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MADE EASY
RPSC AE
HANDWRITTEN NOTES
Social Aspects of Engineering

- Theory
- Explanation
- Derivation
- Example
- Shortcuts
- Previous Years Question With Solution

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ENVIRONMENT

① Global warming & climate change

② pollution

③ Energy

✱ SOLAR SYSTEM →

1. Solar cycle / sun spot cycle →

- It is 22 year cyclic process (11 yrs Maxima + 11 yrs Minima)
- During 11 yrs maxima cycle Magnetic flux increases in some of the regions at solar surface, which generates strong Magnetic field
- Due to this high magnetic field, Solar Flares generation and Corona mass ejection takes place, which causes Solar stroms.
- After this activity, in some of the regions temp^{r}. becomes relatively lower than Sourrounding regions and under visible light this low temp^{r} region appears darker and is known as Sun spot.
- Sun spots cause changes in solar radaition and furthur it affects our climate also.

2. Solar insolation →

- It is the amount of solar radaition that reaches upto earth surface. and it is measured in per square cm. per minute.

- Higher the Solar insolation, More will be the heating

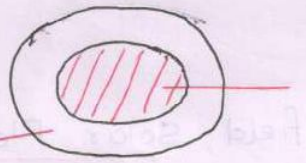
★ ALBEDO →

- It measures the reflectivity of any surface.
- It is unitless quantity. measured on a scale from 0-1.

  0 → Ideal black body.

  1 → perfect white surface

- Albedo measures how much of the Solar energy reflected back into space.



{More dark}
umbra [inner part of sunspot]

{relatively Bright}
penumbra
[outer part of sun spot]

Sun spot (bi-circular ring)

Charged particles + O_2 → Green lights / Northan lights / Aurora borealis.

{Comes with radiation of solar during Solar storms Activity}

{ON Northan poles (Feenland & Norway)}

→ High Temp^r of Sun is maintained due to Nuclear Fusion Reaction. —

$$_{1}^{1}H + _{1}^{2}H \longrightarrow _{2}^{3}He + \text{energy}$$

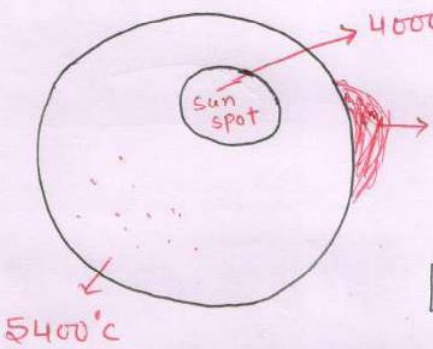
Ex - Sun's Reaction

Hydrogen Bomb

Nuclear Fission → (Breakdown)

Controlled chain Reaction
Ex - • Nuclear Reactor
• Nuclear Bomb
↓
Uncontrolled chain Reaction

$$^{235}U + {}^{1}_{0}n \longrightarrow Ba + Kr + 3\,{}^{1}_{0}n$$



Solar Flares
+
Corona Mass Ejection
[Atomsphere Near the Surface of Sun]

Why use ^{235}U → • Highly fissionable material
• Less stable

NOTE - • Fusion process release more energy but difficult to Control.
• In 2008 ITER project launched in France to develop Fusion based Reactor
• ITER - International Thermo-Nuclear Experiment Reactor.
• India is also Member.

Moderator → used to slow down speed of Neutrons

Ex - Graphite, D_2O [Heavy water], Beryllium oxide

PHWR - pressurised Heavy Water Reactor

	I	II	III
Fuel →	U-235	PU-239	U-233
	PHWR + U-238	Fast Breeder Th-232	Under Construction

(U-235)

PU-239 produce by PHWR + U-238 → PU-239
(Fuel of Fast Breeder)

- Ist Fast breeder Reactor in india → Kallpakam, Tamilnadu

✱ Nuclear Reactor in India –

① Tarapur → Maharastra – USA

② Rawatbhatta → Rajasthan – CANADA

③ Kudankulam → T.N. – Russia

④ Kaiga → Karnataka

⑤ Kakrapar → Gujrat

⑥ Narora → U.P.

