
- Blood pressure is controlled by Adrenal gland
- Bee Keeping is known as Apiculture
- Dolly the World's First cloned animal was a sheep
- An ECG shows the functioning of the heart
- Amoebic dysentery is caused by Entamoeba histolytic
- DNA test was developed by Watson and Crick
- Anaemia occurs due to the deficiency of folic acid
- Vegetables are easily perishable because of their high content of water
- Insufficient blood supply In human body is referred as Ischemia
- The limb bones of children become bent if there is deficiency of vitamin D
- Cereals are a rich source of starch
- Mitochondria called the power plants of the cell
- Chewing gum is made from Latex
- Pituitary gland is situated In the base of the brain
- Ringworm is a Fungal disease.
- The colour of the eye depends upon the pigment present in iris
- The vitamin most readily destroyed by heat is Ascorbic acid
- The term RH factor refers to Rhesus factor
- An instrument for measuring blood pressure is called Sphygmomanometer
- Amla is called Herbal Indian Doctor
- Thyroid is largest endocrine gland in the body
- The noble gas used for the treatment of cancer is Radon
- BT seed is associated with cotton
- Bark of this tree is used as a condiment Cinnamon
- The total number of biosphere reserves present In India are 18
- Growth of the baby in the uterus is found using Ultra sound
- A drug which helps in controlling fever is Paracetamol
- The deficiency of iron in man result in Anaemia

# Railway Exams – General Awareness

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## SOLAR SYSTEM

- Our solar system is a part of Milky Way galaxy. In ancient India, it was imagined to be a river of light flowing in the sky. Thus, it was named Akash Ganga
- A solar system consists of a sun at the centre and the eight planets, moons, asteroids, comets and meteoroids that revolve it. The gravitational attraction between the Sun and these objects keeps them revolving around it
- The sun, the moon and all those objects shining in the night sky are called celestial bodies
- The study of universe is known as cosmology
- The size of the solar system has been estimated to at about  $10^5$  AU

# Railway Exams – General Awareness

- The eight planets, namely the Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune, revolve around the sun in fixed elliptical paths known as ‘orbits’.
- Pluto is dwarf planet
- The light-year is a unit of length used to express astronomical distances

## SUN

- The sun is in the centre of the solar system.
- The sun is the ultimate source of heat and light for the solar system
- The sun is about 150 million km away from the earth.
- Light takes about 8.5 minutes to reach the earth from the sun
- Hydrogen and helium are the main gases present in the sun.
- The boundary between the Sun's interior and the solar atmosphere is called the photosphere. It is the visible ‘surface’ of the Sun
- The core is at the centre of the sun. It is the hottest region, where the nuclear fusion reaction takes place to give the sun power
- The outer layer of sun atmosphere made up of thin hot gases is called corona. Corona is visible only during a total eclipse of the sun
- Sun has a surface temperature of 6000 degree Celsius
- The temperature at the centre of sun is around  $1.5 \times 10^7$  K

## PLANETS

- The planets are classified in order of their distance from the sun and based on their characteristics. They are:
  1. The inner planets or terrestrial planets or rocky planets. Mercury, Venus, Earth and Mars are called inner or terrestrial planets.
  2. The outer planets or gaseous planets or giant planets. Jupiter, Saturn, Uranus and Neptune are called outer or gaseous planets.
- All the eight planets of the solar system move around the sun in fixed paths. These paths are elongated. They are called orbits
- A ninth planet has been recently discovered by NASA named as Carla

## MERCURY

- Mercury is nearest to the sun and it is the smallest planet in the solar system
- Mercury has no satellite of its own

# Railway Exams – General Awareness

- It rotates on its own axis in 58.65 earth days while it takes 88 Earth days to complete one revolution around the sun
- The sunlight takes 3.2 minutes to travel from the Sun to Mercury
- Mercury has no protective blanket like Ozone around it to prevent us from harmful radiations

## VENUS

- Venus is the second planet in distance from the sun
- Venus is earth's nearest planetary neighbour. It is the brightest planet.
- Venus has no moon or satellite of its own. Rotation of Venus on its axis is somewhat unusual. It rotates from east to west. Only Venus and Uranus have this backwards direction
- It completes one rotation in 243 Earth days which is the longest day of any planet in our solar system
- The Venus takes 224.7 Earth days to complete one revolution around the sun, and it has no natural satellites.
- Venus is 0.7 astronomical units away from the sun
- Venus is considered as 'Earth's-twin' because its size and shape are very much similar to that of the earth. It's also called as 'Earth sister'
- Venus is known as the evening star as well as Morning star
- Venus is hotter than Mercury because Venus has an atmosphere which is thicker and made almost entirely of carbon dioxide.
- The sunlight takes 6 minutes to travel from the sun to Venus

## THE EARTH

- The earth is the third nearest planet to the sun. In size, it is the fifth largest planet
- The axis of rotation of the Earth is not perpendicular to the plane of its orbit. The Earth is 23.5 degrees tilted on its axis and thus makes 66.5 degrees angle. The tilt is responsible for the change of seasons on the Earth. The Earth has only one moon.
- The Earth rotates from west to east
- It is also known as the 'Blue Planet' because of the presence of water.
- Earth has only one natural satellite called the Moon.
- The Earth takes 365.25 days to complete one revolution around the Sun. It takes 23 hours 56 minutes and 4 seconds for the earth to complete one rotation on its own axis
- The sun light takes about 8.3 minutes to reach the earth
- Earth has a protective blanket of ozone layer high up in its atmosphere to save life from harmful ultraviolet radiations coming from the sun

## THE MARS

- Mars is the fourth nearest planet to the sun and it is the second smallest planet in the Solar system
- It is also described as the “Red planet”. It is reddish in colour due to the presence of iron oxide on its surface
- The landmass of Mars and Earth are very similar
- It takes 24 hours and 37 minutes to complete one rotation on its axis and it takes 687 days to complete one revolution around the Sun
- Mars has two satellites namely Phobos and Deimos.

## THE JUPITER

- Jupiter is the largest planet in the solar system. It is made primarily of gases and is therefore known as ‘Giant Gas planet’
- Jupiter is also known as winter planet
- It takes 9 hours 55 minutes to complete one rotation on its axis and it takes 11.86 years to complete one revolution
- Jupiter has the shortest day in the solar system.
- Jupiter has a faint ring system around it. They are mostly comprised of dust particles
- Jupiter has 67 confirmed satellites orbiting the planet. Ganymede, the satellite of Jupiter, is the largest natural satellite in the solar system (even bigger than the planet Mercury)

## THE SATURN

- Saturn is the sixth planet from the sun and the second largest planet in the solar system. Saturn is called as the Ringed Planet
- Saturn is the only planet in our solar system whose average density is less than water.
- The Saturn has 30 rings and 53 confirmed natural satellites
- The Saturn takes 10 hours 34 minutes to complete one rotation on its axis and it takes 29.4 years to complete one revolution around the sun
- Titan is Saturn’s largest moon and the second largest (after Ganymede of Jupiter) in the solar system. It is the only moon in the solar system with clouds and a dense, planet-like atmosphere

## THE URANUS

- Uranus is the seventh planet from the sun and it is not visible to the naked eye.
- Uranus rotates on its axis from east to west

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- Uranus is inclined on its axis at an angle of 98 degrees.
- Hydrogen, helium and methane are the major gases of its atmosphere.
- It is very cold due to its great distance from the sun
- This planet appears greenish in colour because of methane gas present in its atmosphere
- Uranus also has rings and twenty-seven satellites
- Uranus is the first planet to have been discovered by the use of telescope

## THE NEPTUNE

- Neptune is the eighth planet from the sun.
- It takes 16 hours to complete one rotation on its own axis and it takes nearly 165 years to revolve around the sun.
- It is the coldest planet in the Solar System because it is the farthest planet from the Sun.
- It has 13 natural satellites and 5 rings
- Neptune is surrounded by methane rings of subzero temperature

## IMPORTANT FACTS ABOUT THE PLANETS

Biggest planet	Jupiter
Smallest plant	Mercury
Brightest planet	Venus
Brightest star	Dog Star
Planet having maximum number of satellite	Jupiter (67)
Coldest planet	Neptune
Red planet	Mars
Biggest satellite of solar system	Ganymede
Smallest satellite of solar system	Demos
Blue planet	Earth
Red planet	Mars
Sister of Earth	Venus
Morning star, Evening star	Venus
Greatest average density	Earth
Lowest average density	Saturn
Hottest Planet	Venus
Deepest Oceans	Jupiter

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Strongest Magnetic fields	Jupiter
Retrograde revolution (East to west)	Venus, Uranus

## DWARF PLANETS

- Dwarf planets are tiny planets in our solar system. Any celestial body orbiting around the sun, weighing for the self-gravity and nearly be round in shape is called ‘Dwarf Planet’.
- It should not be a satellite of any planet
- Ceres, Pluto, Heumea, Makemake and Eris are dwarf planets

## ASTEROIDS

- Asteroids are small rocky celestial bodies that revolve around the Sun, like other planets. They are also called ‘Minor Planets’.
- Larger asteroids are called Planetoids. These are found in between the planets Mars and Jupiter. This belt is known as ‘Asteroid belt’.
- The diameter of the asteroids varies from 100 km to a size of a pebble

## COMETS

- They revolve around the Sun. But their orbits are irregular. Sometimes they get very close (Perihelion) to the sun and in other times they go far away (Aphelion) from the sun
- These are generally found in Kuiper Belt. They travel towards the sun
- The best known Comet, Halley’s Comet, appears once in every 76 years. The Halley’s Comet was seen last in 1986

## METEORS

- The small pieces of rocks which move around the sun are called meteoroids
- They are the removed pieces of rocks mainly from the Asteroid belt. They are called Meteoroids before they enter into our atmosphere. They enter into the atmosphere with great speed. But most of them are burnt when they enter into the atmosphere. After entering into our atmosphere they are called as Meteors. Some pieces do not burn fully and they fall on the earth and make craters.
- Examples for Meteorite Fall: Meteor crater in Northern Arizona and Lake Lonar in Buldhana District of Maharashtra in India were created by meteor impacts.

## SATELLITES



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- The satellites move around a planet from West to East
- They have no atmosphere and water.
- Number of natural Satellite in solar system

Planet	Number of natural Satellite
Jupiter	63
Saturn	60
Uranus	27
Neptune	13
Mars	2
Earth	1
Venus	0
Mercury	0

Moon: The Earth's Satellite

- The moon is located at a distance of 8, 84,401 km from the earth. The moon revolves around the earth.
- The moon takes 27 days and 7 hours and 43 minutes for both its rotation and revolution around the earth
- The moon is the fifth largest natural satellite in the solar system.
- The light which is reflected by the Moon will reach the Earth in just one and a quarter seconds
- The moon is smaller than the earth and it has 1/6 of the gravitational pull of the earth
- Apollo 11 was the first manned mission to land on the Moon sent by NASA.

## THE EARTH

- Pythagoras (582-507 B.C.) believed that the Earth was a sphere. The first to suggest that the earth was shaped like a globe.
- The earth has two basic movements: 1) Rotation and 2) Revolution.

## ROTATION OF EARTH

- The earth completes one rotation in 23 hours, 56 minutes and 4.09 seconds. It rotates in an eastward direction opposite to the apparent movement of the sun
- The earth's axis is tilted at an angle of  $23\frac{1}{2}^\circ$  from a perpendicular to the elliptic plane
- The velocity of earth's rotation varies depending on the distance of a given place from the equator. The rotational velocity at the poles is nearly zero. The greatest velocity of the rotation is found at the equator

## Effects of earth's rotation

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- The apparent rising and setting of the sun is actually caused by the earth's rotation which results in the alternate occurrence of day and night everywhere on the earth's surface
- Rotation of the earth is also responsible for the difference in time between different places on the earth
- Rotation causes the working of the Coriolis force which results in the deflection of the winds and the ocean currents from their normal path
- Tide is caused by the rotation of the earth apart from the gravitational pull of the sun and the moon

## REVOLUTION OF THE EARTH

- The movement of the earth in its orbit around the sun in an anti-clockwise direction, that is, from west to east is called revolution of the earth
- The period taken by the earth to complete one revolution around the sun is 365 days and 6 hours
- The distance of the earth from sun varies time to time due to the elliptical shape of the orbit
- January 3rd the earth is closest to the sun and it is said to be at **Perihelion**. At Perihelion, the distance is 147 million km
- July 4th the earth is farthest from the sun and it is said to be at **Aphelion**. At Aphelion the distance of the earth is 152 million km away from the sun

### Effects of revolution of the earth

The revolution of earth results

- Cycle of seasons,
- Variation in length of days and nights,
- Variation in distribution of solar energy over the earth and the temperature zones

## SEASONS

- The seasons are caused due to the combined effect of the earth's revolution and the tilt of its axis in the same direction throughout the year
- The four seasons are spring, summer, autumn and winter
- The earth is moving around the sun on its tilted axis. It varies when observed on a daily and monthly basis, at different times of the year. On 21 March and 23 September the sun rises precisely in the east and sets exactly in the west

## EQUINOXES

- During the equinoxes the periods of day light and darkness are equal all over the world. It happens on two days of the year 21 March and 23rd September
- On 21 March the sun is directly overhead at the equator. This position of the sun is called spring equinox
- On 23 September the sun is directly overhead on the equator and it is called autumn equinox

## SOLSTICE

- Solstice is one of the two dates in the year on which the sun reaches greatest altitude north or south of the equator and is directly overhead along one of the lines of the tropics

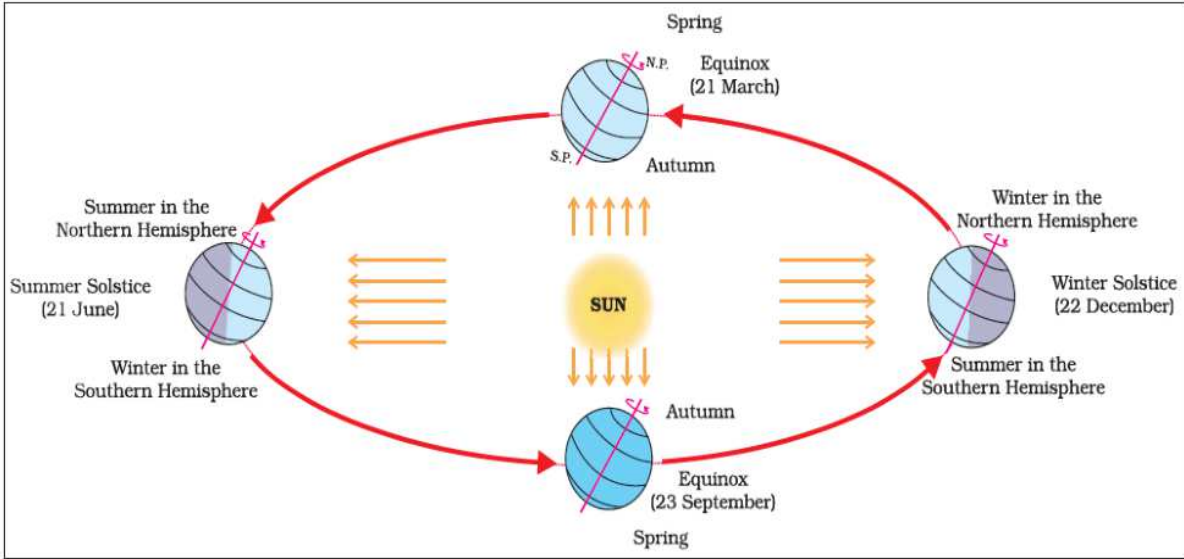
## SUMMER SOLSTICE

- On June 21 the earth is so located in its orbit that the sun is overhead on the tropic of cancer ( $23\frac{1}{2}^{\circ}$  N). The day 21 June is known as summer solstice
- On this date the northern hemisphere is tipped towards the sun having the longest day. While southern hemisphere is tipped away from the sun having the shortest day
- On that day the North Pole is inclined or tilted towards the sun. It, therefore, experiences complete light for 24 hours. The South Pole is tilted away from the sun so it is in complete darkness for 24 hours.

## WINTER SOLSTICE

- The sun is overhead on the tropic of Capricorn ( $23\frac{1}{2}^{\circ}$  S). The day December 22 is known as winter solstice
- The greater part of the southern hemisphere gets the direct rays of the sun so the days are long and the nights are short here. In the northern hemisphere the nights are longer than the days at this time. The southern hemisphere has summer. The northern hemisphere has winter

# Railway Exams – General Awareness



## EARTHY POSITION WITH RESPECT TO MOON

Apogee	Perigee
The period of the farthest distance between the moon and the earth is called apogee	The period of the nearest distance between the moon and the earth is called perigee

## ECLIPSES

- An eclipse is a complete or partial obscuration of light from a celestial body and it passes through the shadow of another celestial body. The eclipses are of two types. They are:

Lunar eclipses	Solar eclipses
It is the situation when the earth comes between sun and moon	It is the situation when the moon comes between sun and earth
It occurs only on a full moon day. But it does not occur on every full moon day because the moon is so small and the plane of its orbit is tilted about 5 degree with respect to the earth's orbital plan	It occurs only on a New Moon day. But it does not occur on every new moon day because of the inclination of the moon's orbital plan

# Railway Exams – General Awareness

## LATITUDE AND LONGITUDE

### LATITUDE

- Latitude is the angular distance of a point on earth surface from the centre of earth. They are measured in degrees.
- The latitude specifies a location's distance north or south of the equator

#### Important Parallels of Latitudes

- Tropic of Cancer ( $23\frac{1}{2}^{\circ}$  N) in the Northern Hemisphere
- Tropic of Capricorn ( $23\frac{1}{2}^{\circ}$  S) in the Southern Hemisphere
- Arctic Circle at  $66\frac{1}{2}^{\circ}$  north of the equator
- Antarctic Circle at  $66\frac{1}{2}^{\circ}$  south of the equator

#### Equator

- Equator is an imaginary line running on the globe that divides it into two equal parts.
- Northern half of the earth is known as the Northern Hemisphere and Southern half is known as the Southern Hemisphere.

### LONGITUDES

- Longitude is the angular distance of a point on the earth surface along the equator, east or west from the prime meridian
- The semi-circles running from pole to pole or from north to south are known as meridians of longitude and distance between them is measured in degrees of longitude
- Prime meridian is the semi-circle from pole to pole, from which all the other meridians radiate east wards and west wards up to 180
- The time at  $0^{\circ}$  longitude is called Greenwich Mean Time. It is based on local time of the meridian passing through Greenwich near London
- 180 degree meridian (International date line) is exactly opposite to the prime meridian
- Indian government has accepted the meridian of  $82.5$  degree east for standard time, which is 5 hours 30 minutes ahead of the Greenwich Mean time
- The International Date Line running over the Pacific Ocean

### LITHOSPHERE

# Railway Exams – General Awareness

- The lithosphere is the outermost rigid rocky shell of the earth. It comprises the crust and the upper portion of the mantle
- The earth is composed of lithosphere, atmosphere, hydrosphere, and biosphere
- The lithosphere is the solid outer part of the Earth.
- The atmosphere is a thin layer of gases that surrounds the Earth.
- The hydrosphere is the watery part of the Earth's surface including oceans, rivers, lakes and water vapour
- The biosphere is the layer of Earth where life exists

## INTERIOR OF THE EARTH

- Earth's interior can be divided into the crust, upper mantle, lower mantle, outer core, and inner core

### THE CRUST

- Crust is the outer layer of the Earth, where we live. It is the skin of our Earth, which ranges between 5 to 30 km
- The thickness of the crust is greater below the continents than the ocean floor
- Continental Crust is made up of SIAL and Oceanic Crust is made up of SIMA
- The boundary between the upper crust and the lower crust is termed as 'Conorod boundary'

### THE MANTLE

- The mantle is composed of silica, magnesium and iron. It lies between the lower crust and the outer core, which is about 2,900 km thick
- It is divided into upper mantle and lower mantle. The mantle generally is in a solid state. The upper part of the mantle is called asthenosphere
- The asthenosphere is the part of the mantle that flows and moves the plates of the earth

### THE CORE

- The core is the innermost and hottest layer of the Earth which lies below the mantle. It is composed mainly of Nickel (Ni) and Iron (Fe). Hence it is called NIFE
- The core is divided into Solid inner core and Liquid outer core
- The presence of large quantities of iron in the core is responsible for the Earth's gravitational force. As the Earth rotates on its axis, the liquid outer core spins over the solid inner core and generates the Earth's magnetic field

## ROCKS

- The earth's crust (Lithosphere) is composed of rocks. An aggregate of minerals on the Earth's crust is called 'rock'. It may be hard and compact like 'granite' or soft as 'clay' or loose as 'sand'
- The scientific study of rocks is called **petrology**
- Based on formation, rocks are classified as
  1. Igneous,
  2. Sedimentary,
  3. Metamorphic.

## IGNEOUS ROCKS

- The igneous rocks are formed by the solidification of molten magma. These rocks are also called as the 'Primary Rocks' or 'Parent Rocks' as all other rocks are formed from these rocks.
- They do not contain fossils
- They are associated with the volcanic activities
- These rocks are useful for construction work
- Granite, pegmatite, basalt, etc are some of the examples of igneous rocks

## SEDIMENTARY ROCKS

- It is formed due to the aggregation and compaction of sediments derived from the older rocks, plants , animals and contain fossils of plants
- The bodies of plants and animals that fall on the deposits get embedded in the layers and form Fossils. Sandstone, limestone, chalk, gypsum, coal and conglomerate are examples of sedimentary rocks.

## METAMORPHIC ROCKS

- These are changed form of igneous and sedimentary rocks

Sedimentary rocks	Metamorphic rocks
Lime stone	Marble
Sandstone	Quartzite
Shale/clay	Slate , Schist
Coal	Diamond

- When Igneous or sedimentary rocks are subjected to extreme heat and pressure, they undergo a complete change in their form and character

# Railway Exams – General Awareness

- Rocks are useful for making
  1. Cement
  2. Writing chalk
  3. Fire,
  4. Building materials,
  5. Bath scrub,
  6. Kerb stone
  7. Ornament,
  8. Roofing materials
  9. Decorative materials,
  10. Rocks are valuable source of minerals such as gold, diamond, sapphire etc.

## SOILS

- Soil is a mixture of organic matter, minerals, gases, liquids and organisms that together support life. It is known as the 'skin of the earth'.
- Soils are produced from rocks (parent material) through the processes of weathering and natural erosion
- World Soil Day is observed on 5th December.
- The basic components of soil are mineral, organic matter, water and air. It consists of about 45% mineral, 5% organic matter, 25% of water and 25% air
- Soils are classified on the basis of their formation, colour, physical and chemical properties. Based on these, soil is classified into six major types. They are: Alluvial soil, Black soil, Red soil, Laterite soil, Mountain soil, Desert soil

### ALLUVIAL SOIL

- Alluvial soils are found in the regions of river valleys, flood plains and coastal regions.
- These are formed by the deposition of silt by the running water. It is the most productive of all soils
- It is suitable for the cultivation of sugarcane, jute, rice, wheat and other food crops.

### BLACK SOILS

- These soils are formed by weathering of igneous rocks.
- Black soil is clayey in nature. It is retentive of moisture.
- It is ideal for growing cotton.

### RED SOILS

- These soils are formed by weathering of metamorphic rocks and crystalline rocks.
- The presence of iron oxide makes this soil brown to red in colour.
- It is suitable for millet cultivation.

### LATERITES SOILS



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- These are the typical soils of tropical regions. These soils are found in the regions which experienced alternate wet and dry condition
- It is suitable for plantation crops of tea and coffee.

## **MOUNTAIN SOILS**

- Mountain soils are found over the slopes of mountain

## **DESERT SOILS**

- These are sandy soil found in the hot desert regions. These soils are porous and saline. Since it is infertile agriculture in these soils are not so successful.

