



**NEERAJ®**

# **PHYSICAL GEOGRAPHY**

**B.G.G.C.T.-131**

**Chapter Wise Reference Book  
Including Many Solved Sample Papers**

*Based on*

**C.B.C.S. (Choice Based Credit System) Syllabus of**

# **I.G.N.O.U.**

**& Various Central, State & Other Open Universities**

*By: Baljit Kaur*



**NEERAJ  
PUBLICATIONS**

*(Publishers of Educational Books)*

Mob.: 8510009872, 8510009878 E-mail: [info@neerajbooks.com](mailto:info@neerajbooks.com)

Website: [www.neerajbooks.com](http://www.neerajbooks.com)

**MRP ₹ 280/-**

Content

# PHYSICAL GEOGRAPHY

Question Paper–June-2023 (Solved).....	1-2
Sample Question Paper–1 (Solved) .....	1
Sample Question Paper–2 (Solved) .....	1
Sample Question Paper–3 (Solved) .....	1
Sample Question Paper–4 (Solved) .....	1

---

<i>S.No.</i>	<i>Chapterwise Reference Book</i>	<i>Page</i>
--------------	-----------------------------------	-------------

---

## **BLOCK-I : GEO-TECTONICS**

1. Origin of Earth .....	1
2. Earth – A Living Planet.....	7
3. Interior of the Earth: Structure and Composition .....	16
4. Concepts of Isostasy .....	23

## **BLOCK-II : LITHOSPHERE**

5. Materials of The Earth's Crust: Rocks and Minerals .....	31
6. Continental Drift, Mountain Building and Plate Tectonics .....	37
7. Endogenetic Forces .....	46
8. Exogenetic Processes - I .....	55
9. Exogenetic Processes -II .....	63

**BLOCK-III : ATMOSPHERE**

10.	Composition and Structure of the Atmosphere .....	71
11.	Insolation and Atmospheric Temperature .....	78
12.	Global Distribution of Surface Pressure Systems and Winds .....	86
13.	Humidity and Precipitation .....	94
14.	Climatic Classification .....	102

**BLOCK-IV : HYDROSPHERE**

15.	Introduction to Hydrosphere .....	110
16.	Ocean Floor and Relief Features .....	118
17.	Distribution of Temperature and Salinity in the Oceans .....	127
18.	Tides and Currents .....	134
19.	Ocean Deposits .....	143



**Sample Preview  
of the  
Solved  
Sample Question  
Papers**

*Published by:*



**NEERAJ  
PUBLICATIONS**

[www.neerajbooks.com](http://www.neerajbooks.com)

# QUESTION PAPER

June – 2023

(Solved)

PHYSICAL GEOGRAPHY

B.G.G.C.T.-131

Time: 3 Hours ]

[ Maximum Marks: 100

Note: All questions are compulsory.

**Q. 1. Answer any five of the following questions:**

(i) Differentiate between inner and outer planets.

Ans. Ref.: See Chapter-1, Page No. 4, Q. No. 3.

(ii) Discuss briefly the four major elements of ecosystem.

Ans. Ref.: See Chapter-2, Page No. 12, Q. No. 2.

(iii) Mention two differences between igneous and sedimentary rocks.

Ans. Ref.: See Chapter-5, Page No. 32, 'Igneous Rocks' and Page No. 33, 'Sedimentary Rocks'.

(iv) Differentiate between planetary winds and seasonal winds.

Ans. Ref.: See Chapter-12, Page No. 88, 'Planetary Winds', 'Seasonal Winds'.

(v) Distinguish between mechanical weathering and chemical weathering.

Ans. Ref.: See Chapter-8, Page No. 55, 'Physical or Mechanical Weathering', Page No. 56, 'Chemical Weathering'.

(vi) What are iceshelves and icebugs?

Ans. Ice shelves form in areas where cold ocean water lies next to a large continental glacier or ice sheet that reaches the sea. Under cooling or cold conditions, the ice that reaches the sea will flow out over the ocean, floating as a thick ice plate on top of it. Often the glacier ice flows outward over the frozen ocean in the form of landfast sea ice, displacing it. Under cooling climate conditions, landfast ice can often remain through the summer, persisting for years or even decades, until the surrounding glaciers slowly push it out of the way, forming a true ice shelf.

