

# UPPSC

Uttar Pradesh Public Service Commission

## Assistant Engineer

Combined State Engineering  
Services Examination

# General Studies

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**UPPSC-AE Combined State Engineering Services Examination : General Studies**

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# Preface

The compilation of this book **General Studies** is motivated by the desire to provide a concise book which can benefit students who are preparing for Uttar Pradesh Public Service Commission (UPPSC) Combined State Engineering Services Examination (Assistant Engineer).



**B. Singh** (Ex. IES)

This textbook provides all the requirements of the students, i.e. comprehensive coverage of General Studies topics and objective types questions articulated in a lucid language. This book not only covers the syllabus of Uttar Pradesh Public Service Commission (UPPSC) Combined State Engineering Services Examination (Assistant Engineer) in a holistic manner but is also useful for other competitive examinations. All the topics are given the emphasis they deserve so that mere reading of the book helps aspirants immensely.

Our team has made their best efforts to remove all possible errors of any kind. Nonetheless, we would highly appreciate and acknowledge if you find and share with us any printing and conceptual errors.

It is impossible to thank all the individuals who helped us, but we would like to sincerely thank all the authors, editors and reviewers for putting in their efforts to publish this book.

With Best Wishes

**B. Singh**

CMD, MADE EASY Group

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# General Studies

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# History & Culture

## CHAPTER 1

### Ancient India



#### PREHISTORIC PERIOD

- Prehistoric period belongs to the time before the emergence of writing. It is believed that man learnt writing only about 5000-8000 years ago during the Neolithic period.
- The earliest known Neolithic writings are Dispilio Tablet (found in Greece) and Tartaria tablets (found in Romania). Both of these belong to the 6th millennium BC.
- Thus, Prehistory began with the appearance of human beings about five lakh years ago, and finished with the invention of writing about 6-8 thousand years ago.



| Period/ Age      | Remarks   |
|------------------|---|
| Paleolithic Age  | <ul style="list-style-type: none"> <li>• People in Paleolithic age were dependent on hunting for their livelihood and used to travel from one place to another depending on the availability of natural resources for survival. They developed sharp weapons of stone for hunting purpose.</li> </ul> |
| Mesolithic Age   | <ul style="list-style-type: none"> <li>• During Mesolithic age, people were still hunter-gatherers, but were possibly starting to stay in one place.</li> <li>• Domestication of animals can be seen in this age.</li> </ul>  |
| Neolithic Age    | <ul style="list-style-type: none"> <li>• During Neolithic age, stone tools and weapons were also further modified and were sharpened by fine shedding of the stones.</li> <li>• It also contributed greatly in the field of transportation by an important invention of the wheel.</li> </ul>         |
| Chalcolithic Age | <ul style="list-style-type: none"> <li>• The people of Chalcolithic age practiced agriculture. They used tools made up of copper and stone.</li> <li>• Painted pottery was the most distinguishing feature of all Chalcolithic cultures.</li> </ul>   |

#### Important Palaeolithic sites in India

- Lingsugur in Raichur district, Karnataka was the first site to be discovered from India. Apart from this, some of the most important Palaeolithic sites in India are as follows:
- Lidder river Pahalgam, Kashmir.
- Sohan valley Punjab.
- Banks of River Beas, Banganga, Sirsa Haryana.
- Chittorgarh and Kota, Rajasthan.
- River Wagoon, Kadamali basins Rajasthan.
- River Sabaramati and Mahi basins (Rajasthan & Gujarat).
- Basins of river tapti, Godavari, Bhima and Krishna.

- Koregaon, Chandoli and shikarpur (Maharashtra).
- River Raro (Jharkhand).
- River Suvarnrekha (Orissa).
- Ghatprabha River Basin (Karnataka).
- Belan Valley, Allahabad.
- Singgi Talav, Didwana Nagaur Rajasthan.
- Hunsgi, Gulbarga in Karnataka.
- Attirampakkam in Tamilnadu.

#### Palaeolithic tools



### Important Mesolithic Sites

- In Rajasthan, Bagor is almost largest Mesolithic site in India. Other major Mesolithic sites in



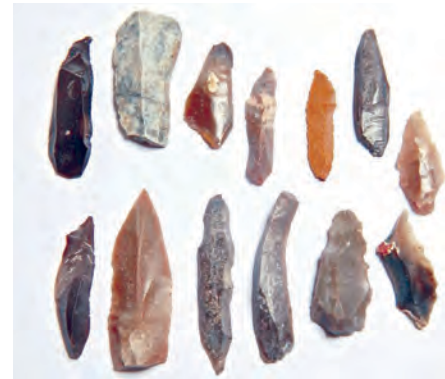
Rajasthan are Tilwara, Pachpadra basin and Sojat Area etc.