## **LANDFORMS**

### **RIVER LAND FORMS**

- The place of origin of the river is known as its Source. The place where it joins a lake or sea or an ocean is known as the River mouth
- Falling of river water over a vertical step in the river bed is called waterfall
- The highest waterfall is Angel Falls of Venezuela in South America. The other waterfalls are Niagara Falls located on the border between Canada and USA in North America and Victoria Falls on the borders of Zambia and Zimbabwe in Africa
- Delta: The large of sediments a fan shaped by river deposition. Deltas are excellent productive lands. They have more minerals which favor cultivation. E.g. Cauvery delta, Ganges delta, Mississippi delta
- A flood plain is a flat area of land adjacent to a river. It stretches from the bank of its channel to the base of the enclosing valley walls which experiences flooding during the period of high discharge.
- Raised bed and a bank of the river due to frequent flooding and deposition of the sediments is called levees
- Oxbow lake is a free standing body of water formed when the meander is cut off from the main river. This landform is so named because it resembles horse shoe

### **GLACIER**

- A large body of ice moving slowly down a slope or valley due to gravity is called a glacier. Glaciers are grouped into Mountain or Valley Glaciers and Continental Glaciers.
- Continental Glacier: The glacier covering vast areas of a continent with thick ice sheets. E.g. Antarctica, Greenland

# Railway Exams – General Awareness

- Mountain or Valley Glacier is a stream of ice, flowing along a valley. It usually follows former river courses and is bounded by steep sides. E.g. the Himalayas and the Alps.

## COAST

- A part of the land adjoining or near the sea is called the Sea coast.
- The boundary of a coast, where land meets water is called the Coast line
- The sea waves deposit sediments of sand and gravel along the shores forming beaches
- The first longest beach in the world is the Miami Beach in South Florida in U.S.A. The second longest beach in the world is the Marina beach in Chennai

## LAGOON

- Lagoon is a shallow stretch of water partially or completely separated from the sea. E.g. Chilka lake in Odisha, Pulicat lake in Tamil Nadu and Andhra Pradesh and Vembanad lake in Kerala are the famous lagoons in India.

## ATMOSPHERE

- Atmosphere is a mixture of gases, water vapour and dust particles in different proportions.
- Nitrogen (78%) and Oxygen (21%) are permanent gases of the atmosphere. They constitute 99% of the total composition and their percentages always remain the same without any change. The remaining one percentage is occupied by Argon (0.93%), Carbon-di-oxide, (0.03%), Neon (0.0018%), Helium (0.0005%), Ozone (0.00006%) and Hydrogen (0.00005%).

## STRUCTURE OF THE ATMOSPHERE

- The atmosphere is divided into five distinct layers based on the temperature variations.
  1. Troposphere
  2. Stratosphere
  3. Mesosphere
  4. Ionosphere (Thermosphere)
  5. Exosphere

## TROPOSPHERE

# Railway Exams – General Awareness

- The troposphere is the lower most layer of the atmosphere. It extends approximately to a height of 8 km from the poles and 18 km from the equator. The height of the troposphere changes seasonally also. It increases during summer and decreases during winter
- The air we breathe exists here. Almost all the weather phenomena like rainfall, fog and hailstorm occur in this layer.
- This layer is the most important layer of the atmosphere

## STRATOSPHERE

- Stratosphere lies above the troposphere. It extends to a height of about 50km above earth surface
- This layer is almost free from clouds and associated weather phenomenon, making conditions most ideal for flying Aero planes
- The temperature increases with increase in height in this layer. The upper limit of the stratosphere is called as stratopause.
- One important feature of stratosphere is that it contains a layer of ozone gas

## MESOSPHERE

- This is the third layer of the atmosphere. It lies above the stratosphere. It extends up to the height of 80 km.
- Meteorites burn up in this layer on entering from the space.
- The temperature decreases with increase of altitude due to the absence of ozone

## THERMOSPHERE

- Thermosphere exists above the mesosphere. It extends to about 80-400 km. In thermosphere temperature rises very rapidly with increasing height
- Ionosphere is a layer of the thermosphere that contains Ions and free electrons
- This layer helps in radio transmission. In fact, radio waves transmitted from the earth are reflected back to the earth by this layer.

## EXOSPHERE

- The upper most layer of the atmosphere is known as exosphere
- This layer has very thin air. Light gases like helium and hydrogen float into the space from here.
- The exosphere extends beyond the thermosphere up to 960 Km

## WEATHER AND CLIMATE

# Railway Exams – General Awareness

- Weather is the day today conditions(state) of the atmosphere at any place as regards sunshine, temperature, cloud cover, Wind fog condition, air pressure, humidity, precipitation and such other elements.
- The average weather condition of a place for a longer period of time represents the climate of a place
- Temperature is one of the key elements of weather and climate.
- Temperature varies with time due to changes in the level of radiation which reach the earth surface. This is due to motions of the earth (The rotation and revolution) and inclination of the earth's axis.
- Temperature varies both horizontally and vertically. Temperature decreases with increasing height is known as Lapse rate which is 6.5 degree celsius per 1000 meters in troposphere

## HEAT ZONES OF THE EARTH

- The spherical shape of the earth along with its movement around the sun causes differences in the angles at which the sun's ray's fall on the earth's surface. This causes a difference in the distribution of heat on the earth's surface.

### Torrid Zone

- The mid-day sun is exactly overhead at least once a year on all latitudes in between the Tropic of Cancer and the Tropic of Capricorn. It therefore, receives the maximum heat.

### Frigid Zones

- Areas lying between the Arctic Circle and the North Pole in the Northern Hemisphere and the Antarctic Circle and the South Pole in the Southern Hemisphere, are very cold. It is because here the sun does not raise much above the horizon.

### Temperate Zones

- The mid-day sun never shines overhead on any latitude beyond the Tropic of Cancer and the Tropic of Capricorn. The angle of the sun's rays goes on decreasing towards the poles. and the Tropic of Capricorn and the Antarctic Circle in the Southern Hemisphere, They have moderate temperatures

## AIR PRESSURE

- Air pressure is defined as the pressure exerted by the weight of air on the earth's surface. As we go up the layers of atmosphere, the pressure falls rapidly
- The air pressure is highest at sea level and decreases with height
- Horizontally the distribution of air pressure is influenced by temperature of air at a given place

## WIND

- The movement of air from high pressure area to low pressure areas is called wind
- Winds can be broadly divided into three types.

# Railway Exams – General Awareness

1. Permanent winds – The trade winds, westerlies and easterlies are the permanent winds. These blow constantly throughout the year in a particular direction.
  2. Seasonal winds – These winds change their direction in different seasons. For example monsoons in India.
  3. Local winds – These blow only during a particular period of the day or year in a small area. For example, land and sea breeze
- Clouds: A visible mass of Condensed water vapour floating in the air

## CYCLONE

- Cyclone is an area of low pressure surrounded by high pressure ,,
- Anticyclone is an area of high pressure area surrounded by low pressure.
- Cyclones can be classified into
  1. Tropical cyclones
  2. Temperate cyclones
  3. Extra tropical cyclones

### Tropical cyclones

- Tropical cyclones are known as ‘**cyclones**’ in Indian ocean, ‘**Typhoons**’ in the western pacific ocean, ‘**Hurricanes**’ in the Atlantic and eastern Pacific ocean, ‘**Baguios**’ in Philippine’s and ‘**willy willy**’ in Australia, ‘**Taifu**’ in japan.

## ISOLINES

- Isolines are those which join the places of equal values.
- Isolines are given different names based on the weather element they represent.

Isopleth	Reactions
Isobars	Equal atmospheric pressure
Isohyet	Equal amount of rainfall
Isollobar	Equal pressure
Isohel	Equal sunshine
Isocryme	Equal lowest mean temperature for a specified period
Isotherm	Equal temperature
Isocline	Slope
Isodapan	Equal transportation cost distance

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Isoneph	Cloudiness
Isonif	Snow
Isohypse	Elevation above sea-level
Isobaths	Equal depth sea
Isobronts	Thunder-storm at the same time
Isohaline	salinity

## EARTHQUAKE AND VOLCANO

- A sudden movement of a portion of the earth's crust which produces a shaking or trembling is known as an earthquake
- The point where these vibrations originate is called the focus of the earthquake
- The point of the earth's surface directly above the focus is called the epicentre of the earthquake
- From the focus, the earthquake vibrations travel in different directions in the form of seismic waves. There are three types of earthquake waves:
  1. P waves or longitudinal waves
  2. S waves or transverse waves
  3. L waves or surface waves
- The earthquake waves are recorded by an instrument known as seismograph. The magnitude of an earthquake is measured by the Richter scale. The numbers on this scale range from 0 to 9
- The Ring of Fire is a major area in the basin of the Pacific Ocean where many earthquakes and volcanic eruptions occur
- A volcano is a vent or an opening on the surface of the Earth crust, through which hot solid, liquid and gaseous materials (Magma) erupt out to the surface from the Earth's interior
- Barren Island is situated in the Andaman Sea and lies about 138 km northeast of the territory's capital. It is only in active volcano along the chain from sumatra to myanmar. Last eruption occurred in 2017

## INDIAN GEOGRAPHY

### INDIA-SIZE AND LOCATION

- India is the seventh largest in terms of area (3287263 Km<sup>2</sup>) and second most populous nation after china, accounting 2.4 percent of total area
- The Indian peninsula is separated from mainland Asia by the Himalayas. The Country is surrounded by the Bay of Bengal in the east, the Arabian Sea in the west, and the Indian Ocean to the south.

# Railway Exams – General Awareness

- India has 6100 Km of mainland coastline (Total including Lakshadweep, and Andaman and Nicobar are 7516.6 km) and share 15200 km land border with nations
- India sharing border with Pakistan (3310 km), China(3917 km), Nepal (1752 km), Bhutan(587 km), Bangladesh(4096 km)
- India's longest border is with Bangladesh (4156 km)while the shortest border is with Afghanistan.(106 km)
- The Tropic of Cancer (23° 30'N) divides the country into almost two equal parts
- Tropic cancer passes through the eight states of India (Gujarat, Rajasthan, Madhya Pradesh, Chhattisgarh, Jharkhand, West Bengal, Tripura and Mizoram)
- Great channel separates India from Indonesia
- Sri Lanka is separated from India by a narrow channel of sea formed by the Palk strait and the Gulf of manner
- The Ten Degree Channel is separates the Andaman Islands and Nicobar Islands from each other in the Bay of Bengal
- India extends from 8°4 'N to 37°6 'N latitudes and 68°7 'E to 97°25 'E longitudes. Hence India is located of the north Eastern hemisphere
- Indian subcontinent was originally part of Gondwana Continent
- The southernmost point of main land of India is Cape Comorin (Kanniyakumari)
- The southernmost point of the country is Pygmalion Point or Indira Point (6°45'N latitude) located in the Andaman and Nicobar Islands
- The north-south extent of India is 3,214 km and it extends from Indira Col in Jammu and Kashmir in the north to Kanniyakumari in the south
- The east-west extension is 2933 km and it stretches from Rann of Kutch (Gujarat) in the west to Arunachal Pradesh in the east
- Standard Meridian of India (82°30'E) passing through Mirzapur (in Uttar Pradesh) is taken as the standard time for the whole country

## LIST OF INDIAN STATES SHARE INTERNATIONAL BORDER WITH NEIGHBORING COUNTRIES

- 17 states of India have the common land borders with neighboring countries.

Country	Indian states having common borders	Number of states having common borders

# Railway Exams – General Awareness

Pakistan	Gujarat, Rajasthan, Punjab and Jammu & Kashmir	4
Afghanistan	Jammu and Kashmir	1
Nepal	Uttarakhand, Uttar Pradesh ,Bihar, Sikkim and West Bengal	5
Myanmar	Arunachal Pradesh, Nagaland , Manipur and Mizoram	4
Bhutan	Sikkim, West Bengal, Arunachal Pradesh and Assam	4
Bangladesh	West Bengal , Meghalaya, Mizoram, Tripura and Assam	5
China	Jammu & Kashmir, Uttarakhand, Himachal Pradesh, Sikkim and Arunachal Pradesh	5

## THE PHYSICAL FEATURES OF INDIA

- The physical features of India can be grouped under the following physiographic divisions
  - 1 The Himalayan Mountains
  - 2 The Northern Plains
  - 3 The Peninsular Plateau
  - 4 The Indian Desert
  - 5 The Coastal Plains
  - 6 The Islands

## THE HIMALAYAN MOUNTAINS

- The Himalayas, geologically young and structurally fold mountains stretch over the northern borders of India
- Aravalli range is the oldest fold mountain range in India.
- It stretches for a distance of 2,400 km from the Indus gorge in the west to Brahmaputra gorge in the east
- The width of the Northern Mountains varies from 400 km in Kashmir to 150 km in Arunachal Pradesh
- The Pamir Knot, popularly known as the “Roof of the World” is the connecting link between the Himalayas and the high ranges of Central Asia
- The Northern Mountains that function as a great wall is grouped into three divisions.
  - 1) The Trans-Himalayas, 2) Himalayas, 3) Eastern or Purvanchal hills.



# Railway Exams – General Awareness

## THE TRANS-HIMALAYAS

- It is also known as western Himalaya's.
- The Trans-Himalayas are about 40 km wide in its eastern and western extremities and about 225 km wide in its central part
- The rocks of this region contain fossils bearing marine sediments which are underlain by Tertiary granite
- The prominent ranges of Trans Himalayas are Zaskar, Ladakh, Kailash, and Karakoram.

## THE HIMALAYAS

- It constitutes the core part of northern mountains. It is an young fold mountain
- The main divisions of the Himalayas are the (i) Greater Himalayas, (ii) the Lesser Himalayas and (iii) the Siwaliks

### The greater or inner Himalayas or the Himadri

- The Greater Himalayas are about 25 km wide. Its average height is about 6,000 m. The Greater Himalayas receive lesser rainfall as compared to the Lesser Himalayas and the Siwaliks
- The folds of Great Himalayas are asymmetrical in nature. The core of this part of Himalayas is composed of granite
- Almost all the lofty peaks of Himalayas are located in this range. The notable ones are Mt. Everest (8,848 m) and Kanchenjunga (8,586 m). Mt. Everest is located in Nepal and Kanchenjunga is located between Nepal and Sikkim
- It is perennially snow bound
- Gangotri, Yamunotri and Siachen are some of the glaciers found in this region

### The Lesser Himalayas or The Himachal

- It is the middle range of Himalayas. Height of this range varies from 3,700 to 4,500 m. Its width varies upto 80 km.
- The major rocks of this range are slate, limestone and quartzite
- Pir Panjal, Dhauladhar and Mahabharat are the mountain ranges found in this part.
- Major hill stations of the Himalayas are located in this range. Shimla, Mussoorie, Nainital, Almora, Ranikhet and Darjeeling are the familiar ones.

### The Siwaliks or Outer Himalayas

# Railway Exams – General Awareness

- The Siwaliks extend from Jammu and Kashmir to Assam. It is partly made by the debris brought by the Himalayan rivers
- The altitude varying between 900-1100 metres elevation of this range is 1300 m. The width of Siwaliks vary from 10 km in the east to 50 km in the west
- The longitudinal valleys found between the Siwaliks and the Lesser Himalayas are called Duns in the west and Duars in the east

## PURVANCHAL HILLS

- These are the eastern off-shoot of Himalayas. It extended in the north-eastern states of India.
- Most of these hills are located along the border of India and Myanmar while others are inside India.
- Dafla Hills, Abor Hills, Mishmi Hills, Patkai Bum Hills, Naga Hills, Manipur Hills, Mizo Hills, Tripura Hills, Mikir Hills, Garo Hills, Khasi Hills and Jaintia Hills are the hills which are collectively known as purvanchal Hills

## HIGHEST PEAKS IN HIMALAYAS

- Himalaya is the home of several high peaks. However, it holds the record of having the maximum number of highest peaks among any mountain range in world. Out of 14 heights peaks in this world, Himalayas holds 9.

Peak	Country	Height in metres
Mt. Everest	Nepal	8848
Mt.K2 or Godwin Austen	India	8611
Kanchenjunga	India	8598
Makalu	Nepal	8481
Dhaulagiri	Nepal	8172
Nanga Parbat	India	8126
Annapurna	Nepal	8078
Nanda Devi	India	7817
Kamet	India	7756
Namcha Barwa	India	7756
Gurla Mandhata	Nepal	7728

## THE GREAT NORTHERN PLAINS

- This plain is one of the most extensive stretches of the alluvium in the world and is deposited by the rivers Indus, Ganga, Brahmaputra and their tributaries

# Railway Exams – General Awareness

- The length of the plain is about 2,400 km and the width varies from 240 to 320 km. Its width increases from east to west. It covers an area of over 7 lakh sq.km
- The Great Plains of India is remarkably a homogeneous surface with an imperceptible slope. They are formed mostly by the depositional process of the Himalayan and Vindhyan rivers. These rivers deposit enormous quantity of sediments deposited along the foothills and flood plains
- Northern Great Plains is divided into four as Rajasthan Plains, Punjab Haryana Plains, Gangetic Plains and Brahmaputra Plains.
- The great northern plains is a rich soil cover combined with adequate water supply and favorable climate it is agriculturally a very productive part of India
- The rivers coming from northern mountains are involved in depositional work. In the lower course, due to gentle slope, the velocity of the river decreases which results in the formation of riverine islands.
- Majuli, in the Brahmaputra River is the largest inhabited riverine island in the world

## THE PENINSULAR PLATEAU

- The Peninsular plateau is a tableland composed of the old crystalline, igneous and metamorphic rocks
- The plateau region lies to the south of the Great Northern Plains. This is the largest physiographic division of our country. It covers an area of about 16 lakh sq.km
- Aravalli hills mark the north-western boundary of the plateau region. Its northern and north-eastern boundaries are marked by the Bundelkhand upland, Kaimur and Rajmahal hills. The Western Ghats and the Eastern Ghats mark the western and eastern boundaries respectively
- The altitude of a large portion of the plateau is more than 600 m from mean sea level.
- The peak of Anaimudi is the highest point in the plateau. Its height is 2,695 m and is located in Anaimalai
- All the major rivers (Mahanadi, Godavari, Krishna, Kaveri etc.) lying to the south of the Vindhyas flow eastwards and fall into the Bay of Bengal.
- Narmada and Tapi are the two rivers situated to the south of the Vindhyas flow westward. Their movement towards west is due to the presence of a rift valley in the region
- The river Narmada divides the plateau region of India broadly into two parts. The region lying to the north of the Narmada is called the Central Highlands and the region lying to the south of Narmada is called the Deccan Plateau

## CENTRAL HIGHLANDS

- The Central Highlands extend between the river Narmada and the Northern Great Plains.

# Railway Exams – General Awareness

- The Aravallis form the west and northwestern edge of the Central Highlands. These hills extend from Gujarat, through Rajasthan to Delhi in the northwesterly direction for a distance of about 700 km.
- **Gurushikhar** (1,722 m) is the highest peak of Aravallis range
- The Western part of the Central Highland is known as the Malwa Plateau. The rivers Chambal, Betwa and Ken drain the Malwa Plateau before they join the river Yamuna
- The part of the Central Highlands which extends to the east of Malwa Plateau is known as Bundelkhand and its further extension is known as Bagelkhand
- The eastern part of the Central High lands which lies in the north-eastern part of the Indian Plateau is known as Chhota-Nagpur Plateau. It covers much of Jharkhand, adjacent parts of Odisha, West Bengal, Bihar and Chhattisgarh. This region is very rich in mineral resources particularly iron ore and coal.

## DECCAN PLATEAU

- This physiographic division is the largest part of the plateau region of India. The shape of this plateau is roughly triangular
- The area of this Plateau is about 7 lakh square km and the height ranges from 500 to 1000 m above sea level.
- The Western Ghats forms the western edge of the Peninsular Plateau. It runs parallel to the Arabian Sea coast. The northern part of this range is called as Sahyadris. The height of the Sahyadris increases from north to south
- Eastern Ghats run from southwest to northeast form the eastern edge of this Plateau. This range is also called as Poorvadri
- The Eastern Ghats join the Western Ghats at the Nilgiri hills, bordering Karnataka and Tamil Nadu.
- The Eastern Ghats are not continuous like the Western Ghats

## THE INDIAN DESERT

- The Thar desert, also known as the Great Indian desert is a large arid region in the north western part of the Indian subcontinent that covers an area of 2,00,000 km<sup>2</sup> and forms a natural boundary between India and Pakistan
- It is the world 7th largest desert, and world 9th largest sub-tropical desert located in Western part of the India.
- This region receives very low rainfall below 150 mm per year. Luni is the only large river in this region.

## THE COASTAL PLAINS

- The Indian coastal plains are divided into the following two divisions:
  - 1) The Western Coastal Plains and

## 2) The Eastern Coastal Plains

### THE WESTERN COASTAL PLAIN

- It lies between the Western Ghats and the Arabian Sea. It extends from Rann of kutch in the north to Kanniyakumari in the south and its width varies from 10 to 80 km
- The northern part of the West Coastal Plain is known as Konkan Plain. The middle part of this plain is known as Kanara. The southern part of the plain is known as Malabar Coast which is about 550 km long and 20-100 km wide
- Along the west coast, there are numerous shallow lagoons and backwaters called Kayals and Teris. Vembanad is a famous back water lake found in this region.

### THE EASTERN COASTAL PLAIN

- It lies between the Eastern Ghats and the Bay of Bengal
- The coastal plain between Mahanadi and Krishna River is known as the Northern Circars and the southern part lies between Krishna and Kaveri rivers is called Coromandal coast
- The Marina beach on this coast in Chennai and it is the second longest beach in the world
- Lake Chilka (Odisha) is the largest lake in India located to the southwest of the Mahanadi delta
- The Chilika Lake is the largest salt water lake in India. It lies in the state of Orissa, to the south of the Mahanadi delta.
- The Kolleru Lake which lies between the deltas of Godavari and Krishna
- The Pulicat Lake lies in the border of Andhra Pradesh and Tamil Nadu are the well-known lakes in the east coastal plain

### THE ISLANDS

- India has two major island groups namely Andaman and Nicobar and Lakshadweep
- The Andaman and Nicobar group consists of 572 islands and are located in Bay of Bengal
- Lakshadweep consists 27 islands and are located in Arabian Sea

### ANDAMAN AND NICOBAR ISLANDS

- India's only active volcano is found on Barren Island in Andaman and Nicobar group of Islands is divided into two. They are Andaman in the north and the Nicobar in the south
- Port Blair is the administrative capital of the Andaman and Nicobar islands
- The Ten Degree Channel separates Andaman from Nicobar group.
- The southernmost tip, the Indira Point is a part of Nicobar Island.

# Railway Exams – General Awareness

- India's only active volcano is found on Barren Island in Andaman and Nicobar group of Islands

## LAKSHADWEEP ISLANDS

- This is a small group of coral islands located off the west coast of India. It covers an area of 32 sq. km. Kavaratti is its administrative capital.
- Lakshadweep islands are separated from the Maldives Islands by the Eight Degree Channel.
- The uninhabited "Pitt Island" of this group has a bird sanctuary

## DRAINAGE SYSTEM OF INDIA

- A drainage system is an integrated system of tributaries and a trunk stream which collects and drains surface water into the sea, lake or some other body of water.
- The drainage system of India is broadly divided into two major groups on the basis of their location. They are Himalayan Rivers and the Peninsular Rivers.
- The river system provides irrigation, drinking water, and navigation, power as well as grant livelihoods for a large number of populations.
- Perennial Rivers: The rivers which flow throughout the year and have permanent source of water
- The Indus River system, the Ganga River system and the Brahmaputra River system have made the agricultural lands of north India as fertile land. These rivers are perennial in nature.
- Narmada, Tapti, Mahi and Sabarmathi rivers confluence with the Arabian Sea.
- Mahanadi, Godavari, Krishna and Cauvery are the major east flowing rivers and drain into Bay of Bengal.