Under Construction →

⑦ Jaitapur → Maharastra – France

⑧ Kovvada → An. pr. (Srikakulam)

→ APSARA → BARC Reactor → {Again Commisioned}

→ 2.1% from Nuclear energy in our total energy.

→ Total Nuclear Power generation in world → USA

→ In % Nuclear generation in world → France

✱ World Ist Floating type Nuclear power plant → Academic Lomonosov (Russia)

✱ Uranium Reserve in India →

- Jadugoda → Jharkhand
- Rohil, (Sikar) → Raj.
- Jhunjhunu → Raj.
- Tumalapalle → An. pr.

- World Uranium production -

① Kazakhistan

② Canada

③ Australia {Max^m Reserve}

- Pitchblende (Uranium ore)
- Monazite sand (Thorium ore) → Huge deposits in Malabar Coast (Kerala)

✱ Advantages of Nuclear Energy →

- Clean energy
- Less Fuel quantity required than Thermal
- Waste generated quantity is also less
- High energy Generation.

✱ Disadvantages →

- High installation Cost
- Nuclear Radiation leakage problem
- Nuclear Waste disposal problem
- Operation and Maintainance Cost.
- Limited Nuclear material availability and difficulty in supply.
- Skilled Labour

27/03/19

✱ Atomspheric Composition →

Gravity is the binding force due to which atomsphere exist.

78% - N_2

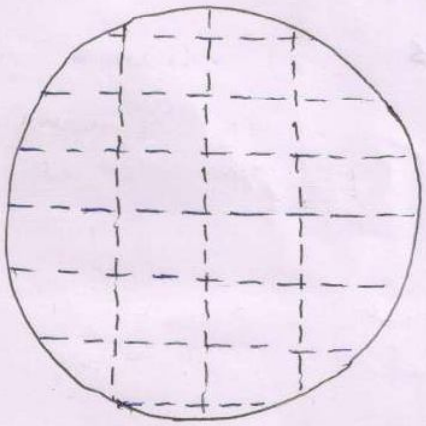
21% - O_2

0.9% - Argon

0.03% - CO_2

0.0018% - Neon

0.000524% - He

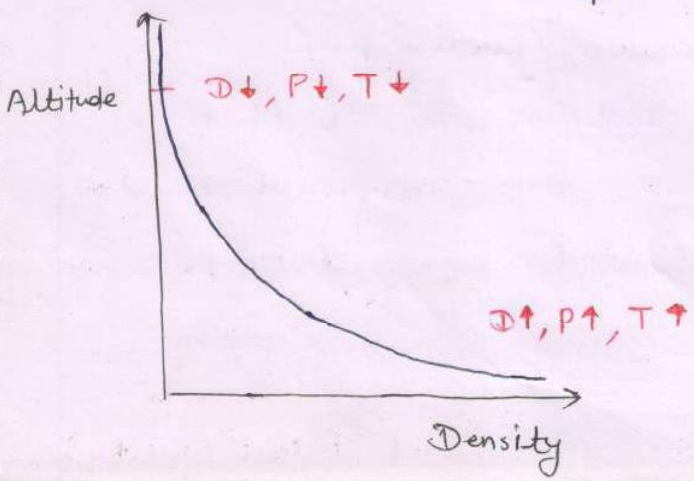


Latitude → Temp^r Coordinates

Longitude → Time Coordinates

- Gravity and Radius of earth are inversely proposonal.
- Gravity is Max^m at poles and Min^m at equaetor