- In Gujarat, mesolithic sites include those on banks of river Sabarmati asuch as Akhaj, Valsana, Hirpur, Langhanj etc.
- In Uttar Pradesh, Sarai Nahar Rai, Morhana Pahar and Lekkahia are important Mesolithic sites.
- In Madhya Pradesh, Bhimbetka along with Adamgarh, Chaturbhujnath Nala are major Mesolithic sites.

- In Jharkhand Chhota nagpur plateau is a major Mesolithic site in India.
- In Odisha, Mayurbhanj, Keonjhar, Sundergarh are major mesolithic sites.
- In South India, Mesolithic sites are abundant in Karnataka, Tamil Nadu and Andhra Pradesh.

### Important Neolithic Sites

- Mehrgarh is located on the Bolan River, a tributary of the Indus, at the eastern edge of the Balochistan plateau overlooking the Indus plain. It is supposed to be the oldest agricultural settlement in the Indian subcontinent.
- In Kashmir valley, Burzahom (meaning place of birth) and Gufkral (meaning cave of the potter) are important Neolithic / Chalcolithic sites.
- In Uttar Pradesh, Belan valley is a Neolithic site known as earliest rice-farming community in India.



## INDUS VALLEY CIVILIZATION

- The Bronze Age Indus Valley Civilization or Harappan Civilization was the culmination of a long and sustained cultural evolution in the Indus Valley and surrounding areas. The term "Indus Valley Civilization" was used by John Marshall for the first time. The people of this civilization were definitely in touch with the other civilizations especially with Mesopotamian civilization.
- Indus Valley Civilization is one of the oldest civilizations of the world. It flourished around the Indus river and its tributaries. The area consists of modern Pakistan and Northwestern India. Mohenjodaro is the largest site of the Civilization.
- Indus valley civilization is also called as Harappan civilization because Harappa was the first site to be excavated in 1921 under the supervision of **Daya Ram Sahni**.
- The known extent of this civilization in the west is upto Sutkagendor in Baluchistan; Alamgirpur (UP) in the east; Daimabad (Maharashtra) in South; and Manda (J and K) in the north.



| Types of Painting  | Remarks   |
|--------------------|---|
| Mysore painting    | Mysore painting is an important form of classical South Indian painting that originated in the town of Mysore in Karnataka. These paintings are known for their elegance, muted colours and attention to detail. The themes for most of these paintings are Hindu Gods and Goddesses and scenes from Hindu mythology. |
| Tanjore painting   | Tanjore painting is an important form of classical South Indian painting native to the town of Tanjore in Tamil Nadu. The art form dates back to the early 9th century, a period dominated by the Chola rulers, who encouraged art and literature.  |
| Madhubani painting | Madhubani painting is a style of painting, practiced in the Mithila region of Bihar state. Themes revolve around Hindu Gods and mythology, along with scenes from the royal court and social events like weddings.  |
| Pahari painting    | The Pahari painting developed and flourished during 17th to 19th centuries stretching from Jammu to Almora and Garhwal, in the sub-Himalayan India, through Himachal Pradesh.   |

## Practice Questions

## HISTORY & CULTURE

- Q.1** Railway and telegraph systems were introduced in India by
- Lord Cornwallis
  - Lord Dalhousie
  - Lord Wellesley
  - Lord Bentinck
- Q.2** Which type of pottery was most popular with the Later Vedic people?
- Black and Grey Ware
  - Black and Red Ware
  - Painted Grey Ware
  - Red Ware
- Q.3** The Pitaka that contains pronouncements attributed to the Buddha, laying down numerous rules for the conduct of the order is
- Vinaya Pitaka
  - Sutta Pitaka
  - Abhidhamma Pitaka
  - None of the above
- Q.4** In Jainism, 'Perfect Knowledge' is referred to as
- Nirvana
  - Ratna
  - Kaivalya
  - Jina
- Q.5** What is the correct chronological sequence of the following Satavahana rulers?
- Simuka
  - Satakarni-I
  - Gautamiputra Satakarni
  - Vasishthiputra Pulumayi
- Select the correct answer from the codes given below.
- 1, 2, 4, 3
  - 2, 1, 3, 4
  - 1, 2, 3, 4
  - 1, 3, 4, 2
- Q.6** Which of the following pairs is incorrectly matched?
- Kharavela : Hathigumpha inscription
  - Simuka : Nanaghat inscription
  - Sungas : Nasik inscription
  - Rudradaman-I : Girnar inscription
- Q.7** What was the purpose of the Indian visit of Hiuen Tsang?
- To visit the holy places connected with Buddhism
  - To amass wealth
  - To know the geography of India
  - To establish political ties with India