Grylloblattidae, commonly known as the icebugs, or ice crawlers, is a family of extremophile (psychrophile) and wingless insects that live in the cold on top of mountains and the edges of glaciers. They cannot tolerate warmth (most species will die at 10 °C) and many species have small distribution ranges.

(vii) Define terrigenous deposits and pelagic deposits.

Ans. Ref.: See Chapter-19, Page No. 143, 'Continental or Terrigenous Deposits' and 'Pelagic Deposits'.

(viii) List out different approaches to climatic classification. Explain any one of them.

Ans. Ref.: See Chapter-14, Page No. 106, Q. No. 1.

Q. 2. Give a detailed description of Nebular hypothesis of Laplace. What are the major criticisms to this hypothesis?

Ans. Ref.: See Chapter-1, Page No. 3, 'Nebular Hypothesis', 'Critical Analysis', Page No. 5, Q. No. 2.

Or

Explain the processes of mountain building with the help of four different types of plate convergences. Illustrate your answer with suitable diagrams.

Ans. Ref.: See Chapter-6, Page No. 38, 'Plate Tectonic Theory and Mountain Building'.

Q. 3. Explain the process of 'Corrosion' and 'Abrasion' with respect to the action of sea waves. Briefly describe any four coastal landforms. Illustrate your answer with suitable diagrams.

Ans. Ref.: See Chapter-9, Page No. 65, 'Work of Sea Waves'.

**Also Add:** Waves are responsible for erosion along the coastline. Because of corrosion, the soluble rocks to some extent gets dissolved in sea water by wave action. But this process is less significant in the work of waves as solution is slow due to high calcium carbonate distribution in the ocean water. Abrasion plays an important part in shoreline processes. Waves mobilize the smooth rounded stones, sand, pebbles, and small boulders to hit against rocky cliffs and shore that lead to the intense erosion.

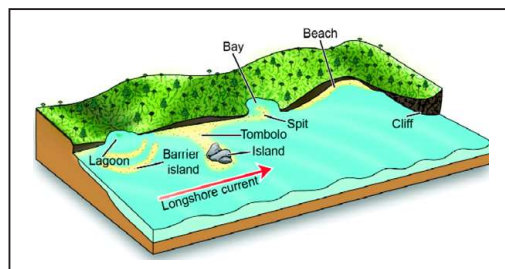
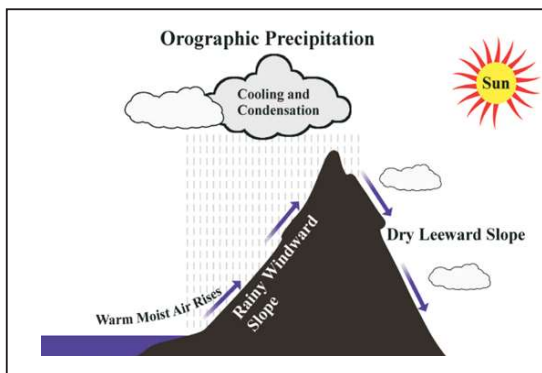


Fig.: Various Coastal Landforms

Or

Discuss any five factors affecting the horizontal distribution of temperature on earth.

Ans. Ref.: See Chapter-11, Page No. 83, Q. No. 3.



Q. 4. Define precipitation and explain its types with suitable diagrams.

Ans. Ref.: See Chapter-13, Page No. 97, 'Precipitation', Page No. 99, Q. No. 4.

Also Add:

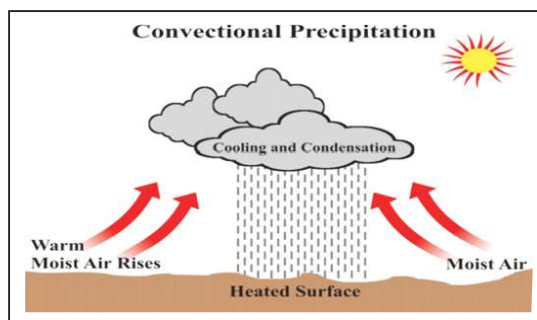


Fig. : Convective Precipitation

Or

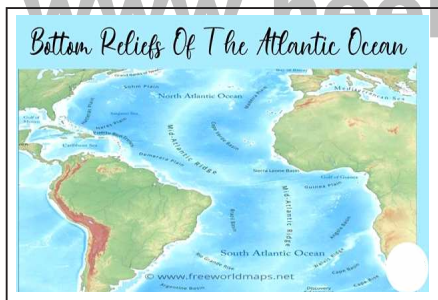
Define isostasy and explain the concept of 'Isostasy as the Earth's balance'. Describe the biostatic effects of plate tectonics and icesheets.