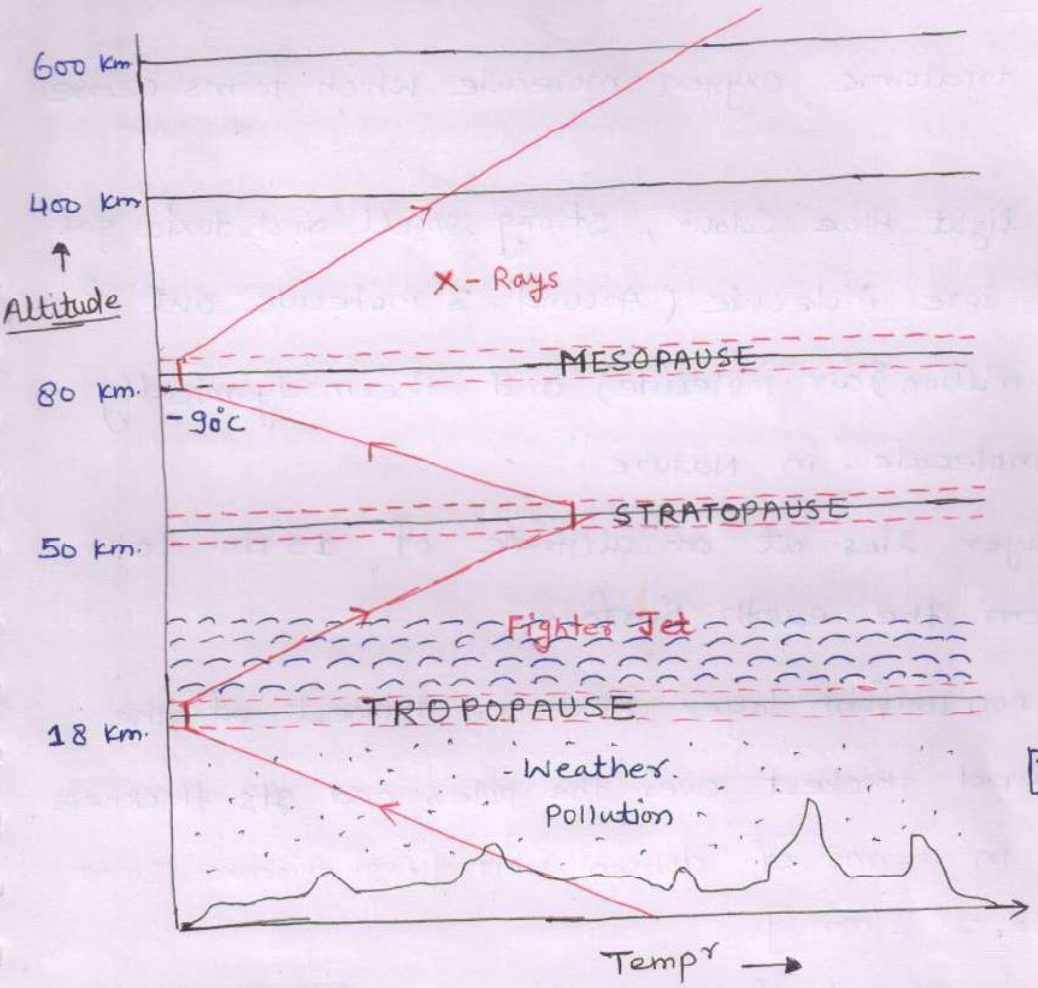
$$G = \frac{m_1 m_2}{r^2}$$



Graph -

→ Density V/s Altitude

Graph - Temp^r V/s Altitude →



EXOSPHERE
600 km

THERMOSPHERE
upto 400 km.

MESOSPHERE
EQ - upto 80 km.
Pole - 40 km.

STRATOSPHERE
EQ - upto 50 km.
Pole → upto 25 km.

Troposphere
Equator → upto 18 km
Poles → upto 9 km

Question - Why atomsphere is more thicker over the equator than poles ?

Ans

- At equator, Solar insolation is high due to this near the surface air warming occour and hot air rises up due to less density and high Centrifugal force at equator move these gases furthur upward.
- In this Consept, where Considering Atomspheric pressure Near the Surface Constant and at Constant pressure density temp^r both are inversely proposnal and that is charles law.

