



# BPSC

**BIHAR PUBLIC SERVICE COMMISSION**

**GEOGRAPHY OF INDIA**



## INDEX

| CONTENTS                                     | PAGE |
|--|------|
| <b><u>GEOGRAPHY OF INDIA</u></b>             |      |
| 1. Earth - Origin and Shape                  | 1    |
| 2. Internal Structure of Earth               | 9    |
| 3. Plate Tectonics Theory                    | 16   |
| 4. The Theory of Continental Drift           | 21   |
| 5. Rocks                                     | 26   |
| 6. Soils                                     | 30   |
| 7. Mountain Building                         | 35   |
| 8. Volcanism                                 | 43   |
| 9. Flood and Drought                         | 46   |
| 10. Earthquake                               | 52   |
| 11. Ocean Bottom Relief                      | 53   |
| 12. Temperature and Salinity of Ocean Waters | 56   |
| 13. Ocean Currents                           | 58   |
| 14. Tides                                    | 63   |
| 15. Coral Reefs                              | 66   |
| 16. Cyclone                                  | 69   |
| 17. Earth's Atmosphere                       | 72   |
| 18. Weather and Climate                      | 76   |
| 19. Air Mass                                 | 82   |
| 20. Fronts and Temperature Anomaly           | 83   |
| 21. Pressure & winds                         | 88   |

|  |            |
|--|------------|
| <b>22. Humidity</b>                          | <b>96</b>  |
| <b>23. Types of clouds</b>                   | <b>98</b>  |
| <b>24. Types of Rainfall</b>                 | <b>99</b>  |
| <b>25. Primary sector and locations</b>      | <b>101</b> |
| <b>26. Secondary sector and locations</b>    | <b>103</b> |
| <b>27. Tertiary sector and locations</b>     | <b>104</b> |
| <b>28. Issues in industrial development</b>  | <b>105</b> |
| <b>29. Government of India steps</b>         | <b>110</b> |
| <b>30. Population</b>                        | <b>114</b> |
| <b>31. Mountains</b>                         | <b>119</b> |
| <b>32. Plains and Plateau</b>                | <b>135</b> |
| <b>33. River</b>                             | <b>141</b> |
| <b>34. Drainage System and pattern</b>       | <b>145</b> |
| <b>35. Himalayan Drainage System</b>         | <b>148</b> |
| <b>36. Natural vegetation</b>                | <b>156</b> |
| <b>37. Geography of India</b>                | <b>165</b> |
| <b>38. Climate of India</b>                  | <b>172</b> |
| <b>39. Distribution of Rainfall in India</b> | <b>193</b> |
| <b>40. Minerals</b>                          | <b>200</b> |
| <b>41. Major oil Refineries of India</b>     | <b>210</b> |
| <b>42. Major Industries</b>                  | <b>212</b> |
| <b>43. Transport in India</b>                | <b>231</b> |
| <b>44. Energy in India</b>                   | <b>255</b> |



# GEOGRAPHY

## OF

# INDIA



## GEOGRAPHY

geo + graphy = Spatial Science  
 Earth to have discourse  
 ↓  
 discussion / describe

### Geography

#### Physical

Study of environment



(what surrounds us)

Surroundings

#### Human

deals with human activities

#### Social

way we live

#### Economic

way we make our living

#### Real

\* Perceptional → population

or Virtual env

↳ agriculture

↳ industries

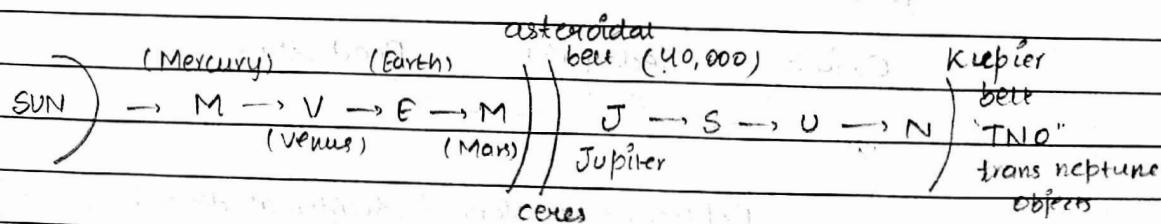
↳ planning etc

**EARTH** → planet

In 2006, IAU - 8 planets

(Pluto was excluded)

Any celestial body revolving around a star and have enough mass and gravity not only to maintain its shape but also have capacity to clear its own orbit.