## THE HIMALAYAN RIVERS

- The major Himalayan Rivers are the Indus, the Ganga and the Brahmaputra. These rivers are long, and are joined by many large and important tributaries
- Perennial in nature

### The Indus River System

- The river Indus rises in Tibet, near Lake Mansarowar. Flowing west, it enters India in the Ladakh district of Jammu and Kashmir
- Its length is about 2,880 km (Only 709 km is in India)
- Its major tributaries are Jhelum, Chenab (Largest tributary of Indus), Ravi, Beas and Sutlej. It enters into with the Arabian Sea.

### The Ganga River System

# Railway Exams – General Awareness

- The Ganga River system is the largest drainage system of India it extend over an area of 8,61,404 sq km in India
- The river Ganga originates as Bhagirathi from the Gangotri Glacier in Uttarakhand state, at an elevation of 7,010 m
- The length of the river Ganga is about 2,525 km
- Its major tributaries from the north are Gomti, Gandak, Kosi and Ghaghra and from south, Yamuna (largest tributary of Ganga), Son, Chambal etc
- The river Yamuna rises from the Yamunotri Glacier in the Himalayas. It flows parallel to the Ganga and as a right bank tributary, meets the Ganga at Allahabad
- The Ganga flows eastwards till Farakka in West Bengal. This is the northernmost point of the Ganga delta. The river bifurcates here; the Bhagirathi-Hooghly (a distributary) flows southwards through the deltaic plains to the Bay of Bengal
- The river Ganga is known as the River Padma in Bangladesh.
- The combined river of Ganga and Brahmaputra creates the World's largest delta known as Sundarbans in Bangladesh before joining the Bay of Bengal

## The Brahmaputra River System

- The river Brahmaputra originates from the Chemayungdung Glacier of the Kailash range to the east of Lake Manasarovar in Tibet at an elevation of about 5,150 m
- This river is known as Tsangpo (Purifier) in Tibet.
- The length of this river is about 2,900 km (900 km in India).
- It enters into India through a gorge in Arunachal Pradesh namely Dihang. It has many tributaries. Tista, Manas, Barak, Subansiri are some of them.
- This river is called as Jamuna in Bangladesh. After it joins with the river Ganga in Bangladesh, the river is called as Meghna.

## PENINSULAR RIVERS

- The rivers in south India are called the Peninsular Rivers. Most of these rivers originate from the Western Ghats. These are seasonal rivers (non-perennial).
- Based on the direction of flow, the peninsular rivers are divided into the West flowing and East flowing rivers

## WEST FLOWING RIVERS

### Narmada

- The Narmada rises in the Amarkantak hills in Madhya Pradesh and flows for a distance of about 1,312 km. It flows towards the west in a rift valley formed due to faulting

# Railway Exams – General Awareness

- It covers an area of 98,796 sq km and forms 27 km long estuary before outfalling into the Arabian Sea through the Gulf of Cambay
- It is the largest among the west flowing rivers of Peninsular India
- Its principal tributaries are Burhner, Halon, Heran, Banjar, Dudhi, Shakkar, Tawa, Barna and Kolar.

## **Tapti**

- The Tapti is one of the major rivers of Peninsular India with the length of about 724 km. It outfalls into the Arabian Sea through the Gulf of Cambay
- Tapti River rises near Multai in the Betul district of Madhya Pradesh at an elevation of about 752 m.
- It is one of only the three rivers in Peninsular India that runs from east to west - the others being the Narmada and the Mahi.
- The major tributaries are Vaki, Gomai, Arunavati, Aner, Nesu, Buray, Panjhra and Bori.

## **EAST FLOWING RIVERS**

### **The Mahanadi Basin**

- The river Mahanadi originates near Sihawa in Raipur district of Chattisgarh and flows through Odisha. Its length is 860 km
- The main stream of Mahanadi gets divided into several distributaries such as Paika, Birupa, Chitartala, Genguti and Nun
- The Mahanadi empties its water in Bay of Bengal

### **The Godavari Basin**

- The Godavari is the largest Peninsular River. it is also known as the ‘Dakshin Ganga’.
- It rises from the slopes of the Western Ghats in the Nasik district of Maharashtra.
- Its length is about 1500 km. It drains into the Bay of Bengal.
- Kolleru, a fresh water lake is located in the deltaic region of the Godavari.

### **The Krishna Basin**

- Rising from a spring near Mahabaleshwar in the Western Ghats of Maharashtra, the Krishna flows for about 1400 km and reaches the Bay of Bengal



# Railway Exams – General Awareness

- It is the second longest Peninsular river Bhima, Peddavagu, Musi, Koyna and Thungabhadra are the major tributaries of this river

## The Kaveri Basin

- The river Kaveri originates at Talakaveri, Kudagu hills of Karnataka and it reaches the Bay of Bengal. Its length is 760 km
- Its main tributaries are Amravati, Bhavani, Hemavati and Kabini

## LIST OF INDIAN RIVERS AND THEIR PLACE OF ORIGIN

River	Place of Origin	Fall into
Ganga	Gangotri (Uttarakhand)	Bay of Bengal
Sutlej	Lake Rakshastal in Tibet	Chenab
Indus	Indus rises in Tibet, near Lake Mansarowar	Arabian Sea
Jhelum	Verinag Spring	Chenab
Yamuna	Yamunotri (Uttarakhand)	Ganga
Narmada	Maikal Hills, Amarkantak (MP)	Gulf of Khambat
Tapti	Satpura Range, Betul (MP)	Gulf of Khambat
Mahanadi	Nagri Town (Chhattisgarh)	Bay of Bengal
Brahmaputra	Chemayungdung (Tibet)	Bay of Bengal
Sutlej	Mt Kailash (Tibet)	Chenab
Beas	Rohtang Pass (Himachal Pradesh)	Satluj
Godavari	Nasik (Maharashtra)	Bay of Bengal
Krishna	Mahabaleshwar (Maharashtra)	Bay of Bengal
Cauvery	Brahmagiri Hills, Coorg (Karnataka)	Bay of Bengal
Sabarmati	Udaipur, Aravalli Hills (Rajasthan)	Arabian Sea
Ravi	Chamba (Himachal Pradesh)	Chenab

# Railway Exams – General Awareness

Tungabhadra	Koodli	Krishna River
Pennar	Nandi Hills, Chickballapur (Karnataka)	Bay of Bengal
Luni	Pushkar, Aravalli Hills (Rajasthan)	Rann of Kachchh
Chambal	Janapav, Indore, Vindhya (MP)	Yamuna

## LIST OF DAMS IN INDIA

Dam	River	State
SardarSarovar Dam	Narmada	Gujarat
Srisailem Dam	Krishna	Telangana
RanjitSagar Dam	Ravi	Punjab
Koteswar Dam	Bhagirathi	Uttarakhand
Gandhi Sagar Dam	Chambal	Madhya Pradesh
Omkareshwar Dam	Narmada	Madhya Pradesh
Mullaperiyar Dam	Periyar	Kerala (idukki district)
NagarjunaSagar Dam	Krishna	Telangna/Andhra Pradesh
Baglihar Dam	Chenab	Jammu & Kashmir
Salal Dam	Chenab	Jammu & Kashmir
Tehri Dam	Bhagirathi	Uttarakhand
Uri Dam	Jhelum	Jammu & Kashmir
Indira Sagar Dam	Narmada	Madhya Pradesh
Rihand Dam	Rihand	Uttar Pradesh
Ukai Dam	Tapi	Gujarat
Bhakra Dam	Sutlej	Himachal Pradesh
Lakhwar Dam	Yamuna	Uttarakhand
Hirakud Dam	Mahanadi	Odisha

# Railway Exams – General Awareness

RanaPratapSagar Dam	Chambal	Rajasthan
JawaharSagar Dam	Chambal	Rajasthan

## LIST OF LAKES IN INDIA

- Largest freshwater lakes in Asia & India – Wular Lake, Kashmir
- Largest artificial lake in Asia – Govind Vallabh Pant Sagar (Rihand Dam)
- Largest saline water lake in India – Chika lake, Orissa
- Longest lake in India – Vembanad, Kerala
- Highest Lake in India – Cholamu Lake, Sikkim
- The Sambhar lake in Rajasthan is a salt water lake

State	Name of the Lake
Andhra Pradesh	Kolleru Lake Pulicat Lake
Assam	Deepor Beel Lake Haflong Lake Son Beel Lake
Bihar	Kanwar Lake
Gujarat	Hamirsar Lake Kankaria Lake Nal Sarovar Lake Narayan Sarovar Thol Lake Vastrapur Lake Lakhota Lake Sursagar Lake
Haryana	Badkhal Lake Karna Lake Surajkund Lake Tilyar Lake Blue Bird Lake
Himachal Pradesh	Brighu Lake Dashir Lake

# Railway Exams – General Awareness

	Dhankar Lake Kareri (Kumarwah) lake Khajjiar Lake Macchial Lake Maharana Pratap Sagar Lake Manimahesh Lake Nako Lake Pandoh Lake Renuka Lake Rewalsar Lake Seruvalsar Lake Manimahesh Lake Suraj Taal Lake
Jammu and Kashmir	Dal Lake Wular Lake Manasbal Lake Mansar Lake Sheshnag Lake
Karnataka	Lalbagh Lake Puttenahalli Lake Madiwala Lake Agara Lake Karanji lake Kukkarahalli lake Lingambudhi Lake Pampa Sarovar Lake
Kerala	Vembanad Lake Shasthamkotta lake Vellayani Lake
Madhya Pradesh	Moti lake Sarang pani lake Shahpura lake Tawa Reservoir Upper Lake

# Railway Exams – General Awareness

Maharashtra	Gorewada Lake Khindsi Lake Lonar Lake Mehrun Lake Pashan Lake Powai Lake Rankala Lake Salim Ali Lake
Meghalaya	Umiam Lake
Manipur	Loktak Lake
Mizoram	Palak dil Tam Dil
Odisha	Anshupa Lake Chilika Lake Kanjia lake
Punjab	Harike Lake Kanjli Lake Ropar Lake
Rajasthan	Talwara Lake Sambhar Salt Lake Fateh Sagar Lake Rangsagar lake Uday sagar Lake Nakki Lake
Sikkim	Gurudongmar Lake Khecheopalri Lake Lake Tsongmo Lake Cholamu
Telangana	Durgam Cheruvu (Secret Lake) Himayat Sagar
Tamil Nadu	Berijam Lake Chembarambakkam Lake Kaliveili Lake Kaveripakkam Lake

# Railway Exams – General Awareness

	Kodaikanal Lake Ooty Lake
Uttarakhand	Skeleton Lake (Roopkund Lake) Bhimtal Lake Dodital Nainital Lake Naukuchiatal Sat Tal
West Bengal	Santragachhi Lake Senchal Lake Rabindra Sarobar

## CLIMATE OF INDIA

- There are six major controls of the climate of any place. They are: latitude, altitude, pressure and wind system, distance from the sea (continentality), ocean currents and relief features
- The Tropic of cancer divides the country into two equal halves
- The area located to the south of Tropic of cancer experiences high temperature and no severe cold season throughout the year whereas, the areas to the north of this parallel enjoys subtropical climate.
- When the altitude increases, the temperatures decreases. Temperature decreases at the rate of 6.50C for every 1000 metres of ascent
- Distance from the sea does not cause only temperature and pressure variations but also affects the amount of rainfall
- Air near the coast has more moisture and greater potential to produce precipitation
- Areas of central and north India experience much seasonal variation in temperature due to the absence of influence of seas
- A large area of India, especially the peninsular region, is not very far from the sea and this entire area has a clear maritime influence on climate
- The most dominant factor which affects the climate of India is the monsoon winds
- The climate of southeast India is also influenced by northeast monsoon
- The meteorologists recognize the four distinct seasons in India. They are;
  1. Winter or cold weather season (January - February).
  2. Pre Monsoon or summer or hot weather season (March - May).
  3. Southwest monsoon or rainy season (June - September).

4. Northeast monsoon season (october - december).

- Mawsynram, the place which receives highest rainfall (1141 cm) in the world. It is located in Meghalaya.
- The average annual rainfall of India is 118 cm

## NATURAL VEGETATION

- Natural vegetation refers to a plant community unaffected by man either directly or indirectly
- The term flora is used to denote plants of a particular region or period. Similarly, the species of animals are referred to as fauna
- According to India State of Forest Report 2011, the forest cover in India is 21.05 per cent.

## TYPES OF VEGETATION

- The following major types of vegetation may be identified in our country
  1. Tropical Evergreen Forests
  2. Tropical Deciduous Forests
  3. Tropical Thorn Forests and Scrubs
  4. Montane Forests
  5. Mangrove Forests

## TROPICAL EVERGREEN FORESTS

- These forests are restricted to heavy rainfall areas of the Western Ghats and the island Groups of Lakshadweep, Andaman and Nicobar, upper parts of Assam and Tamil Nadu coast
- These forests are found in areas with 200 cm or more annual rainfall.
- The most important trees are rubber, mahogany, ebony, rosewood, coconut, bamboo, cinchona, candel, palm, iron wood and cedar

## TROPICAL DECIDUOUS FORESTS

- These are found in the areas with 100 to 200cm. annual rainfall. These are called ‘Monsoon Forests’
- These are the most widespread forests of India
- On the basis of the availability of water, these forests are further divided into moist and dry deciduous
- The moist deciduous forests is found in areas receiving rainfall between 200 and 100 cm
- The dry deciduous forests are found in areas having rainfall between 100 cm and 70 cm
- The trees of these forests drop their leaves during the spring and early summer

## THE THORN FORESTS AND SCRUBS

- The thorn forests are found in the regions which receive less than 70 cm of rainfall

# Railway Exams – General Awareness

- Trees are scattered and have long roots penetrating deep into the soil in order to get moisture. The stems are succulent to conserve water.
- Leaves are mostly thick and small to minimize evaporation
- This type of vegetation is found in the north-western part of the country including semi-arid areas of Gujarat, Rajasthan, Madhya Pradesh, Chhattisgarh, Uttar Pradesh and Haryana

## **MOUNTAIN OR MONTANE FOREST**

- The wet temperate type of forests is found between a height of 1000 and 2000 metres.
- The common animals found in these forests are Kashmir stag, spotted deer, wild sheep, jack rabbit, Tibetan antelope, yak, snow leopard, squirrels, Shaggy horn wild ibex, bear and rare red panda, sheep and goats with thick hair
- Alpine Forest occurs all along the Himalayas with above 2400 m altitude. These are purely having coniferous trees. Oak, silver fir, pine and juniper are the main trees of these forests. The eastern parts of Himalayas has large extent of these forests

## **MANGROVE FORESTS**

- The mangrove tidal forests are found in the areas of coasts influenced by tides
- The delta of the Ganga-Brahmaputra has the largest tidal forest. Sundari trees are found in this delta and Royal Bengal Tiger is the famous animal in these forests.
- The deltas of the Ganga, the Mahanadi, the Krishna, the Godavari and the Kaveri are covered by such vegetation

## **WILDLIFE**

- The Government of India enacted Wildlife (Protection) Act in 1972
- Project Tiger , Project Rhino , Project Great Indian Bustard and many other eco developmental projects have been introduced
- Project Tiger was launched in April 1973 with the aim to conserve tiger population in specifically constituted “Tiger Reserves” in India
- Wildlife projects
  1. Hangul project-1970
  2. Gir Lion project-1972
  3. Project Tiger-1973
  4. Crocodile Breeding Project-1974
  5. Rhinos Conservation-1987



# Railway Exams – General Awareness

6.Project Elephant-1992

7.Red panda project-1996

- The Indian government has established 18 Biosphere Reserves in India
- Twelve of the eighteen biosphere of India fall under the list of Man and Biosphere Programme of UNESCO  
1. Gulf of Mannar, 2. Nandadevi, 3. The Nilgiris, 4. Nokrek, 5.Pachmarhi, 6.Simlipal, 7.Sundarbans, 8.Agasthiyamalai, 9.Great Nicobar, 10.Kanjanjunga 11.Panna and 12..Amarkantak

## BIOSPHERE RESERVES IN INDIA

S.No	Biosphere Reserves	State
1	Achanakmar-Amarkantak	Madhya Pradesh, Chattisgarh
2	Agasthyamalai	Kerala
3	Dibru Saikhowa	Assam
4	Dihang Dibang	Arunachal Pradesh
5	Great Nicobar	Andaman and Nicobar Islands
6	Gulf of Mannar	Tamil nadu
7	Kachch	Gujarat
8	Kanchenjunga	Sikkim
9	Manas	Assam
10	Nanda Devi	Uttarakhand
11	The Nilgiris	Tamil nadu
12	Nokrek	Meghalaya
13	Pachmarhi	Madhya Pradesh
14	Simlipal	Odisha
15	Sundarbans	West Bengal
16	Cold desert	Himachal Pradesh
17	Sesahachalam hills	Andhra Pradesh
18	Panna	Madhya Pradesh

# Railway Exams – General Awareness

## LIST OF IMPORTANT NATIONAL PARKS IN INDIA

State	National Parks
Assam	Rajiv Gandhi Orange National Park Dibru-Saikhowa National Park Kaziranga National Park Manas National Park Nameri National Park
Arunachal Pradesh	Mouling National Park Namdapha National Park
Andhra Pradesh	Sri venkateshwar National Park
Andaman and Nicobar Islands	Campbell Bay National Park Galathea Bay National Park Mahatama Gandhi Marine (Wandoor) National Park Middle Button Island National Park Mount Harriett National Park North Button Island National Park Rani Jhansi Marine National Park Saddle Peak National Park South Button Island National Park
Bihar	Valmiki National Park
Chhattisgarh	Guru Ghasi Das National Park Indravati National Park Kanger Valley National Park
Gujarat	Vansda National Park

# Railway Exams – General Awareness

	Blackbuck National Park Gir Forest National Park Marine National Park, Gulf of Kutch
Goa	Bhagwan Mahavir National Park
Himachal Pradesh	Pin Valley National Park Great Himalayan National Park Inderkilla National Park Khirganga National Park Simbalbara National Park
Jammu & Kashmir	Hemis National Park Kishtwar National Park Salim Ali National Park Dachigam National Park
Jharkhand	Betta National Park
Karnataka	Anshi National Park Bandipur National Park Bannerghatta National Park Kudremukh National Park Nagarhole National Park
Kerala	Eravikulam National Park Anamudi Shola National Park Mathikettan National Park Pampaclum National Park Periyar National Park Silent Valley National Park

# Railway Exams – General Awareness

Meghalaya	Balphakram National Park Nokrek National Park
Maharashtra	Chandoli National Park Nawegaon National Park Tadoba National Park Gugamal national park Pench National Park Sanjay Gandhi (Borivilli) National Park
Manipur	Keibul Lamjao National Park
Meghalaya	Balphakram National Park Nokrek Ridge National Park
Mizoram	Murlen National Park Phawngpui National Park
Nagaland	Intanki National Park
Odisha	Bhitarkanika National Park Simlipal National Park
Rajasthan	Sariska National Park Ranthambore National Park Darrah National Park Desert National Park Keoladeo National Park
Sikkim	Khangchendzonga National Park
Tamil Nadu	Guindy National Park Indira Gandhi National Park Mukurthi National Park Mudumalai National Park

# Railway Exams – General Awareness

	Gulf of Mannar Marine National Park
Telangana	Mrugavani National Park
Tripura	Clouded Leopard National Park Bison (Rajbari) National Park
Uttar Pradesh	Dudhwa National Park
Uttarakhand	Corbett National Park Gangotri National Park Nanda Devi National Park Rajaji National Park Valley of Flowers National Park
West Bengal	Neora Valley National Park Singalila National Park Buxa National Park Sundarbans National Park

## AGRICULTURE IN INDIA

### SOILS

- Soil is the finest particle found on the earth surface.
- Soil is the uppermost layer of the land surface, usually composed of minerals, organic matter, living organisms, air and water
- Alluvial soil, black soil, red soil and laterite soil are the major types of soil in India
- Khadar- Newer alluvium soil found in valley flooded almost every year
- Bhangar- Older alluvium soil found in 30 mts above flood level

### SOIL TYPES AND THEIR DISTRIBUTION IN INDIA

Soil Type	Distribution	Crops growing
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# Railway Exams – General Awareness

Alluvial soil	Ganga and Brahmaputra river valleys; Plains of Uttar Pradesh, Uttarakhand, Punjab, Haryana, West Bengal and Bihar	Rice, Wheat, Sugarcane and Oilseeds
Black soils	Maharashtra and Malwa plateaus, Kathiawar peninsula, Telangana and Rayalaseema region of Andhra Pradesh and northern part of Karnataka	Cotton, Millets, Tobacco and Sugarcane
Red soils	Eastern parts of Deccan plateau, southern states of Kerala, Tamil Nadu, Karnataka and Chota Nagpur plateau (Jharkhand)	Wheat, Rice, Cotton, Sugarcane and Pulses
Laterite soils	Assam hills, hill summits of Kerala and Karnataka and eastern Ghats and region of Odisha	Coffee, Rubber, Cashew nut and Tapioca
Forest and mountain soils	Coniferous forest belts of Jammu and Kashmir, Himachal Pradesh, Uttarakhand and Sikkim. Eastern and Western Ghats	Coffee, tea, rice, maize, potato, barley, tropical fruits and various types of spices
Arid and desert soils	Rajasthan, Northern Gujarat and southern Punjab	millets, barley, cotton, maize and pulses
Peaty and marshy soils	Kottayam and Alappuzha districts of Kerala; and coastal areas of Odisha and Tamil Nadu, Sundarbans of West Bengal, in Bihar and Almora district of Uttarakhand	Paddy, jute

## IRRIGATION

- The main sources of irrigation used in different parts of the country are Canal irrigation ,Well irrigation and Tank irrigation
- Canal irrigation is the second most important source of irrigation in our country. Percentage of area under canal irrigation in our country is 24%
- Well irrigation is the most important source of irrigation as it contributes about 62 percent of net irrigated area in India
- A tank is a natural or man-made hollow on the surface developed by constructing a small bund around it across a stream

# Railway Exams – General Awareness

## CROPPING SEASONS IN INDIA

- India has three cropping seasons — Rabi, Kharif and Zaid

Cropping Seasons	Major crops cultivated in Northern States	Major crops cultivated in Southern States
Kharif Season June–September	Rice, Cotton, Bajra, Maize, Jowar, Tur	Rice, Ragi, Maize, Jowar, Groundnut
Rabi Season October–March	Wheat, Gram, Rapeseeds, Mustard, Barley	Rice, Maize, Ragi, Groundnut, Jowar
Zaid Season April–June	Vegetables, Fruits, Fodder	Rice, Vegetables, Fodder

## MAJOR CROPS CULTIVATED IN INDIA

### FOOD CROPS

- Rice, Wheat, Jowar, Bajra, Maize, Barley, Ragi, gram and Tur are some important food crops

### RICE

- It is the staple food crop of a majority of the people in India.
- India is the second largest producer of rice in the world after China
- It is a kharif crop which requires high temperature, (above 25°C) and high humidity with annual rainfall above 100 cm.
- The first 10 leading rice producing states are West Bengal (First in India) Uttar Pradesh, Punjab, Tamil Nadu, Andhra Pradesh, Bihar, Chhattisgarh, Odisha, Assam, and Haryana.

### WHEAT

- This is the second most important cereal crop. It is the main food crop, in north and north-western part of the country
- This rabi crop requires a cool growing season and a bright sunshine at the time of ripening
- The major wheat-producing states are Uttar Pradesh, Punjab, Haryana, Rajasthan and Madhya Pradesh.

