

SPACE FOR ROUGH WORK

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Paper-III, part-A

There are 15 sub-question In this question, each has to be answered In maximum 30 words. All questions are mandatory. Each question carries 3 (three) marks.

3x15=45

Paper - III , Part - A

(A) Q1. Influenza - Viral caused flu  
Ans: - Contagious through water-droplets  
- Has variants Bird flu, Swine flu etc

Marks = 03

Marks Obtained

(B) Q2. Double Salt -  
Ans:

Marks = 03

Marks Obtained

(C) Q3. Angiography - To tackle Blockage issues in heart  
Ans: - Stents (a medical device) is used to unblock cholesterol.

Marks = 03

Marks Obtained

(D) Q4. Copyright - Rights given to creator of content (eg. Music, Video, Paintings, photos etc), to prevent its replication or missuse.

Marks = 03

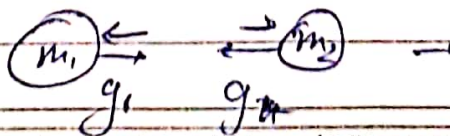
Marks Obtained

(E) Q5. Gravity - Universal force through which every Body with mass attract each other.

Marks = 03

Marks Obtained

$$g = \frac{G m_1 m_2}{R^2}$$

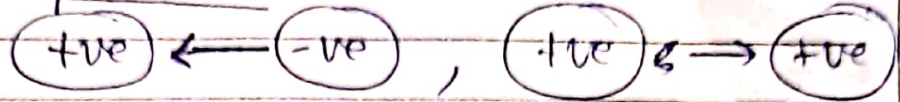


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3x15=45

(F) Q6. Electric Field - Force of attraction or repulsion created around charged particles

Ans:



Marks = 03

Marks Obtained

(G) Q7. Probability - Chances or propensity calculation for a particular event to occur.

Ans:

Marks = 03

Marks Obtained

(H) Q8. Insat 3dR - is Geosynchronous satellite for communication purposes

Ans:

Marks = 03

Marks Obtained

(I) Q9. Gene Mapping - Is international effort to collect data about human genome. As per research around 2 Billion genes are present in one genetic transfer

Ans:

Marks = 03

Marks Obtained

Q10. Protein Synthesis - Is done by cell organelles to keep the life form going.

Ans:

Marks = 03

Marks Obtained

There are 15 sub-question in this question, each has to be answered in maximum 30 words. All questions are mandatory. Each question carries 3 (three) marks.

3x15=45

(K) Q 11. Bandwidth - Is frequency range in which particular operation takes place

Marks = 03

Marks Obtained

(L) Q 12. Magnetic Flux - Is force of attraction surrounding a Magnet or moving charges.

Marks = 03

Marks Obtained

(M) Q 13. Cartosat - Is Mapping satellite launched by India  
- PSLV orbit  
- High resolution carto-graphy

Marks = 03

Marks Obtained

(N) Q 14. Radio Active isotopes - Uranium with differing mass no. which show instability and radio-activity

Marks = 03

Marks Obtained

(O) Q 15. GM crop - Genetical Modified Crop where gene editing was done to recess or enhance particular trait in crop.

Marks = 03

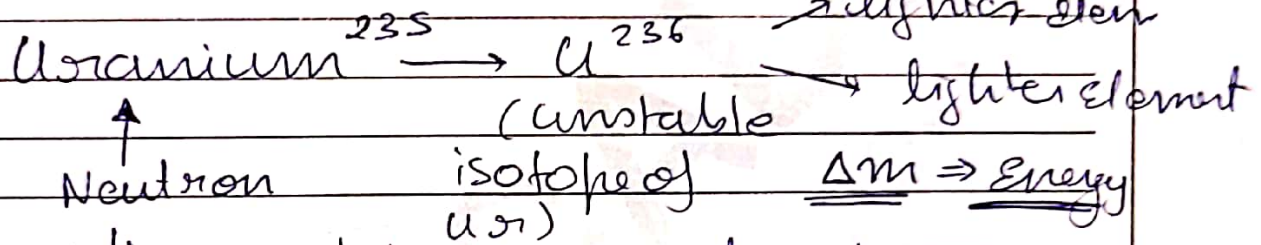
Marks Obtained

India - Bt Cotton in use  
Bt Brinjal under trial

Write the answers of any 10 of the following questions in maximum 80 words. Each question carries 6 (six) marks. 10 x 6 = 60

(A) Q1. ~~Nuclear Fission is when two lighter particles combine to form heavy material~~  
Ans:

When a heavy unstable element breaks into two lighter ones, and ~~a release in differential energy mass~~ leads to release in energy



One of the most used form of nuclear Energy

Q2. (B)

Ans:

Write the answers of any 10 of the following questions in maximum 80 words. Each question carries 6 (six) marks.