- Q.91** With reference to Indian freedom struggle, which one of the following events occurred earliest?  
 (a) Swadeshi movement  
 (b) Shifting of imperial capital from Calcutta to Delhi  
 (c) Lucknow Pact  
 (d) Khilafat movement
- Q.92** Who founded the 'Indian League' in London?  
 (a) Annie Besant  
 (b) Bhikaji Cama  
 (c) Shyamji Krishna Verma  
 (d) V.K. Krishna Menon
- Q.93** During India's freedom struggle, which one of the following led to the first "All India Hartal"?  
 (a) Protest against Rowlatt Act  
 (b) Protest against Jallianwalabagh incident  
 (c) Arrest and trial of Mahatma Gandhi  
 (d) Arrival of Simon Commission
- Q.94** During the Indian freedom struggle, who of the following started the newspaper "Bande Matram"?  
 (a) Barindra Kumar Ghose  
 (b) Bipin Chandra Pal  
 (c) Devendra Nath Tagore  
 (d) Surendra Nath Banerjee
- Q.95** Who of the following is popularly known as 'Deshbandhu'?  
 (a) Aurobindo Ghosh  
 (b) Chittaranjan Das  
 (c) G.B. Pant  
 (d) R.M. Lohia
- Q.96** Who of the following resigned as Defence Minister in the wake of Indo-China war in 1962?  
 (a) Sardar Baldev Singh  
 (b) Sardar Swaran Singh  
 (c) V.K. Krishna Menon  
 (d) Y. B. Chavan
- Q.97** Who of the following was the founder of Khudai Khidmatgars (Red Shirts) movement?  
 (a) Hakim Ajmal Khan  
 (b) Shaukat Ali  
 (c) Maulana Abul Kalam Azad  
 (d) Khan Abdul Gaffar Khan
- Q.98** Who is the author of the play 'Nil Darpan'?  
 (a) Aurobindo Ghosh  
 (b) Bankim Chandra Chattopadhyay  
 (c) Deen Bandhu Mitra  
 (d) Rabindra Nath Tagore
- Q.99** Due to whose efforts were the legal obstacles to the remarriage of widows removed through law in the year 1856?  
 (a) Raja Rammohan Roy  
 (b) Keshab Chandra Sen  
 (c) Ishwar Chandra Vidyasagar  
 (d) Devendranath Tagore

## ANSWER KEY ► HISTORY AND CULTURE

- |         |         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1. (b)  | 2. (d)  | 3. (a)  | 4. (c)  | 5. (c)  | 6. (c)  | 7. (a)  | 8. (d)  | 9. (c)  |
| 10. (c) | 11. (b) | 12. (a) | 13. (b) | 14. (d) | 15. (c) | 16. (a) | 17. (b) | 18. (c) |
| 19. (c) | 20. (c) | 21. (c) | 22. (a) | 23. (c) | 24. (a) | 25. (c) | 26. (b) | 27. (d) |
| 28. (c) | 29. (c) | 30. (d) | 31. (b) | 32. (c) | 33. (c) | 34. (d) | 35. (d) | 36. (d) |
| 37. (c) | 38. (b) | 39. (a) | 40. (c) | 41. (d) | 42. (d) | 43. (d) | 44. (c) | 45. (b) |
| 46. (a) | 47. (d) | 48. (d) | 49. (c) | 50. (d) | 51. (d) | 52. (d) | 53. (a) | 54. (b) |
| 55. (c) | 56. (d) | 57. (a) | 58. (c) | 59. (c) | 60. (d) | 61. (b) | 62. (d) | 63. (a) |
| 64. (c) | 65. (b) | 66. (c) | 67. (a) | 68. (b) | 69. (b) | 70. (b) | 71. (a) | 72. (c) |
| 73. (a) | 74. (a) | 75. (c) | 76. (d) | 77. (a) | 78. (b) | 79. (b) | 80. (d) | 81. (b) |
| 82. (d) | 83. (d) | 84. (b) | 85. (b) | 86. (d) | 87. (d) | 88. (b) | 89. (c) | 90. (d) |
| 91. (a) | 92. (c) | 93. (a) | 94. (b) | 95. (b) | 96. (c) | 97. (d) | 98. (c) | 99. (c) |



# Indian Polity

CHAPTER

# 2



## CONSTITUTIONAL DEVELOPMENTS

- It was in 1934 when the idea of Constituent Assembly for India was put forward for the first time by M. N. Roy (A pioneer of communist movement in India).
- In 1935, the Indian National Congress (INC) demanded a Constituent Assembly to frame the Constitution of India.
- In 1938, Jawaharlal Nehru, on behalf of INC declared that the Constitution of Free India must be framed without outside interference and by a Constituent Assembly elected on the basis of Adult Franchise. The demand was accepted by British Government during August Offer in 1940.
- In 1942, Sir Stafford Cripps, a member of the British Cabinet came to India with draft proposal of the British Government on the framing of an independent Constitution which to be adopted after the World War II.
- The Cripps Proposals were rejected by the Muslim League which wanted India to be divided into two autonomous States with two separate Constituent Assemblies.
- Finally, the Constituent Assembly was constituted in November, 1946 under the scheme formulated by the Cabinet Mission Plan.