### MILLETS

- Jowar, bajra and ragi are the important millets grown in India
- Jowar is the third most important food crop with respect to area and production
- Jowar is essentially a crop of the Peninsular India

# Railway Exams – General Awareness

- Major Jowar producing States were Maharashtra, Karnataka, Andhra Pradesh and Madhya Pradesh
- Bajra grows well on sandy soils and shallow black soil
- Bajra is a crop of dry region.
- Rajasthan is the largest producer of bajra followed by Uttar Pradesh, Haryana, Gujarat and Maharashtra
- Ragi is a crop of dry regions and grows well on red, black, sandy, loamy and shallow black soils.
- Major Ragi producing states are: Karnataka, Tamil Nadu, Himachal Pradesh, Uttarakhand, Sikkim, Jharkhand and Arunachal Pradesh.

## MAIZE

- It is a kharif crop which requires temperature between 21°C to 27°C and grows well in old alluvial soil
- Major maize-producing states are Karnataka, Uttar Pradesh, Bihar, Andhra Pradesh, Telangana and Madhya Pradesh

## PULSES

- India is the largest producer as well as the consumer of pulses in the world
- The major pulse growing areas are Madhya Pradesh, Uttar Pradesh, Rajasthan, Maharashtra and Andhra Pradesh

## CASH CROPS

- Sugarcane, tobacco, fibre crops (cotton, jute, and mesta) and oilseeds are some important cash crops

## SUGARCANE

- India is the second largest producer of sugarcane only after Brazil
- Uttar Pradesh is the leading producer of sugarcane in India followed by Maharashtra, Karnataka, Tamil Nadu and Gujarat
- It grows well in hot and humid climate with a temperature of 21°C to 27°C and an annual rainfall between 75cm. and 100cm
- Irrigation is required in the regions of low rainfall.

## COTTON

- India ranks second next to China in the production of cotton
- Top cotton producing countries are Gujarat, Maharashtra, Andhra Pradesh and Punjab
- Cotton is the most important cash crop of India. It provides raw material to the largest industry of India
- It is a kharif crop and requires 6 to 8 months to mature



# Railway Exams – General Awareness

## JUTE

- It is a tropical fibre crops, grows well in the alluvial soil
- West Bengal is the leading state both in cultivation and production of jute. The other cultivators of jute are Bihar, Assam and Meghalaya.
- It is known as the golden fibre

## OIL SEEDS

- Main oil-seeds produced in India are groundnut, mustard, coconut, sesamum (til), soyabean, castor seeds, cotton seeds, linseed and sunflower
- Groundnut is a kharif crop and accounts for about half of the major oilseeds produced in the country. Gujarat was the largest producer of groundnut
- Linseed and mustard are rabi crops.
- Sesamum is a kharif crop in north and rabi crop in south India.
- Castor seed is grown both as rabi and kharif crop.

## PLANTATION CROPS

- Tea, coffee, rubber and spices are the major plantation crops of India.

## TEA

- Tea is an evergreen plant that mainly grows in tropical and subtropical climates
- India is the second largest producer of tea after China in the world.
- Assam is the larger producer of tea in India. Other states are Tamil Nadu, Kerala and West Bengal.

## COFFEE

- Coffee is grown in shade and it grows effectively in the altitudes between 1,000 and 1,500 m above mean sea level.
- India is the 7th largest producer of coffee globally.
- Karnataka is the leading producer of coffee in India. It produces 71% in India, and 2.5 % in the world

## SPICES

- Pepper, chillies, turmeric, ginger, cardamom, clove and areca nut are the major spices cultivated in India.
- Kerala is the leading producer of spices in India.

## RUBBER

# Railway Exams – General Awareness

- Rubber plantation were first established in Kerala in 1902
- It needs hot and wet climatic conditions
- The major rubber growing areas are Tamil Nadu, Kerala, Karnataka and Andaman and Nicobar Islands.

## HORTICULTURE CROPS

- It refers to the cultivation of fruits, flowers and vegetables
- India was the second largest producer of fruits and vegetables in the world after China
- India contributes about 13% of the world's production of vegetables.

## LARGEST CROPS PRODUCING STATES

### FOOD GRAINS

CROP	STATE
Rice	West Bengal
Bajra	Rajasthan
Wheat	Uttar Pradesh
Maize	Andhra Pradesh
Pulses	Madhya Pradesh

### OIL SEEDS

CROP	STATE
Groundnut	Gujarat
Soya bean	Madhya Pradesh
Mustard	Rajasthan
Sunflower	Karnataka

### CASH CROPS

CROP	STATE
Sugarcane	Uttar Pradesh
Cotton	Gujarat
Coffee	Karnataka
Tea	Assam
Silk	Karnataka
Rubber	Kerala
Tobacco	Andhra Pradesh

# Railway Exams – General Awareness

## LIST OF IMPORTANT AGRICULTURAL REVOLUTIONS IN INDIA

Revolution	Related Product
Green Revolution	Food Grains
White Revolution	Milk Production
Round Revolution	Potato
Red Revolution	Meat Production / Tomato Production
Silver Fibre Revolution	Cotton
Silver Revolution	Egg Production / Poultry Production
Evergreen Revolution	Overall Production of Agriculture
Yellow Revolution	Oil seed Production (Especially Mustard and Sunflower)
Blue Revolution	Fish Production
Brown Revolution	Leather / Cocoa / Non-Conventional Products
Golden Fibre Revolution	Jute Production
Golden Revolution	Fruits / Honey Production / Horticulture Development
Grey Revolution	Fertilizers
Pink Revolution	Onion Production / Pharmaceuticals / Prawn Production

## TOP MINERAL PRODUCING STATES IN INDIA

Name of the Minerals	Top producing State
Chromite	Orissa
Uranium	Andhra Pradesh
Thorium	Kerala
Lead	Rajasthan
Iron ore	Odisha
Nickel	Orissa
Lignite	Tamil Nadu
Diamond	Madhya Pradesh
Copper	Madhya Pradesh
Natural Gas	Assam
Coal	Jharkhand
Manganese	Odisha

# Railway Exams – General Awareness

Bauxite	Odisha
Mica	Andhra Pradesh
Gold	Karnataka
Lime stone	Andhra Pradesh
Barytes	Andhra Pradesh

## INDUSTRIES

- On the basis of the source of raw materials, Industries are classified into the Agro based industries, Forest based industries and Mineral based industries.

### AGRO BASED INDUSTRIES

- These industries draw their raw materials from agricultural sector.

### COTTON TEXTILE INDUSTRY

- The first successful textile mill was established in Mumbai in 1854.
- It is one of the largest sources of employment generation in the country
- Cotton textile industry is the largest organized modern industry of India. About 16% of the industrial capital, 14% of industrial production and over 20% of the industrial labour of the country are engaged in this industry
- The higher concentration of textile mills in and around Mumbai, makes it as “Manchester of India”
- The major cotton textile industries are concentrated in the states of Maharashtra, Gujarat, West Bengal, Uttar Pradesh and Tamil Nadu

### JUTE TEXTILES

- India is the largest producer of jute goods contributing 35% of the world’s total output
- India tops in the production of raw jute and jute goods and second in the export of jute goods next to Bangladesh.
- The first jute mill in India was established at Rishra near Kolkata in 1855

### SILK INDUSTRY

- CSTRI was established in the year 1983 by the Central Silk Board, Ministry of Textiles, Govt. of India having head quarter at Bangalore

# Railway Exams – General Awareness

- India is the second largest producer of raw silk next only to China
- Karnataka is the largest producer of silk in India. Other major producers of silk are West Bengal, Jammu Kashmir, Bihar, Jharkhand, Chhattisgarh, Uttar Pradesh, Punjab, Assam and Tamil Nadu

## SUGAR INDUSTRY

- Presently is the second largest agro based industry of India after cotton textiles
- India is the world's second largest producer of sugar cane after Brazil
- Uttar Pradesh is the largest producer of sugar in India

## FOREST BASED INDUSTRIES

- Forest provides us with different types of material which are used as raw material for certain industries like paper, lac, sports goods, plywood etc.

## PAPER INDUSTRY

- The first paper mill of India was started in 1812 at Serampore in West Bengal.
- West Bengal is the largest producer of paper in the country followed by Madhya Pradesh, Odisha and Tamil Nadu states.

## IRON AND STEEL INDUSTRIES

- Iron and steel industry of India is mainly concentrated in the states of Jharkhand, West Bengal and Odisha

Name of Industry	Place	Establishment Year
Tata Iron and Steel Company(TISCO)	Jamshedpur, Jharkhand	1907
Visweshwaraya Iron Steel Ltd(VISL)	Bhadravati,Karnataka	1923
Bhilai Steel Plant Collaborated with Russia	Bhilai, Chattisgarh	1959
Rourkela Steel plant Collaborated with Germany	Rourkela, Odisha	1959
Durgapur Steel Plant Collaborated with United kingdom	Durgapur, West Bengal	1959

# Railway Exams – General Awareness

Indian Iron and Steel Company (IISCO)	Burnpur (Asansol)	1918
Bokaro Steel Plant Collaborated with Russia	Bokaro, Jharkhand	1964
Salem Steel Ltd	Salem, Tamil Nadu	1982
Visakhapatnam Steel Plant(VSP)	Visakhapatnam, Andhra Pradesh	Started operating in 1992

## TRANSPORTATION

- Transport is a system in which passengers and goods are carried from one place to another. Transport system is considered as the lifeline of a country

### AIR TRANSPORT

- The Indian Airlines and Air India are the two airline services run by the government of India
- Domestic Airways fly within the boundaries of a country and International Airways connect major cities of the world.
- Airports Authority of India (AAI) was constituted in 1995. It provides security to Indian Airports
- Pawan-Hans Helicopter Ltd has been providing Helicopter support services to various state governments in India particularly north east India Inter Island, Ferry services in Andaman & Nicobar Islands, services to Lakshadweep Island etc.,

### LIST OF INDIAN AIRPORTS (DOMESTIC AND INTERNATIONAL)

Name of the Airport	Location	State/Union Territory
Veer Savarkar International Airport	Port Blair	Andaman and Nicobar Island
Visakhapatnam International Airport	Visakhapatnam	Andhra Pradesh
Rajiv Gandhi International Airport	Hyderabad	Telangana
Lokpriya Gopinath Bardoloi International Airport	Guwahati	Assam
Indira Gandhi International	New Delhi	Delhi

# Railway Exams – General Awareness

Airport		
Goa International Airport	Goa	Goa
Sardar Vallabhai Patel International Airport	Ahmedabad	Gujarat
Kempe Gowda International Airport	Bengaluru	Karnataka
Mangalore International Airport	Mangalore	Karnataka
Cochin International Airport	Kochi	Kerala
Calicut International Airport	Kozhikode	Kerala
Trivandrum International Airport	Thiruvananthapuram	Kerala
Chhatrapati Shivaji International Airport	Mumbai	Maharashtra
Dr Babasaheb Ambedkar International Airport	Nagpur	Maharashtra
Bir Tikendrajit International Airport/	Imphal	Manipur
Biju Patnaik International Airport	Bhubaneshwar	Odisha
Sri Guru Ram Dass Jee International Airport	Amritsar	Punjab
Jaipur International Airport	Jaipur	Rajasthan
Chennai International Airport	Chennai	Tamil Nadu
Coimbatore International Airport	Coimbatore	Tamil Nadu
Tiruchirapalli International Airport	Tiruchirapalli	Tamil Nadu
Chaudhary Charan Singh International Airport	Lucknow	Uttar Pradesh
Lal Bahadur Shastri Airport	Varanasi	Uttar Pradesh
Netaji Subash Chandra Bose International Airport	Kolkata	West Bengal
Maharana Pratap Airport/ Dabok Airport	Udaipur	Rajasthan
Sheikh ul-Alam International Airport	Srinagar	Jammu & Kashmir

# Railway Exams – General Awareness

Birsa Munda Airport	Ranchi	Jharkhand
Swami Vivekananda Airport	Raipur	Chhattisgarh
Jai Prakash Narayan International Airport	Patna	Bihar
Dr. Babasaheb Ambedkar International Airport	Nagpur	Maharashtra
Mandakalli Airport	Mysore	Karnataka
Kushok Bakula Rimpochee Airport	Leh	Ladakh
Devi Ahilyabai Holkar international airport	Indore	Madhya Pradesh
Raja Bhoj Airport	Bhopal	Madhya Pradesh

## ROAD TRANSPORT IN INDIA

- Roads in India have been classified as National Highways (NH), State Highways (SH), Major District Roads, and Rural Roads
- The National Highways Authority of India (NHAI), which is an autonomous body under the Ministry of Transport, The National Highways Authority of India (NHAI) was operationalized in 1995. The NHAI is responsible for the development, maintenance, and operation of National Highways .The National Highways constitute only 2.7per cent of the total road length, but carry about 40 per cent of the road traffic
- State Highways are constructed and maintained by the state governments.
- Border road and International highways maintained by Central Government
- About 80 per cent of the total road length in India are categorized as rural roads
- District Roads provide connectivity between the district and taluk headquarters with the state highways and national highways. District Roads are constructed and maintained by the Public Works Department of the states
- **NH 44** - 3,745 km (2,327 mi) from Srinagar to Kanyakumari. It is the longest national highway in India



# Railway Exams – General Awareness

- Golden Quadrilateral comprises the National Highways connecting the four metro cities, Delhi, Mumbai, Chennai and Kolkata. The component has a total length of 5846km
- Sher shah suri built the shahi (Royal) road to strengthen and consolidate his empire from the Indus valley to the Sonar valley in Bengal. This road from Kolkata to Peshawar was renamed as Grand Trunk(GT) road during the British period
- North South corridor aims at connecting Srinagar in Jammu and Kashmir with Kanyakumari in Tamil Nadu with 4,076km long road. The East-West corridor has been planned to connect Silchar in Assam with the port town of Porbandar in Gujarat with 3,640km of road length. The two corridors intersect at Jhansi

## WATERWAYS

- The water transport is of two types- Inland Waterways and Ocean water ways(sea routes).

## INLAND NATIONAL WATERWAYS OF INDIA

- Inland Waterways Authority was set up in 1986 for the development, maintenance, and regulation of Inland national waterways in the country
- The total cargo carried by inland waterways is just about 0.1% of the total inland traffic of India

NW Number	River system	Route	Length of NW In KM
NW – 1	Ganga-Bhagirathi-Hooghly	Prayagraj – Haldia	1620
NW – 2	Brahmaputra	Sadiya-Dhubri	891
NW – 3	West Coast Canal, Champakara Canal and Udyogamandal Canal	Kottapuram – Kollam	205
NW – 4	Krishna and Godavari	Kakinada-Marakkanam	1095
NW – 5	Mahanadi, Brahmini	Magalgarhi to Pradeep and Talcher to Dhamra	623

# Railway Exams – General Awareness

## OCEANIC ROUTES

- Oceanic routes play an important role in the transport sector of India's economy. About 95% of India's foreign trade by volume and 70 percent by value moves through ocean routes.
- Visakhapatnam port is known as Jewel of all port
- India has 13 major port

Port	State	Zone
Kolkata (Haldia)	West Bengal	Eastern Coast
Paradip	Odisha	Eastern Coast
Vishakapatnam	Andhra Pradesh	Eastern Coast
Ennore	Tamil Nadu	Eastern Coast
Chennai	Tamil Nadu	Eastern Coast
Tuticorin Port	Tamil Nadu	Eastern Coast
Kochi	Kerala	Western Coast
Mangalore	Karnataka	Western Coast
Mormugao port	Goa	Western Coast
Jawaharlal Nehru Port	Maharashtra	Western Coast
Mumbai Port	Maharashtra	Western Coast
Kandla	Gujarat	Western Coast
Port Blair port	Andaman and Nicobar	

## RAILWAYS

- Railways was introduced to India in 1853
- The first railway line in India between Mumbai to Thane was constructed during the rule of Lord Dalhousie
- The headquarter of Indian Railways is New Delhi.
- The total length of Indian Railways network is 67368 km
- The first sub-urban railway was started in 1925 in Mumbai.
- Konkan Railways line runs parallel to the Arabian Sea
- Gorakhpur railway station has the world's longest railway platform
- Mumbai is the busiest suburban railway network in India
- Vivek Express (Dibrugarh to Kanyakumari ) is the longest train route in the Indian Subcontinent

# Railway Exams – General Awareness

- Ahmedabad Mumbai Central Double Decker Express is the India's first double Decker train
- First female loco pilot of the Indian Railways in India is Surekha Shankar Yadav
- UNESCO World Heritage Sites on Indian Railways are
  1. The Darjeeling Himalayan Railway
  2. The Nilgiri Mountain Railway and
  3. The Kalka-Shimla Railway,
  4. The Chatrapati Shivaji Terminus
- India's first private train is Delhi - Lucknow Tejas Express
- The first Shatabdi Express train was introduced in 1988 between New Delhi and Jhansi Junction
- Shatabdi Express trains were introduced in 1989 to commemorate the 100th anniversary of Jawaharlal Nehru
- Indian Railways was nationalized in 1951
- Uttar Pradesh has the longest route (in kilometers) of railway line in India
- National Rail Museum located in New Delhi
- Northern Railways is the largest zone in terms of route kilometers
- The Maitree Express Running between India with Bangladesh
- Great Indian Peninsula Railway ran the first train from Bori Bunder to Thane in 1853
- The width of broad gauge railway line in India is 5 feet 6 inches
- Siliguri station has all the three gauges viz. broad, metre and narrow
- The world's highest railway bridge in Kashmir being constructed over Chenab river
- India's first rail auto hub will be located in Chennai
- The National Rail and Transportation Institute (NRTI) is India's first and only transportation university located in Vadodara
- The Railway network is divided into 17 zones. The 17 zones are their respective headquarters are given below

Zonal Railways	Headquarters
Central railway	Mumbai CST
Eastern railway	Kolkata

# Railway Exams – General Awareness

East Central Railway	Hajipur
East Coast Railway	Bhubaneswar
Northern Railway	New Delhi
North Central Railway	Prayagraj
North Eastern Railway	Gorakhpur
North Frontier Railway	Maligaon, Guwahati
North Western Railway	Jaipur
Southern Railway	Chennai
South Central Railway	Secunderabad
South Eastern Railway	Kolkata
South East Central Railway	Bilaspur
South Western Railway	Hubballi
Western Railway	Mumbai
West Central Railway	Jabalpur
Kolkata metro Railway	Kolkata

## OIL AND GAS PIPELINES

- Pipelines are the most convenient and efficient mode of transporting liquids and gases over long distances. Even solids can also be transported by pipelines after converting them into slurry
- Oil India Limited (OIL) under the administrative set up of the Ministry of Petroleum and Natural Gas is engaged in the exploration, production and transportation of crude oil and natural gas. It was incorporated in 1959 as a company
- Asia's first cross country pipeline covering a distance of 1,157 km was constructed by OIL from Naharkatiya oilfield in Assam to Barauni refinery in Bihar. It was further extended up to Kanpur in 1966

## POPULATION

- India covers only 2.4 percent of the land area of the world, but is the home of about 17.5 percent of the world's population
- In India the first census was carried out in the year 1872. But the first complete and synchronous census was conducted in 1881
- Census 2011 was the 15th census of India & 7th census after Independence
- The motto of census 2011 was “Our Census, Our future”.
- According to 2011, the average density of population of India is 382 persons per sq.km. India is one of the most thickly populated ten countries of the world
- The most densely populated state of India is Bihar and the state with least population density is Arunachal Pradesh. Among the union territories, Delhi is the densely populated one with 11,297 per sq.km, while Andaman and Nicobar Islands have the lowest density of population
- According to 2011 census, the sex ratio of the country is 940 females per 1000 males
- India's literacy rate as per 2011 census is 74.04%. From this, the literacy rate of male is 82.14% and the female is 65.46%

## TRIBES IN INDIA

### 1. Andhra Pradesh

Andh, Sadhu Andh, Bhagata, Bhil, Chenchus (Chenchawar), Gadabas, Gond, Goundu, Jatapus, Kammara, Kattunayakan, Kolawar, Kolam, Konda, Manna Dhora, Pardhan, Rona, Savaras, Dabba Yerukula, Nakkala, Dhulia, Thoti, Sugalis.

### 2. Arunachal Pradesh:

Apatanis, Abor, Dafla, Galong, Momba, Sherdukpen, Singpho.

### 3. Assam

Chakma, Chutiya, Dimasa, Hajong, Garos, Khasis, Gangte.

### 4. Bihar

Asur, Baiga, Birhor, Birjia, Chero, Gond, Parhaiya, Santhals, Savar.

### 5. Chhattisgarh

Agariya, Bhaina, Bhattra, Biar, Khond, Mawasi, Nagasia.

### 6. Goa

Dhodia, Dubia, Naikda, Siddi, Varli.

### 7. Gujarat

Barda, Bamcha, Bhil, Charan, Dhodia, Gamta, Paradhi, Patelia.

# Railway Exams – General Awareness

## 8. Himachal Pradesh

Gaddis, Gujjars, Khas, Lamba, Lahaulas, Pangwala, Swangla.

## 9. Jammu and Kashmir

Bakarwal, Balti, Beda, Gaddi, Garra, Mon, Purigpa, Sippi.

## 10. Jharkhand

Birhors, Bhumij, Gonds, Kharia, Mundas, Santhals, Savar.

## 11. Karnataka

Adiyan, Barda, Gond, Bhil, Iruliga, Koraga, Patelia, Yerava.

## 12. Kerala

Adiyan, Arandan, Eravallan, Kurumbas, Malai arayan, Moplahs, Uralis.

## 13. Madhya Pradesh

Baigas, Bhils, Bharia, Birhors, Gonds, Katkari, kharia, Khond, Kol, Murias.

## 14. Maharashtra

Bhaina, Bhunjia, Dhodia, Katkari, Khond, Rathawa, Warlis.

## 15. Manipur

Aimol, Angami, Chiru, Kuki, Maram, Monsang, Paite, Purum, Thadou.

## 16. Meghalaya

Chakma, Garos, Hajong, Jaintias Khasis, Lakher, Pawai, Raba.

## 17. Mizoram

Chakma, Dimasa, Khasi, Kuki, Lakher, Pawai, Raba, Synteng.

## 18. Nagaland

Angami, Garo, Kachari, Kuki, Mikir, Nagas, Sema.

## 19. Odisha

Gadaba, Ghara, Kharia, Khond, Matya, Oraons, Rajuar, Santhals.

## 20. Rajasthan

Bhils, Damaria, Dhanka, Meenas(Minas), Patelia, Sahariya.

## 21. Sikkim

Bhutia, Khas, Lepchas.

## 22. Tamil Nadu

Adiyan, Irular, Kadar, Kanikar, Aranadan, Eravallan, , Kotas, Todas.

## 23. Telangana

Chenchus.

## 24. Tripura

Bhil, Bhutia, Chaimal, Khasia, Lushai, Mizel, Chakma, Halam, Namte.

# Railway Exams – General Awareness

## 25. Uttarakhand

Bhotias, Buksa, Jannasari, Khas, Raji, Tharu.

## 26. Uttar Pradesh

Bhotia, Buksa, Jaunsari, Kol, Raji, Tharu.

## 27. West Bengal

Asur, Ho, Parhaiya, Rabha ,Khond, Hajong, Santhals, Savar.

## 28. North-East

Abhors, Chang, Galaong, Mishimi, Singpho, Wancho.

