ABOUT THIS BOOK

General Studies Geography India & World (2022) reprint edition has been presented as per the current nature and trend of the questions in General Studies (Preliminary and Mains) syllabus of the examinations conducted by the Union and State Public Service Commissions and similar competitive examinations.

In this book, we have dealt with Physical, Social, and Economic Geography of India and the World in two sections. Different topics are dealt with subtle explanations without overlapping/ repetition - for clarity.

Theories of Geography as well as the latest facts, figures and maps have been presented in proper place. In order to make the book more useful, new research and investigations in the field of geography have also been included in their assigned places.

At present, the pattern of questions related to geography are changing more and more quickly than other subjects related to humanities. There is more emphasis on economic and social aspects of geography. Further, questions are no more static; it is imperative to link current affairs with broader aspects of geography. Keeping this fact in view, the book has been presented in an insightful manner.

We have used an interdisciplinary approach with simple language while dealing with topics as well as current developments in that field to give a holistic view on that topic and to apprehend questions being asked in contemporary times.

Our objective while coming out with this book has been multifaceted – to address the students in graduation or post-graduation in geography at the university level and also for those who have neither been a student of geography nor have studied geography before but going to appear in competitive examinations.

This book is written by NN Ojha & Chronicle Editorial Team.

NN Ojha, Editor, Civil Services Chronicle, has over 30 years' of experience in civil services and other related examinations for writing and guidance of magazines, books, study materials, etc.

In 1990-91, he introduced –Civil Services Chronicle – India's first magazine solely dedicated to civil services aspirants. After that, under his expert guidance, notable books that were brought out are **'IAS Planner'** (1995), **'IAS Mains Optional and GS Solved Papers', 'Chronicle Year Book', 'Lexicon' – for Ethics, Integrity and Aptitude** (2013), and many other books exclusively for UPSC and State PCS Exams.

Chronicle Editorial Team comprises of a strong team of 40-45 subject experts/research scholars and persons having recent exam experience, who have contributed to more than 200 books that have set a benchmark in civil services and related examinations. Aspirants have benefited from these books immensely.

We have put sincere efforts to make this book flawless and hope that it will prove to be very useful in your endeavor – whether obtaining good marks in your academic pursuit or in any competitive examination where questions from geography are asked.

'GS Marvel' Series

'GS Marvel' series of books have been conceptualized by the Editorial Team of Chronicle for complete preparation and guidance towards Civil Services Prelims cum Mains examinations. These books are based on the latest UPSC syllabus and analysis of 'trend and nature' of last 30 years' Prelims and Mains question papers.

The forthcoming books under this 'GS Marvel' series will assist you in complete preparation of civil services examinations.

CONTENT

SECTION-A, Part-A

World Physical Geography

1. Our Universe, Solar System and Evolution of Earth 9-25

- Universe 11
  - * Evolution of Universe 11
  - * Galaxies 12
  - * Stars 12
  - * Constellations 13
- Solar System 13
  - * The Sun 14
  - * Planets 15
  - * Dwarf Planet 17
  - * Asteroids 17
  - * Meteors and Meteoroids 17
  - * Comets 18
  - * Asteroid Belt 18
  - * Kuiper Belt 18
  - * Satellite: The Moon 18
- Evolution of the Earth 19
  - * Motions of the Earth 19
  - * Rotational Motion of Earth 19
  - * Revolution 19
  - * Impact of Revolution and Rotation of Earth 20
  - * Latitude and Longitude 21
  - * Great Circles 22
  - * Longitude 22
  - * Greenwich Mean Time 22
  - * Standard Time 22
  - * Indian Standard Time 23
  - * International Date Line 23
  - * Evolution of the Earth 23
  - * Geological Time Scale 24

2. Structure of the Earth 22-24

- Sources of Information about the Interior 22
- Structure of the Earth's Interior 22
- Mechanical Layers of Earth 24
- Temperature, Pressure and Density Change in Earth's Interior 24

3. Minerals and Rocks 29-33

- Physical Characteristics of Minerals 29
- Rocks 30
- Rock Cycle 33

4. Major Landforms and Earth Movements 34-47

- Dynamism of the Earth's Crust 34
- Continental Drift Theory 34
- Paleomagnetism 35
- Sea Floor Spreading 35
- Plate Tectonic Theory 36
- Theory of Isostasy 37
- Sea Level Change 38
- Earth Movements 39
  - * Endogenetic Forces 39
  - * Folding 40
  - * Types of Folds 40
  - * Faulting 41
  - * Exogenetic Forces 42
- Major Landforms of the Earth 43
  - * Mountains 43
  - * Plateaux 44
  - * Plains 45
  - * Lakes 46

5. Volcanism and Earthquakes 48-55

- Volcano 48
  - * Volcanic Eruption Processes 48
  - * Classification of Volcanoes 48
  - * Plate Tectonics & Volcanoes 49
  - * Volcanic Hotspots 50
  - * Volcanic Topography or Landforms 50
  - * Distribution of Volcanoes 51
  - * Hot Springs & Geysers 52
- Earthquake 52
  - * Distribution of Earthquakes 54
- Tsunamis 55

6. Weathering and Mass Wasting 56-60

- Agents of Weathering 56
- Types of Weathering 56
  - * Mechanical Weathering 56
  - * Chemical Weathering 57
  - * Biological Weathering 58
- Mass Wasting 59

7. Erosion and Associated Landforms 61-73

- Erosion 61
- Geomorphic Agents and Associated Landforms 61
- Running Water and Related Landforms 61
  - * Erosional Landforms 63

* River Terraces 63
* Meanders 63
* Depositional Landforms 63
- Aeolian Landforms 65
* Erosional Landforms 65
* Wind Transportation 66
* Depositional Landforms 66
- Glaciated Landforms 67
* Erosional Landforms 67
* Depositional Landforms 67
- Coastal Landforms 68
* Erosional Coastal Landforms 70
* Depositional Landforms 71
- Karst Landforms 72
* Chemical Process 72
* Erosional Landforms 72
* Depositional Landforms 73

8. Drainage System 74-77

- Stream Order 74
- Drainage System 75
- Classification of Drainage System 75
- Drainage Patterns 75
- Classification of Drainage Pattern 75