Universe = Cosmos = Space

(Greek) ↓ (UK)

Astronomy cosmology

↓ Space Science

(Space & outer space)

beyond the earth atmosphere system.

Universe - collection of galaxies

↓  
collection

Star ← of Stars  
System.

galaxy in which we live - Milky way  
(Akash ganga)

More than 2.6 billion stars.

Sun - Star in Akash ganga.



Solar system.

Fusion → 2 hydrogen atom combined  
to form helium, and  
energy is generated in  
form of light.

Star - generate energy, have origin  
and dies.

Red giant - when pressure is released, expansion happens  
(i.e. it swells)

↓  
Old star, dead stars

→ White dwarf

→ Neutrinos / Pulsars

↓  
energy

Increases

→ Black hole

Intense gravitational force  
(densest)

Star eater

Origin

Red giant

Dead stars

Explosions in stars (Accidental death)  
of stars.

only upper part,  
have experienced  
explosion

Partial

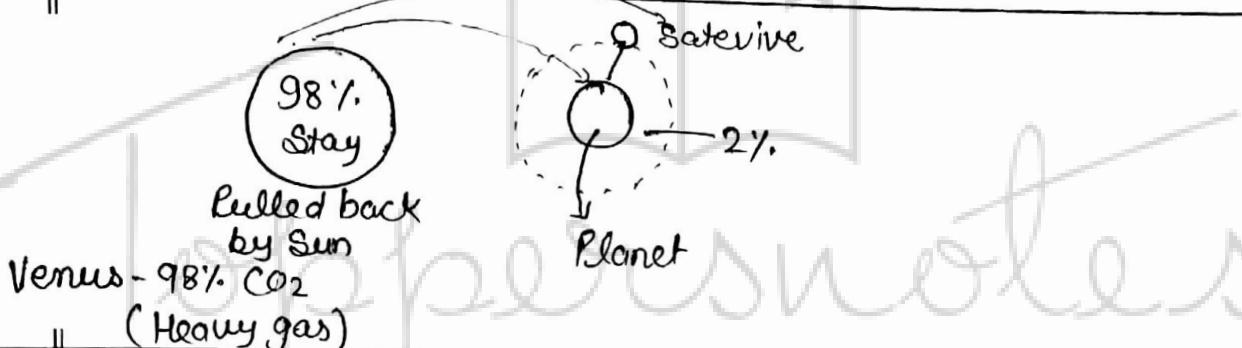
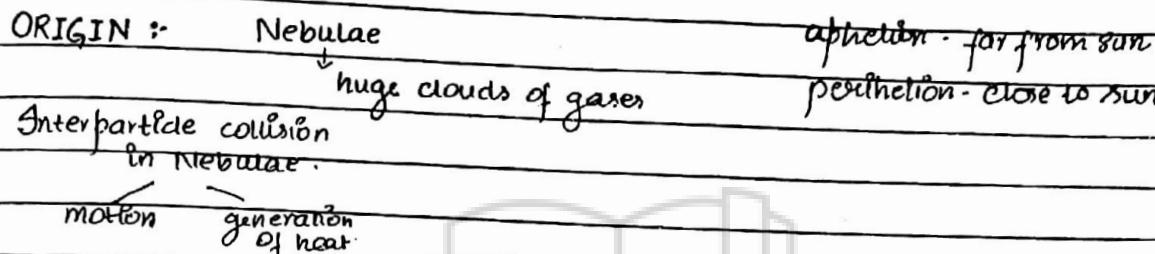
Nova.  
hydrogen over the  
surface has been  
converted to He.