## Important British Acts of Constitutional Significance

### Regulating Act, 1773

- The Regulating Act, 1773 was the first step taken by the British Government to control and regulate the affairs of the East India Company in India.
- It designated the Governor of Bengal as the 'Governor-General of Bengal' and created an Executive Council consisting of four members to

assist him. The first Governor-General of Bengal was Lord Warren Hastings.

- It made a provision of Supreme Court at Fort William in Calcutta, comprising one Chief Justice and three other judges.
- It strengthened the control of the British Government over the East India Company by requiring the Court of Directors which was a governing body of the Company to report on its revenue, civil and military affairs in India.

### Pitt's India Act, 1784

- This Act created a new body called Board of Control to manage the political affairs while Court of Directors were allowed to manage the commercial affairs. Thus, Pitt's India Act made a provision of separation in company's political and commercial activities.
- It empowered the Board of Control to supervise and direct all operations of the civil and military affairs and revenues of the British possessions in India.
- The Company's territories in India were for the first time called **British Possessions in India**.

### Charter Act, 1793

- This Act recognised the courts and redefined their jurisdictions. Accordingly, the revenue administration was separated from the judiciary functions. This provision led to disappearing of the Maal Adalats (Revenue courts).
- Salaries of the members of the Board of Control to be drawn from the Indian exchequer.

### Charter Act, 1813

- The East India Company's monopoly over trade was abolished in India but its monopoly over trade with China and for trade in tea retained.
- This Act asked Company to spend one lakh rupees every year on the education of Indians.
- Christian missionaries were permitted to propagate their religion in India.

**Charter Act, 1833**

- This Act made the Governor-General of Bengal as the Governor-General of India and vested in him all civil and military powers. Lord William Bentinck was made the first Governor-General of India.
- The East India Company lost its monopoly over trade with China also and it was asked to close the commercial business. The Company became a purely administrative body.
- This Act asked government to abolish **slavery** in India.

**Charter Act, 1853**

- This Act had provisions of separation of executive and legislative functions of the Governor General's Council. It provided for addition of six new members called Legislative Councillors to the **Indian (Central) Legislative Council**.
- For the first time, the local representation in the Indian (Central) Legislative Council was allowed.
- An open competition system of selection and recruitment of civil servants was introduced. For the first time, Indians were allowed to take part in Civil Services recruitment process. Consequently, the Macaulay Committee (the Committee on the Indian Civil Service) was appointed in 1854.

**Government of India Act, 1858**

- It brought an end to the Company's rule and transferred all powers to the British crown.

**GOI ACT, 1858**

The Act of 1858 was, however, largely confined to the improvement of the administrative machinery by which the Indian Government was to be supervised and controlled in England. It did not alter in any substantial way the system of government that prevailed in India.

- The system of **Dual government** (Board of Control and Court of Directors) introduced by Pitt's India Act was abolished by this Act.
- A new office of **Secretary of State for India** was created and he was vested with complete authority and control over Indian administration. He was a member of the British Cabinet and was ultimately responsible to the British Parliament. Lord Stanley was the first Secretary of State for India.

**Indian Councils Act, 1861**

- The Viceroy was empowered to issue ordinances in case of emergency without the concurrence

of the legislative council. The life span of such ordinances was six months.

- This Act also introduced the 'portfolio' system. Under this, a member of the Viceroy's council was made in-charge of one or more departments of the government.

**Indian Councils Act, 1892**

- This Act empowered the Universities, district boards, municipalities, zamindars and chambers of Commerce to recommend members to the Provincial Legislative Council which were to be nominated by governors.
- According to this Act, the members of the Legislatures were for the first time entitled to take part in debate over Annual Statement of Revenue and Expenditure i.e. Budget. They could also put questions within certain limitations.

**COUNCILS ACT, 1892**

The Act of 1892 made a limited and indirect provision for the use of election in filling up some of the non-official seats both in the Central and provincial legislative councils. The word "election" was, however, not used in the act. The process was described as nomination made on the recommendation of certain bodies.

**Indian Councils Act, 1909 (Morley-Minto Reforms)**

- This Act is also known as **Morley-Minto Reforms**. Morley was the then Secretary of State for India and Lord Minto was the then Viceroy of India.
- Muslims were given separate representation and hence Lord Minto came to be known as the **Father of Communal Electorate**.
- A provision was made for the association of Indians with the Executive Council of the Viceroy and Governors. **Satyendra Prasad Sinha** became the first Indian to join the Viceroy's Executive Council. He was appointed as Law Member.