9. Atmosphere and Weather 78-101

- Composition of Atmosphere 78
* Structure of the Atmosphere 79
* Insolation/Solar Radiation 81
* Factors Affecting the Distribution of Insolation 81
* Heat Budget 81
* Mechanism of Heat Transfer 82
* Factors Influencing Temperature 82
* Latitudinal Variation in Net Radiation Balance 83
* Temperature Anomaly 83
* Inversion of Temperature 83
- Atmospheric Circulation and Weather System 84
* World Distribution of Air Pressure 84
* Pressure Belts 84
* General Circulation of the Atmosphere (Tri-meridional Circulation) 86
* Types of Winds 87
* Jet Streams 89
* Climate Change and the Jet Stream 90
* Atmospheric Disturbances 91
- Development Cycle of Tropical Cyclones 92
- Temperate Cyclone or Extra-tropical Cyclones 93
- Anti-Cyclones 94
- Water in the Atmosphere 95
- Evaporation and Condensation 96
- Forms of Condensation 96
- Lapse Rates 97
- Atmospheric Stability 97
- Clouds 98
* Formation of Clouds 98
* Classification of Clouds on the basis of Height 98
* Precipitation 99
* World Distribution of Rainfall 100
- Hydrological Cycle 101

10. World Climatic Classification 102-107

- Climate Control 102
- Classification of Climate 102
* Koppen Classification 103
* Thornthwaite Classification 106
* Trewartha Climate Classification 106

11. Water and Ocean Basins 108-125

- Ocean Basin 108
* Major Relief of Ocean Basins 108
* Minor Relief Features of the Ocean Basin 110
* Pacific Ocean Basin 110
* Atlantic Ocean Basin 111
* Indian Ocean Basin 112
* Southern Ocean Basin 112
* Arctic Ocean Basin 112
- Properties of Ocean Water 113
* Temperature of the Ocean Waters 113
* Ocean Salinity 114
* Density of Sea Water 115
- Oceanic Zones 115
- Ocean Deposits 116
- Coral Reefs & Atolls 117
* Geographical Distribution of Coral Reefs 118
- Ocean Currents 119
* Classification of Ocean Currents 119
* Surface Currents or Surface Circulation 120
* Major Ocean Currents of the World 121
* Deep Water Currents or Thermohaline Circulation 122
* Effects of Ocean Currents Ocean Currents 123
- Tides 123
* Importance of Tides 125

12. Soil 126-133

- Factors Responsible for Soil Formation 126
- Soil Forming Processes 127
- Soil Texture 128
- Soil Structure 128
- Soil Colour 129
- Water Retention of Different Soil Types 129
- Soil Profile 129
- Soil Classification 130
* Marbut's or Zonal Classification of Soil 130
* USDA (United States Department of Agriculture) Soil Taxonomy 131
- Soil Erosion 132
- Types of Soil Erosion 133
- Soil Conservation 133

13. Environmental Geography 134-152

- Population Interactions 134
- Biological Communities and Succession..... 135
- Ecosystem 136
  - * Structure and Functions of Ecosystems 137
  - * Functions of Ecosystem 138
- Decomposition 139
- Food Chain and Food Web and Flow of Energy..... 139
- Ecological Pyramid..... 140
- Nutrient Cycles or Biogeochemical Cycles..... 141
  - * Gaseous Cycles 142
  - * Sedimentary Cycle..... 142
- Biomes 143
- Natural Vegetations..... 145
- Biodiversity and Conservation 146
- Threat to Biodiversity 147
- Major Environmental Issues of the World..... 148
- Lithosphere 148
- Hydrosphere..... 149
- Atmosphere..... 150
- Biosphere 152

Part-B

World Social and Economic Geography

1. Population Geography 155-160

- World Population 155
- World Population Distribution..... 156
- World Population Growth..... 157
- World Population Prospect 2019 157
- Demographic Theories..... 158
- Races of the World..... 159

2. Human Settlement.....161-163

- Classification of Human Settlements..... 161
- Rural Settlements..... 161
  - * Classification of Rural Settlements 161
  - * Pattern of Rural Settlements 161
  - * Major Problems of Rural Settlements 162
- Urban Settlements..... 162
  - * Types of Urban Settlements..... 162
- Miscellaneous Terms 163

3. Agriculture and Fisheries. 164-169

- Agriculture..... 164
  - * Factors that affect Agriculture 164
  - * Classification of Agriculture..... 164
  - * Subsistence Farming 164
  - * Commercial Farming..... 165
  - * Other Miscellaneous Types of Agriculture 166
  - * Agricultural Regions of the World 166
  - * Agricultural Location Theory..... 168
- Fisheries..... 168
  - * Important Conditions for the Development of Fishing Grounds 168
  - * Types of Fish..... 169

4. Mining Minerals and Industries 170-176

- Mining..... 170
- Minerals 170
  - * Mineral Deposits in the World..... 171
  - * Major Mineral Producers of the World..... 171
  - * World Energy Production 172
  - * Major Hydropower Projects of the World 172
- Industries..... 173
  - * Factors Influencing Industrial Location..... 173
  - * Industrial Location Theory 173
  - * Industrial Regions of the World..... 174
  - * USA..... 174
  - * Russia..... 174
  - * West Europe..... 175
  - * Japan 175
  - * China..... 175
  - * Major Industrial Centers of the World..... 175

5. Trade Transport and Communication.....177-186

- International Trade..... 177
  - * Genesis Factors of International Trade..... 178
  - * Factors that Influence International Trade..... 178
  - * Important Aspects of International Trade 178
  - * Types of International Trade..... 178
  - * Merits and Demerits of Trade..... 179
  - * Globalisation and International Trade 179
  - * Ports: Gateways of International Trade 179
- Transport..... 181
  - * Land Transport..... 181
  - * Road Transport..... 181
  - * Railway 181
  - * International North-South Transport Corridor 181
  - * Pipelines..... 182
  - * Water Transport..... 183
  - * Inland Waterways..... 184
  - * Ocean Transport or Maritime Transport 184
  - * Important Waterways and Sea Routes 184
  - * Air Transport..... 185
- Communications 185

Part-C

World Regional Geography

1. World: Continents and Ocean Basins.....189-190

2. Asia 191-205

- Physical Geography 191
- Landscape 192
- Climate 193
- Social Geography..... 193
- Economic Geography 194

West Asia 195

- Physical Geography 195
- Climate..... 196
- Social Geography..... 196
- Economic Geography 196

South Asia 196

- Physical Geography 196
- Climate..... 197
- Social Geography..... 197
- Economic Geography 197
- Industry 198

South East Asia 198

- Physical Geography 198
- Climate..... 199
- Social Geography..... 199
- Economic Geography 199
- Industry 199

East Asia 200

- Physical Geography 200
- Climate 201
- Social Geography..... 202
- Economic Geography 202
- Industry 202

Central Asia 203

- Physical Geography 203
- Climate..... 203
- Social Geography..... 203
- Economic Geography 203
- Industry 204

North Asia 204

- Physical Geography 204
- Climate..... 204
- Social Geography..... 205
- Economic Geography 205
- Industry 205

3. Europe

- Physical Geography 206
- Climate..... 207
- Social Geography..... 208
- Economic Geography 208
- Industry 208

Northern Europe 209

- Physical Geography 209
- Climate..... 209
- Social Geography..... 209
- Economic Geography 210