Ans. Ref.: See Chapter-4, Page No. 24, 'Development of Concept of Isostasy'.

Q. 5. Describe the bottom reliefs of Atlantic Ocean. Illustrate your answer with suitable diagrams.

Ans. Ref.: See Chapter-16, Page No. 120, 'Bottom Reliefs of Atlantic Ocean'.

Also Add:



Or

Explain waves, tides and currents and differentiate between them. Explain the process of origin of tides with the help of equilibrium theory of Newton giving suitable diagram.

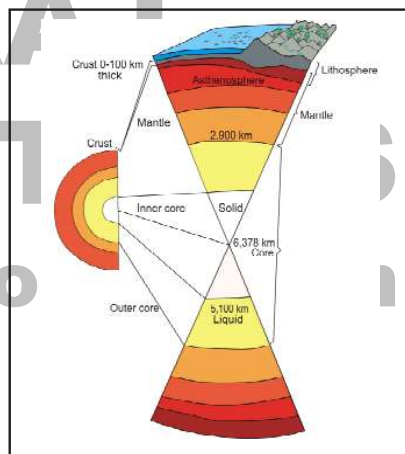
Ans. Ref.: See Chapter-18, Page No. 134, 'Oceanic Circulations', 'Origin of Tides', Page No. 137, Q. No. 2.

Q. 6. Answer any two of the following questions:

(i) Describe briefly earth's internal structure. Illustrate your answer with a suitable diagram.

Ans. Ref.: See Chapter-3, Page No. 17, 'Earth's Internal Structure : Theories'

Also Add:



(ii) What are folds? Explain different types of folds.

Ans. Ref.: See Chapter-7, Page No. 52, 'Folding', Page No. 47, 'Folding'.

(iii) Explain the factors that affect the distribution of salinity in the oceans.

Ans. Ref.: See Chapter-17, Page No. 132, Q. No. 3, Page No. 129, 'Distributors of Salinity in the Oceans'.

(iv) Briefly explain the different types of atmosphere on the basis of distribution of temperature with height.

Ans. Ref.: See Chapter-10, Page No. 75, Q. No. 2.



# Sample Preview of The Chapter

*Published by:*

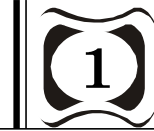


**NEERAJ  
PUBLICATIONS**

[www.neerajbooks.com](http://www.neerajbooks.com)

# PHYSICAL GEOGRAPHY

## BLOCK-I : GEO-TECTONICS



## Origin of Earth

### INTRODUCTION

Universe has been defined as the totality of existence which means that all the astronomical bodies including planets, star, galaxies, all matter and energy are called universe. Solar system consists of the sun, the eight planets and their satellites and millions of smaller celestial objects such as – asteroids, comets and meteoroids.

### CHAPTER AT A GLANCE

#### BASIC CONCEPTS

##### Earth as a Blackbody

Earth is like a black-body radiator which is responsible for green house effect because it can absorb solar energy at any wavelength but emits it in a narrow band of radiator. Life is possible on earth because of green house effect. The earth reflects about one third of energy reaches to it. So it appears to be bright but close to a blackbody radiator.

##### Rotation and Revolution of Earth Planets and Satellites

The earth rotates from west to east or we can say that anti-clockwise on its axis. One end of axis is at the north pole and other is in Antarctica, South pole. It completes its rotations in 23 hours 56 minutes and 4 seconds. This rotation is responsible for the alternate periods of light and darkness that gives us day and night.

Earth revolution is the complete orbit of the sun by the earth which is called a year and takes 365 days to complete. Earth orbit is an ellipse so it is nearer to Sun in January and farther in July. The difference in distance is about 3 million miles.