Super  
Nova  
complete

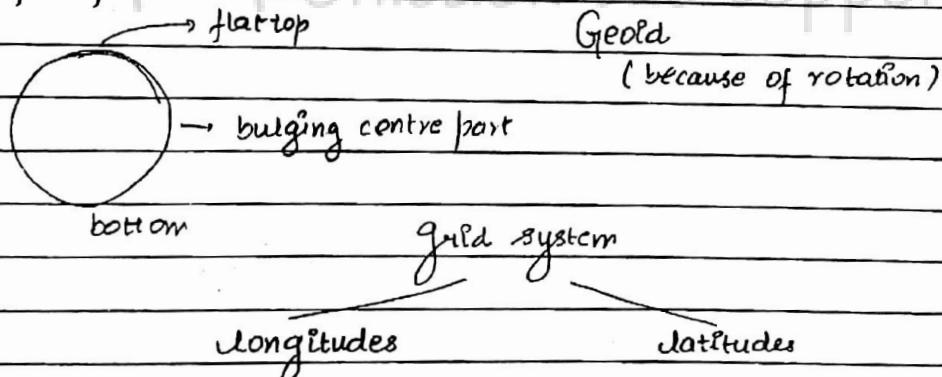
Entire hydrogen  
exploded

- Q) 1) After the stage of Super Novae, a star will be called red giant.  
 2) After the stage of Novae, a star may be called white dwarf, neutrino.

Ans. Both statements are false.



05/08 Shape of Earth :-



Any arc or part of circle which divides earth into equal halves is called great circle.

Distance b/w latitude = 1113 km/s

Total latitudes = 181

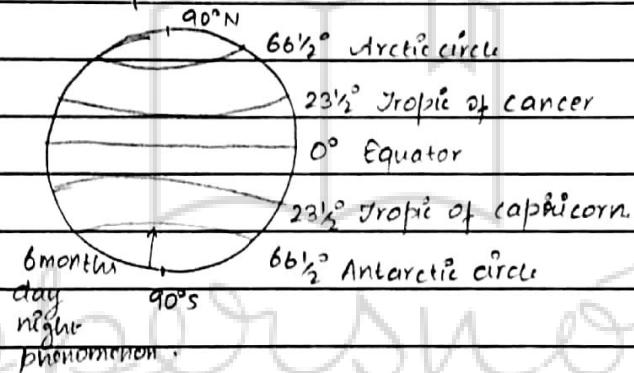
Total longitudes = 360

Along with latitude, dist b/w longitude is same.

Longitudes -  $0^\circ$   $\Rightarrow$  Prime Meridian

$180^\circ \Rightarrow$  International date line not a perfect arc  
zig-zag.  
(Because of date change)

Latitude -  $0^\circ \rightarrow$  Equator



Moments of Earth :-

① Galactic movement

② Rotation

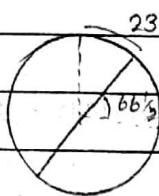
③ Revolution

Earth as a member of Solar System revolves around centre of its own galaxy, i.e. Milky Way and is called Galactic movement with speed of 250 km/sec, it takes 250 million years to complete one revolution, which is called solar year.

Spinning of earth on its own axis is called rotation.

↓  
Imaginary line passing  
through centre of earth  
and connecting 2 poles.

Axis - Inclined -  $23\frac{1}{2}^\circ$



( $22^\circ$  to  $24^\circ$ )

from normal.

$66\frac{1}{2}^\circ$  from plane / orbital plane  
of earth.

Impact: ① day and night  
position of time

Time of a place.

alternate  
rise and fall ↕ ② tides.  
in ocean

③ coriolis force

Duration = 24 hrs.

( speed of <sup>rotation of</sup> latitude decreases from equator to pole - due to circumference of latitudes ).

Speed of spinning of pts. located on different latitudes are different because of variation in circumference of latitude.

It is max. at equator and keep on decreasing towards pole

at  $60^\circ$  latitude, it is exactly half of equator and at  $75^\circ$  latitude

it is  $\frac{1}{4}$ th of equator.

Direction of rotation - West to east

Parallelism of Earth  $\Rightarrow$  Axis

Characteristic of axis

pointing  
towards  
north  
star

The axis of earth remains parallel to its previous position throughout period of revolution and plays very significant role in various earth atmospheric phenomenon.