Benelux Countries 211

- Physical Geography 211
- Social Geography.....211
- Economic Geography 212

The British Isles.....212

- Physical Geography 212
- Social Geography..... 213
- Economic Geography 213

Iberian Countries: Spain, Portugal and Andorra ..214

- Physical Geography 214
- Climate..... 215
- Social Geography..... 215
- Economic Geography 215

Alpine States 215

- Physical Geography 215
- Climate..... 217
- Social Geography..... 217
- Economic Geography 217
- Industry 218

Eastern and Central Europe 218

- Physical Geography 218
- Climate..... 221
- Social Geography..... 221
- Economic Geography 221
- Industry 222

4. Africa 223-228

- Physical Geography 223
- Climate..... 225
- Social Geography..... 226
- Economic Geography 227

5. Oceania.....229-234

- Physical Geography 229
- Climate and Vegetation..... 232
- Social Geography..... 232
- Economic Geography 233

6. North America and South America.....235-249

North America 235

- Physical Geography 235
- Climate..... 237
- Social Geography..... 238
- Economic Geography 239
- Industries..... 240

South America 242

- Physical Geography 242
- Social Geography..... 244
- Economic Geography 245

Middle America 246

- Central American States 247

The Islands of Caribbean 248

- Physical Geography 248
- Social Geography..... 249
- Economic Geography 249

7. Antarctica 250-251

- Physical Geography 250
- Climate..... 250
- Social Geography..... 251
- Economic Geography 251
- Miscellaneous Facts on Antarctica 251

8. World Miscellaneous Facts.....252-258

- World Facts 254
- Rivers of the World..... 254
- Biggest/Highest/Largest/Longest/Deepest in the World 255
- Important Islands 256
- Important Deserts..... 257
- Boundary Lines..... 257
- Ten Largest Countries by Area 257
- Ten Smallest Countries by Area 257
- Countries & Cities with New Names..... 258
- Human Habitats 258
- Geographical Epithets..... 258

SECTION–B, Part-A

India: Physical Geography

1. India : An Introduction.....261-263

2. India: Geological Structure 264-266

- Archaean Group..... 264
  - * Gneiss and Shiest Series..... 264
  - * Dharwar Rock System 265
- Purana Group..... 265
  - * Cuddpah System 265
  - * Vindhayan System 265
- Dravidian Rock System 265
- Aryan Group 265
  - * Jurassic System..... 265
  - * Deccan Trap 266
  - * Tertiary System..... 266
  - * Quarternary System 266

3. Physiographic Divisions of India 267-280

- Northern Mountain System..... 267
  - * Orogeny of Himalayan System..... 267
  - * North-South Division of Himalayan System..... 268
  - * Regional or Longitudnal Division of Himalayas..... 269
  - * Eastern Hills or the Purvanchal 271
- The North Indian Plains..... 271
  - * Morphological or Structural Classification of North Indian Plains 271
  - * Classification of the Great North Indian Plains 272
- The Peninsular Plateau 273
  - * Division of Peninsular Plateau..... 273
  - * North-Central Highlands 273
  - * South-Central Highlands 274
  - * Eastern Plateau..... 274
  - * North Deccan Plateau 275
  - * South-Deccan Plateau..... 276
  - * Western Ghats..... 276
  - * Eastern Ghats..... 276
  - * Meghalaya Plateau..... 277
- The Coastal Plains and Islands 277
  - * Eastern Coastal Plains..... 277
  - * Western Coastal Plains..... 278
- Islands of India 279

4. Drainage System of India 281-293

- Important Drainage Patterns 281
- Classification of Indian Drainage System..... 282
  - * Himalayan Drainage System 282
  - * Peninsular Drainage System..... 285
  - * Difference Between Himalayan and Peninsular Rivers.....287
- Important Falls in India 288
- Major Lakes in India..... 288
- Major River Valley Projects in India 289
- National Water Grid and River Interlinking 290
  - * Status of Ground Water of India..... 292
  - * National Water Policy of India 292
  - * Jal Jeevan Mission 293
  - * Jal Shakti Abhiyan..... 293

5. Climate of India 294-300

- Factors Affecting Climate of India 294
- Indian Monsoon and its Features 296
- Monsoonal Breaks 297
- Western Disturbances 297
- Tropical Cyclones 297
- Tropical Cyclones in India 298
- Effect of Tropical Cyclones 298
- Distribution of Rainfall in India 298
  - * Variability of Rainfall 299
- El-Nino, La-Nina & Southern Oscillation 299

6. Soils of India 301-305

- Types of Soil in India 301
- Soil Degradation in India 303
  - * Types of Soil Degradation 303
  - * Soil Erosion 304
  - * Causes of Soil Erosion 304

7. Flora and Fauna 306-318

- Forests in India 306
- Classification of Forests in India 306
  - * Tropical Moist Forest 307
  - * Tropical Dry Forest 308
  - * Montane Sub Tropical Forest 308
  - * Temperate Montane Forests 308
  - * Sub-Alpine Forest 309
  - * Alpine Forest 309
- India State of Forest Report (ISFR) 2019 310
- Flora in India 310
- Fauna in India 311
- Critically Endangered Species in India 312
- Wildlife Conservation Efforts 313
- Forest Conservation in India 315
- Other Significant Efforts for the Conservation of Biodiversity in India 315
- Biosphere Reserves in India 316
  - * List of Biosphere Reserves in India 316

Part-B

India - Social and Economic Geography

1. Population, Migration and Urbanisation in India 321-329

- Sources of Population Data 321
- Census 2011 321
- Population Characteristics 322
  - * Population Size 322
  - * Geographic Distribution 322
  - * Rate of Population Growth 322
  - * Population Density 323
- Population Composition 323
  - * Literacy Rate 323
  - * Sex Ratio 324
  - * Child Sex Ratio 324
  - * Linguistic Composition 325
  - * Religious Data 325
  - * Scheduled Caste Population 326
  - * Scheduled Tribe Population 326
- Migration 326

2. Agriculture and Allied Activities 330-348

- Indian Agriculture 330
  - * Types of Farming in India 330
  - * Land-use Pattern in India 331
  - * Important Agricultural Terms 332
  - * Major Crops of India 333
  - * Cropping Systems in India 333
  - * Types of Cropping Systems 333
  - * Agricultural Regions in India 334
  - * Agro-Climatic Zones in India 334
  - * Major Crops of India 335
  - * Development of Agriculture 338
  - * Evergreen Revolution 339
  - * Organic Farming 339
  - * Sustainable Agriculture 340
  - * Integrated Farming System (IFS) 341
  - * Zero Budget Natural Farming (ZBNF) 341
  - * Dryland Agriculture 341
- Land Reforms in India 342
- Livestock in India 343
  - * 20th Livestock Census 345
- Fisheries 346
- Pearl Fisheries 346
- Apiculture 347
- Sericulture 347
- Dairy Development Scheme 347
- Agricultural Revolutions in India 348