**Government of India Act, 1919 (Montague-Chelmsford Reforms)**

- This Act is also known as **Montague-Chelmsford Reforms or Montford Reforms**. Montague was the then Secretary of State for India and Chelmsford was the then Viceroy of India.
- All administrative subjects were divided into two groups viz. central and provincial subjects.

# Geography

CHAPTER

# 3

## General Aspects of Geography

### The Universe

- The universe is all of space, time, matter, and energy that exist. Universe is not just space, but space is just the framework or scaffolding in which the universe exists. As Space and time are intimately connected in a four-dimensional fabric called space-time.

### Age of Universe

- The universe is not infinitely old. According to modern astronomical measurements, the universe began to exist about 13.7 billion years ago.

### Size of Universe

- It has not yet been scientifically determined exactly how large the universe is. It may indeed be infinitely large, but we have no way yet to confirm this possibility scientifically.

### Cosmic Horizon

- The farthest limit to our viewing is called the cosmic horizon, which is about 13.7 billion light-years away in every direction. Everything within that cosmic horizon is called the observable universe.

### Structure of Universe

- The structure of the universe—as opposed to the structure of matter in the universe—is determined by the shape of space. The shape of space is, surprisingly, curved.
- On a very large scale—millions or even billions of light-years across—space has three-dimensional “saddle shape” that mathematicians refer to as “negative curvature”.

### Sun and Solar System

- The Sun is a star with a diameter of 109 times of earth and a mass of 3.30 lakh times of Earth, roughly accounting for 99.9% of the total mass of the Solar system. The Sun is mostly made of Hydrogen and Helium and is a main sequence yellow dwarf. It was formed some 4.6 billion years ago and is expected to deplete its hydrogen in next 5-6 billion years to turn into a red giant at the end of its life.

### Structure of Sun

- The Sun has a core at its center; a radiative zone surrounding the core; a convective zone surrounding the radiative zone; a thin photosphere at its surface; and a chromosphere and corona that extends beyond the photospheric surface.

### Composition of Sun

- The Sun's mass is composed of 71 percent hydrogen, 27 percent helium, and 2 percent others.

Elements in terms of the number of atoms in the Sun, 91 percent are hydrogen atoms, 9 percent are helium atoms, and less than 0.1 percent are atoms of other elements. Most of the stars in the universe have a similar chemical composition.

### Big Bang Theory

- According to the Big Bang theory, the universe began to exist as a single point of space-time, and it has been expanding ever since. As that expansion has occurred, the conditions in the universe have changed from small to big, from hot to cold, and from young to old resulting in the universe we observe today.
- Big Bang theory developed as independent works on Einstein's General Theory of relativity by Willem de Sitter (1917).

## Planets

- A planet is an object which is not a star (i.e. no nuclear fusion takes place in it) and that orbits around a star and is mostly round because its own gravitational pull has shaped it into more or less a sphere.
- As per the current system, there are eight planets in the solar system—Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune—and a number of dwarf planets, including Pluto, Charon, Ceres, Eris, etc.

### Inner Planets/ Terrestrial Planets

- The planets that are collectively thought of as belonging to the inner solar system are Mercury, Venus, Earth, and Mars. These four objects are called the terrestrial planets because they resemble one another (specifically, Earth) in their structure: a metallic core, surrounded by a rocky mantle and thin crust.

### Outer Planets / Gas Giants

- Gas giant planets are so named because they are much larger than the terrestrial planets and they have atmospheres so thick that the gas is a dominant part of the planets' structure. Jupiter, Saturn, Uranus, and Neptune are all categorized as gas giants.
- The gas giant zone is the part of the solar system roughly between the orbits of Jupiter and the orbit of Pluto. It contains the outer (gas giant) planets Jupiter, Saturn, Uranus, and Neptune. Each of the gas giant planets has a host of moons and rings or ringlets.