Revolution :

An apparent force is generated because of rotation of earth called Coriolis force. It affects the direction of moving fluids and causes deflection. Rightward in northern hemisphere and leftward in southern hemisphere.

Magnitude of coriolis force  $\propto$  latitudes i.e ( max. at poles and min. at equator )

$\propto$  Speed of moving fluid.

( It does not affect speed of fluid )

Movement of earth around centre of solar system i.e. Sun.

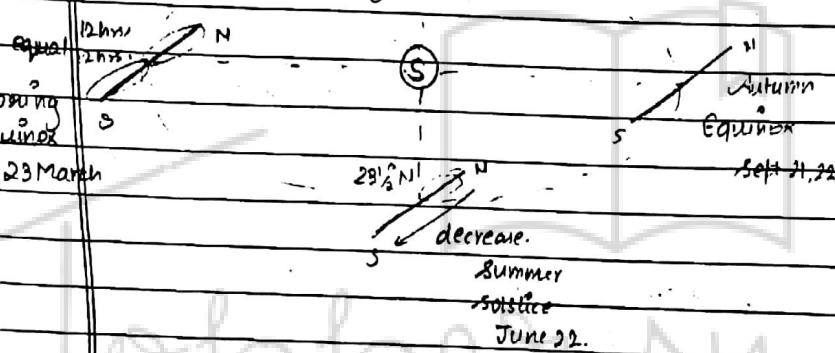
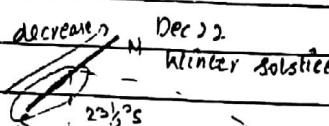
Speed - 29 km/s

= 365 days and 6 hrs.

+ 24 hrs = 366 days - leap year.

Impact :-

- Duration of Sunshine - length of day and night decreases from pole to pole.



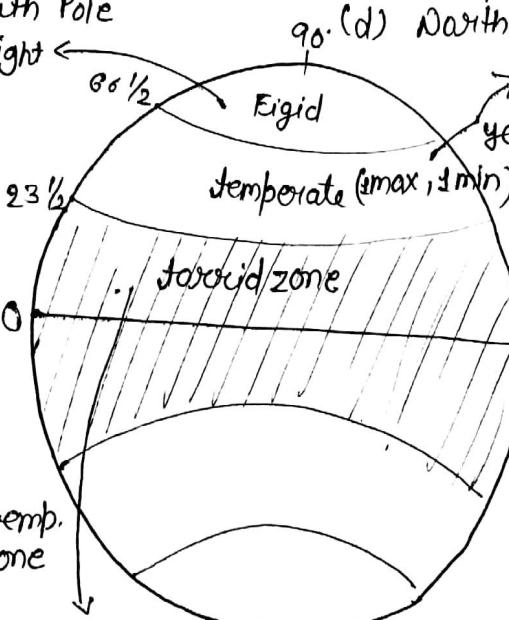
- Q On 15 Dec., longest shadow of person will be formed at which of the following latitudes?

- (a) Tropic of Capricorn      (b) Tropic of Cancer  
(c) South Pole                (d) North Pole

6 month day night phenomenon

old classification

Insolation - temp. zone



availability of Sunlight whole year no vertical sun rays SP (Long dist. from 70°C)

MODERN CLASSIFICATION :-

Eq. belt - 10°N to 10°S

Tropical - 10°N - 25°N

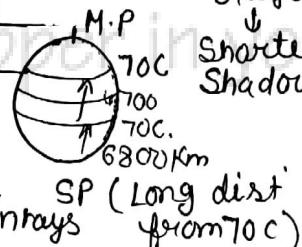
Sub Tropical - 25°N - 35°N

Temperate - 35°N - 55°N

Sub. Polar - 55°N - 65°N

Polar - 65°N - 90°N

Vertical rays  
↓  
Shortest Shadow



All the places located on this belt exp. a maximum and minimum associated with their exp. with vertical rays of Sun which will be twice a year. Annual avg. temp. is highest from where it reefs on decreasing towards Polar.