Most planets and their moon rotate and revolve in anti-clockwise direction on which, likely reflect the rotation of the original cloud from which all component of solar system originated. Distance between Earth and

Sun is 149.5 million kms. This defines the Astronomical unit. Two key positions are Perihelion – the point closest to the sun, Aphelion – the point farthest from the sun. The change in seasons is caused by the tilt of the earth's axis to the plane of its orbit at an angle of  $66.5^\circ$ . When the northern end is tilted towards the sun it causes summer season in northern hemisphere and winter in southern hemisphere. When all the parts of earth have equal day and night is considered equinox and is regarded as the first day of spring.

##### Universe and Galaxies

Galaxies are vast space, made up of dust and stars. There may be hundred billion galaxies in our universe. Some are similar to our milkyway. The diameter of our milkyway is about 100,000 light years. The sun with its solar system is revolving around the center of the milkyway and is about 30 thousand light years away from the center of the milkyway. It takes  $224 \times 10^6$  years to revolve and completed two rounds till now with the speed of 285 kilometers per second.

##### Classifications of Galaxies

Edwin Hubble has categorised galaxies into four types:

**1. Spiral Galaxies:** They have at the center and a flattened disk containing spiral arms. Spiral arm is wrapped around the bulge which has countless young blue stars, gas and dust. The disks of spiral galaxies rotate like a hurricane.

**2. Barred Spiral Galaxies:** They have a bar shaped collection of stars which runs across the center of the galaxy.

**3. Elliptical Galaxies:** They are identified by a smooth oval shaped appearance. It includes old stars, little gas or dust. In these galaxies stars move on randomly oriented orbits like a swarm of bees.

**4. Irregular Galaxies:** They are usually smaller objects that are without definite shape. They have new very hot stars with lots of gases and dust particles.



**THE SOLAR SYSTEM**

Our solar system was formed around 4.6 billion years ago from the gravitational collapse of a giant molecular cloud. It has sun in the center and other objects which revolve around it directly or indirectly such as – dwarf planets, comets and asteroids. All planets can be divided into two types Inner or Terrestrial and Outer planets.

**Inner Planets:** They are four in number : Mercury, Venus, Earth, Mass and Asteroids. They are made up of rocks and metals and that’s why they are called Terrestrial planets. They have higher density and smaller in size.

**Outer Planets:** They are bigger planets and jupiter type. Jupiter, Saturn, Uranus, Neptune and Pluto, falls in this category. They have thick atmosphere with helium and hydrogen. Their speed of rotation is more than the inner planets.

Mars, Venus, Earth Mercury	Composed of Rock and Metal
Jupiter and Saturn	Hydrogen and Helium
Uranus and Neptune	Substances with high melting point as – Ice such as water, ammonia and methane

Between Mars and Jupiter, asteroid belt lies which has object made up of rock and mineral. Beyond Neptune’s orbit lies the kuiper belt which has objects made up of ice. Numerous object within these populations that may be large enough to have been rounded by their own gravity are called dwarf planets. Examples – Pluto and Eris.

**Angular Momentum:** Angular momentum is the product of mass, angular velocity and the square of the radius of the rotating body. Angular momentum in the solar system is not same. Sun contain 1.7% and 98.3% of angular momentum constitutes the other planets whereas Sun have 99.9% of mass and planets have only 0.1% of mass.

**Asteroids and Planeteroids**

Asteroids are small celestial object which revolve around the sun between the orbit of Mars and Jupiter.

Planets are the large celestial objects which revolve around the sun in closed elliptical paths called orbit.

Asteroids can be classified mainly into three groups:

C type	Carbon group
S type	Strong
M type	Metallic

Exceptionally 4 Vesta has a relatively reflective surface and visible to the naked eye.

**ORIGIN OF EARTH AND SOLAR SYSTEM**

Various people tried to explain the origin and evolution of the solar system which broadly can be divided into two categories – Religious and Scientific.

Religious theories are discarded as they do not have scientific proof. Scientific theories can be divided into two types – hot origin and cold origin.

- In hot origin concept, the planets are formed from the hot matter or was heated at the time of formation.
- The cold origin explains that origin of solar system from the cold matter or have always remained cold.

On the basis of number of heavenly bodies involved in the formation of solar system, theory can be divided into three categories.

1. Monistic – One star hypothesis
2. Dualistic – Binary or two heavenly hypothesis
3. Modern Concept

**Monistic Concept**

The hypothesis of Kant, Laplace comes under this category.