## Mercury

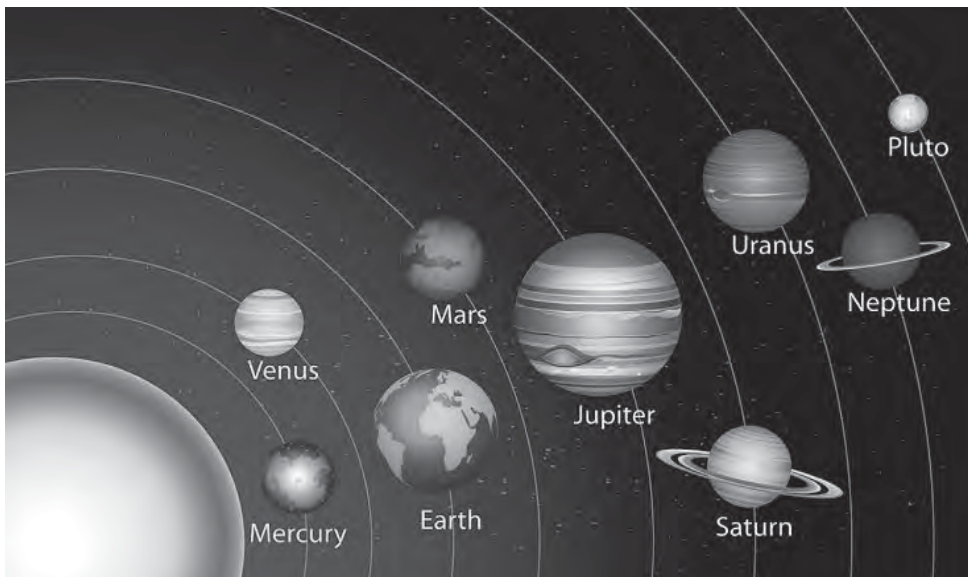
- At 58 million kilometers distance, Mercury is the closest planet to the Sun. Due to this much proximity, Mercury's orbit is very much stretched into a long elliptical shape.
- Mercury takes 88 Earth days to complete one revolution around the sun, however, it takes 59 Earth days to complete one rotation.
- Mercury's most notable surface feature is an ancient crater called the Caloris Basin, which is a huge pit for such a small planet.
- Mercury is so close to the Sun, the glare of the Sun makes it difficult to observe Mercury from Earth.
- The NASA's Mercury-orbiting probe, Messenger, has confirmed a vast amount of ice at the north pole on Mercury, the closest planet to the Sun.

## Venus

- Venus is similar to Earth in many ways and is closer in distance to Earth than any other planet, and it has a similar size and composition.
- A Venus year is equal to 225 days while a Venus day is equal to 243 days. Thus, a day on Venus is longer than a year.
- Venus is blanketed by a thick atmosphere nearly 100 times denser than Earth; it is made mostly of carbon dioxide. No terrestrial life is possible on Venus.
- Venus's clouds are laced with poisonous sulphur dioxide, and its surface temperature is 500°C.
- Through a small telescope, it is possible to see Venus undergo phases, just like the Moon.

## Mars

- Mars is known as the red planet because it looks red from Earth. The reddish color comes from the high concentration of iron oxide compounds—that is, rust—in the rocks of the Martian surface.
- Martian year is 687 days and Martian day is 24h 37m.
- Martian atmosphere is very thin—only about 7000th the density of Earth's atmosphere.



- Q.1** Which one of the following layers of the atmosphere contains water vapour and dust particles?  
(a) Ionosphere (b) Mesosphere  
(c) Stratosphere (d) Troposphere
- Q.2** Very high grade iron ore found in India is limited and restricted mainly to  
(a) Anantapur district of Andhra Pradesh  
(b) Degana in Rajasthan  
(c) Hospet area of Karnataka  
(d) Bailadila mines of Madhya Pradesh
- Q.3** Which one of the following states has the world's largest fresh water island?  
(a) Uttar Pradesh (b) Karnataka  
(c) Bihar (d) Assam
- Q.4** The timber of which one of the following trees is used for making cricket bats?  
(a) Deodar (b) Sal  
(c) Teak (d) Willow
- Q.5** Consider the following crops:  
1. Cotton 2. Groundnut  
3. Rice 4. Wheat  
Which of these are kharif crops?  
(a) 1 and 4 (b) 2 and 3  
(c) 1, 2 and 3 (d) 3 and 4
- Q.6** The Durand Agreement signed in the year of  
(a) 1893  
(b) 1895  
(c) 1900  
(d) 1909
- Q.7** In which one of the following states is cotton cultivation based mainly on irrigation?  
(a) Maharashtra (b) Madhya Pradesh  
(c) Rajasthan (d) Haryana
- Q.8** The second largest river basin in India is that of  
(a) Mahanadi (b) Godavari  
(c) Narmada (d) Krishna
- Q.9** Which of the following towns is located eastern-most?  
(a) Bokaro (b) Jamshedpur  
(c) Patna (d) Ranchi
- Q.10** Which among the following is the smallest State area-wise?  
(a) Nagaland (b) Mizoram  
(c) Meghalaya (d) Manipur
- Q.11** Consider the following statements :  
1. The movement of the isotherms is greater over the land than it is over the oceans.  
2. Coastal regions have a smaller range of temperature than the continental interiors.  
Which of these statements is/are correct?  
(a) 1 only (b) 2 only  
(c) Both 1 and 2 (d) Neither 1 nor 2
- Q.12** As per Census 2001, which one of the following states recorded the lowest growth rate of population during 1991 to 2001?  
(a) Andhra Pradesh (b) Karnataka  
(c) Kerala (d) Tamil Nadu
- Q.13** Consider the following towns/cities :  
1. Chennai 2. Kochi  
3. Mangalore 4. Visakhapatnam  
At which of the places given above are oil refineries located?  
(a) 1 and 2 (b) 2, 3 and 4  
(c) 1, 3 and 4 (d) 1, 2, 3 and 4
- Q.14** Among the following States, the percentage decadal growth of population in the inter-censal period of 1991-2001 is highest in  
(a) Delhi (b) Gujarat  
(c) Nagaland (d) Sikkim
- Q.15** Through which one among the following groups of States does the river Narmada flow?  
(a) Gujarat and Madhya Pradesh  
(b) Gujarat, Madhya Pradesh & Maharashtra  
(c) Gujarat, Madhya Pradesh & Uttar Pradesh  
(d) Gujarat, Rajasthan and Uttar Pradesh