Time Zone :-

3 types of time :-

- Local time                      Rotation - 24 hrs. -  $360^\circ$
- Standard time                  $1^\circ = 4 \text{ mins}$
- International time

For finding time :-

- (1) Find out difference b/w given longitudes.
- (2) Find out difference of time
  - Same hemisphere - Subtract
  - Different hemisphere - Add.

$$\text{Longitude} \Rightarrow \frac{\circ}{\text{min}} \times 4$$

$$x + x' = 24$$

- (3) Find out exact time

Add → eastward

$$6:36 \quad 7:00 \quad 7:04$$

Subtract → westward

Indian Standard time -  $82\frac{1}{2}^\circ E$

(near Allahabad)

- Q If it is 7:30 am in India, what would be the time at  $60^\circ E$  longitude?

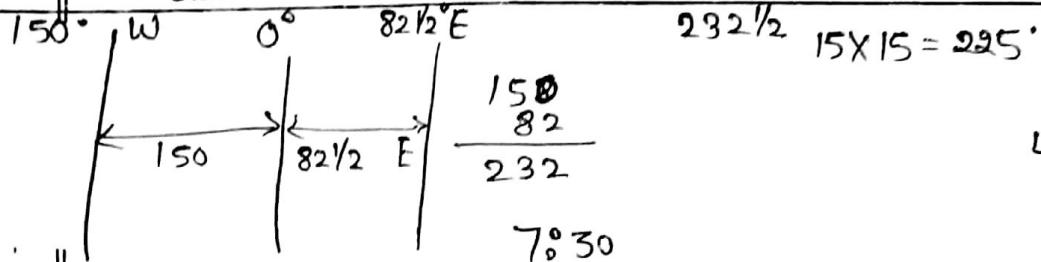
|                          |   |
|--------------------------|---|
| $60^\circ E$             | $82\frac{1}{2}^\circ E$                     |
| $22\frac{1}{2} \times 4$ | $22\frac{1}{2} \times 4 = 90 \text{ mins.}$ |
| ↔                        | → Subtract                                  |
| 7:30                     | = 6:00 am.                                  |

- Q If it is 7:30 am in India, find out time at  $50^\circ W$  longitude?

|              |           |                         |
|--------------|-----------|-------------------------|
| $50^\circ W$ | $0^\circ$ | $82\frac{1}{2}^\circ E$ |
| ↓            | ↓         | $132\frac{1}{2}$        |
| 10:40 pm     | 12:30 pm  | $15 \times 9 = 135$     |
| ↓            | ↓         | 8:50 am                 |

Q

16 July  
7:30 am Sunday in India. What will be the time, date & date at  $150^{\circ}$  W.



4 Hours  
Previous day

Q

If a person crossing international date line in east west direction if he started on Monday, he will reach on -

- (a) Sunday      (b) Tuesday      (c) Wednesday      (d) Saturday

Q

Discuss advantages and disadvantages of India having 2 time zones?

France - 15 time zones

Day light saving :- completing all work in day light for saving energy.

## Structure of Earth

### Surface

The configuration of surface of earth is largely product of processes operating in interior of earth.

### Internal ( 6400 km)

Our reach - 12 km

↓  
Indirect Sources

### Indirect Sources:

Physical  
→ Conditions of earth interior.

→ Density, pressure and temperature

↳ Volcanoes

→ The study of meteoroids

→ Seismology : Earthquake wave (study)

Avg. increase =  $1^{\circ}\text{C} / 32 \text{ mtr}$

In temp. ↓

2000°C

(temp. of core)

100 - 200 km → Zone

The temp. is exceptionally high but not higher than core.

↓  
presence of radioactive minerals - Radiogenic heat

Land  $\frac{1}{3}$  Ocean

density

5.5

Core

Pressure ↑ (density)

density ↑ When Pressure ↑

for maintaining this density core is made up of heavy material like NE, Fe - NiFe

Pressure ↑

Melting pt. ↑

Rocks - aggregates of minerals.