3. Irrigation 349-353

- Reasons for Water Scarcity and Need of Irrigation Facility 349
- Importance of Irrigation 349
- Irrigation Potential in India 350

- Sources of Irrigation 350
- Irrigation Areas by Crop 351
- Traditional Water Harvesting Methods of India 352
- Development of Irrigation & Government Policy during the Plan Period 352
- Jal Kranti Abhiyan 353

4. Minerals in India 354-362

- Minerals 354
- Classification of Minerals 354
- Mineral Belts in India 354
- Metallic Minerals 355
- Non-Ferrous Minerals 357
- Rare Earth Minerals 359
- Non-Metallic Minerals 359
- Other Non-Metallic Minerals 361
- National Mineral Exploration Policy 362

5. Energy Scenario in India 363-374

- Energy Secutity in India 363
- Energy Mix of India 363
- Non-Renewable Resources of Energy 364
- Nuclear Energy 365
- Projects under Construction 366
- Planned Projects 366
- Renewable Sources of Energy 367
  - * Solar Energy 367
  - * Hydro- Electricity 368
  - * Major Hydro Power Plants in India 368
  - * Wind Energy 368
  - * Biomass Energy 369
  - * Hydrogen Fuel Cells 370
  - * Geothermal Power 370
  - * Ocean Energy 370
  - * Waste to Energy 372
- Advantages & Disadvantages of Renewable Energy 372
- Shale Gas Reserves 372
- Methane Hydrates 373
- Draft National Energy Policy, 2017 373

6. Industries in India 375-386

- Industry 375
  - * Factors that affect Location of Industries 376
  - * Major Industries in India 376
  - * Mineral Based Industries 376
  - * Petro-chemicals Industry 378
- Agro-based Industries 378
- Major Industrial Regions of India 382
- Minor Industrial Regions of India 385
- Major Industrial Centers of India 385

7. Transportation 387-400

- Different Means of Transport 387
- Road Transport 387
  - * National Highways 388
  - * State Highways 389
  - * Issues in India Related to the Road Network 389
- The Railways 390
- Aviation Sector in India 393
  - * Major Airports in India 394
- Water Transport in India 395
  - * Important National Waterways 396
  - * Major Ports of India 396
  - * Important Sea Ports of India 397
  - * Challenges faced by India's Waterways Transport Sector 398
- Oil and Gas Pipelines 399
  - * Important pipelines of India 399

PART-A

WORLD PHYSICAL GEOGRAPHY

1. Our Universe, Solar System and Evolution of Earth
2. The Structure of the Earth
3. Minerals and Rocks
4. Major Landforms and Earth Movements
5. Volcanism and Earthquakes
6. Weathering and Mass Wasting
7. Erosion and Associated Landforms
8. Drainage System
9. Atmosphere and Weather
10. World Climatic Classification
11. Water and Ocean Basins
12. Soil
13. Environmental Geography

1
CHAPTER

Our Universe, Solar System and Evolution of Earth

The Universe is all of space and time and their contents, including planets, stars, galaxies, and all other forms of matter and energy. While the spatial size of the entire Universe is unknown, it is possible to measure the size of the observable universe, which is currently estimated to be 93 billion light-years in diameter.

UNIVERSE

Evolution of Universe

The term "evolution" usually refers to the biological evolution of living things. But, the processes by which planets, stars, galaxies, and the universe form and change over time are also types of "evolution." In all of these cases there is change over time, although the processes involved are quite different.

- The **Big Bang theory** explains the origin of our universe. It was propounded by E George Lemaitre in 1927 and according to this theory, 13.7 billion years ago, cosmic matter was in a compressed state from which expansion started by a primordial explosion. The super-dense ball broke to form galaxies, which again broke to form stars and finally stars broke to form planets including Earth.
- Just two years later, an astronomer named **Edwin Hubble** noticed that other galaxies were moving away from earth and the **farthest** galaxies were moving **faster** than the closer ones.
- **Redshift** describe how light shifts toward longer wavelengths as objects in space (such as stars or galaxies) move farther away from earth. The concept is key to charting the universe's expansion. American astronomer Edwin Hubble (who the Hubble Space Telescope is named after) was the first to describe the **redshift** phenomenon and tie it to an expanding universe. His observations, revealed in 1929, showed that nearly all galaxies he observed are moving away.
- The **Hubble Space Telescope** is a spacecraft that orbits Earth and takes pictures of the universe.
- The **cosmic microwave background (CMB)** is remnant electromagnetic radiation from an early stage of the universe, also known as "relic radiation". The CMB is faint cosmic background radiation filling all space. Robert Wilson discovered the cosmic microwave background (CMB) radiation in 1964 along with Arno Penzias, putting the Big Bang theory on solid footing.

Since the outer space is limitless, conventional units for measuring distances are not suitable. Some of the units used in astronomical measurements are following:

- **Light Year:** Distance covered by light in one year in vacuum at a speed of 3x108 m/s. One light year is equal to **9.46x1012 kilometers**.
- **Astronomical Unit:** The Mean distance between the Sun and the Earth **(1.49 x 108 km)**. One light year is equal to 60,000 AU.
- **Cosmic Year:** Sun's period of revolution around the galactic centre **(250 million years)**. Also called as 'galactic year'
- **Parsec:** Distance at which the mean radius of the Earth's orbit subtends an angle of one second of an arc. It is equal to **3.26 light years**.

Theories of Origin of Earth

1. **Buffon-Hypothesis:** Based on Sun-comet collision.
2. **Kant-Gaseous Mass Theory:** Based on Newton's law of gravitation.
3. **Planetesimal Hypothesis:** Chamberlain-Moulton
4. **Tidal Hypothesis:** Jeans & Jeffery (Based on Sun-giant star attraction
5. **Electromagnetic Hypothesis:** Alfven
6. **Binary Star Hypothesis:** H. N. Russell and Littleton
7. **Fission Hypothesis:** Ross-Gun
8. **Super Nova Hypothesis:** F. Hoyle
9. **Big Bang Theory:** E. George Lemaitre

Galaxies

A galaxy is a huge collection of gas, dust, and billions of stars and their solar systems, all held together by gravity. For e.g. the Milky Way and Andromeda galaxy.