**Gaseous Hypothesis of Kant**

Immanuel Kant presented this hypothesis in 1755 in his treatise entitled “The General Natural History and Theory of Heaven” based on Newton’s first law of gravity and rotatory motion. He assumed that primordial matter was scattered in the universe and attracted towards one another due to gravitational pull. As a result they collide and generated heat. This result in the change of matter to solid then liquid to gaseous state. This changed motionless cloud into hot nebula and started rotating at terrific speed and large amount of centrifugal force was generated. When centrifugal force became larger than gravitational force, a ring was thrown away from the equator to the nebula. It was repeated nine times and nine planets were formed. The residual central mass become the sun and rest of rings became the planets. And the material of each ring condensed to form satellite of the concerned planets.

**Critical Analysis**

1. Origin of primordial matter not explained.
2. He has not explained the source of energy which caused motion suddenly became active.
3. Some external force is required to generate angular momentum. Kant did not explain the generation of angular momentum.
4. Kant assumed that the speed of rotation of the nebula increased with the increase in the size of the gaseous matter which is against the law of science of law of motion.

**Result:** It was disapproved as it was based on assumption and wrong application of Newton's law of gravitation and invalid concept.

#### **Nebular Hypothesis of Laplace**

Laplace explained his concept about the origin of solar system and the earth in his book "Exposition of the World System" in 1796. It was modified version of Kant.

He explained that nebula, a hot and huge gaseous matter existed in the space rotating on its axis.

It was constantly losing heat because of radiation and cooling and reducing in size and volume due to contraction on cooling. Because of this, velocity of rotatory motion increased so much that centrifugal force became greater than centripetal force. Then rings started detaching it. The matter of ring condensed and started to rotate around nebula. This mass later cooled and formed planets.

#### **Critical Analysis**

1. He did not explain why only nine ring came from nebula.
2. He did not explain the origin of nebula.
3. If all planets formed from rotation of nebula then rest of nebula i.e. sun should also rotate at high speed but it is not so.
4. If sun is rest part of nebula, it should have bulge in the middle but it is not so.
5. All planets were in the liquid state in the beginning according to Laplace. But only a solid matter can rotate along the circular pattern without losing its shape.

#### **DUALISTIC CONCEPT**

In this concept James Jeans, Chamberlain and Molten, Weitzacker's and Russell believed that solar system was formed from two stars.

#### **The Planetesimal Hypothesis of Chamberlin and Moulton**

T.C. Chamberlain believed that these were two stars in the Universe in the beginning. One was sun which was bigger then now and second was a star. Sun was cold and solid while star was moving on its path. They came closer and due to the gravitational pull of star solar tide accrued and large number of particles detached from outer layer of the sun. They became planets.

#### **Critical Analysis**

1. Big planets cannot be formed by the material ejected from sun.
2. The assumption that the increase in the size of nucleus due to collision of planetesimal is not trustworthy.

#### **Tidal Hypothesis of James Jeans and Jeffrey**

Sir James proposed this hypothesis in 1919. According to him, beside sun there was an intruder star,

when they came close, gravitational pull of the intruder star made tide of the sun increased. As a result huge amount of matter was ejected and cigar shaped tide created. This matter filament could not unite with sun or intruder star. This matter got condensed and formed planets.

#### **Critical Analysis**

1. According to Delevin, stars are at the great distance in the universe, there is very less possibility to come near to each other.
2. Russell said "It is not possible that such a large amount of material of filament could, come out of sun to form planets."
3. Planets cannot be formed due to the cooling of the gaseous filament.

#### **Binary Star Hypothesis of Russell**

According to Russell Hypothesis, there were two stars, besides sun. Approaching star and companion star, both were revolving around the sun in opposite directions and when they come near a huge amount of matter was ejected from the companion star due to gravitational force. So planet were formed from this ejected matter.

#### **Critical Analysis**

1. Russell has not explained to what happened to remaining companion star.
2. He did not explain why planets started revolving around the sun.

#### **MODERN CONCEPT**

#### **The Nova Hypothesis of Hoyle and Littleton**

F. Foyle and Littleton were mathematicians in Cambridge University. They presented their hypothesis in 1946 which was known as Supernova Hypothesis. based on nuclear physics.