Que About ozone →

- O_3 is an triatomic oxygen molecule which forms ozone layer.
- Ozone is light blue colour, strong smell and toxic gas
- It is very rare molecule (Around 3 molecule out of every 10 million air molecule) and thermodyamically unstable molecule in Nature.
- Ozone layer lies at an altitude of 15 km. to 30 km. from the earth surface.
- Ozone is non uniform layer which is thinest at the equator and thickest over the poles and its thickness measured in terms of dobson unit. [Avg. thickness 3000 dobson unit = 3 mm]
- Around 90% of part of ozone lies in startosphere in the form of layer and it is called as good ozone because it contributes in our protection against harmful ultravoilet radiation.
- Around 10% Molecule lies in troposphere and it is harmful. It is A.K.A. trophospheric or Negetive or Bad ozone or ground level or smogy ozone or secondary ozone.
- It is an air pollutant and it also contributes in photochemical smog.
- Negetive ozone produces due to chemical reaction involving → $NO_x + \underset{\text{Volatile organic C...}}{VOC} \xrightarrow{\text{Sunlight}}$ Negetive O_3 { Source - Automobile &

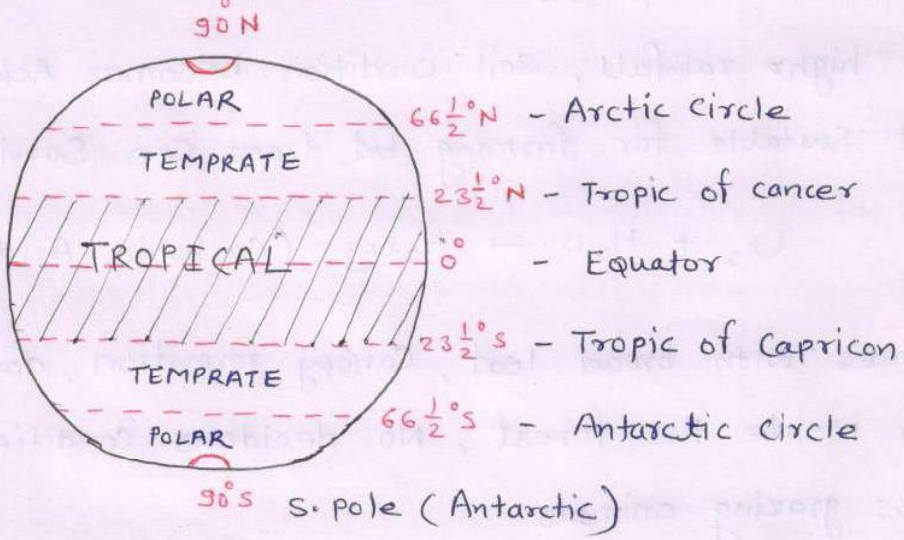
- Ozone is one of the green house gase and it Contributes in heat trapping and it keeps stratosphere warm. and ~~ozon~~ due ozone depletion minor cooling effect occour in the stratosphere, which cause furthur more cooling and more depletion.
- Ozone is being continously produce and destoryed and distruction is due to both Natural and man made activities.
- In 2016, partial recovery in ozone layer observed.
- Ozone depletion doesn't cause Global warming. but Global warming may indirectely cause ozone depletion.
- Frist ozone hole detected over Antarctica in 1985

  second → Antarctica - 1990

  third → Arcatic

Question → why more ozone depletion occaur over Antarctica than Arcatic ?

27/3/19



SHAPE OF EARTH - OBLATE SPHEROID

About Equator →

- It is greatest possible circle.
- Africa is the only continent through which tropic of Cancer, equator and torpic of Capricon passes.
- Day and Night formation depends on Rotation of earth and at equator day and night is almost equal around 12 hrs. But when we move away from equator towards the pole day and night length gap increases.
- Season formation depends on ~~xenta~~ elliptic orbit revolution and tilt of earth.
- At the equator Area No season formation occour and Condition remains same throughout the year.
- Equatorial region receives maximum Sun light in a year So almost daily rainfall Condition occour and as a result World largest river Volume-vise Amazon & Congo lies at equator.
- Due to high rainfall, Soil condition becomes Acidic and Not Suitable for farming. but trees can Survive.

$$CO_2 + H_2O \rightarrow H_2CO_3 \text{ (Carbonic Acid)}$$

Features

- Tall trees with broad leaf, Canopy formation, dark Condition inside the forest, No decidous condition, No gross grazing animals
- That's why equatiorial forest A·K·A· Evergreen forest or shadow forest.