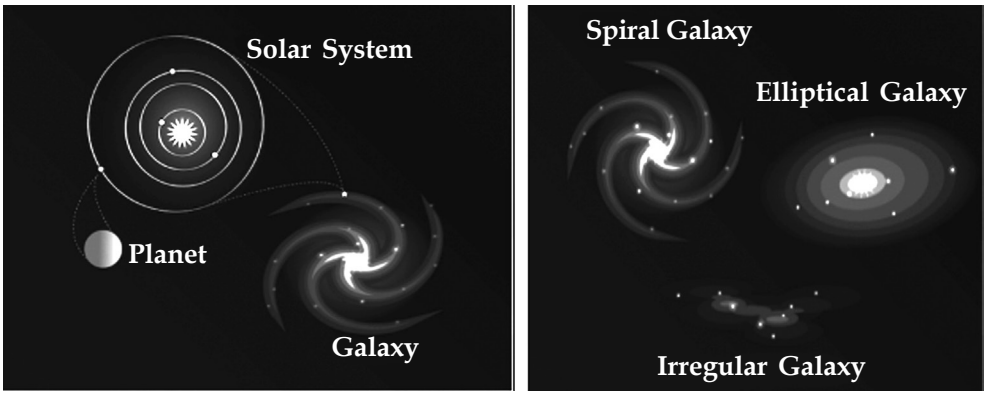

Fig: Galaxy and their shape

- **There are around** one hundred billion galaxies in the universe and each one have around 100 billion stars.
- **Shape of Galaxies:** There are three main types of galaxies: Elliptical, Spiral, and Irregular.
  - **Elliptical Galaxies:** These are shaped like a spheroid or elongated sphere.
  - **Spiral Galaxies:** Spiral galaxies consist of a flat, rotating disk containing stars, gas and dust, and a central concentration of stars known as the bulge.
  - **Irregular Galaxies:** They have no regular or symmetrical structure.

Examples of Some Galaxies

- **Milky Way Galaxy:** that contains the Solar System. The name describes the galaxy's appearance from Earth: a hazy band of light seen in the night sky formed from stars that cannot be individually distinguished by the naked eye.
- The **Andromeda Galaxy**, also known as Messier 31, is a spiral galaxy, and the nearest major galaxy to the Milky Way.
- **Bedin 1:** Astronomers using the NASA/ESA Hubble Space Telescope have discovered a new dwarf galaxy in our cosmic neighborhood in 2019.

Stars

Stars are huge celestial bodies made mostly of hydrogen and helium that produce light and heat from the churning nuclear forges inside their cores.

- Stars are self luminous bodies that account for 98 percent of the matter in a galaxy.

Life Cycle of Star

- A star's life cycle is determined by its mass. The larger its mass, the shorter its life cycle. A star's mass is determined by the amount of matter that is available in its nebula, the giant cloud of gas and dust from which it was born.
  - **Formation:** Birth takes place inside hydrogen-based dust clouds called nebulae. Over the course of thousands of years, gravity causes pockets of dense matter inside the nebula to collapse under their own weight.
  - One of these contracting masses of gas, known as a **protostar**, represents a star's nascent phase. Because the dust in the nebulae obscures them, protostars can be difficult for astronomers to detect.

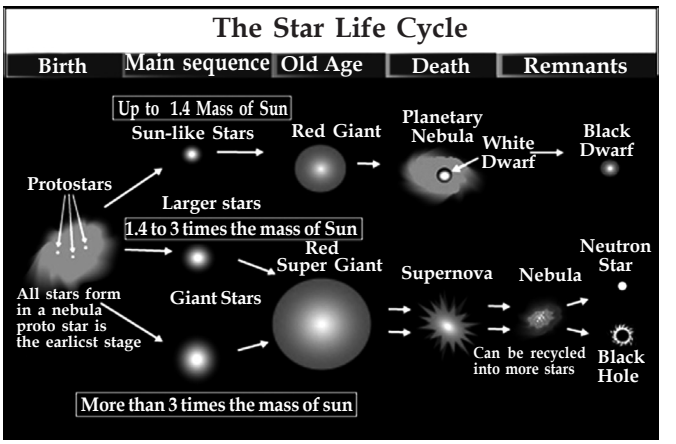

Fig: Life cycle of Star

- As the main sequence star glows, hydrogen in its core is converted into helium by nuclear fusion. When the hydrogen supply in the core begins to run out, and the star is no longer generating heat by nuclear fusion, the core becomes unstable and contracts. The outer shell of the star, which is still mostly hydrogen, starts to expand. As it expands, it cools and glows red. The star has now reached the red giant phase.
- **Red Giant:** It is red because it is cooler than it was in the main sequence star stage and it is a giant because the outer shell has expanded outward. In the core of the red giant, helium fuses into carbon. Our Sun will turn into a 'Red Giant' in 5 billion years.

PART-B

SOCIAL AND ECONOMIC GEOGRAPHY

1. Population Geography
2. Human Settlement
3. Agriculture and Fisheries.
4. Mining Minerals and Industries
5. Trade Transport and Communication

1
CHAPTER

Population Geography

Human geography embraces the study of human population growth and distribution, demographic characteristics, migration, linguistic composition and racial classifications. **Population** is the pivotal element in geographical studies as it is the point of reference from which all other elements are observed and from which they derive significance and meaning. 'Resources', 'calamities' and 'disasters' are all meaningful only in relation to human beings.

World Population

Earth's population is neither uniformly nor randomly dispersed across lands. In fact, there are many logical reasons why population clusters exist in areas called the **ecumene** and why some areas remain sparsely populated.

Factors Affecting Population Density

There are a range of **human and natural factors** that affect population density.

Physical Factors	High Density	Low Density
Relief (shape and height of land)	Low land which is flat e.g., **Ganges Valley in India**	High land that is mountainous e.g., **Himalayas**
Resources	Areas rich in resources (e.g., coal, oil, wood, fishing etc.) tend to densely populated e.g., **Western Europe.**	Areas with few resources tend to be sparsely populated e.g., **The Sahel Region.**
Climate	Areas with temperate climates tend to be densely populated as there is enough rain and heat to grow crops e.g., **UK**	Areas with extreme climates of hot and cold tend to be sparsely populated e.g., **the Sahara Desert**

Human Factors	High Density	Low Density
Political	Countries with stable governments tend to have a high population density e.g., **Singapore**	Unstable countries tend to have lower population densities as people migrate e.g., **Afghanistan.**
Social	Groups of people want to live close to each other for security e.g., **USA.**	Other groups of people prefer to be isolated e.g., **Scandinavians.**
Economic	Good job opportunities encourage high population densities, particularly in large cities in economically developed countries of the world.	Limited job opportunities cause some areas to be sparsely populated e.g., **Amazon Rainforest.**

Basics of Demography

- **Crude Birth Rate**: Population grows with births, and the crude birth rate (CDR) is used to measure this growth. The CBR is the number of births in a year for every 1000 people in a country.
- **Total Fertility Rate (TFR):** The TFR is the average number of children a woman in a particular country will have during her childbearing years. The larger the TFR, the larger the crude birth rate.
- **Crude Death Rate:** Population declines with deaths, and this rate of decrease is measured with the crude death rate (CDR). The CDR is the number of deaths in a year for every 1000 people in a country. Again, it is presented as a rate to make it comparable between countries. Many factors influence death rates, including access to health care, sanitation, and even how elderly population is.