## 30. Andaman and Nicobar

Oraons, Onges, Sentinelese, Shompens

## LIST OF INDIAN CITIES ON RIVERS BANKS

Cities	Rivers
Sri Nagar	Jhelum
Surat	Tapti
Vijayawada	Krishna
Hyderabad	Musi
Badrinath	Alaknanda
Jabalpur	Narmada
Durgapur	Damodar
Gwalior	Chambal
Kota	Chambal
Dhaulpur	Chambal
Jhansi	Betwa
Jamshedpur	Subarnarekha
Nasik	Godavari
Ujjain	Kshipra
Kolkata	Hugli
Ahmedabad	Sabarmati
Aurangabad	Kauna
Agra	Yamuna
Delhi	Yamuna
Haridwar	Ganga
Kanpur	Ganga
Patna	Ganga
Srirangapatnam	Kaveri

# Railway Exams – General Awareness

Tiruchirapalli	Kaveri
Lucknow	Gomti
Jaunpur	Gomti
Dibrugarh	Brahmaputra
Ayodhya	Saryu
Panaji	Mandovi
Madurai	Vaigai
Sambalpur	Mahanadi
Cuttack	Mahanadi
Guwahati	Brahmaputra

## IMPORTANT MOUNTAIN PASSES IN INDIA

Name	Connects	Place
Zojila Pass	Srinagar to Leh	Jammu and Kashmir
Bara Lacha-la Pass	Mandi to Leh	Himachal Pradesh
Shipki-la-Pass	Shimla to Garetok (Tibbet)	Himachal Pradesh
Pangsad pass	Dibrugarh to Myanmar	Arunachal Pradesh
Bhorghat	Bombay-Pune	Maharashtra
Palghat	Palkhad – Coimbtore	Kerala
Shenkota pass	Kollam – Madurai	Kerala
Aghil Pass	Ladakh & Xinjiang (China)	J&K (Karakoram Range)
Chang La Pass	Ladakh with Tibet	Jammu and Kashmir
Dongkha La	Sikkim with Tibet	Sikkim
Fotu La	Leh and Kargil	J&K
Nathu La	Sikkim & Tibet	Sikkim
Mana Pass	Tibet with Uttarakhand	Uttarakhand
Nama Pass	Kuthi and Darma Valley	Uttarakhand
Jelep La	Sikkim with Lhasa (Tibet)	Sikkim
Karakoram Pass	Ladakh & Xinjiang (China)	Jammu and Kashmir
Namika La	Kargil and Leh	Jammu and Kashmir
Rohtang Pass	Kullu Valley with the Lahaul and Spiti Valleys of Himachal Pradesh	Himachal Pradesh
Zoji la Pass	Connects Srinagar with Kargil and Leh	Jammu and Kashmir
Sasser Pass	Nubra & Siachen Glacier	Jammu and Kashmir
Shipki La	Himachal Pradesh with Tibet	Himachal Pradesh



## UNESCO'S WORLD HERITAGE SITES IN INDIA

- In India there are 40 World Heritage sites which are recognized by UNESCO
- It's include 32 cultural sites, seven natural sites and one mixed-criteria site

### CULTURAL (32)

1. Agra Fort (1983)
2. Ajanta Caves (1983)
3. Archaeological Site of Nalanda Mahavihara at Nalanda, Bihar (2016)
4. Buddhist Monuments at Sanchi (1989)
5. Champaner-Pavagadh Archaeological Park (2004)
6. Chhatrapati Shivaji Terminus (formerly Victoria Terminus) (2004)
7. Churches and Convents of Goa (1986)
8. Elephanta Caves (1987)
9. Ellora Caves (1983)
10. Fatehpur Sikri (1986)
11. Great Living Chola Temples (1987,2004)
12. Group of Monuments at Hampi (1986)
13. Group of Monuments at Mahabalipuram (1984)
14. Group of Monuments at Pattadakal (1987)
15. Hill Forts of Rajasthan (2013)
16. Historic City of Ahmadabad (2017)
17. Humayun's Tomb, Delhi (1993)
18. Jaipur City, Rajasthan (2019)
19. Khajuraho Group of Monuments (1986)
20. Mahabodhi Temple Complex at Bodh Gaya (2002)
22. Mountain Railways of India (1999,2005,2008)
23. Qutb Minar and its Monuments, Delhi (1993)
24. Rani-ki-Vav (the Queen's Stepwell) at Patan, Gujarat (2014)
25. Red Fort Complex (2007)
26. Rock Shelters of Bhimbetka (2003)
27. Sun Temple, Konârak (1984)
28. Taj Mahal (1983)
28. The Architectural Work of Le Corbusier, an Outstanding Contribution to the Modern Movement (2016)

# Railway Exams – General Awareness

29. The Jantar Mantar, Jaipur (2010)
30. Victorian Gothic and Art Deco Ensembles of Mumbai (2018)
31. Kakatiya Rudreshwara (Ramappa) Temple, Telangana (2021)
32. Dholavira: a Harappan City (2021)

## **NATURAL (7)**

1. Great Himalayan National Park Conservation Area (2014)
2. Kaziranga National Park (1985)
3. Keoladeo National Park (1985)
4. Manas Wildlife Sanctuary (1985)
5. Nanda Devi and Valley of Flowers National Parks (1988,2005)
6. Sundarbans National Park (1987)
7. Western Ghats (2012)

## **MIXED (1)**

1. Khangchendzonga National Park (2016)

## **WORLD GEOGRAPHY**

### **OCEANS ON THE EARTH**

- About 70 percent of the world covered by water, and 97 percent of this water lies in the oceans and seas
- They are salty while river and lakes are fresh water
- There are four major oceans. In order of their size, they are Pacific ocean, Atlantic Ocean, Indian Ocean, Arctic Ocean

### **PACIFIC OCEAN**

- Pacific Ocean, taking up more than one-third of the planet's surface
- The Pacific Ocean is the largest ocean of the world
- It is the deepest ocean with an average depth of 4200 m
- The Marina Trench is the world's deepest trench with a depth of 11033 metres

### **ATLANTIC OCEAN**

- The Atlantic Ocean is the second largest ocean in the world

# Railway Exams – General Awareness

- The Atlantic Ocean has the longest coastline
- The Atlantic Ocean is the busiest Ocean for trade and commerce since its shipping routes connect the two most industrialized regions ,namely Western Europe and North Europe and USA

## INDIAN OCEAN

- The Indian Ocean is the only Ocean named after a country
- The India Ocean is deeper than the Atlantic Ocean
- It contains numerous continental islands; Madagascar and Sri Lanka are being the largest ones
- Some of the islands of volcanic origin are those of Mauritius, Andaman and Nicobar, Seychelles, Maldives and Lakshadweep are coral origin

## ARCTIC OCEAN

- The Arctic Ocean is the smallest of all the Oceans
- It lies within the Arctic Circle, hence the name Arctic Ocean
- The North Pole lies in the middle of the Arctic Ocean
- Most of the parts of Arctic Ocean remain frozen with thick ice for most of the days every year
- It is the shallowest of all Oceans, with an average depth of 1500 m
- It has least salinity of all the Oceans. It has a salinity of 20 units per Thousand

## OCEANS GREATEST DEPTH

Mariana Trench	Pacific Ocean	11033 m
Puerto Rico Trench	Atlantic Ocean	8605 m
Java Trench	Indian Ocean	7125 m
Arctic Basin	Arctic Ocean	5122 m

## MAJOR SEAS OF THE WORLD

Sea	Area(Sq.km)	Location
Arabian Sea	3,862,000	Indian Ocean
South China Sea	3,500,000	Pacific Ocean
Caribbean Sea	2,754,000	Atlantic Ocean
Mediterranean Sea	2,500,000	Atlantic Ocean

# Railway Exams – General Awareness

Bay of Bengal	2,172,000	Indian Ocean
Bering Sea	2,000,000	Pacific Ocean
Sea of Okhotsk	1,583,000	Pacific Ocean
Gulf of Mexico	1,550,000	Atlantic Ocean
East China Sea	1,249,000	Pacific Ocean
Hudson Bay	1,230,000	Atlantic Ocean
Sea of Japan	977,980	Pacific Ocean

## MAJOR STRAITS OF THE WORLD

<b>Strait</b>	<b>Joining water bodies</b>	<b>Separates</b>
Strait of Bab-el-Mandeb	Red Sea to Gulf of Aden	Yamen (Asia) from Djibouti & Eritrea (Africa)
Bass strait	Pacific Ocean	Tasmania from the Australian mainland
Bering Strait	Bering Sea (Pacific Ocean) to Chukchi Sea (Arctic Ocean)	Russia from Alaska
Palk Strait	Bay of Bengal to Gulf of Mannar	India from Sri Lanka
Gibraltar Strait	Atlantic Ocean to Mediterranean Sea	Spain (Europe) from Morocco (Africa)
Malacca Strait	The Pacific Ocean to the east with the Indian Ocean to the west	Malaysia and Sumatra
Sunda Strait	Indian Ocean to Java Sea	Islands of Java from Sumatra (Indonesia)
10 <sup>0</sup> Channel	Bay of Bengal to Andaman Sea	Island of Little Andaman from Car Nicobar Island (of India)
9 <sup>0</sup> Channel	Indian Ocean	Laccadive Islands of Kalpeni from Suheli Par, and Maliku Atoll
Denmark strait	Atlantic Ocean	Iceland from Greenland
Florida Strait	Gulf of Mexico to Atlantic Ocean	Florida (USA) from Cuba
Korea Strait	East China Sea and Sea of Japan	Japan and South Korea
Hormuz strait	Gulf of Oman to Persian Gulf	UAE & Oman from Iran

# Railway Exams – General Awareness

North Channel	Irish Sea & Atlantic Ocean	Ireland-England
Davis Strait	The Baffin Bay and the Labrador Sea	Between Greenland and Canada
Jamaica Channel	The Caribbean Sea and North Atlantic	Jamaica and Hispaniola
Hudson strait	Atlantic Ocean to Hudson Bay	Baffin Island from Quebec

## IMPORTANT FACTS ABOUT STRAITS

- Strait that separates Asia from America-Bering strait
- Strait that separates Europe from Africa- Gibraltar Strait
- Strait that separates Australia from Tasmania-Bass Strait
- Longest strait: Strait of Malacca which separates Malay Peninsula and the Indonesian island of Sumatra
- Widest strait: Denmark strait which separates the Iceland from Greenland

## LAKES

### MAJOR LAKES OF THE WORLD

Lake	Area(Sq.Km)	Location
Caspian Sea	371,000	Asia
Lake Superior	82,100	North America
Lake Victoria	68,870	Africa
Lake Huron	59,600	North America
Lake Michigan	58,000	North America
Lake Tanganyika	32,600	Africa
Lake Baikal	31,500	Russia
Great Bear Lake	31,000	Canada
Aral sea	30700	Asia
Malawi	29,500	Africa
Great Slave Lake	28568	Canada
Balkhash	18300	Kazakhstan

### DEEPEST LAKES

# Railway Exams – General Awareness

Lake Name	Depth( m)	Location
Baikal	1620	Asia(Siberia, Russia)
Lake Tanganyika	1463	Africa
Caspian Sea	1025	Asia
Malawi or Nyasa	706	Africa
Lake Vostok	900	Antarctica
Issyk-Kul	702	Kyrgyzstan

## LIST OF MAJOR RIVERS OF THE WORLD

River	Source	Outflow	Km
Nile	Tributaries of Lake Victoria, Africa	Mediterranean Sea	6690
Amazon	Glacier-fed lakes, Peru	Atlantic Ocean	6296
Mississippi-Missouri-Red Rock	Source of Red Rock, Montana	Gulf of Mexico	5970
Chang Jiang (Yangtze)	Tibetan plateau, China	China Sea	5,797
Ob	Altai Mts.,Russia	Gulf of Ob	5567
Huang He (Yellow)	Eastern part of Kunlan Mts., West China	Gulf of Chihli	4667
Yenisei	Tannu-Ola Mts., western Tuva, Russia	Arctic Ocean	4506
Parana	Confluence of Paranaiba and Grande rivers	Río de la Plata	4498
Irtish	Altai Mts., Russia	Ob River	4,438
Zaire (Congo)	Confluence of Lualaba and Luapula rivers, Congo	Atlantic Ocean	4371
Heilong (Amur)	Confluence of Shilka (Russia) and Argun (Manchuria) rivers	Tatar Strait	4352
Lena	Baikal Mts., Russia	Arctic Ocean	4268
Mackenzie	Head of Finlay River, British Columbia,	Beaufort Sea (Arctic Ocean)	4241

# Railway Exams – General Awareness

	Canada		
Niger	Guinea	Gulf of Guinea	4184
Mekong	Tibetan highlands	South China Sea	4023
Mississippi	Lake Itasca, Minnesota	Gulf of Mexico	3779
Missouri	Confluence of Jefferson, Gallatin, and Madison rivers, Montana	Mississippi River	3726
Volga	Valdai plateau, Russia	Caspian Sea	3687
Purus	Peruvian Andes	Amazon River	3207
Yukon	Junction of Lewes and Pelly rivers, Yukon Territory, Canada	Bering Sea	3185
Brahmaputra	Himalayas	Ganges River	2897
Indus	Himalayas	Arabian Sea	2897
Danube	Black Forest, Germany	Black Sea	2842
Ural	Southern Ural Mts., Russia	Caspian Sea	2533
Ganges	Himalayas	Bay of Bengal	2506
Orange	Lesotho	Atlantic Ocean	2092
Don	Tula, Russia	Sea of Azov	1968
Tigris	Taurus Mts., Turkey	Shatt-al-Arab	1899

## THE CONTINENTS OF THE WORLD

Asia, Africa, North America, South America, Antarctica, Europe and Australia are the seven continents

### CONTINENTS-AREAWISE

NAME	PERCENTAGE OF EARTH'S AREA
Asia	29.5
Africa	20.0
North America	16.3
South America	11.8
Europe	6.5

# Railway Exams – General Awareness

Australia	5.2
Antarctica	9.6

## CONTINENTWISE HIGHEST POINT

Continent	Peak	Height(m)
Asia	Mt Everest	8848
Africa	Kilimanjaro	5963
North America	Mt.Mckinley	6194
South America	Aconcagua	6959
Europe	Mt Elbrus	5633
Australia	Puncak Jaya	4884
Antarctica	Vinson Massif	4897

## CONTINENTWISE LOWEST POINT

Continent	Water body	Depth(m)
Asia	Dead Sea	-396.8
Africa	Lake Assal	-156.1
North America	Death Valley	-85.9
South America	Valdes Penin	-39.9
Europe	Caspian sea	-28.0
Australia	Lake Eyre	-15.8

## LIST OF IMPORTANT COUNTRIES AND THEIR CAPITALS & CURRENCIES

Country	Capital	Currency
Afghanistan	Kabul	Afghani
Albania	Tirane	Lek
Algeria	Algiers	Dinar
Argentina	Buenos Aires	Peso
Armenia	Yerevan	Dram
Australia	Canberra	Australian dollar



# Railway Exams – General Awareness

Austria	Vienna	Euro
Azerbaijan	Baku	Manat
Bahrain	Manama	Bahrain dinar
Bangladesh	Dhaka	Taka
Belgium	Brussels	Euro
Bhutan	Thimphu	Ngultrum
Bolivia	La Paz	Boliviano
Brazil	Brasilia	Brazilian real
Bulgaria	Sofia	Lev
Canada	Ottawa	Canadian dollar
Chile	Santiago	Chilean Peso
China	Beijing	Chinese Yuan
Colombia	Bogota	Colombian Peso
Croatia	Zagreb	Croatian
Cuba	Havana	Cuban Peso
Cyprus	Nicosia	Euro
Ecuador	Quito	U.S. dollar
Egypt	Cairo	Egyptian pound
Fiji	Suva	Fiji dollar
Finland	Helsinki	Euro
France	Paris	Euro
Germany	Berlin	Euro
Ghana	Accra	Cedi
Greece	Athens	Euro
Haiti	Port-au-Prince	Gourde
Iceland	Reykjavik	Icelandic króna
India	New Delhi	Indian Rupee
Indonesia	Jakarta	Rupiah
Iran	Tehran	Rial
Iraq	Baghdad	Iraqi Dinar
Ireland	Dublin	Euro
Italy	Rome	Euro
Japan	Tokyo	Yen

# Railway Exams – General Awareness

Jordan	Amman	Jordanian dinar
Kazakhstan	Nur Sultan	Tenge
Kenya	Nairobi	Kenya shilling
North Korea	Pyongyang	Won
South Korea	Seoul	Won
Kuwait	Kuwait City	Kuwaiti Dollar
Lebanon	Beirut	Lebanese pound
Libya	Tripoli	Libyan dinar
Luxembourg	Luxembourg	Euro
Madagascar	Antananarivo	Malagasy Ariary
Malaysia	Kuala Lumpur	Ringgit
Maldives	Male	Rufiyaa
Mauritius	Port Louis	Mauritian rupee
Mexico	Mexico City	Mexican peso
Mongolia	Ulaanbaatar	Togrog
Montenegro	Podgorica	Euro
Namibia	Windhoek	Namibian dollar
Nepal	Kathmandu	Nepalese rupee
Netherlands	Amsterdam	Euro
New Zealand	Wellington	New Zealand dollar
Nigeria	Abuja	Naira
Norway	Oslo	Norwegian krone
Oman	Muscat	Omani rial
Pakistan	Islamabad	Pakistani rupee
Papua New Guinea	Port Moresby	Kina
Paraguay	Asuncion	Guaraní
Peru	Lima	Nuevo sol
Philippines	Manila	Peso
Poland	Warsaw	Zloty
Portugal	Lisbon	Euro
Qatar	Doha	Qatari riyal
Russia	Moscow	Ruble
Saint Lucia	Castries	East Caribbean dollar

# Railway Exams – General Awareness

San Marino	San Marino	Euro
Saudi Arabia	Riyadh	Riyal
Serbia	Belgrade	Serbian Dinar
Seychelles	Victoria	Seychelles rupee
Singapore	Singapore	Singapore dollar
South Africa	Pretoria (administrative);Cape Town(legislative); Bloemfontein(judiciary)	Rand
South Sudan	Juba	Sudanese Pound
Spain	Madrid	Euro
Sri Lanka	Colombo	Sri Lankan rupee
Sudan	Khartoum	Sudanese Pound
Swaziland	Mbabane	Lilangeni
Sweden	Stockholm	Krona
Switzerland	Berne	Swiss franc
Syria	Damascus	Syrian pound
Thailand	Bangkok	Baht
Tunisia	Tunis	Tunisian dinar
Turkey	Ankara	Turkish lira
Uganda	Kampala	Ugandan new shilling
Ukraine	Kiev	Hryvnia
United Arab Emirates	Abu Dhabi	U.A.E. Dirham
United Kingdom	London	Pound sterling
United States of America	Washington D.C.	Dollar
Vatican City	Vatican City	Euro
Venezuela	Caracas	Bolivar
Vietnam	Hanoi	Dong
Yemen	Sanaa	Rial
Zimbabwe	Harare	United States dollar

# Railway Exams – General Awareness

## LANDLOCKED COUNTRIES IN THE WORLD

Country Name	Location
Lesotho	Africa (Locked by South Africa)
Botswana, Burkina Faso, Chad, Czech Republic, Ethiopia, Malawi, Mali, Niger, Rwanda, South Sudan, Uganda, Zambia, Zimbabwe	Africa
Vatican City	Europe (Locked by Italy)
San Marino	Europe (Locked by Italy)
Mongolia	Asia (Locked by Russia & China)
Bhutan	Asia (Locked by India & China)
Nepal	Asia (Locked by India & China)
Andorra	Europe (Locked by France & Spain)
Liechtenstein	Europe (it is one of the double landlocked countries between Switzerland & Austria)
Moldova	Europe (Locked by Ukraine & Romania)
Swaziland	Africa (Locked by South Africa & Mozambique)
Bolivia	South America
Afghanistan, Armenia, Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Laos	Asia
Austria, Belarus, Hungary, Kosovo, Luxembourg, Macedonia, Moldova, Serbia, Slovakia, Switzerland	Europe

## COUNTRIES WITH MOST LAND BORDERS

Countries	Number of Bordering Countries
China	14
Russia	14
Brazil	10
Congo, Germany and	9

# Railway Exams – General Awareness

Austria, France, Tanzania, Turkey and Zambia	8
India, Sudan,	7
Afghanistan	6
Pakistan	4
Bangladesh	2

## IMPORTANT INTERNATIONAL BOUNDARY LINES IN THE WORLD

- **The Radcliffe Line** – It is the Boundary Line Between India & Pakistan drawn by Sir Cyril Radcliffe in 1947
- **The McMahon Line**- It is the Boundary Line Between India & China
- **Durand Line**- It is the Boundary Line between Afghanistan and Pakistan
- **The Oder–Neisse line**- It is the Boundary Line Between Germany & Poland
- **The 24<sup>th</sup> Parallel**- This is the Line that Pakistan claims for the demarcation purpose, but India does not accept it
- **Maginot Line**- It is the Boundary Line Between France & Germany
- **The Line of Control (LoC)** - This is the military control line between India and Pakistan (in the state of Jammu & Kashmir)
- **The Siegfried Line**- It is the Boundary Line between France and Germany
- **The 49<sup>th</sup> Parallel (also The Medicine Line)** - It is the Boundary Line Between Canada & the USA
- **The 38<sup>th</sup> parallel**- It is the Boundary Line between North & South Korea (Before the Korean War)
- **The 17<sup>th</sup> Parallel**- It is the Boundary Line between North & South Vietnam
- **Blue Line** - It is the Boundary Line between Israel & Lebanon
- **Purple Line**- It is the Boundary Line between Israel and Syria
- **Mannar haime line** - It is the Boundary Line between Russia & Finland

# Railway Exams – General Awareness

## IMPORTANT CITIES SITUATED ON THE BANKS OF RIVER (WORLD)

City	Country	River
Adelaide	Australia	Torrens
Amsterdam	Netherlands	Amsel
Alexandria	Egypt	Nile
Ankara	Turkey	Kazil
Bangkok	Thailand	Chao Praya
Basra	Iraq	Elupharates and Tigris
Baghdad	Iraq	Tigris
Berlin	Germany	Spree
Bristol	UK	Avon
Buenos Aires	Argentina	Laplata
Chittagong	Bangladesh	Maiyani
Canton	China	Si-Kiang
Cairo	Egypt	Nile
Dublin	Ireland	Liffy
Kabul	Afghanistan	Kabul
Karachi	Pakistan	Indus
Lahore	Pakistan	Ravi
Liverpool	England	Messey
London	England	Thames
Moscow	Russia	Moskva
Montreal	Canada	St. Lawrence
New Orelans	U.S.A.	Mississipi
New York	U.S.A.	Hudson
Ottawa	Canada	Ottawa
Paris	France	Seine
Perth	Australia	Swan
Rome	Italy	Tiber
Stalingrad	Russia	Volga
Sidney	Australia	Darling
Saint Luis	U.S.A.	Mississippi

# Railway Exams – General Awareness

Tokyo	Japan	Arakava
Washington D.C.	U.S.A.	Potomac
Yangoon	Myanmar	Irawaddy

## DISTINCTIVE NAMES OF COUNTRIES & TOWNS (WORLD)

DISTINCTIVE NAMES	COUNTRIES / TOWNS
Britain of the South	New Zealand
The Battlefield of Europe	Belgium
City of the Golden Gate	San Francisco
City of Magnificent Distances	Washington D.C.
City of Popes	Rome
City of Seven Hills	Rome
City of Skyscrapers	New York
Cockpit of Europe	Belgium
Dark Continent	Africa
Dairy of Northern Europe	Denmark
Emerald Island	Ireland
Empire City	New York
Eternal City	Rome, Italy
Forbidden City	Lhasa (Tibet)
Garden of England	Kent(England)
Gate of Tears	Babel-Mandab, Jerusalem
Granite City	Aberdeen (Scotland)
Gift of Nile	Egypt
Gibraltar of the Indian Ocean	Aden
Herring Pond	Atlantic Ocean
Hermit Kingdom	Korea
Land of Cakes	Scotland
Land of the Golden Pagoda	Myanmar (Burma)
Land of Kangaroos	Australia
Land of Lilies	Canada
Land of the Midnight Sun	Norway
Land of the Rising Sun	Japan