According to them, planets are made up of heavy elements and it can be formed only if the burning of hydrogen takes place at high temperature which is available only in supernova star. Supernova star is formed when a star is left with less hydrogen which is not enough to burn. So planets have been formed due to the explosion of one supernova star. The explosion of the supernova generated intense heat and pressure from which earth was made. Other planets were formed due to the condensations of the matter of the disc form of the matter thrown out by supernova due to explosion.

#### **Critical Analysis**

1. This hypothesis does not support the origin of the pair of stars.
2. It failed to explain the arrangement of planets, size, rotation, etc.

#### **The Big Bang Hypothesis**

This is the latest hypothesis proposed by Limaitre in 1950-60 and validated in 1972. In this theory, our

4 / NEERAJ : PHYSICAL GEOGRAPHY

universe has all the matter in the form of dense and huge primordial matter. Because of a violent explosion dust particles present in this matter scattered and formed present day universe.

**Cepheid Hypothesis of A.C. Banerjee**

According to him, stars in the universe keep contracting and expanding this process is called pulsation and these stars are called cepheid variable. Once an intruding star passed by such cepheid star, pulsation increased due to the gravitational attraction of intruding star. As a result the intruding star attracted matter of cepheid star towards itself. Condensation of this matter formed planets, the residual part became the sun.

**SELF-ASSESSMENT QUESTIONS**

**Q. 1. What do you understand by Earth's revolution?**

**Ans.** All the planet revolve (move) around the sun and also rotate on its axis. The time taken by a planet to complete one revolution around the sun is called its period of revolution. As the distance of planet from the sun increases, its period of revolution also increases. Our earth complete its revolution in 365 days and its

distance from the sun is  $150 \times 10^6$  km. Earth revolve around the sun in anti-clockwise direction i.e. West to East and its orbit (path) is an ellipse.

**Q. 2. What causes change in season? When do we have summer season in Northern Hemisphere?**

**Ans.** The earth rotate on its axis from West to East. The axis of rotation is not perpendicular to the plane of the earth's orbit. The axis of the earth is slightly tilted with respect of the plane of its orbit around the sun making an angle to  $66.5^\circ$ . When the northern part of the earth tilted towards the sun the direct rays of the sunlight fall in northern hemisphere causing summer season. At the same time in southern hemisphere experience winter as its receive slanting or indirect rays. Halfway between in spring and autumn there is a time when all parts of the earth have equal day and night. When Northern end is titled away from the sun, it receive slanting or indirect sunlight causing winter.

From March to September, the Northern hemisphere gets more sunlight than southern one, so experience summer season.

**Q. 3. Write some differences between inner and outer planets?**

**Ans.** All planets can be divided into two groups: Inner planets and Outer Planets.

Inner Planets	Outer Planets
1. Four planets Venus, Earth, Mars and Mercury fall in this group.	1. It includes Jupiter, Saturn, Uranus, Neptune and Pluto.
2. They are called inner planets as they lie between the sun and belt of asteroids and are closer to the sun.	2. They are called outer planets as they lie beyond the asteroid belt.
3. They are called terrestrial which mean like earth as they are made up of rock and metal.	3. They are known as gas planets or jovian planets (Jupiter like) made up of helium and hydrogen.
4. They are small in size and relatively higher density.	4. They are big in size and relatively less dense.
5. The speed of rotation is less.	5. The speed of rotation is more compare to the inner planets.
6. They have no or less satellite as earth has one and Mars have two satellites.	6. They have more satellite comparatively.

**Q. 4. Where do Asteroids lie? Name the three group of asteroids.**

**Ans.** Asteroids are minor planets. There are million of asteroids, they thought to be the shattered material came from young sun's nebula, which never grew large enough to become planets. The large majority of asteroids lies in the belt between the orbit of Mars and Jupiter. They can be categorised into three groups:

1. **C type:** Carbon group-approximately the same chemical composition as sun minus hydrogen, helium and other volatiles. They are about 75%.

2. **S type:** 17% stony – It is metallic nickel-iron mixed with iron and magnesium silicates.

3. **M type:** Metallic-pure nickel-iron. Only one asteroid four Vesta which has a relatively reflective surface is normally visible to the naked eye.