(partial heating of rocks)

Meteoroid - Source - Asteroid belt

Partial / complete explosion → due to friction force

↓  
shooting star

fire ball

temp ↑

Meteorites - For source / explanation of core

meteors  
density

Comets - head/coma  
tail

Earthquake :- displacement of rocks

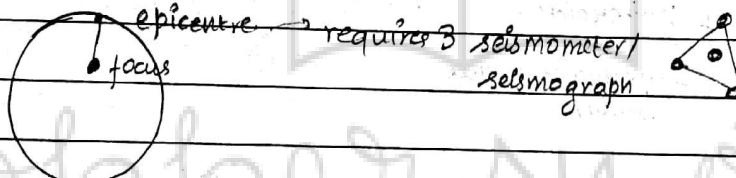
Vibration produced below earth surface because of displacement of rocks.

Fault

↓  
sharp break in  
crustal rocks.  
Force shock, main shock, after shock

The pt. of origin of an earthquake is known as focus or hypocentre.

Closest pt. from hypocentre on surface is called epicentre,  
which is vertically above the focus.



On the basis of density :-

Shallow foci < 60km

Intermediate foci 60 - 300 kms

Deep foci > 300kms

Deepest - 720 kms (Chile)  
deep

Size of earthquake is measured by 2 terms

- Magnitude
- Intensity

Amt. of energy released during earthquake is called magnitude.

Severity of ground motion produced is called intensity

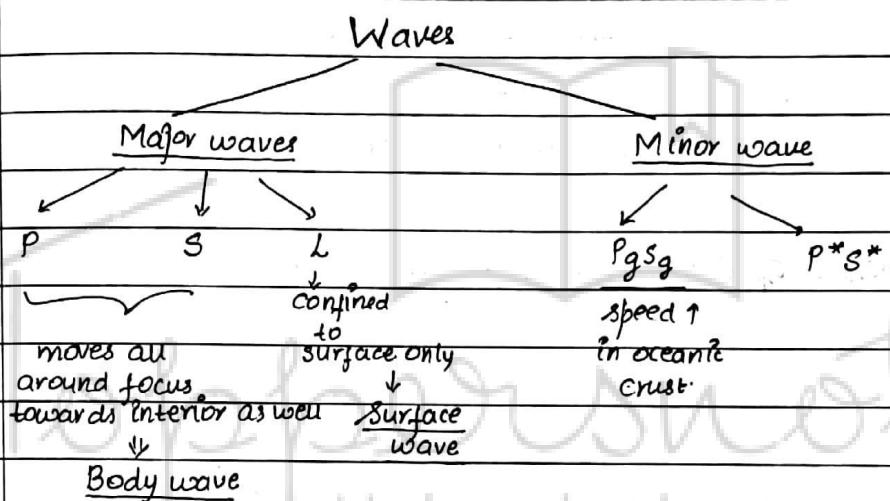
Magnitude is measured by - Richter scale

Intensity - Modified mercalli scale

Magnitude - power   Intensity - Effect / output  
 (Nature of foci, dist., location - factors)

If 2 diff. earthquake have same magnitude and same intensity, then they may have diff. foci.

Destruction - depends on popn  
 (anthropology)



Prob. of waves:

① Speed  $\rightarrow \propto$  Density of the medium.

P  $\rightarrow$  max. / highest speed

(first one to be recorded - Primary wave)

S  $\rightarrow$  Second highest speed

Secondary wave

L  $\rightarrow$  product of P and S

longest wavelength and lowest speed

② Medium  $\therefore$  requirement to move

Must have resistance

Solid, liquid and gases  $\rightarrow$  P can pass through all states but with varying speed.