10 x 6 = 60

- (C) Q3. Housing is one of the amongst essentials to human development, SDG-11 focuses on its importance. A few new innovations are -
- Ans:
- Fly Ash Bricks - light weight, fire resistant, cheaper, contains atmospheric pollution.
- Made up of Ash and PM from thermal power plants
- Roof top solar power - in form of water heaters and generators, decrease energy load, increase sustainability affordable in long term.

Marks = 06

Marks Obtained

- (D) Q4. Endocrine Gland is master gland of all as it controls secretion from other glands.
- Ans:

Marks = 03

Marks Obtained

Releases hormones like Adrenaline in case of emergency and Rush.

Situated in hind side of Brain.

Is essential for proper functioning of body.

Write the answers of any 10 of the following questions in maximum 80 words. Each question carries 6 (six) marks.

10 x 6 = 60

(A) Q5.

Ans:

Marks = 06

Marks Obtained

(A) Q6.

Ans:

Marks = 06

Marks Obtained

Cloning is creating an exact genetic replica of a living being. First ever clone was that of a sheep named 'Dolly'.

It is done through extracting somatic cells from one being and cultivating them to grow into another individual.

Write the answers of any 10 of the following questions in maximum 80 words. Each question carries 6 (six) marks.

10 x 6 = 60

(6) Q7. Nanotechnology is manipulation of material to dimensions in  $10^{-9}$  m in which material undergoes physiochemical change. It helps in disease diagnosis.

Marks = 06

Marks Obtained

- Precision diagnosis in localised area
- Cellular level diagnosis using nano robots
- Endoscopy using ~~Nano~~ Nanoparticles and ~~Nano~~ Cameras
- Easy and targeted penetration inside human body.

Q8. But there accumulation in human body should also be taken care of.

(14) Ans: Petroleum is remains of living organisms plants and animals, sedimented and accumulated over millions of years.

Marks = 06

Marks Obtained

It has various components which include -

- Oil - which is used as a source of energy and has high calorific value.
- Gas - Also used as energy source, Primarily for cooking in India (LPG)
- Plastics originating from waste material of petroleum
- Oil is further divided into petrol and diesel



Write the answers of any 10 of the following questions in maximum 80 words. Each question carries 6 (six) marks. 10 x 6 = 60

(I) Q9. GSLV mk-3 is heaviest and fastest satellite launch vehicle in India.

Ans:

It can be a gamechanger as it uses Cryogenic engine i.e. indigenously developed. It implies it uses solid form of gas at ultralow temperatures for fuel combustion, and decreases overall fuel load.

It will help India master GSLV technique, will aid Interplanetary mission, Geosynchronous satellite etc.

Marks = 06



Marks Obtained

(J) Q10. Biopesticides are derived from organic material, with low or no chemical percentage.

Ans:

- Example - Neem oil
- Unlike chemical pesticide they are least harmful to human health
- Instead of completely wiping off all pest, they are selective towards various useful pest insects.
- Help conserve Biotechnology Biodiversity
- May be easily synthesised.

There use in Organic farming has shown immense result.

Marks = 06



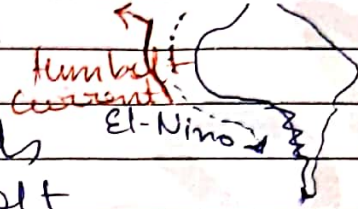
Marks Obtained

Write the answers of any 10 of the following questions in maximum 80 words. Each question carries 6 (six) marks.

10 x 6 = 60

(K) Q 11. El-Nino is warm current flowing in East Pacific ocean near the coast of Peru.

It is caused when oceans are not adequately heated up, which leads to reversal of Humbolt current (cold).



It changes the ~~weather~~ weather of Peru by creating low pressure, and causes rain, similarly is reason for Drought conditions in Indonesiana and India.