# Railway Exams – General Awareness

Land of a Thousand Lakes	Finland
Land of Thunderbolt	Bhutan
Land of White Elephants	Thailand
Lady of Snow	Canada
Playground of Europe	Switzerland
Pearl of the Pacific	Guayaquil Port (Ecuador)
Quaker City	Philadelphia
Queen of the Arabian Sea	Kochi (India)
Roof of the World	Pamir (Tibet)
The Sea of Mountains	British Columbia
Sorrow of China	River Hwang Ho
Sugar Bowl of the World	Cuba
Venice of the North	Stockholm
Yellow River	Hwang Ho (China)
The Imperial City	Rome
City of Arabian Nights	Baghdad
The Modern Babylon	London

## TRIBES AND RACES OF THE WORLD

Tribes	Area Inhabited
Abhors	Mongolians living in the Assam region
Afridis	Inhabitants of the north-west frontier in Pakistan (tribal area of Waziristan)
Afrikaner	Dutch-born South African race
Anglo-Saxon	People who invaded Britain after the withdrawal of the Romans AD 410. Now living in England, Canada, USA and Australia
Bantus	Negroes of central and south Africa (Black race)
Bedouins	Wandering tribe of Arabia and North Africa
Bhils	Ancient Dravidians of central India
Cossacks	Inhabitants of southern and eastern frontiers of Russia
Croats	Inhabitants of Croatia
Dravidians	Ancient people of South India (non-Aryans)
Eskimos	Inhabitants of the Arctic Circle and Greenland



# Railway Exams – General Awareness

Filipinos	Natives of Philippines
Flemish	Inhabitants of Belgium
Garos	Hill tribe of Assam
Gorkhas	Martial race of Nepal
Hottentots	Pastoral nomads of south-west Africa
Kaffris	Martial race of South Africa
Kardars	Descendants of Austric race, now living in the forests of central and northern India
Khasis	Tribes of Assam
Khirgiz	Tribe living in Central Asia
Kiwis	People of New Zealand
Magyars	Inhabitants of Hungary
Masuds	Tribe living in Waziristan (Pakistan)
Maoris	Natives of New Zealand
Moor	A mixed tribe of Arab and Berber people of Morocco
Negroes	Dark-skinned race of Africa
Nipponese	People living in Japan
Red Indians	Original inhabitants of North America. They were named so by Columbus who thought that he had discovered India
Sherpas	Tribe on the border of Tibet and Nepal
Slovenes	People of Slavic origin living in former Yugoslavia
Swahili	People living in parts of Kenya and Tanzania
Todas	Natives of Nilgiri Hills
Zulus	People living in South Africa, belonging to the Bantu family

## ANCIENT CIVILIZATIONS

Civilization	Location
Indus Valley	River Indus
Egyptian	River Nile
Celtic	River Rhine
Roman	River Tiber
Sumerian	Tigris and the Euphrates

# Railway Exams – General Awareness

## LARGEST PRODUCING COUNTRIES OF AGRICULTURAL COMMODITIES IN WORLD

PRODUCT	COUNTRY
Barley	Russia
Oat	Russia
Rice	China
Wheat	China
Grapes	China
Kiwifruit	China
Watermelon	China
Cucumber	China
Tea	China
Chestnut	China
Peanut	China
Egg	China
Honey	China
Tobacco	China
Cotton	China
Silk	China
Tomato	China
Potato	China
Spinach	China
Almond	United States
Maize	United States
Corn	United States
Soybean	United States
Apple	China
Avocado	Mexico
Banana	India
Mango	India
Papaya	India
Lemon	India

# Railway Exams – General Awareness

Guava	India
Okra	India
Pomegranate	India
Jackfruit	India
Milk	India
Jute	India
Ginger	India
Blueberry	United States
Cocoa	Ivory coast
Olive	Spain
Coconut	Indonesia
Cinnamon	Indonesia
Vanilla	Indonesia
Cloves	Indonesia
Avocado	Mexico
Cherry	Turkey
Fig	Turkey
Coffee	Brazil
Sugar cane	Brazil
Rubber	Thailand
Saffron	Iran
Wool	Australia
Black Pepper	Vietnam
Cashew nut	Vietnam
Dates	Egypt
Cardamom	Guatemala

## LIST OF MINERALS AND THEIR LEADING PRODUCING COUNTRIES

Minerals	Largest Producers	Second Largest Producers
Coal	China	United States
Fluorite	China	Mexico
Aluminium	China	Russia

# Railway Exams – General Awareness

Bismuth	China	Mexico
Gold	China	Australia
Iron Ore	China	Australia
Tin	China	Indonesia
Zinc	China	Australia
Natural Gas	United States	Russia
Petroleum	United States	Saudi Arabia
Uranium	Kazakhstan	Canada
Diamond	Russia	Botswana
Palladium	Russia	South Africa
Bauxite	Australia	China
Lithium	Australia	Chile
Titanium	Australia	South Africa
Manganese	South Africa	China
Platinum	South Africa	Russia
Silver	Mexico	China
Nickel	Philippines	Russia

## GEOGRAPHY ONE LINERS

- Loktak Lake situated in Manipur
- 10° Channel separates the Andaman from the Nicobar
- Standard Meridian of India (82°30'E) passing through Mirzapur (in Uttar Pradesh) is taken as the standard time for the whole country
- Mawsynram in Meghalaya receives the highest rainfall in the world
- Loo is the local name of the wind blowing in the northern plains during summers
- Reason of rainfall during winters in north-western part of India is Western disturbances
- 68° 7' E is the easternmost longitude of India
- The Southernmost Himalayas are known as Shiwaliks.
- Western Ghats is the another name of Sahyadris
- Palk Strait lies between India and Sri Lanka
- Aravali Mountains is the oldest mountain range in India
- Environmental degradation is the highlights of the 'Rally for Valley' programme in India

# Railway Exams – General Awareness

- Paleozoic is the era of the origin of the continental shelf
- Antarctica is the India's permanent research station Dakshin Gangotri
- The Duncan Pass is located between South Andaman and Little Andaman
- Secunderabad is popularly known as twin city of Hyderabad
- Uttar Pradesh is called the sugar bowl of India
- Tehri dam is the highest dam in India
- Western Ghats of Kerala is famous for the lion-tailed macaque
- Silent valley located in Kerala
- Chilka Lake is the largest lake in India
- Digboi is the India's oldest oil Refinery in India
- Jog Falls is created by the Sharavathi River
- Godavari is the largest river basin of Indian peninsular region
- The Damodar river is called the 'Sorrow of Bengal'
- The Asia's largest fresh water lake "Wular lake" is located in Jammu and Kashmir
- River Narmada originated from Amarkantak
- Sambhar Lake is a salt water lake
- Krishna Raja Sagara Dam, located in Karnataka is built on river Cauvery
- Ganga river is the home for fresh water dolphins
- Godavari river is known as Dakshina Ganga
- Indira Sagar Dam located in Madhya Pradesh is built on Narmada
- Bhakra Nangal dam is situated on River Satluj
- River Koshi is known as "Sorrow of Bihar"
- The Radcliffe Line is the international border between India and Pakistan
- Duncan pass is located between South and little Andaman
- The average salinity of sea water is 3.50%
- Tropical Moist Deciduous Forest covers the maximum area in India
- Suez Canal joins Red & Mediterranean Sea
- Aravallis mountain range stretches from Gujarat in west to Delhi in the north
- Black Soil is also known as 'Regur'
- Congo river crosses the equator twice
- Brazil is the only country that passes through both the equator and a tropic of Capricorn
- Strait of Gibraltar separates Africa from Europe
- The fertile land between two rivers is called Doab

# Railway Exams – General Awareness

- Limpopo river crosses tropic of Capricorn twice
- Madagascar is the largest island in the Indian Ocean
- Tropical Rain forests is found in silent valley of Kerala
- Gulf of Khambat separates the Daman & Diu
- Port Blair – the capital of Andaman and Nicobar Islands, is located in South Andaman
- Damodar river basin is called 'Ruhr of India'
- "Valley of flowers" is located in Uttrakhand
- Atlantic ocean is called 'Herring Pond'
- Jodhpur gets the least rainfall in India
- Guru Shikhar Peak located in Rajasthan
- Lake Superior is the largest fresh water lake in the world
- The Sivasamudram Falls is located on River Cauvery
- Bering strait separates the Asia from North America
- Australia is the largest producer of Bauxite
- The cool temperate grasslands of South America are known as Pampas
- Tides are caused by the gravitational pull of the Sun and Moon on the Earth
- World's largest Mangrove forest is located in Sundarbans
- Highest railway bridge in the world constructed in Jammu & Kashmir on Chenab River
- Koyali oil refinery located in Gujarat
- The longest dam in India is Hirakund Dam
- Savannah is the tropical grassland
- The great Victoria Desert is located in Australia
- Earth is known as the 'Blue planet' due to Presence of huge amount of water on it
- Mount Etna, one of the world's most active volcanoes, is located in Italy
- Bab el-Mandeb strait connects Red Sea and Indian Ocean
- Lesotho is a country completely surrounded by South Africa
- The most densely populated island of the World is Java
- The Prime Meridian passes through Greenwich
- The atmospheric air is held to the Earth by Gravity
- The land between two rivers is called Doab
- Pachmarhi hill station is called as the Queen of the Satpurus
- The famous species of tree 'Sundari' is found in Sunderbans delta formed by the rivers Ganga and Brahmaputra in West Bengal

# Railway Exams – General Awareness

- The Nanda Devi Peak is located in Uttarakhand
- Majuli, the largest river island in the world is located in Assam
- Baglihar Dam is built on Chenab River in the Doda district of Jammu & Kashmir.
- Bum La Pass connects Tawang with Lhasa
- Alluvial soil is best suited for rice cultivation
- Diphu pass is located at the tri junction of India, Myanmar and china and it is located on the Mcmohan border line
- The ‘Friendship Highway’ is a road that connects China to Nepal
- **Gujarat** has the longest mainland coastline in India
- China has the world’s largest number of International Borders
- The river ganga emerges from Gangotri Glacier and drains into Bay Of Bengal
- Ganga is 2525 kilometres long and is the longest river of India
- The (western Ghats) Sahyadri mountains starts near the Songadh town of Gujarat and covers the states of Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu
- Kibolithu is the easternmost point of India. It is located in Arunachal Pradesh
- Rajasthan is the largest in terms of the total area covered
- India has longest International border with Bangladesh
- Red data book contains data of all plant endangered species
- The final boundary between the Earth and the outer space is called magnetosphere created due to solar wind
- Himalayan mountain range falls under Fold Mountain
- A difference between 2 longitudes at the equator is nearly equivalent to 111 km
- Alps is the highest mountain range that lies entirely in Europe and stretching across eight Alpine countries (from west to east): France, Switzerland, Italy, Monaco, Liechtenstein, Austria, Germany and Slovenia.
- Mount Blanc is the highest mountain peak of Alps.
- Saddle Peak which has a height of 737 metres is the highest peak in Andaman and Nicobar islands. It is located in North Andaman Island and is covered by saddle national park which has a wide variety of flora and fauna
- The Patkai hills belong to Purvanchal mountain ranges.
- Kosi river originates in Nepal and flows into the Ganges
- Dachigam National Park is located in Jammu and Kashmir
- The Keoladeo National Park formerly known as the Bharatpur Bird Sanctuary in Rajasthan.
- Gujarat is India’s largest salt producing state
- The Sankosh river forms boundary between Assam and Arunachal Pradesh

# Railway Exams – General Awareness

- The northernmost point of India is Indira Col
- Karnataka is largest producer of Coffee in India
- Paradip Port is located on the delta of Mahanadi
- The salal project is on the river Chenab River
- The state having a largest area of forest cover in India is Madhya Pradesh
- The oldest oil field in India is the Digboi field in Assam
- Sugarcane crops needs maximum water per hectare
- Deccan plateau is the most ideal region for the cultivation of cotton in India
- Canada has longest coastline in world
- The great Victoria Desert is located in Australia
- khasi hills located in Meghalaya
- Adam's bridge locate between India and Sri Lanka

## **INDIAN ECONOMY**

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## INTRODUCTION-ECONOMY

- The term economy has been defined by A. J. Brown as, “A system by which people earn their living.” J. R. Hicks defined as, “An economy is a cooperation of producers and workers to make goods and services that satisfy the wants of the consumers.”
- The subject Economics is classified into two branches, namely, Micro Economics and Macro Economics.
- The terms ‘micro economics’ and ‘macro economics’ were first used in economics by Norwegian economist **Ragner Frisch** in 1933
- John Maynard Keynes is considered the father of macroeconomics

### Macro-economics

- The branch of economics that studies the behavior and performance of an economy as a whole
- It is the study of aggregates such as national output, inflation, unemployment and taxes
- **The General Theory of Employment, Interest and Money** published by Keynes is the basis of modern macro-economics.

### Micro-economics

- Micro Economics is the study of the economic actions of individual units say households, firms or industries.

### Economic System

- Economic System refers to the manner in which individuals and institutions are connected together to carry out economic activities in a particular area. It is the methodology of doing economic activities to meet the needs of the society
- There are three major types of economic systems. They are:

# Railway Exams – General Awareness

1. Capitalistic Economy
2. Socialistic Economy
3. Mixed Economy

## Capitalistic Economy

- Adam Smith is the ‘Father of Capitalism’.
- Capitalistic economy is also termed as a free economy or market economy where the role of the government is minimum and market determines the economic activities.
- The means of production in a capitalistic economy are privately owned. Manufacturers produce goods and services with profit motive. The private individual has the freedom to undertake any occupation and develop any skill.
- The USA, Germany, Australia and Japan are the best examples for capitalistic economies

## Socialistic Economy

- The Father of Socialism is Karl Marx.
- Socialism is defined as a way of organizing a society in which major industries are owned and controlled by the government, A Socialistic economy is also known as ‘Planned Economy’ or ‘Command Economy’
- In a socialistic economy, all the resources are owned and operated by the government. Public welfare is the main motive behind all economic activities
- It aims at equality in the distribution of income and wealth and equal opportunity for all
- China, Vietnam, Poland and Cuba are the examples of socialist economies. But, now there are no absolutely socialist economies.

## Mixed Economy

- In a mixed economy system both private and public sectors co-exist and work together towards economic development

# Railway Exams – General Awareness

- In these economies, resources are owned by individuals and the government.
- Examples of mixed economy: India, England, France and Brazil

## NATIONAL INCOME

- National Income provides a comprehensive measure of the economic activities of a nation. It denotes the country's purchasing power. The growth of an economy is measured by the rate at which its real national income grows over time.
- National income thus serves as an instrument of economic planning.
- National Income means **‘The total money value of all final goods and services produced in a country during a particular period of time’**

### Basic concepts of national income

- The following are some of the concepts used in measuring national income.
  1. Gross Domestic Product (GDP)
  2. Net Domestic Product (NDP)
  3. Gross National Product (GNP)
  4. Net National Product (NNP)
  5. NNP at factor cost
  6. Personal Income
  7. Disposable Income
  8. Per capita Income
  9. Real Income
  10. GDP deflator

### Gross Domestic Product (GDP)

# Railway Exams – General Awareness

- Gross Domestic Product (GDP) is the value of the all final goods and services produced within the boundary of a nation during a year period. For India, the financial year is from 1st April to 31st March.
- India's GDP is 3rd largest in the world in terms of purchasing power parity(PPP)

## Net Domestic Product (NDP)

- Net Domestic Product (NDP) is the GDP calculated after adjusting the weight of the value of 'depreciation'.  
**NDP = GDP – Depreciation.**
- NDP of an economy has to be always lower than its GDP for the same year

## Gross National Product (GNP)

- GNP is the total measure of the flow of final goods and services at market value resulting from current production in a country during a year, including net income from abroad
- The normal formula is **GNP = GDP + Income from Abroad**  
{**(Income from abroad**= Trade balance + Interest on External Loans+ Private Remittance)  
Private remittance= Inflows and outflows on account of private transfer  
Trade balance = Net outcome at the year end of the total import and export.  
Interest on external loans= balance of the inflow of interest payment – Outflow of interest payment}
- In India's case, it has always been negative (due to heavy outflows on account of trade deficits and interest payments on foreign loans). It means, the 'Income from Abroad' is subtracted from India's GDP to calculate its GNP.  
**GNP = GDP + (–Income from Abroad)**  
(India's GNP is always lower than its GDP)
- GNP at market prices means the gross value of final goods and services produced annually in a country plus net factor income from abroad

## Net National Product (NNP)

# Railway Exams – General Awareness

- Net National Product (NNP) of an economy is the GNP after deducting the loss due to ‘depreciation’.

$$\text{NNP} = \text{GNP} - \text{Depreciation}$$

Or

$$\text{NNP} = \text{GDP} + \text{Income from Abroad} - \text{Depreciation.}$$

- This is the purest form of the income of a nation.

## NNP at Factor cost

- NNP refers to the market value of output. Whereas NNP at factor cost is the total of income payment made to factors of production. Thus from the money value of NNP at market price, we deduct the amount of indirect taxes and add subsidies to arrive at the net national income at factor cost.

$$\text{NNP at factor cost} = \text{NNP at Market prices} - \text{Indirect taxes} + \text{Subsidies.}$$

## Personal Income

- Personal income is the total income received by the individuals of a country from all sources before payment of direct taxes in a year

$$\text{Personal Income} = \text{National Income} - (\text{Social Security Contribution and undistributed corporate profits}) + \text{Transfer payments}$$

## Disposable Income

- Disposable Income is also known as Disposable personal income. It is the individual's income after the payment of income tax

$$\text{Disposable Income} = \text{Personal income} - \text{Direct Tax}$$

## Per Capita Income

- The average income of a person of a country in a particular year is called Per Capita Income. Per capita income is obtained by dividing national income by population

# Railway Exams – General Awareness

**Per Capita income = National Income/ Population**

## Real Income

- Nominal income is national income expressed in terms of a general price level of a particular year in other words, real income is the buying power of nominal income.
- Real income is the income of individuals or nations after adjusting for inflation

## GDP deflator

- The GDP deflator is an index of price changes of goods and services included in GDP. It is a price index which is calculated by dividing the nominal GDP in a given year by the real GDP for the same year and multiplying it by 100.

$$\text{GDP deflator} = \text{Nominal GDP} / \text{Real GDP} \times 100$$

## Gross value added

- Gross value added (GVA) is the measure of the value of goods and services produced in an area, industry or sector of an economy.

$$\text{GVA} = \text{GDP} + \text{subsidies} - (\text{direct, sales}) \text{ taxes.}$$

## Cost and Price of National Income

### Cost

- **Factor cost**-The actual incurred on goods and services that are produced by the firms and industries in an economy is known as factor cost. i.e., cost of capital, interest on loans, raw materials, labour, rent, power, etc
- **Market cost**- ‘Market cost’ is derived after adding the indirect taxes to the factor cost of the product, it means the cost at which the goods reach the market

# Railway Exams – General Awareness

- India officially used to calculate its national income at factor cost. Since January 2015, the CSO has switched over to calculating national income at market cost. The market price is calculated by adding the product taxes to the factor cost

## Price

- Income can be derived at two prices, constant and current. The difference in the constant and current prices is only that of the impact of inflation  
Current prices= constant prices + inflation

## Purchasing Power Parity

- A concept related to purchasing power is Purchasing Price Parity (PPP). PPP is an economic theory that estimates the amount that needs to be adjusted to the price of an item
- PPP can be used to compare countries income levels and other relevant economic data concerning the cost of living, or possible rates of inflation and deflation.
- India is the third-largest economy in terms of Purchasing Price Parity (PPP)

## SECTORS OF THE ECONOMY

- Economic activities in a country/economy are broadly divided into three main sectors and by their dominant, economies get their names also

### Primary Sector

- The economic activities which take place while exploiting the natural resources fall under it, such as agricultural activities, mining, oil exploration, etc.
- When agriculture sector (sub-sectors of the primary sector) contribute minimum half of the national income and livelihood in a country it is called an agrarian economy.

### Secondary Sector

# Railway Exams – General Awareness

- It contains all of the economic activities under which the raw materials extracted out of the primary sector are processed (also called industrial sector).
- When secondary sector brings in minimum half of the national income and livelihood in a country it is called an industrial economy.

## Tertiary Sector:

- All of the economic activities where services are produced falls in this sector, such as education, healthcare, banking, communication, etc.
- When this sector contributes minimum half of the national income and livelihood in a country it is called a service economy.

## SECTORS OF THE INDIAN ECONOMY

- Indian economy is broadly divided into three sector
  1. **Primary Sector: (Agricultural Sector)** Agricultural sector is known as primary sector, in which agricultural operations are undertaken. Agriculture based allied activities, production of raw materials such as cattle farm, fishing, mining, forestry, corn, coal etc. are also undertaken.
  2. **Secondary Sector: (Industrial Sector)** Industrial sector is secondary sectors in which the goods and commodities are produced by transforming the raw materials. Important industries are Iron and Steel industry, cotton textile, Jute, Sugar, Cement, Paper, Petrochemical industry, automobile and other small scale industries.
  3. **Tertiary Sector: (Service Sector)** Tertiary sector is known as service sector which includes Government, scientific research, transport communication, trade, postal and telegraph, Banking, Education, Entertainment, Healthcare and Information Technology etc.

## Contribution of different sectors in GDP of India



# Railway Exams – General Awareness

- India is 2nd largest producer of agricultural products. India accounts for 7.39 percent of total global agricultural output
- Indian GDP composition in currently is as follows: Agriculture (16.5%), Industry (29.01%) and Services (53.09%).
- The share of agriculture has been falling in the country's gross income, while industrial and services sectors' shares have been on a rise constantly. But from the livelihood point of view still 48.7 per cent of the people of India depend on the agriculture sector
- Sector share by working force: (Agriculture (48%): Tertiary (27%) : Secondary (24%))
- Contribution of Agriculture sector in Indian economy is much higher than world's average (6.4%). Contribution of Industry and Services sector is lower than world's average 30% for Industry sector and 63% for Services sector.
- India is the world's fifth-largest economy by nominal GDP and the third-largest by purchasing power parity (PPP).

## Agricultural Sector in India

- Agriculture being the maximum pursued occupation in India, it plays an important role in its economy as well.
- The share of agriculture has been falling in the country's gross income, while industrial and services sectors' shares have been on a rise constantly. But from the livelihood point of view still 48.7 per cent of the people of India depend on the agriculture sector. This makes agriculture is more important sector than the industry and the services
- Agriculture is the biggest unorganized sector of the economy accounting for more than 90 per cent share in the total unorganized labour-force (Over 94 percent of India's working population is part of the unorganized sector)
- India occupies a leading position in global agricultural trade having a share of 2.15 percent in the world agricultural trade

# Railway Exams – General Awareness

- Agriculture is not only the biggest sector of the economy, but also the biggest private sector of the country also.
- Green revolution, ever green revolution and inventions in bio technology have made agriculture self-sufficient and also surplus production
- Aimed at doubling the farmers' income by 2022, the Government of India has announced a 'seven-point strategy'. Details of the 'seven-point strategy' are as given below
  1. Focus on irrigation with bigger budgets aimed at 'per drop, more crop'.
  2. Provision of quality seeds and nutrients based on soil health.
  3. Strengthening warehousing and cold chains to prevent post-harvest crop losses.
  4. Promoting value addition through food processing.
  5. Creation of a national farm market, removing distortions and e-platform.
  6. Mitigating risks at affordable cost through suitable kind of farm insurance.
  7. Promoting ancillary activities like poultry, beekeeping and fisheries.

## RESERVE BANK OF INDIA

- The Reserve Bank of India was established on April 1, 1935, in accordance with the provisions of the Reserve Bank of India Act, 1934.
- The Central Office of the Reserve Bank was initially established in Kolkata but Headquarter moved from Calcutta to Mumbai in 1937
- Osborne Smith was the first Governor of Reserve Bank of India
- RBI was Nationalised on 1 January 1949

## Administration

- RBI has four zonal offices: New Delhi for North, Chennai for South, Kolkata for East, and Mumbai for West
- The Central Board consists of:
  - Governor

- 4 Deputy Governors
  - 2 Finance Ministry representatives
  - 4 directors to represent local boards headquartered at Mumbai, Kolkata, Chennai, and New Delhi
- Governors and 4 Deputy Governors along with the central board of directors are appointed by the Government of India.
- The only Prime Minister who was the Governor of RBI was **Manmohan Singh**.
- The Reserve bank is referred to by the name 'Mint Street'.