PART-C

WORLD REGIONAL GEOGRAPHY

1. **World: Continents and Ocean Basins**
2. **Asia**
   - West Asia
   - South Asia
   - South East Asia
   - East Asia
   - Central Asia
   - North Asia
3. **Europe**
   - Northern Europe
   - Benelux Countries
   - British Isles
   - Alpine States
   - Iberian Countries
   - East-Central Europe
   - South Europe
4. **Africa**
5. **Oceania**
6. **North America and South America**
   - **North America**
   - **South America**
   - **Middle America**
7. **Antarctica**
8. **World Miscellaneous Facts**

1 CHAPTER

World: Continents and Ocean Basins

The solid portion of the earth on which we live is called the **lithosphere**. It comprises of the rocks of earth's crust and the thin layers of soil that contain nutrient elements which sustain the life of vegetation and organisms of earth. It also contains vast depressions which are filled with life sustaining water. So there are two main divisions of the earth's surface: the large landmasses which are known as the **continents** and huge water bodies which are called the **Ocean basins**. There are seven major continents which are separated by large water bodies. These continents are – **Asia, Europe, Africa, North America, South America, Australia and Antarctica**. At the other hand five major ocean basins of the world are the **Pacific Ocean, the Atlantic Ocean, the Indian Ocean, the Southern Ocean** and **the Arctic Ocean**. Both continents and ocean basins are depicted in the Fig 1.1 given below.

In depth coverage of the continents and ocean basins are provided in the subsequent chapters and some important facts regarding the continents and ocean basins are mentioned below in Fig 1.2, Fig 1.3 and Fig 1.4.

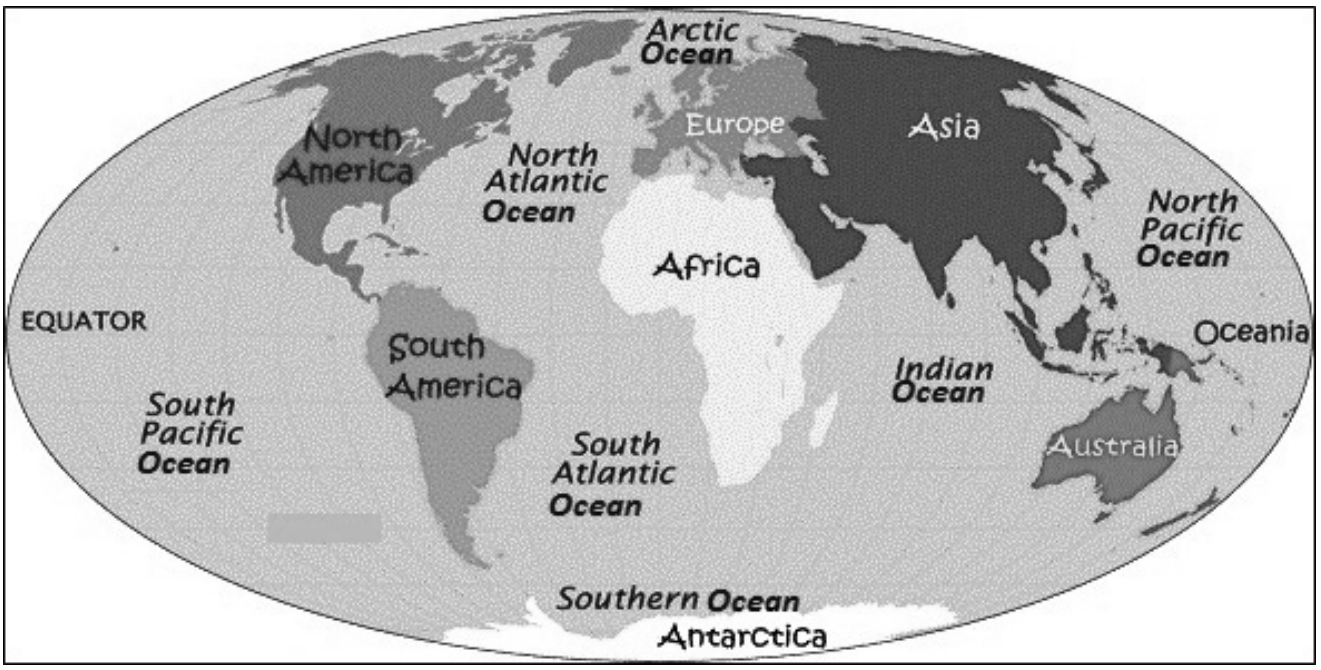

Fig 1.1 Continents and Ocean Basins

World continents in the order of size	Continent with Most Countries
1. Asia - (44,579,000 sq km)	1. Africa - (54)
2. Africa - (30,221,532 sq km)	2. Europe - (47)
3. North America - (24,709,000 sq km)	3. Asia - (44)
4. South America - (17,840,000 sq km)	4. North America - (23)
5. Antarctica - (14,000,000 sq km)	5. Oceania - (14)
6. Europe - (10,180,000 sq km)	6. South America - (12)
7. Australia/Oceania - (8,525,989 sq km)	7. Antarctica - (0)

Fig 1.2 Sizes of Continents

Ocean basins in decreasing order of their size
1. The Pacific Ocean
2. The Atlantic Ocean
3. The Indian Ocean
4. The Southern Ocean
5. The Arctic Ocean

Fig 1.3 Sizes of Ocean Basins

Name of continent	2019 Population	World's Population (%)	Growth Rate (%)	Population Density (sq km)
Asia	4,601,371,198	59.65%	0.89%	103.22
Africa	1,308,064,195	16.96%	2.52%	43.17
Europe	747,182,751	9.69%	0.10%	33.76
South America	427,199,446	5.54%	0.85%	23.95
North America	366,600,964	4.75%	0.63%	14.84

Fig 1.4 World Population

PART-A

INDIA: PHYSICAL GEOGRAPHY

1. India: An Introduction
2. India: Geological Structure
3. Physiographic Divisions of India
    - The Northern Mountains
    - The North Indian Plains
    - The Peninsular Plateau
    - The Coastal Plains and Islands
4. Drainage System of India
5. Climate of India
6. Soils of India
7. Flora and Fauna

1 CHAPTER

India: An Introduction

India is an ancient country which is also known as **Bharatvarsh**. It is surrounded by the sea on three sides and separated from the rest of Asia by a lofty mountain chain i.e. the Himalayan mountain system. With time, due to its insular location, it has become an independent entity: **Indian sub-continent.** This sub-continent is shared by India, Pakistan, Bangladesh, Nepal and Bhutan and form the well-defined realm of **South Asia.**

- India with its area of 3.28 million sq. km accounts for 2.4 per cent of the world's land surface area and stands as the seventh largest country in the world.
- It is also the **second most populous** country of the world behind China and its population is around 17.5% of the total world population.
- The mainland of India extends, from Kashmir in the north to Kanniyakumari in the south and Arunachal Pradesh in the east to Gujarat in the west. India's territorial limit further extends towards the sea upto 12nautical miles (about 21.9 km) from the coast.
- Lying entirely in the northern hemisphere (tropical zone), the Indian mainland extends between the latitude - 8°4′N to 37°6′N and longitude - 68°7′ E to 97°25′E.
- The southernmost point of the Indian i.e., **Indira Point**, is situated at 6°30′ north in the Andaman and Nicobar Islands. Similarly **Indira Col**, which is located in the eastern Karakoram Range of the Himalayas, is the northernmost point of India.