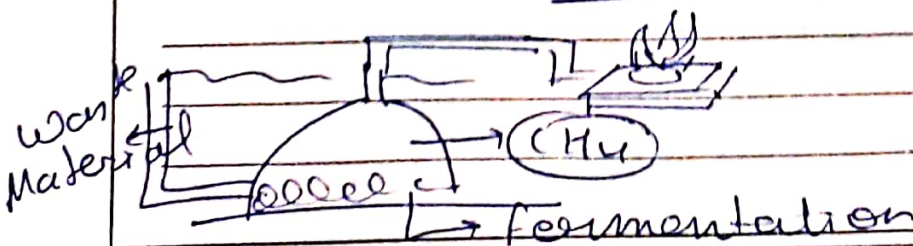
Marks = 06



Marks Obtained

(A) Q 12. Biomass energy is extracted from waste material from animals, humans and garbage.

The Biomass is kept in fermentation tank where anaerobic breakage of Biomass leads to release of Methane gas. This gas can be directly supplied to household for as clean cooking fuel option.



Marks = 06



Marks Obtained

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(A)

Q 3.1

With population graph reaching 8 Billion, and increase in energy intensive lifestyle. Availability of energy resource is a major concern among countries. Specially in Developing nations like India.

Various sources of energy available are

Marks = 15

Marks Obtained

Renewable	Non Renewable
<ul style="list-style-type: none"> <li>• May be renewed over the years or are inexhaustible</li> </ul>	<ul style="list-style-type: none"> <li>• Exhaustible and is irreplaceable sources of energy</li> </ul>
<ul style="list-style-type: none"> <li>• Less conventionally used</li> </ul>	<ul style="list-style-type: none"> <li>• More conventionally used</li> </ul>
<ul style="list-style-type: none"> <li>• Example - Solar Energy, Wind Energy, Geo-thermal, Tidal Energy etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Example - Coal, petroleum and other fossil fuel generated energy.</li> </ul>
<ul style="list-style-type: none"> <li>• Mostly cleaner source of energy with lower environmental impact</li> </ul>	<ul style="list-style-type: none"> <li>• Unclean source of energy with high Carbon emission.</li> </ul>

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3 x 15 = 45

Q 3.1 Continued ..

In India more than 70% of energy is sourced from non-renewable source of which coal generated thermal power has over 50% of share. Hence a shift towards solar energy is essential as

- India is tropical country with most regions receiving over 200 days of high intensity sunlight, which can be used efficiently.
- It will particularly aid remote areas where other sources of power generation are not available like Desert areas of Rajasthan and Gujarat, Leh, Ladakh, Island regions etc.
- Research has shown that over the years solar energy is more affordable and cheaper source of energy.

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Q 3.1 Continued ..

- It will lead to a cleaner cleaner and more sustainable development
- Will help India meet its INDCs in Paris Summit.