**Codes:**

|     | A | B | C | D |
|-----|---|---|---|---|
| (a) | 3 | 4 | 1 | 2 |
| (b) | 4 | 3 | 1 | 2 |
| (c) | 4 | 3 | 2 | 1 |
| (d) | 3 | 4 | 2 | 1 |

**Q.102** Consider the following cities of Japan:

- A.** Tokyo                      **B.** Osaka  
**C.** Hiroshima                **D.** Nagoya

Identify the cities marked as 1, 2, 3 and 4 on the given map of Japan and select the correct answer using the codes given below.

**Codes:**

|     | A | B | C | D |
|-----|---|---|---|---|
| (a) | 2 | 3 | 4 | 1 |

- (b) 1    3    4    2  
(c) 2    4    3    1  
(d) 1    4    3    2

**Q.103** Which of the alternatives is/are correctly matched?

1. Eskimo–Canada    2. Oraon–Norway  
3. Lapps–India        4. Gonds–Africa

Select the correct answer using the codes given below:

- (a) 1 and 2                      (b) 2 and 3  
(c) 4                                (d) 1

**Q.104** The shaded area in the map of the USA shown above has

- (a) mediterranean type of climate  
(b) humid subtropical type of climate  
(c) steppe type of climate  
(d) St. Lawrence type of climate

## ANSWER KEY ► GEOGRAPHY

- |          |          |          |          |          |         |         |         |         |
|----------|----------|----------|----------|----------|---------|---------|---------|---------|
| 1. (d)   | 2. (c)   | 3. (d)   | 4. (d)   | 5. (c)   | 6. (a)  | 7. (d)  | 8. (b)  | 9. (b)  |
| 10. (a)  | 11. (c)  | 12. (c)  | 13. (d)  | 14. (c)  | 15. (b) | 16. (d) | 17. (a) | 18. (b) |
| 19. (b)  | 20. (d)  | 21. (d)  | 22. (c)  | 23. (c)  | 24. (d) | 25. (b) | 26. (a) | 27. (d) |
| 28. (b)  | 29. (c)  | 30. (c)  | 31. (b)  | 32. (c)  | 33. (a) | 34. (c) | 35. (b) | 36. (b) |
| 37. (b)  | 38. (a)  | 39. (a)  | 40. (c)  | 41. (a)  | 42. (a) | 43. (d) | 44. (a) | 45. (b) |
| 46. (a)  | 47. (b)  | 48. (c)  | 49. (b)  | 50. (a)  | 51. (b) | 52. (b) | 53. (a) | 54. (d) |
| 55. (c)  | 56. (b)  | 57. (b)  | 58. (d)  | 59. (c)  | 60. (b) | 61. (a) | 62. (b) | 63. (a) |
| 64. (b)  | 65. (a)  | 66. (d)  | 67. (c)  | 68. (b)  | 69. (d) | 70. (c) | 71. (c) | 72. (c) |
| 73. (d)  | 74. (a)  | 75. (c)  | 76. (a)  | 77. (a)  | 78. (a) | 79. (c) | 80. (c) | 81. (a) |
| 82. (c)  | 83. (d)  | 84. (c)  | 85. (d)  | 86. (a)  | 87. (d) | 88. (d) | 89. (b) | 90. (b) |
| 91. (b)  | 92. (c)  | 93. (d)  | 94. (a)  | 95. (c)  | 96. (a) | 97. (c) | 98. (b) | 99. (d) |
| 100. (c) | 101. (d) | 102. (b) | 103. (d) | 104. (b) |         |         |         |         |

# General Science & Technology

CHAPTER

# 4

## Physics

Physics is a branch of science which is concerned with all aspects of nature on both the microscopic and macroscopic level. Its scope of study encompasses not only the behavior of objects under the action of forces but also the nature of gravitational, electromagnetic, nuclear forces among others. The ultimate objective of physics is to formulate comprehensive principles that bring together and explain all such phenomena.