## Functions of Reserve Bank of India

### Monetary Authority

- It controls the supply of money in the economy to stabilize exchange rate, maintain healthy balance of payment, attain financial stability, control inflation, strengthen banking system

### The issuer of currency

- The objective is to maintain the currency and credit system of the country. It is the sole authority to issue currency (Except the currency and coins of one rupee or its denominations, which are issued by Ministry of Finance). It also takes action to control the circulation of fake currency

### The issuer of Banking License

- As per Section 22 of the Banking Regulation Act, 1949, every bank has to obtain a banking license from RBI to conduct banking business in India.

### Banker's Bank

- RBI is the bank of all banks in India as it provides loan to banks, accept the deposit of banks, and rediscount the bills of banks.

# Railway Exams – General Awareness

## **Banker to the Government**

- It acts as banker both to the central and the state governments. It provides short-term credit. It manages all new issues of government loans, servicing the government debt outstanding and nurturing the market for government securities.
- It advises the government on banking and financial subjects.

## **Lender of last resort**

- The banks can borrow from the Reserve Bank of India by keeping eligible securities as collateral at the time of need or crisis, when there is no other source.

## **Act as clearing house**

- For the settlement of banking transactions, RBI manages 14 clearing house. It facilitates the exchange of instruments and processing of payment instructions.

## **Custodian of foreign exchange reserves**

- RBI acts as a custodian of FOREX. It administers and enforces the provision of Foreign Exchange Management Act (FEMA), 1999.
- RBI buys and sells foreign currency to maintain the exchange rate of Indian rupee v/s foreign currencies. Keeping the Forex (foreign exchange) reserves of the country
- RBI representing the Government of India in the IMF and World Bank (and other international financial agencies of which India is member).

## **Regulator of Economy**

- It controls the money supply in the system, monitors different key indicators like GDP, Inflation, etc.

## **Regulator and Supervisor of Payment and Settlement Systems**

# Railway Exams – General Awareness

- The Payment and Settlement Systems Act of 2007 (PSS Act) gives RBI oversight authority for the payment and settlement systems in the country.
- RBI focuses on the development and functioning of safe, secure and efficient payment and settlement mechanisms.
- The objective is maintaining public confidence in payment and settlement system.

## **Banking Ombudsman Scheme**

- RBI introduced the Banking Ombudsman Scheme in 1995. Under this scheme, the complainants can file their complaints in any form, including online and can also appeal to the Ombudsman against the awards and the other decisions of the Banks.

## **Publisher of monetary data and other data**

- RBI maintains and provides all essential banking and other economic data, formulating and critically evaluating the economic policies in India. RBI collects, collates and publishes data regularly

## **Developmental Functions**

- This role includes the development of the quality banking system in India and ensuring that credit is available to the productive sectors of the economy .It provides a wide range of promotional functions to support national objectives..
- It also includes establishing institutions designed to build the country's financial infrastructure. Playing this role, RBI did set up developmental banks like—IDBI, SIDBI, NABARD, NEDB (North Eastern Development Bank), Exim Bank, NHB.

## **Monetary Policy**

# Railway Exams – General Awareness

- Monetary policy refers to the use of monetary instruments under the control of the central bank to regulate magnitudes such as interest rates, money supply and availability of credit with a view to achieving the ultimate objective of economic policy.
- Monetary Policy is the macroeconomic policy being laid down by the Central Bank towards the management of money supply and interest rate.
- It is the demand side economic policy used by the government of a country to achieve macroeconomic objectives like inflation, consumption, growth and liquidity.
- There are several direct and indirect instruments that are used for implementing monetary policy. These are Cash Reserve Ratio, Statutory Liquidity Ratio, Bank Rate, Repo Rate, Reverse Repo Rate, and Open Market Operations.
- The Monetary Policy Committee (MPC) constituted by the Central Government under Section 45ZB determines the policy interest rate required to achieve the inflation target.
- The objectives of monetary policy are
  1. Neutrality of Money
  2. Stability of Exchange Rates
  3. Price Stability
  4. Full Employment
  5. Economic Growth
  6. Equilibrium in the Balance of Payments

## Credit Control Measures

- Credit control is the primary mechanism available to the Central banks to realize the objectives of monetary management
- The statutory basis for the control of the credit system by the Reserve Bank is embodied in the Reserve Bank of India Act, 1934 and the Banking Regulation Act, 1949.

## Methods of Credit Control

# Railway Exams – General Awareness

- General or Quantitative Methods
  1. Bank Rate
  2. Open Market Operations
  3. Variable Cash Reserve Ratio
- Selective or Qualitative Methods
  1. Rationing of Credit
  2. Direct Action
  3. Moral suasion
  4. Publicity
  5. Regulation of Consumer's Credit
  6. Marginal Requirements

## Quantitative or General Methods

### 1. Bank Rate Policy

- The interest rate which the RBI charges on its long-term lendings is known as the Bank Rate.
- The rate has direct impact on long-term lending activities of the concerned lending bodies operating in the Indian financial system
- Example: If the Central Bank wants to control credit, it will raise the bank rate. As a result, the deposit rate and other lending rates in the money-market will go up. Borrowing will be discouraged, and will lead to contraction of credit and vice versa.

### 2. Open Market Operations

- **In narrow sense**, the Central Bank starts the purchase and sale of Government securities in the money market
- **In Broad Sense**, the Central Bank purchases and sells not only Government securities but also other proper eligible securities like bills and securities of private concerns. When the banks and the private individuals purchase these securities they have to make payments for these securities to the Central Bank.

### 3. Variable Reserve Ratio

#### Cash Reserves Ratio

- Variable Cash Reserve Ratio as an objective of monetary policy was first suggested by J.M. Keynes
- Cash reserve Ratio (CRR) is the amount of Cash that the banks have to keep with RBI
- The commercial banks as per the statute has to maintain reserves based on their demand deposit and fixed deposit with central bank is called as Cash Reserve Ratio

# Railway Exams – General Awareness

- If the CRR is high, the commercial bank's capacity to create credit will be less and if the CRR is low, the commercial bank's capacity to create credit will be high.

## **Statutory Liquidity Ratio**

- Statutory Liquidity Ratio (SLR) is the amount which a bank has to maintain in the form of cash, gold or approved securities. The quantum is specified as some percentage of the total demand and time liabilities of a bank.
- SLR is used to control the bank's leverage for credit expansion.

## **Repo Rate and Reverse Repo Rate**

- The Repo Rate and the Reverse Repo Rate are the frequently used tools with which the RBI can control the availability and the supply of money in the economy. Repo Rate is always greater than Reverse Repo Rate in India

## **Repo Rate**

- Repo rate is the rate at which the central bank of a country lends money to commercial banks in the event of any shortfall of funds.
- Repo rate is used by monetary authorities to control inflation.

## **Reverse Repo Rate**

- The rate at which the RBI is willing to borrow from the commercial banks is called reverse repo rate
- The Reverse Repo Rate is an important Monetary Policy tool used by the Reserve Bank of India (RBI) to control money supply or liquidity and inflation in the economy.

## **CALL MONEY MARKET:**



# Railway Exams – General Awareness

- The call money market is an important segment of the money market where borrowing and lending of funds take place on over night basis
- Participants in the call money market are banks and related entities specified by the RBI, Participants in the call money market in India currently include scheduled commercial banks (SCBs) —excluding regional rural banks), cooperative banks (other than land development banks), Primary Dealers (PDs).
- The money that is lent for **one day** in this market is known as **call money** and, if it exceeds one day, is referred to as **notice money**. Notice Money refers to the borrowing and lending of funds for **2-14 days**

## NEW FINANCIAL YEAR OF RBI

- Aimed at aligning its financial year with the government's financial year, in February 2020, the RBI decided to shift to April- March as its new financial year from 2020-21 (from its existing financial year July-June).

## BANKING IN INDIA

### BANKING

- Banking sector acts as the backbone of modern business world. The banking system significantly contributes for the development of any country.
- The first bank of India was Bank of Hindustan (1770)

### Nationalisation of Banks

- After Independence, the Government of India adopted planned economic development. The main objective of the economic planning aimed at social welfare. Before Independence commercial banks were in the private sector. These commercial banks failed in helping the Government to achieve social objectives of planning. Therefore, the government decided to nationalize 14 major commercial banks on 19 July 1969. In 1980, again the government took over another 6 commercial banks.

### Objectives of Nationalisation

# Railway Exams – General Awareness

1. The main objective of nationalisation was to attain social welfare. Sectors such as agriculture, small and village industries were in need of funds for their expansion and further economic development.
2. Nationalisation of banks helped to curb private monopolies in order to ensure a smooth supply of credit to socially desirable sections
3. Banks created credit facilities mainly to the agriculture sector and its allied activities after nationalization.
4. Nationalisation of banks was required to reduce the regional imbalances where the banking facilities were not available

## COMMERCIAL BANKS

- Commercial bank refers to a bank, or a division of a large bank, which more specifically deals with deposit and loan services provided to corporations or large/ middle-sized business - as opposed to individual members of the public/small business

### Functions of Commercial Banks

- The functions of commercial banks are broadly classified into primary functions and secondary functions

## Primary Functions

### 1. Accepting Deposits

- It implies that commercial banks are mainly dependent on public deposits.
- There are two types of deposits, which are discussed as follows
  - **Demand Deposits:** It refers to deposits that can be withdrawn by individuals without any prior notice to the bank. In other words, the owners of these deposits are allowed to withdraw money anytime by writing a withdrawal slip or a cheque at the bank counter or from ATM centers using debit card.
  - **Time Deposits:** It refers to deposits that are made for certain committed period of time. Banks pay higher interest on time deposits. These deposits can be withdrawn only after a specific time period by providing a written notice to the bank.

## 2. Advancing Loans

- It refers to granting loans to individuals and businesses. Commercial banks grant loans in the form of overdraft, cash credit, and discounting bills of exchange.

## Secondary Functions

### 1. Agency Functions

- It implies that commercial banks act as agents of customers by performing various functions
  - **Collecting Cheques** : Banks collect cheques and bills of exchange on the behalf of their customers through clearing house facilities provided by the central bank.
  - **Collecting Income** : Commercial banks collect dividends, pension, salaries, rents, and interests on investments on behalf of their customers. A credit voucher is sent to customers for information when any income is collected by the bank.
  - **Paying Expenses**: Commercial banks make the payments of various obligations of customers, such as telephone bills, insurance premium, school fees, and rents. Similar to credit voucher, a debit voucher is sent to customers for information when expenses are paid by the bank.

### 2. Transferring Funds

- It refers to transferring of funds from one bank to another. Funds are transferred by means of draft, telephonic transfer, and electronic transfer.

### 3. Letter of Credit

- Commercial banks issue letters of credit to their customers to certify their creditworthiness.
  - **Underwriting Securities**: Commercial banks also undertake the task of underwriting securities. As public has full faith in the creditworthiness of banks, public do not hesitate in buying the securities underwritten by banks.
  - **Electronic Banking**: It includes services, such as debit cards, credit cards, and Internet banking.

### 3. General Utility Functions

# Railway Exams – General Awareness

- It implies that commercial banks provide some utility services to customers by performing various functions.
  - **Dealing in Foreign Exchange:** Commercial banks help in providing foreign exchange to businessmen dealing in exports and imports. However, commercial banks need to take the permission of the Central Bank for dealing in foreign exchange.
  - **Providing Locker Facilities:** Commercial banks provide locker facilities to its customers for safe custody of jewellery, shares, debentures, and other valuable items. This minimizes the risk of loss due to theft at homes. Banks are not responsible for the items in the lockers.

## Other Functions

### 1. Money Supply

- It refers to one of the important functions of commercial banks that help in increasing money supply

### 2. Credit Creation

- Credit Creation means the multiplication of loans and advances. Commercial banks receive deposits from the public and use these deposits to give loans. However, loans offered are many times more than the deposits received by banks. This function of banks is known as 'Credit Creation'.

## REGIONAL RURAL BANKS

- The Regional Rural Banks (RRBs) were first set up on 2 October, 1975 (only 5 in numbers)
- RRBs were established based on the recommendations of Narsimham Committee working group
- RRBs were set up as regional based rural lending institutions under the Regional Rural Banks Act, 1976.
- The Government of India, the concerned state government and the sponsoring nationalised bank contribute the share capital of the RRBs in the proportion of 50 per cent, 15 per cent and 35 per cent, respectively. The area of operation of the RRB is limited to notified few districts in a state.
- First RRB: Prathama Grameen Bank
- As per guidelines of Reserve Bank of India (RBI), the RRBs have to provide 75 per cent of their total credit under Priority Sector Lending(PSL)

# Railway Exams – General Awareness

- The main objective of the RRBs is to provide credit and other facilities particularly to the small and marginal farmers, agricultural labourers, artisans and small entrepreneurs so as to develop agriculture, trade, commerce, industry and other productive activities in the rural areas.

## SMALL & PAYMENT BANKS

- In 2014, the RBI issued the draft guidelines for setting up small banks and payment banks. The guidelines said that both are ‘niche’ or ‘differentiated’ banks with the common objective of furthering financial inclusion

### Small finance banks

- Small finance banks are a type of niche banks in India. Banks with a small finance bank license can provide basic banking service of acceptance of deposits and lending. The aim behind these to provide financial inclusion to sections of the economy not being served by other banks, such as small business units, small and marginal farmers, micro and small industries and unorganized sector entities

### Payments Banks

- The objective of payments banks is to increase financial inclusion by providing small savings accounts, payment/remittance services to migrant labour, low income households, small businesses, other unorganized sector entities and other users by enabling high volume-low value transactions in deposits and payments/remittance services in a secured technology-driven environment.
- Payments Banks can accept demand deposits (only current account and savings accounts). They would initially be restricted to holding a maximum balance of 1 lakhs per customer. Based on performance, the RBI could enhance this limit.
- The Payments Banks would be required to use the word ‘Payments’ in its name to differentiate it from other banks.
- No credit lending is allowed for Payments Banks.
- Payments Banks Formation - Nachiket Mor Committee

## CO-OPERATIVE BANKS

- Banks in India can be broadly classified under two heads — commercial banks and co-operative banks. While commercial banks (nationalized banks, State Bank group, private sector banks, foreign banks and regional rural banks) account for an overwhelming share of the banking business, cooperative banks also play an important role.
- It can be divided into 2 broad segments i) Urban Cooperative Banks ii) Rural Cooperative Banks

### Urban Cooperative Banks

- Urban Cooperative Banks are scheduled and non-scheduled.
- Banking activities of Urban Cooperative Banks are monitored by RBI. Registration and Management activities are managed by Registrar of Cooperative Societies (RCS). These RCS operate in single-state and Central RCS (CRCS) operate in multiple state.

### Rural Cooperatives Banks

- Rural cooperative Banks are short-term and long-term structures.
- The short-term co-operative credit structure operates with a three-tier system
  1. State Cooperative Banks: Operate at the apex level in states
  2. District Central Cooperative Banks: Operate at the district levels
  3. Primary Agricultural Credit Societies: Operate at the village or grass-root level

## MUDRA (Micro Units Development and Refinance Agency)

- Pradhan Mantri MUDRA Yojana (PMMY) is a scheme launched by the Hon'ble Prime Minister on April 8, 2015 for providing loans non-corporate, non-farm small/micro-enterprises.
- These loans are classified as MUDRA loans under PMMY. These loans are given by Commercial Banks, RRBs, Small Finance Banks, MFIs and NBFCs.

# Railway Exams – General Awareness

- The products designed under it are categorized into three buckets of finance named **Shishu** (loan up to ₹50,000), **Kishor** (₹50,000 to ₹5 lakh) and **Tarun** (₹5 lakh to ₹10 lakh).
- The scheme's objective is to refinance collateral-free loans given by the lenders to small borrowers
- Though the scheme covers the traders of fruits and vegetables, in general, it does not refinance the agriculture sector.

## (Non-Banking Financial Companies) NBFCs

- A non-bank financial company (NBFC) is a financial institution that does not have a full banking license or is not supervised by the central bank.
- NBFCs can be broadly classified into two categories. Viz., (1) Stock Exchange; and (2) Other Financial institutions. Under the latter category comes Finance Companies, Finance Corporations, ChitFunds, Building Societies, Issue Houses, Investment Trusts and Unit Trusts and Insurance Companies.
- It is company under companies Act, 1956
- It is engaged in the business of loans and advances, acquisition of bonds/debentures/securities issued by Government or local authority or other marketable securities, leasing, hire-purchase, insurance business, chit business but does not include any institution whose principal business is that of agriculture activity, industrial activity, purchase or sale of any goods or providing any services and sale or purchase of immovable property
- It cannot have demand deposits like current and saving accounts

## NABARD (A National Bank for Agriculture and Rural Development)

- NABARD was established on the recommendation of B.Sivaramman Committee on 12 July 1982
- NABARD set up in July 1982 by an Act of parliament to take over the functions of ARDC and the refinancing functions of RBI in relation to co-operative banks and RRBs
- NABARD is linked organically with the RBI by the latter contributing half of its share capital the other half being contributed by the Government of India.
- Deputy Governor of RBI is appointed as Chairman of NABARD.

# Railway Exams – General Awareness

## Functions of NABARD

- NABARD acts as a refinancing institution for all kinds of production and investment credit to agriculture, small-scale industries, cottage and village industries, handicrafts and rural crafts and real artisans and other allied economic activities with a view to promoting integrated rural development.
- It provides short-term, medium-term and long-term credits to state co-operative Banks (SCBs), RRBs, LDBs and other financial institutions approved by RBI
- NABARD has the responsibility of coordinating the activities of Central and State Governments, the NITI Aayog and other all India and State level institutions entrusted with the development of small scale industries, village and cottage industries, rural crafts, industries in the tiny and decentralized sectors, etc.
- It has the responsibility to inspect RRBs and co-operative banks, other than primary co-operative societies.
- It maintains a Research and Development Fund to promote research in agriculture and rural development

## Pradhan Mantri Jan-Dhan Yojana

- To achieve the objective of financial inclusion by extending financial services to the large hitherto unserved population of the country and to unlock its growth potential, the Pradhan Mantri Jan-Dhan Yojana (PMJDY) was launched on 28 August 2014.

## MONEY

- Monetary Economics is a branch of economics that provides a framework for analyzing money and its functions as a medium of exchange, store of value and unit of account.
- Money is anything that is generally accepted as payment for goods and services and repayment of debts and that serves as a medium of exchange.

## Evolution of Money

### Barter System



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- The introduction of money as a medium of exchange was one of the greatest inventions of mankind. Before money was invented, exchange took place by Barter, that is, commodities and services were directly exchanged for other commodities and services.
- Goods like skins, salt, rice, wheat, utensils, weapons, etc. were commonly used as money. Such an exchange of goods for goods was known as “Barter System”.
- Barter system was introduced by Mesopotamia tribes

## **Metallic Standard**

- Under the metallic standard, some kind of metal with gold or silver is used to determine the standard value of the money and currency. Their face value is equal to their intrinsic metal value.

## **Gold Standard**

- Gold Standard is a system in which the value of the monetary unit or the standard currency is directly linked with gold. The purchasing power of a unit of money is maintained equal to the value of a fixed weight of gold.

## **Silver Standard**

- The silver standard is a monetary system in which the standard economic unit of account is a fixed weight of silver

## **Paper Currency Standard**

- The paper currency standard refers to the monetary system in which the paper currency notes issued by the Treasury or the Central Bank or both circulate as unlimited legal tender. Its value is determined independent of the value of gold or any other commodity.
- The quantity of money in circulation is controlled by the monetary authority to maintain price stability.

## **Plastic Money**

# Railway Exams – General Awareness

- The latest type of money is plastic money. Plastic money is one of the most evolved forms of financial products.
- Plastic money can come in many different forms such as Cash cards, Credit cards, Debit cards, Pre-paid Cash cards, Store cards, Forex cards and Smart cards

## Crypto Currency

- A digital currency in which encryption techniques are used to regulate the generation of units of currency and verify the transfer of funds, operating independently of a Central Bank. Example: Bitcoin

## Important concepts

### Barren Money

- Money which is not earning any interest
- Money which is not invested anywhere
- Money which is kept in a safe deposit locker

### Fiat Money

- Fiat money is one that is declared legal tender. This includes any form of currency in circulation such as paper money or coins. Fiat money is backed by a country's government instead of a physical commodity.

## Supply of Money

- Money supply means the total amount of money in an economy. It refers to the amount of money which is in circulation in an economy at any given time.
- Money supply plays a crucial role in the determination of price level and interest rates
- In India, currency notes are issued by the Reserve Bank of India (RBI) and coins are issued by the Ministry of Finance, Government of India (GOI).
- Determinants of Money Supply

1. Currency Deposit Ratio (CDR)
2. Reserve deposit Ratio (RDR)
3. Cash Reserve Ratio (CRR)
4. Statutory Liquidity Ratio (SLR)

## INFLATION AND BUSINESS CYCLE

### INFLATION

- Inflation is a consistent and appreciable rise in the general price level. In other words, inflation is the rate at which the general level of prices for goods and services is rising and consequently the purchasing power of currency is falling.
- The rate of inflation is measured on the basis of price indices which are of two kinds— Wholesale Price Index (WPI) and Consumer Price Index (CPI).

### Types of Inflation (Based on demand and supply)

#### Demand-Pull Inflation

- Demand and supply play a crucial role in deciding the inflation levels in the society at all points of time. For instance, if the demand is high for a product and supply is low, the price of the products increases

#### Cost-Push Inflation:

- When the cost of raw materials and other inputs raises inflation results. Increase in wages paid to labour also leads to inflation.

### Types of Inflation (On the basis of speed)

#### Creeping Inflation or Low Inflation

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- Creeping inflation is slow-moving and very mild. The rise in prices will not be perceptible but spread over a long period.
- Low inflation or Creeping inflation takes place in a longer period and the range of increase is usually in 'single-digit'.
- This type of inflation is in no way dangerous to the economy. This is also known as mild inflation

## **Walking Inflation:**

- When prices rise moderately and the annual inflation rate is a single digit ( 3% - 9%), it is called walking or trolling inflation.

## **Running Inflation:**

- When prices rise rapidly like the running of a horse at a rate of speed of 10% - 20% per annum, it is called running inflation

## **Galloping Inflation**

- This is a 'very high inflation' running in the range of double-digit or triple-digit (20%,100%,200 per cent in a year)

## **Hyperinflation**

- This form of inflation is 'large and accelerating' which might have the annual rates in million or even trillion. In such inflation not only the range of increase is very large, but the increase takes place in a very short span of time, prices shoot up overnight.

## **Types of inflation (on the basis of inducement)**

### **Credit inflation**

- When banks are liberal in lending credit, the money supply increases and thereby rising prices.

## Currency inflation

- The excess supply of money in circulation causes rise in price level.
- This type of inflation is caused by the printing of currency notes

## Deficit induced inflation

- The deficit budget is generally financed through printing of currency by the Central Banks. As a result, prices rise

## Tax induced inflation

- Increase in indirect taxes like excise duty, custom duty, GST and sales tax may lead to rise in price (Ex. petrol and diesel). This is called **tax induced inflation**.

## Scarcity induced inflation

- The scarcity of goods happen either due to a fall in production (Ex. farm goods) or due to hoarding and black marketing. This also pushes up the price.

## Profit induced inflation

- When the firms aim at higher profit, they fix the price with a higher margin. So prices go up

## Causes of Inflation

The main causes of inflation are as follows:

### Increase in Money Supply

- Inflation is caused by an increase in the supply of money which leads to increase in aggregate demand. The higher the growth rate of the nominal money supply, the higher is the rate of inflation.