S  $\rightarrow$  medium - rigidity

can pass only through solid

L - similar to P

③ Particle of motion within wave :-

P  $\Rightarrow$  to and fro / up down

longitudinal wave

Similar to sound wave

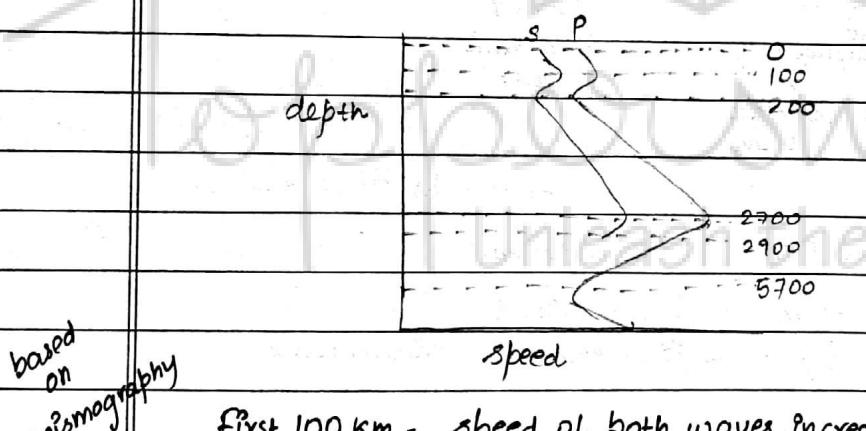
S  $\Rightarrow$  perpendicular to direction of propagation of wave  
transverse wave

Similar to light wave

L  $\Rightarrow$  combination of both

most destructive of all

The response of earth interior to the waves :-



based  
on  
seismography

First 100 km - speed of both waves increases  $\Rightarrow$  Lithosphere

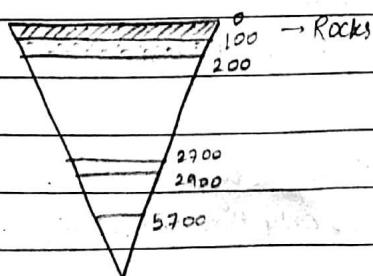
100 - 200 km - speed of both waves decreases  $\Rightarrow$  Asthenosphere

200 - 2700 km - speed continuously increases  $\Rightarrow$  Mesosphere

2700 - 2900 - decreases

at 2900 kms - S stops, does not go deeper }  $\Rightarrow$  Barrysphere

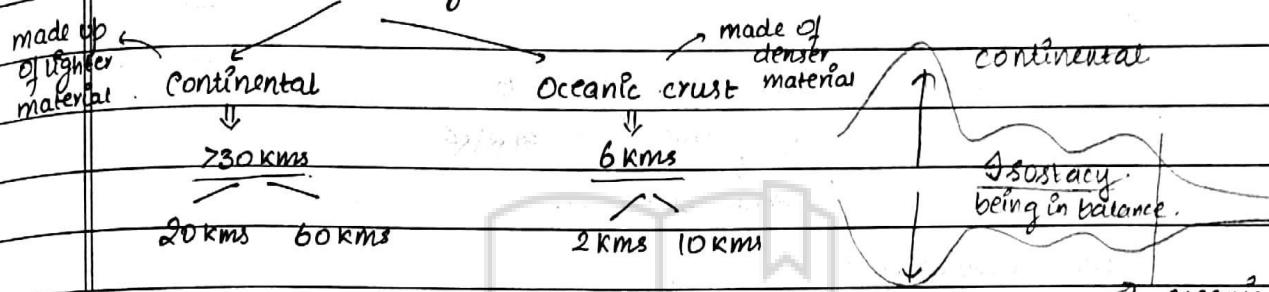
at 5700 kms - speed of P again increases



Lithosphere - Sphere which is made up of hard brittle rocks. The (0-100km) density here increases with increasing depth, because of increasing pressure.

It is this part which was having the older classification of crust.

Crust - Avg. thickness = 20kms



Moho discontinuity :- transition b/w crust and mantle.  
(old classification)

Asthenosphere : weak zone

(100-200kms) (here velo. decreases because of it being in semi-liquid, semi-plastic state)

because of the presence of molten rock material

→ low velocity zone (because of radiogenic heat)

Q 1: Which of the following statement indicates the state of the matter?

2: Which of following statement proves that it is in liquid state?

✓ (a) Speed of P waves decreases.

(b) S wave does not pass through it.

✓ (c) S waves passes through it but with reduced speed.

Mesosphere : speed increasing → density is increasing

middle.