Gulf of Mannar

- The Gulf of Mannar lies between the west coast of Sri Lanka and the southeastern tip of India in the Coromandel Coast region.
- The dugong (sea cow), a 'Vulnerable' species as per IUCN is found here.

- Expanse of India is about 3,214 km from north to south and about 2,933 km east to west.
- The total length of the **mainland coastline is nearly 6,100 km** and land frontier about 15,200 km. Length of entire coastline of India including the **mainland and island territories is around 7,517 km.**
- India is officially known as Republic of India and is comprised of total of 28 states and 8 Union territories. Recently, Jammu and Kashmir got reorganized into two union territories i.e Jammu and Kashmir and Ladakh. Merging of Dadra and Nagar Haveli and Daman and Diu as one union territory.
- The Andaman and Nicobar Islands in the Bay of Bengal and the Lakshadweep islands in the Arabian Sea are parts of the Indian Territory.

Fig: Physical Map of India

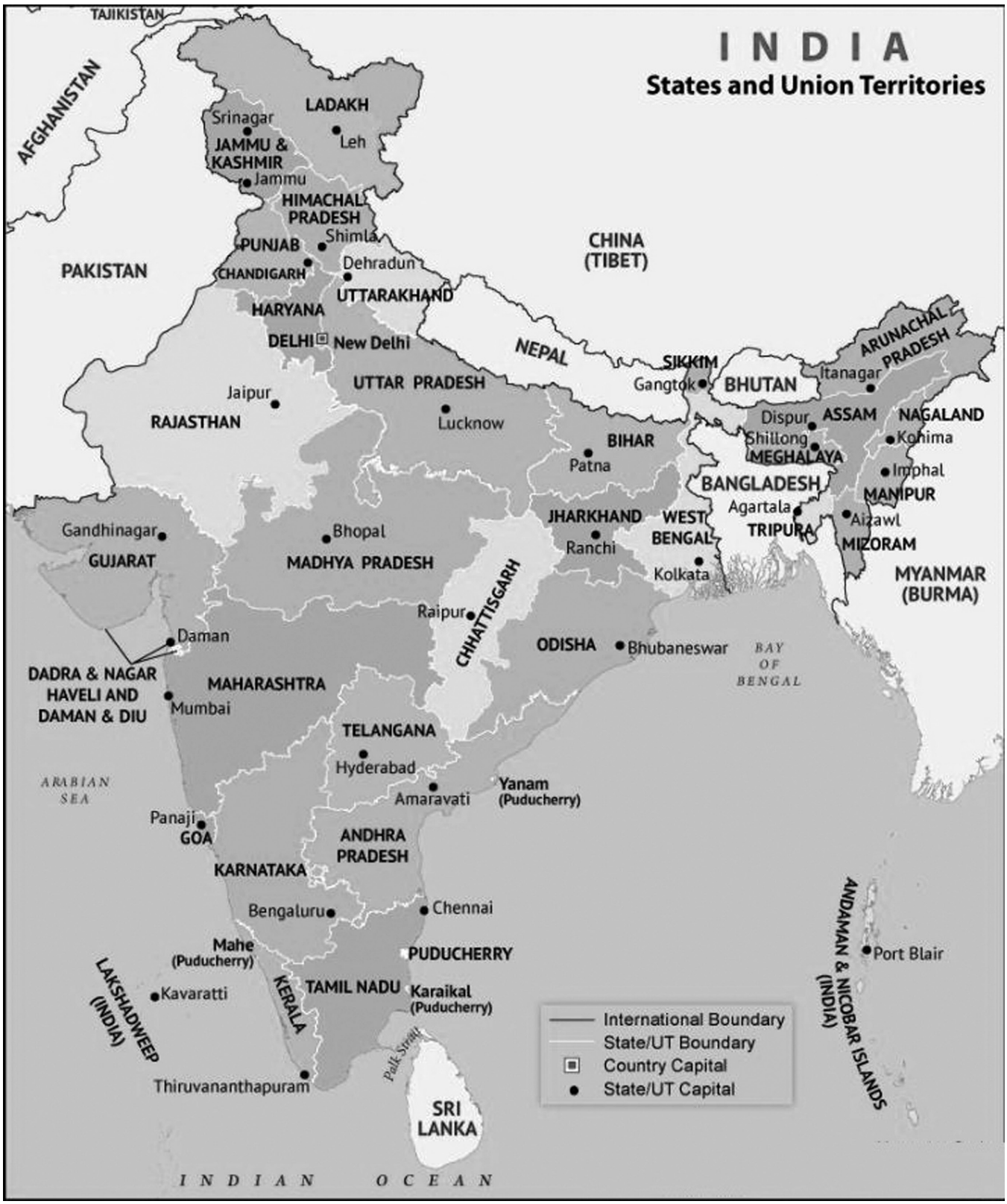

Fig. Political Map of India

- Latitudnally, the southern part of the country lies within the tropics and the northern part lies in the sub-tropical zone or the warm temperate zone. This location is responsible for large variations in land forms, climate, soil types and natural vegetation in the country.
- Tropic of Cancer (23'50 degree) passes through 8 Indian States - Gujarat, Rajasthan, Madhya Pradesh,

Chhattisgarh, Jharkhand, West Bengal, Tripura and Mizoram.

- **Agartala** (Tripura) which lies on 23.51 degree north is nearest to the Tropic of Cancer in India.
- **82°30′ E** has been selected as the '**standard meridian'** of India and Indian Standard Time is ahead of Greenwich Mean Time by 5 hours and 30 minutes.
- **82°30′** East **longitude passes** through five states: **Uttar Pradesh, Madhya Pradesh, Chattisgarh, Odisha and Andhra Pradesh.**

Extreme Points of India

North: Indira col, that is in Siachen Glacier, Leh (Jammu and Kashmir)

South: Indira Point, Nicobar Islands (**On Main Land:** Cape Comorin near Kanyakumari, Tamil Nadu)

East: Kibithu (Anjaw, Arunachal Pradesh)

West: Guhar Moti (Sir Creek, Kutch, Gujarat)

Three Islands of Andaman Renamed

The Union Government has changed the name of 3 islands of Andaman and Nicobar group. Netaji Subhas Chandra Bose had hoisted the flag after the Japanese captured the area during the Second World War.