### Increase in Consumer Spending:

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- The demand for goods and services increases when they are given credit to buy goods on hire-purchase and installment basis.

## **Increase in Exports**

- When exports are encouraged, domestic supply of goods decline. So prices rise.

## **Repayment of Public Debt**

- Whenever the government repays its past internal debt to the public, it leads to increase in the money supply with the public. This tends to raise the aggregate demand for goods and services.

## **Deficit Financing**

- Deficit financing may lead to inflation.
- Deficit refers to the difference between expenditure and receipts. In public finance, it means the government is spending more than what it is earning. Due to deficit financing money supply increases & the purchasing power of the people also increase. This raises aggregate demand in relation to aggregate supply, thereby leading to an inflationary rise in prices.

## **Cheap Money Policy**

- Cheap money policy means making money available to trade and industry at a cheaper interest rate
- Cheap money policy leads to an increase in the money supply which raises the demand for goods and services in the economy

## **Increase in Disposable Income**

- Disposable Income is also known as Disposable personal income. It is the individual's income after the payment of income tax

Disposable Income = Personal income – Direct Tax

# Railway Exams – General Awareness

- When the disposable income of the people increases, it raises their demand for goods and services.

## **Black Assests, Activities and Money**

- The existence of black money and black assets due to corruption, tax evasion, etc., increases the aggregate demand. People spend such money, lavishly. Black marketing and hoarding reduce the supply of goods. These trends tend to raise the price level further

## **Effects of Inflation**

### **On Debtors and Creditors:**

- During inflation, debtors are the gainers while the creditors are losers. The reason is that the debtors had borrowed when the purchasing power of money was high and now repay the loans when the purchasing power of money is low due to rising prices.
- The opposite effect takes place when inflation falls (i.e., deflation).

### **On Employment**

- Inflation increases employment in the short-run, but becomes neutral or even negative in the long run

### **On Import**

- Inflation gives an economy the advantage of lower imports and import substitution as foreign goods become costlier. But in the case of compulsory imports (i.e., oil, technology, drugs, etc.) the economy does not get this benefit and loses more foreign currency instead of saving it.
- Inflation increase exchange rates and makes all the imports costlier

### **On Export**

- With inflation, exportable items of an economy gain competitive prices in the world market. Due to this, the volume of export increases, and thus export income increases in the economy.

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- A high rate of inflation will hit hard the export industry in the economy. The cost of production will rise and the exports will become less competitive in the international market.
- Inflation can heavily impact the imports and exports of a country

## **On Trade Balance**

- In the case of a developed economy, inflation makes trade balance favorable, while for the developing economies inflation is unfavorable for their balance of trade. This is because of composition of their foreign trade.
- If compulsory imports are more inflation act as a disadvantage

## **Fixed-income Groups**

- The fixed incomes groups are the worst hit during inflation because their incomes being fixed do not bear any relationship with the rising cost of living. Examples are wage, salary, pension, interest, rent etc.

## **Investors**

- The investors, who generally invest in fixed interest yielding bonds and securities, have much to lose during inflation. On the contrary those who invest in shares stand to gain by rich dividends and appreciation in value of shares.

## **Effects on Production**

- When inflation is very moderate, it acts as an incentive to traders and producers. The profit due to rising prices encourages and induces business class to increase their investments in production, leading to generation of employment and income

## **On Exchange Rate**



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- The currency with the higher inflation rate then loses value and depreciates, while the currency with the lower inflation rate appreciates on the Forex market.

## Measures to Control Inflation

- Some of the important measures to control inflation are as follows:
  1. Monetary Measures
  2. Fiscal Measures
  3. Other Measures.

### Monetary Measures

- The most important method of controlling inflation is monetary policy of the Central Bank of the country.
- They are (i) Increase in Bank rate (ii) Sale of Government Securities in the Open Market (iii) Higher Cash Reserve Ratio (CRR) and Statutory Liquidity Ratio (SLR) (iv) Consumer Credit Control and (v) Higher margin requirements (vi) Higher Repo Rate and Reverse Repo Rate.
- Monetary policy can only be helpful in controlling inflation due to demand-pull factors.

### Fiscal Measures

- Fiscal policy is now recognized as an important instrument to tackle an inflationary situation.
- The major anti-inflationary fiscal measures are the following:
  1. Reduction of Government Expenditure
  2. Public Borrowing
  3. Enhancing taxation.
  4. Surplus budgets
  5. Increase in savings

### Other Measures

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1. To Increase Production→ One of the foremost measures to control inflation is to increase the production
2. Wage and Price Controls→ Wage and price controls help in controlling wages as the price increases

## OTHER IMPORTANT TERMS

### Deflation

- The essential feature of deflation is falling prices, reduced money supply and unemployment. Though falling prices are desirable at the time of inflation, such a fall should not lead to the fall in the level of production and employment. But if prices fall from the level of full employment both income and employment will be adversely affected.

### Stagflation

- Stagflation is a combination of stagnant economic growth, high unemployment and high inflation.

### Disinflation

- Disinflation is the slowing down the rate of inflation by controlling the amount of credit available to consumers without causing more unemployment. Disinflation may be defined as the process of reversing inflation without creating unemployment or reducing output in the economy

## INFLATION IN INDIA

- India calculates its inflation on two price indices; these are
  1. The wholesale price index (WPI)
  2. The consumer price index (CPI).
- WPI is measured on a weekly basis. The first index of wholesale prices commenced in India for the week of January 10, 1942. The base year of WPI is revised periodically. The current WPI base year is 2011-12 based on the prices of 697 commodities.

# Railway Exams – General Awareness

- India has been measuring inflation at the consumer prices also besides at the wholesale prices. But in place of a single consumer price index, India managing with four different set of the CPIs due to the socio-economic differentiations found among the consumers. These are: CPI-IW (Industrial Worker), CPI-UNME (Urban Non-Manual Employees), CPI-RL (Rural Labourers) and CPI-AL (Agricultural Labourers).

## BUSINESS CYCLE

- The economic activity in a capitalist economy will have its periodic ups and downs. The study of these ups and downs is called the study of Business cycle or Trade cycle or Industrial Fluctuation.

### Meaning of business Cycle

- A business cycle refers to oscillations in aggregate economic activity particularly in employment, output, income, etc. It is due to the inherent contraction and expansion of the elements which energize the economic activities of the nation. The fluctuations are periodical, differing in intensity and changing in its coverage.
- The four different phases of the business cycle are referred to as (i) Boom (ii) Recession (iii) Depression and (iv) Recovery

### Boom

- A strong upward fluctuation in the economic activities is called boom.
- The full employment and the movement of the economy beyond full employment are characterized as boom period. During this period, there is hectic activity in the economy. Money wages rise, profits increase and interest rates go up. The demand for bank credit increases and there is all-round optimism.

### Recession

- The turning point from boom condition is called recession. This happens at higher rate, than what was earlier. Generally, the failure of a company or bank bursts the boom and brings a phase of recession. Investments are drastically reduced, production comes down and income and profits decline. There is panic in the stock

# Railway Exams – General Awareness

market and business activities show signs of dullness. Liquidity preference of the people rises and money market becomes tight.

## Depression

- During the depression, the level of economic activity becomes extremely low. Firms incur losses and closure of business becomes a common feature and the ultimate result is unemployment. Interest prices, profits and wages are low. The agricultural class and wage earners would be worst hit. Banking institutions will be reluctant to advance loans to businessmen.
- Depression is the worst phase of the business cycle. The extreme point of depression is called as “trough”, because it is a deep point in business cycle.. Keynes advocated that autonomous investment of the government alone can help the economy to come out from the depression.

## Recovery

- This is the turning point from depression to revival towards an upswing. It begins with the revival of demand for capital goods. Autonomous investments boost the activity. The demand slowly picks up and in due course the activity is directed towards the upswing with more production, profit, income, wages and employment. Recovery may be initiated by innovation or investment or by government expenditure

## ECONOMIC PLANNING IN INDIA

- Economic planning is a process under which attempts are made to achieve desired targets of economic development within a specified period of time
- After Independence of India, in 1948, a declaration of industrial policy was announced. The policy suggested the creation of a National Planning Commission and the elaboration of the policy of a mixed economic system

**The evolution of planning in India is stated below:**

# Railway Exams – General Awareness

- **Sir M. Vishveshwarya (1934):** a prominent engineer and politician made his first attempt in laying foundation for economic planning in India in 1934 through his book, “**Planned Economy of India**”. It was a 10 year plan.
- **Jawaharlal Nehru (1938):** set-up “**National Planning Commission**” by a committee but due to the changes in the political era and 2nd World War, it did not materialize.
- **Bombay Plan (1940):** The 8 leading industrialists of Bombay presented “Bombay Plan”. It was a 15 Year Investment Plan.
- **S. N Agarwal (1944)** gave the “**Gandhian Plan**” focusing on the agricultural and rural economy.
- **M.N. Roy (1945)** drafted ‘**People’s Plan**’. It was aiming at mechanization of agricultural production and distribution by the state only.
- **J.P. Narayan (1950)** advocated, “**Sarvodaya Plan**” which was inspired by Gandhian Plan and with the idea of Vinoba Bhawe. It gave importance not only for agriculture, but encouraged small and cottage industries in the plan.

## Planning Commission

- Planning Commission was set up to formulate Five Year Plan in India
- The Planning Commission was created on March 15, 1950, and the plan era began on April 1, 1951, with the launch of the first five-year plan (1951-56).
- Jawaharlal Nehru was the first Chairman of Planning Commission
- The Planning Commission has been replaced by the NITI Aayog on 1st January 2015.

## India’s Five Year Plans

- The concept of economic planning in India or five year plan is derived from Russia
- India has launched 12 five year plans so far. The twelfth five-year plan was the last one in five-year plans
- The government of India has decided to stop the launching of five year plans and it was replaced by NITI Aayog.

# Railway Exams – General Awareness

## First Five Year Plan (1951-1956)

- This plan was based on the Harrod-Domar Model.
- Its main focus was on the agricultural development of the country.
- Many irrigation projects including Bhakra-Nangal Dam and Hirakud Dam were started in the first five-year plan.
- About 44.6 percent of the plan outlay went in favour of the public sector undertakings (PSUs).
- The community development projects were started
- This plan was successful and achieved the GDP growth rate of 3.6% (more than its target)

## Second Five Year Plan (1956-1961)

- It was based on the P.C. Mahalanobis Model.
- Its main focus was on the industrial development of the country. Second to transports and communication
- Steel plants at Bhilai, Durgapur, and Rourkela were established during this plan
- This plan was successful and achieved the growth rate of 4.1%. Due to the assumption of a closed economy, a shortage of food and capital were felt during this Plan.

## Third Five Year Plan (1961-1966)

- Third Five Year Plan is called 'Gadgil Yojna' also
- The main target of this plan was to make the economy independent and to reach self-propelled position or take off.
- The plan aimed to increase national income by 30 % and agriculture production by 30 %
- Due to Indo -China war, this plan could not achieve its growth target of 5.6%

## Plan Holiday or Three Annual (1966-1969)

- The main reason behind the plan holiday was the Indo-Pakistan war & failure of third plan.

# Railway Exams – General Awareness

- During this period, annual plans (1966-1967, 1967-1968 & 1968-1969) were made and equal priority was given to agriculture, its allied sectors and the industry sector

## Fourth Five Year Plan (1969-1974)

- There are two main objectives of this plan i.e. growth with stability and Progressive achievement of self-reliance
- Fourteen Major Indian Banks were nationalised
- This plan failed and could achieve growth rate of 3.3% only, against the target of 5.7%.

## Fifth Five Year Plan (1974-1979)

- In this plan top priority was given to agriculture, next came industry and mines.
- The plan also focused on poverty alleviation and self-reliance
- The Twenty Point Programme (TPP) was launched by the Government of India in 1975. Prime Minister Indira Gandhi launched this programme.
- Overall this plan was successful, which achieved the growth rate of 4.8% against the target of 4.4%.
- The draft of this plan was prepared and launched by D.P. Dhar. This plan was terminated by Janata party government in 1978.

## Rolling Plan

- The Janta Government terminated the fifth five-year plan in 1977-78 and launched its own sixth five year plan for period 1978-83.
- In 1980, there was again a change of government at the Centre with the return of the Congress which abandoned the Sixth Plan of the Janata Government in the year 1980 itself.
- The new government launched a fresh new Sixth Plan for the period 1980-85.
- The plan (1978-1980) is called Rolling plan

## Sixth Five Year Plan (1980-1985)

# Railway Exams – General Awareness

- The basic objective of this plan was poverty eradication and technological self-reliance
- This Plan (1980–85) was launched with the slogan of **‘Garibi Hatao’**
- The plan gave emphasis on socio-economic infrastructure in the rural areas and also focused on eliminating rural poverty and regional disparities
- Its growth target was 5.2% but it achieved 5.7%.

## Seventh Five Year Plan (1985-1990)

- The Plan (1985- 90) emphasised on rapid food grain production, increased employment creation and productivity in general.
- The Jawahar Rozgar Yojana (JRY) was launched in 1989 with the motive to create wage employment for the rural poor.
- The plan also focused on growth, modernisation, self-reliance and social justice
- Its growth target was 5.0% but it achieved 6.0%.

## Two Annual Plans

- Eighth five year Plan could not take place due to volatile political situation at the centre. So two annual programmes are formed in 1990-91& 1991-92.
- The two consecutive Annual Plans (1990–92) were formulated within the framework of the approach to the Eighth Plan (1990–95) with the basic thrust on maximisation of employment and social transformation

## Eighth Five Year Plan (1992-1997)

- In this plan the top priority was given to development of the human resources i.e. employment, education and public health.
- During this plan, New Economic Policy of India was introduced.
- The Eighth Plan (1992–97) was launched in a typically new economic environment
- This plan was successful and got annual growth rate of 6.8% against the target of 5.6%.



# Railway Exams – General Awareness

## **Ninth Five Year Plan (1997-2002)**

- The main focus of this plan was “growth with justice and equity”. ,,
- This five-year plan gave priority to Agriculture and Rural Development with a view to generating adequate productive in employment and eradication of poverty
- Ensuring food and nutritional security for all
- The plan emphasizes seven minimum services which include Safe drinking water, Primary health service, Universalization of primary education, and Nutritional support to children.
- This plan failed to achieve the growth target of 7% and Indian economy grew only at the rate of 5.6%.

## **Tenth Five Year Plan (2002-2007)**

- This plan aimed to double the per capita income of India in the next 10 years.
- This five-year plan aims to achieve 8 percent average GDP growth for the period (2002-07)
- Reduction in gender gaps in literacy and wages rates by at least 50% by 2007
- It aimed to reduce the poverty ratio to 15% by 2012.
- Increased emphasis on the social sector (education, health, etc.)
- Its growth target was 8.0% but it achieved only 7.2%.

## **Eleventh Five Year Plan (2007-2012)**

- The Plan targets a growth rate of 10 percent and emphasizes the idea of ‘faster and more inclusive growth’.
- Prepared by C.Rangarajan
- Its growth rate target was 8.1% but it achieved only 7.9%

## **Twelfth Five Year Plan (2012-2017)**

- Its main theme is “Faster, More Inclusive and Sustainable Growth”.
- Provide electricity to all villages

# Railway Exams – General Awareness

- Connect all villages with all-weather roads
- Provide access to banking services to 90 percent Indian households
- Its growth rate target is 8%.

## NITI Aayog

- NITI Aayog (National Institution for Transforming India) was formed on January 1, 2015 through a Union Cabinet resolution. NITI Aayog is a policy **think-tank** of the Government of India
- The NITI Aayog is the new planning body replacing Planning Commission in India.
- NITI Aayog serves as a knowledge hub and monitors progress in the implementation of policies and programmes of the Government of India.
- The Prime Minister is the Chairperson of NITI Aayog and Union Ministers will be Ex-officio members. The Vice-Chairman is the functional head of NITI Aayog

## Structure of the NITI

1. Chairman: the Prime Minister of India (ex-officio).
2. Governing Council: will comprise the Chief Ministers of all states and Lt. Governors of union territories.
3. Vice-Chairperson—to be appointed by the PM (First Vice Chairman was **Arvind Panangariya**).
4. Members: all as full-time.
5. Part-time Members: maximum of 2, from leading universities, research organisations and other relevant institutions in an ex-officio capacity.
6. Ex-Officio Members: maximum of 4 members of the Union Council of Ministers to be nominated by the PM.
7. Chief Executive Officer: to be appointed by the PM for a fixed tenure, in the rank of Secretary to the Government of India.

## Functions of NITI Aayog

# Railway Exams – General Awareness

- **Cooperative and Competitive Federalism:** To enable the States to have active participation in the formulation of national policy.
- **Decentralized Planning:** To restructure the planning process into a bottom-up model.
- **Vision and Scenario Planning:** To design medium and long-term strategic frameworks towards India's future.
- **Internal Consultancy:** It provides internal consultancy to Central and State governments on policy and programmes.
- **Monitoring and Evaluation:** It will monitor the implementation of policies and programmes and evaluate the impacts.

## TAX STRUCTURE IN INDIA

- Tax is a compulsory payment by the citizens to the government to meet the public expenditure. It is legally imposed by the government on the taxpayer and in no case, taxpayers can refuse to pay taxes to the government.  
Example: Income tax, Corporate tax, Sales tax
- Modern economics defines tax as a mode of income redistribution.

### Direct Tax

- Direct tax is referred to as the tax, levied on person's income and wealth and is paid directly to the government.  
Example: Income tax, Corporate tax, etc.

### Indirect Tax

- Indirect Tax is referred to as the tax, levied on a person who consumes the goods and services and is paid indirectly to the government.  
Example: Sales Tax, Entertainment Tax, Service Tax etc.

### Methods of Taxation

# Railway Exams – General Awareness

- There are three methods of taxation prevalent in economies with their individual merits. These are
  1. Regressive taxation
  2. Proportional taxation
  3. Progressive taxation

## **Progressive taxation**

- A progressive tax is a tax that imposes a lower tax rate on low-income earners compared to those with a higher income, making it based on the taxpayer's ability to pay. That means it takes a larger percentage from high-income earners than it does from low income individuals.
- Indian income tax is a typical example of Progressive tax. The idea here is less tax on the people who earn less and higher taxes on the people who earn more
- This is the most popular taxation method in the world and a populist one, too

## **Regressive taxation**

- A regressive tax is a tax applied uniformly, taking a larger percentage of income from low-income earners than from high-income earners. It is in opposition to a progressive tax
- This method while appreciated for rewarding the higher producers or income earners is criticised for being more taxing on the poor and low-producers.

## **Proportional taxation**

- A proportional tax system also referred to as a flat tax system, assesses the same tax rate on everyone regardless of income or wealth.
- The sales tax is one of the best examples of proportional tax because all consumers regardless of income pay the same fixed rate

## **TAXATION IN INDIA**

# Railway Exams – General Awareness

- Article 256 of the constitution of India states that “No tax shall be levied or collected except by the authority of law”. Hence, each and every tax that is collected needs to be backed by an accompanying law.
- The taxation system in India is such that the taxes are levied and collected by the Central Government and the State Governments. Some minor taxes are also levied and collected by the local authorities such as the Municipality and the Local Governments.
- Major Central Taxes
  1. Income Tax
  2. Central Goods & Services Tax (CGST)
  3. Integrated Goods & Services Tax (IGST)
  4. Customs Duty
  5. Corporate tax
  6. Gift Tax
- Major State Taxes
  1. State Goods & Services Tax (SGST)
  2. Stamp Duty & Registration
  3. Professional tax
- Local Bodies Taxes
  1. Property tax
  2. Water tax
- The tax structure in India is divided into direct and indirect taxes

## Direct Taxes

- A direct tax is referred to as a tax levied on person's income and wealth and is paid directly to the government; the burden of such tax cannot be shifted.
- The tax is progressive in nature. It is levied according to the paying capacity of the person, i.e. the tax is collected more from the rich and less from the poor people

# Railway Exams – General Awareness

- The plans and policies of the Direct Taxes are being recommended by the Central Board of Direct Taxes (CBDT) which is under the Ministry of Finance, Government of India.
- Example: Income-tax, corporation tax, property tax and gift tax

## **Merits of Direct Taxes**

- Direct taxes are progressive i.e. rate of tax varies according to tax base. For example, income tax satisfies the canon of equity.
- The cost of collection of direct taxes is relatively low. The tax payers pay the tax directly to the state.
- Direct taxes also satisfy the canon of elasticity. Income tax is income elastic in nature. As income level increases, the tax revenue to the Government also increases automatically
- Direct tax helps in controlling the inflation.

## **Demerits of Direct Taxes**

- Direct tax adversely affects productivity. Citizens are not willing to earn more income because in that case they have to pay more taxes.
- The burden of direct tax is so heavy that tax payers always try to evade taxes. This leads to the generation of black money, which is harmful to the economy

## **Indirect Tax**

- Indirect Tax is referred to as a tax charged on a person who purchases the goods and services and it is paid indirectly to the government. The burden of tax can be easily shifted to another person. It is levied on all persons equally whether rich or poor. Example: GST, Customs Duty, etc.

## **Merits of Indirect Taxes**

- All the consumers, whether they are rich or poor, have to pay indirect taxes. For this reason, it is said that indirect taxes can cover more people than direct taxes.

# Railway Exams – General Awareness

- The Government imposes indirect taxes on those commodities which are harmful to health e.g. tobacco, liquor etc. They are known as sin taxes.

## Demerits of Indirect Taxes

- Indirect taxes are sometimes unjust and regressive in nature since both rich and poor persons have to pay same amount as taxes irrespective of their income level.
- Indirect taxes are less elastic compared to direct taxes. As indirect taxes are generally proportional.

## GST (Goods and Service Tax)

- GST is an Indirect Tax which has replaced many Indirect Taxes in India
- GST is one indirect tax for the entire country.
- The Goods and Service Tax Act was passed in the Parliament on 29th March 2017. The Act came into effect on 1st July 2017. The motto is one nation, one market, one tax.
- Goods & Services Tax in India is a comprehensive, multistage, destination-based tax that is levied on every value addition.
- GST is one of the biggest indirect tax reforms in the Country.

## Destination Based

- GST is a destination-based tax

Example: Consider goods manufactured in Telangana and are sold to the final consumer in Karnataka. Since Goods & Service Tax is levied at the point of consumption, in this case, Karnataka, the entire tax revenue will go to Karnataka and not Telangana.

## Components of GST

- Components of GST The component of GST are of 3 types. They are: CGST, SGST & IGST.
  1. CGST: Collected by the Central Government on an intra-state sale (Eg: Within state/ union territory)

# Railway Exams – General Awareness

2. SGST: Collected by the State Government on an intra-state sale (Eg: Within state/ union territory)
3. IGST: Collected by the Central Government for inter-state sale (Eg: Maharashtra to Karnataka)

**The tax structure under the GST regime will be as follows**

Transaction	New Regime	Old Regime	Remarks
Goods or services (Sale within the State)	CGST + SGST	VAT + Central Excise/Service tax	1. Revenue will be shared equally between the Centre and the State
Goods or services (Sale to another State)	IGST	Central Sales Tax + Excise/Service Tax	1. IGST tax is levied when there is an inter-state transfer of goods and services.  2. The Central Government will then share the IGST revenue based on the destination of goods

## **Other important Details**

- The GST is applicable on all goods and services other than following:
  1. Alcoholic liquor for human consumption
  2. Petroleum products (Petroleum crude, high-speed diesel, motor spirit, natural gas and aviation turbine fuel).
- Single Tax to replace multiple levies, right from manufacturer/supplier to consumer. GST incorporates many of the indirect taxes levied by states and the central government. The following is the list of indirect taxes in the pre-GST regime:
  1. State VAT/Sales Tax
  2. Central Sales Tax
  3. Purchase Tax
  4. Luxury Tax
  5. Entertainment and Amusement Tax