2700 - 2900 km - transition zone - mantle-core boundary

↓ speed decreases

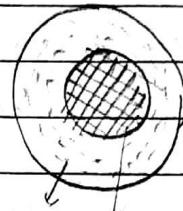
Gutenberg discontinuity

2900 - 5700 km - Outer core of earth

↓  
Liquid state  
(S does not pass through)

Made up of liquid Ni and Fe

↓  
associated with high temp.



Inner core - speed increases again - p

Solid state → Ni and Fe  
↓  
because of pressure

Outer core Inner core.  
(Liquid Fe & Ni)  
(Solid Fe & Ni?)

Old classification :

based  
on  
study  
of  
rocks  
volcanoes

Crust : Thin top layer - 20 km

Mantle : 20 km - 2900 km

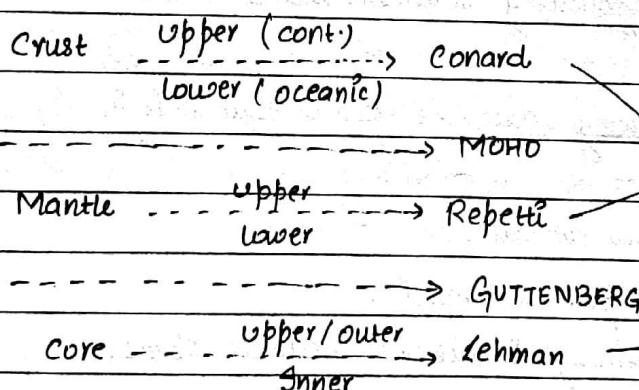
Core : 2900 - 6400 km

↓  
Barrysphere

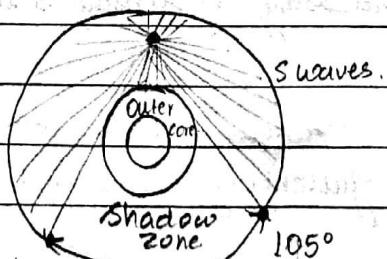
Crust = top 20 km

Mantle = lower lithosphere + asthenosphere + mesosphere

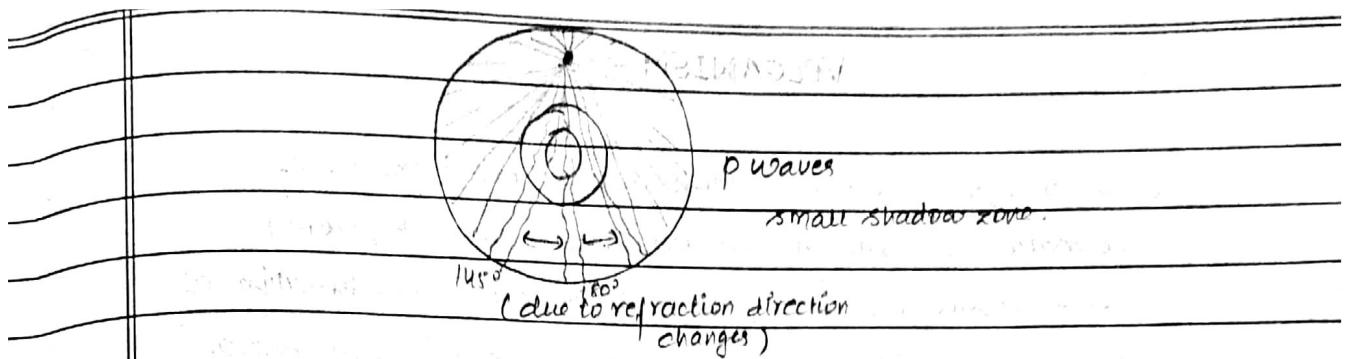
core = Barrysphere.



Shadow Zone :



No S wave experienced here.



Shadow zone is produced because of absence of waves in certain areas opposite to the focus of earthquake.

For S wave, area is much larger as it does not pass through the liquid outer core. Consequently, larger shadow zone is formed.

In case of P waves, it is refracted from outer and inner core because of the change in density of medium.

This refraction creates 2 shadow zones, which together are smaller than shadow of S waves.

Shadow zone is also called Oldham zone, after the name of its discoverer.