Old Name	New Name
Ross Island	Netaji Subhash Chandra Bose Dweep
Neil Island	Shaheed Dweep
Havelock Island	Swaraj Dweep

India and its Neighbours

- India having Land border extending for about 15,200 kms and Coastline of about 7,517 kms and have 11 **neighbouring countries**.

Countries Sharing Land Boundaries with India	
Country	**Length of Border(Km)**
Bangladesh	4096.7
China	3,488
Pakistan	3,323
Nepal	1,751
Myanmar	1,643
Bhutan	699
Afghanistan	106

Indo-Bangla Enclave Exchange

As per the Land Boundary Agreement (LBA), 1974 and Protocol of 2011, 51 erstwhile Bangladeshi enclaves in India and 111 erstwhile Indian enclaves in Bangladesh were physically transferred to the other country with effect from the midnight of 31 July 2015.

- **The countries which share maritime boundaries with India include:**
  - **Sri Lanka**
  - **Maldives**
  - **Thailand**
  - **Indonesia**
- The boundary line between India and China is called the **McMahon line**. It is drawn after a treaty signed between British Indian Government, China and Tibet in 1914. Its legal status is disputed by China, currently along with LAC (Line of Actual Control), it serves as the effective boundary between China and India.
- To the north-west, India, shares a boundary mainly with Pakistan (**Radcliffe Line**) and Afghanistan (**Durand line**); to the east with Myanmar and Bangladesh and the Indian Ocean lies in the south.
- **24th parallel** north latitude is claimed by Pakistan as the boundary line in Rann of Katch area but India has rejected it**.**
- In the south, on the eastern side, the Gulf of Mannar and the Palk Strait separate India from Sri Lanka.

❖❖❖❖❖

PART-B

INDIA: SOCIAL AND ECONOMIC GEOGRAPHY

1. Population, Migration and Urbanisation in India
2. Agriculture and Allied activities
3. Irrigation
4. Minerals in India
5. Energy Scenario in India
6. Industries in India
7. Transportation

1 CHAPTER

Population, Migration and Urbanisation in India

India is the second most populous country after China in the world with its total population of 1,210 million (2011). India's population is larger than the total population of North America, South America and Australia put together. More often, it is argued that such a large population invariably puts pressure on its limited resources and is also responsible for many socio-economic problems in the country.

Sources of Population Data

- Population data are collected through Census operation held every 10 years in our country.
- Census in India collects and publishes information on size and characteristics of the population, such as, age and sex distribution, social and cultural factors such as religion, literacy, languages known, migration and economic activities of the people.
- The first population Census in India was conducted in 1872 but its first complete Census was conducted only in 1881.
- Census 1911-21 is the only period in which India had experienced population decline. It was largely due to the Global Influenza Pandemic of 1918-19.

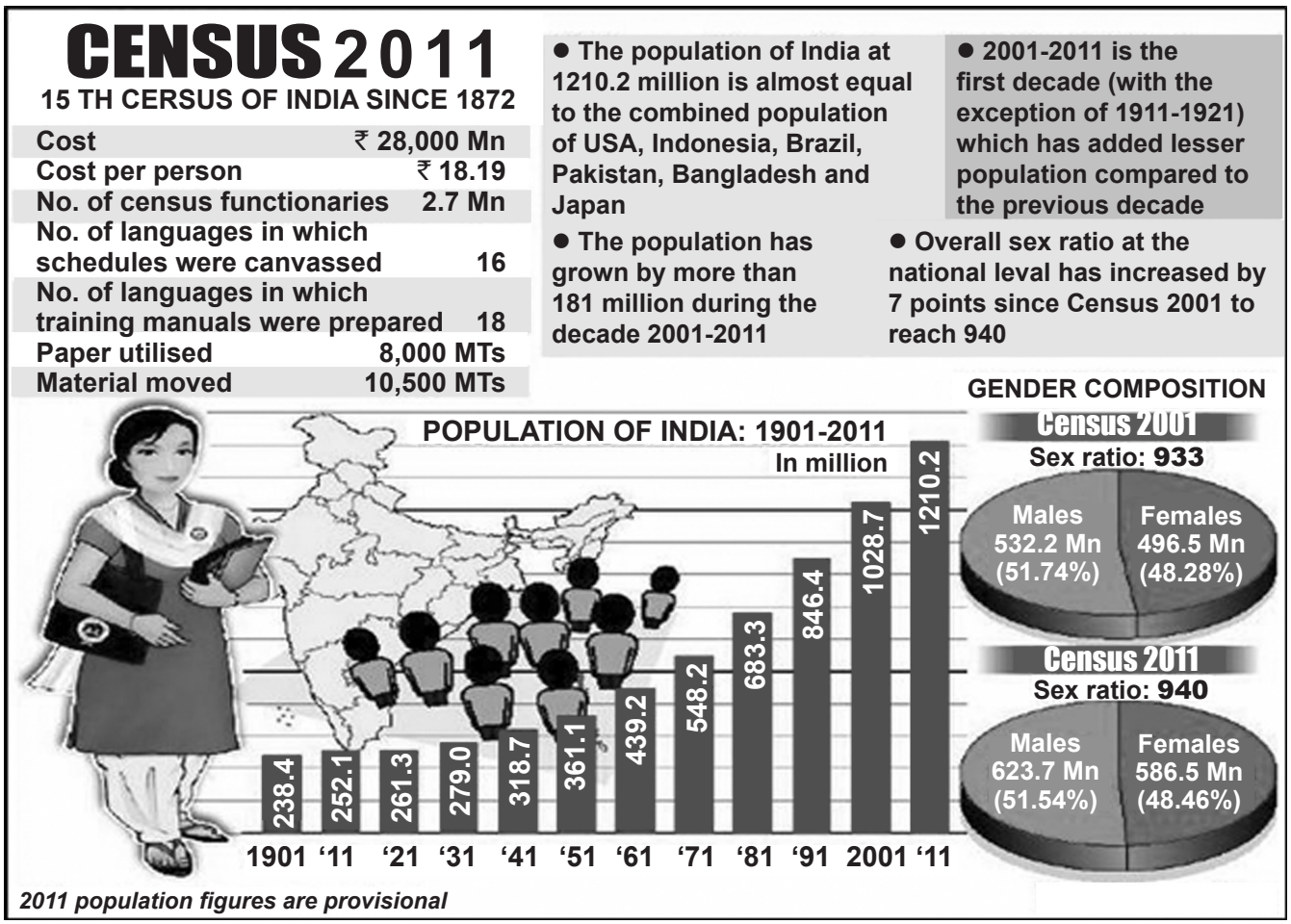

Figure: Census 2011