### UNITS & MEASUREMENT

- Unit is the chosen standard used for measuring a physical quantity.
- There are basically two types of unit:
  1. **Fundamental Unit:** These units are a set of measurements, defined arbitrarily and from which other units are derived. Examples: meter, kilogram, second, etc.  
The fundamental unit of some of the physical quantities are given below:

| International System of Units (S.I.) |             |        |
|--------------------------------------|-------------|--------|
| Physical                             | Fundamental | Symbol |
| Mass                                 | Kilogram    | kg     |
| Length                               | Metre       | m      |
| Time                                 | Second      | s      |
| Temperature                          | Kelvin      | K      |
| Electric-current                     | Ampere      | A      |
| Luminous intensity                   | Candela     | Cd     |
| Quantity of matter                   | Mole        | mol    |

| Systems of units | Length     | Mass     | Time   |
|------------------|------------|----------|--------|
| C.G.S. System    | Centimetre | Gram     | Second |
| F.P.S. System    | Foot       | Pound    | Second |
| M.K.S. System    | Metre      | Kilogram | Second |

2. **Derived Unit:** All the units which are expressed in terms of fundamental units are known as derived units. Examples: Newton, Joule, etc.
- Internationally, there are four types of unit systems. These are:
    1. **S.I. Units/System:** It is the modern form of the metric system, and is the most widely used system of measurement. It comprises a coherent system of units of measurement built on seven base units namely kilogram, meter, second, candela, ampere, kelvin and mol.
    2. **CGS System:** The centimeter-gram-second (CGS) system of units is a variant of the metric system based on centimetre as the unit of length, gram as unit of mass, and the second as the unit of time.
    3. **FPS System:** The foot-pound-second (FPS) system is a system of units built on three fundamental units: the foot for length, the pound for mass and the second for time.
    4. **MKS System:** The MKS system of units is a physical system of units that expresses any given measurement using base units of the metre, kilogram, and second.



## MOTIONS

### Basics of Motion

A body is said to be in motion if it changes its position with respect to its surroundings as time goes on. A body is said to be at rest if it does not change its position with time, with respect to its surroundings.

#### Types of Motion

- (i) When a particle or a body moves along a straight path, its motion is Rectilinear or translatory motion.
- (ii) When a particle or a body moves in a circular path, its motion is circular motion. When a body spins about its own axis, it is said to be in rotational motion.
- (iii) When a body moves to and fro or back and forth repeatedly about a fixed point in a definite interval of time, it is said to be in vibrational or oscillatory motion.

### Speed

The time rate of change of position of an object in any direction i.e. the rate of change of distance of an object with respect to time is known as speed.

$$\text{Speed} = \frac{\text{displacement}}{\text{time taken}}$$

### Velocity

The rate of change of displacement of an object with respect to time is known as velocity.

$$\text{Velocity} = \frac{\text{displacement}}{\text{time}}$$

### Acceleration

The rate of change of velocity with respect to time is called acceleration.

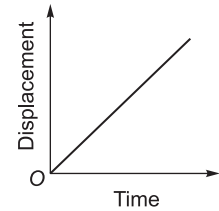
$$\text{Acceleration} = \frac{\text{Change in velocity}}{\text{time taken}}$$

When a body completes equal displacement in equal interval of time, its velocity is constant and hence, it does not have an acceleration. When a body shows equal change in velocity in equal interval of time its velocity is not constant but it has a constant acceleration.

## Position (Displacement)-Time Graphs

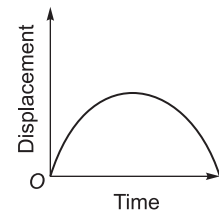
#### For a body moving with a uniform velocity

This graph comes as a straight line because in a uniform velocity the particle completes equal displacement in an equal interval of time.



#### For the motion of a body thrown vertically upwards

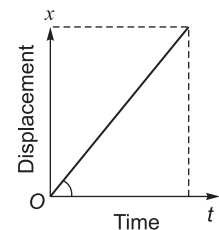
When the body moves up, its velocity continuously decreases due to gravity and finally becomes zero at the maximum height. Then, the body falls with an increasing velocity.



The slope of the position time graph is equal to the uniform velocity.

$$\text{Slope} = \frac{\text{Displacement}}{\text{Time}}$$

$$\text{or } V = \frac{x}{t}$$



## Physical Quantities

### Vectors

They have a definite magnitude and a definite direction, e.g. displacement, velocity, acceleration, force etc.

### Scalars

They have definite magnitudes only and not direction. e.g. distance, speed, work, energy, power, electric charge etc.

### Tensors

They have different magnitudes in different directions, e.g. Moment of inertia, stress etc.

In a motion, a body can have a constant speed but variable velocity like the motion of a body along a circular path. A particle may have zero displacement and zero velocity but non-zero distance and speed. When a body completes one revolution