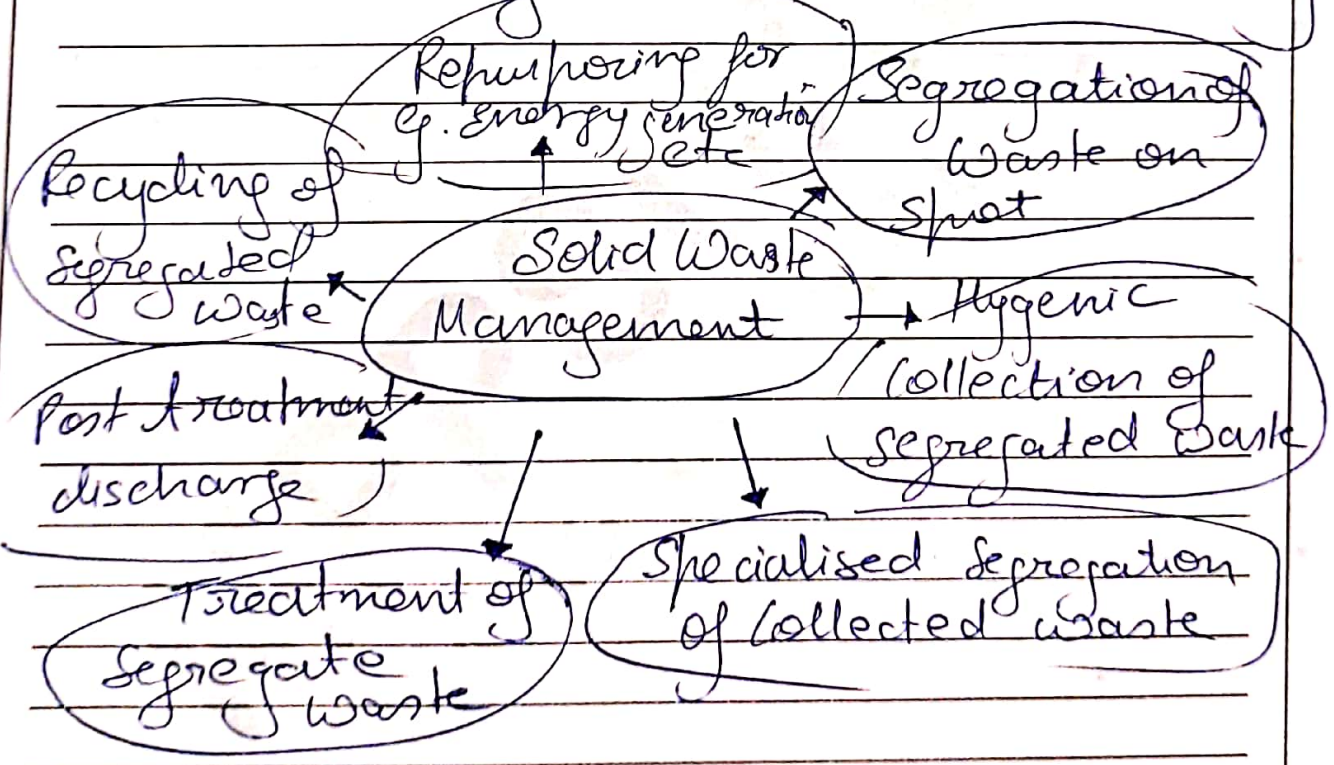
Some efforts taken are

- Asia's largest solar project established in Rewari District M.P.
- International Solar Alliance with France.
- National Solar Energy development Programme etc.
- SDG - 7

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(B) Q3.2. Growing urbanisation, increase in consumerism, and overpopulated areas have led to a new menace of waste accumulation and hazards caused thereby.

Hence the need of solid waste management is ever increasing



Marks = 15  
  
 Marks Obtained

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Q 3.2 Continued ..

Some of the technologies used for solid waste management are -

- Mechanical sedimentation and separation of solid waste specially in case of sewage.

As done in sewage treatment plants

- Incineration - That is burning of solid waste in high heat and less release of harmful gases.

- Recycling techniques include

↳ Magnetic segregation of waste material to separate metallic waste.

- Use of electrostatic scrubbers to prevent release of particulate matter etc.

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Q 3.2 Continued ..

Some efforts taken by govt  
are

- Swachh Bharat Abhiyan

- Regulation of land fills

- E-waste management guidelines  
by govt.

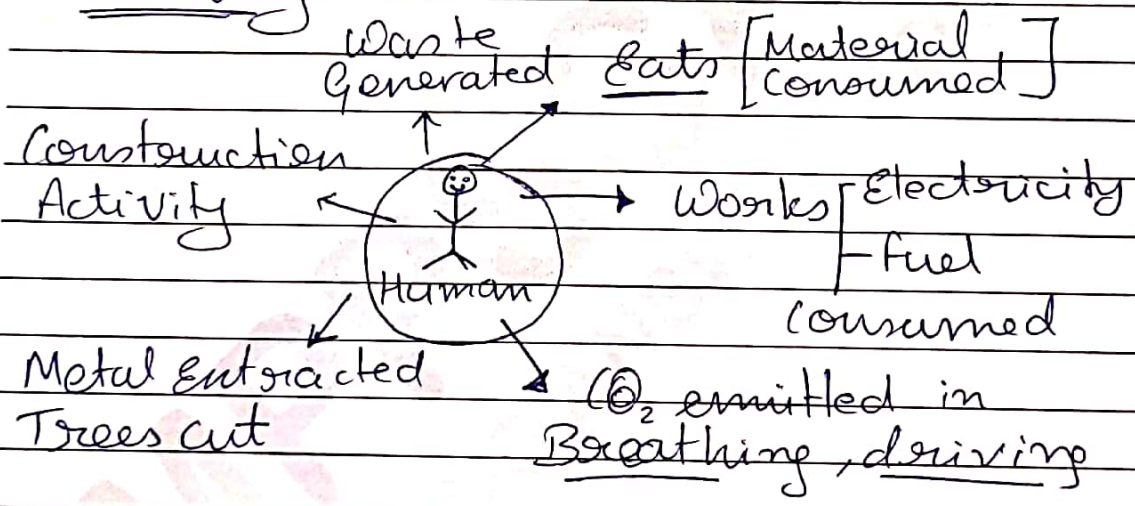
- Environment protection act etc.



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Q 3.3.

Ans: Ecological footprint is the impact caused on Environment and surroundings in terms of carbon emission, waste emission, energy consumed, Destruction caused and resources used like food, plants, animals etc, By an Organism, human being, civilisation or activity



Ecological Footprint has various means of calculation as it is widely defined some of the measures are

- Carbon emitted
- Energy consumed etc.

Marks = 15



Marks Obtained

Q 3.3 Continued ..

The recent HDI reported with Planetary Pressure adjusted HDI is or PHDI is another means of calculating ecological footprint.

Importance of Ecological Footprint -

- Essential for Sustainable development.
- To check inter-regional and inter-generational disparity. For eg. Ecological footprint of developed nations is often higher than developing.
- For environmental conservation
  - Biodiversity preservation
  - Pollution control
  - check emission etc.
- Mitigation measure for climate change etc.

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Q1.

(A) Ans: Modem - Used to translate signals from dit digital to analog and Vice-versa - Important Component of IT which integrates Telecom network to computers

Marks = 03

Marks Obtained

Q2.

(B) Ans: Lithium is ~~not~~ a metal with atomic no. 3. Used in Electronics, Batteries, Solar power generation etc

Marks = 03

Marks Obtained

Q3.

(C) Ans: Pituitary Gland - Is master gland of all and controls entire Endocrine system.  
Regulates Hormonal Secretion.

Marks = 03

Marks Obtained

Q4.

(D) Ans: Mitochondria - known as Power house of cell. Generates ATP which is energy currency of living beings.  
- Has DNA of its own.

Marks = 03

Marks Obtained

Q5.

(E) Ans: Alfa Diversity - Is diversity between different species within a Biome.  
Eg: One Ecosystem having a Forest having variety of trees and animals.

Marks = 03

Marks Obtained

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(F) Q6. Carbon foot print - Is sum total of carbon released and consumed by living beings on society.  
Ans: Total Includes direct and indirect emissions.

Marks = 03

Marks Obtained

(G) Q7. Biometric Information - Is unique identifications of human being including Iris scan, Finger Prints, Voice etc

Marks = 03

Marks Obtained

(H) Q8. PSLV XL → is polar satellite launch vehicle which puts satellite in polar orbit.

Marks = 03

Marks Obtained

(I) Q9. Nano Particle - Particle in Nano Scale i.e  $10^{-9}$  m are categorised.  
Ans: 10<sup>-9</sup> m - Varied application like space, Defence, Medicine etc

Marks = 03

Marks Obtained

(J) Q10. Mensuration - Is ~~science~~ <sup>study</sup> of measuring things and objects, time, speed etc.

Marks = 03

Marks Obtained

It is based on standardised scale and weight management system.

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(K) Q 11. Active Remote Sensing - ~~It~~ ~~Implies~~ ~~on~~  
Ans: Real time tracking of geographical information, location and relative position of an object with respect to time

Marks = 03

Marks Obtained

(L) Q 12. Positive Work - Is work done in direction of force

Marks = 03

Marks Obtained

(M) Q 13. QR Code - is Matrix of Information  
Ans: embedded in graphical form.

Marks = 03

Marks Obtained

(N) Q 14. SWAN  
Ans:

Marks = 03

Marks Obtained

(O) Q 15. Strong acid - With pH value ranging from 3 to 1, concentrated  $\text{HCl}$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{HNO}_3$  are some of the strong acids.

Marks = 03

Marks Obtained

Release more  $(\text{H}^+)$  ion when dissolved in water.

Write the answers of any 10 of the following questions in maximum 80 words. Each question carries 6 (six) marks.

10 x 6 = 60

(A) Q1. Li-Fi - Data is transferred to waves in visible light structure. It is considered to be faster than Wifi.  
Relatively New Innovation.  
Hindrance in opaque medium.

Wifi - Data is transferred over Radio Waves spectrum, No light necessary, Obstructed through solid medium (walls etc)  
Relatively slower.

Marks = 06

Marks Obtained

(B) Q2. Energy Management is availability, affordability of energy along with its sustainable usage, maintaining of demand supply gap and transmission.  
Issues related -

Marks = 06

Marks Obtained

- 40% of energy is lost during transmission
- More than 70% of energy is sourced from non renewable sources of energy
- Nearly 70% energy is coal and fossil fuel based which is major pollutant.
- Urban Biased in energy availability,
- Regional Bias in energy.
- Affordability issues for farmers and MSME and other sectors.

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Write the answers of any 10 of the following questions in maximum 80 words. Each question carries 6 (six) marks. 10 x 6 = 60

(D) Q3.

Ans:

Quantum Computers are based on spin of protons rather than Binary system. Its Applications are -

- Faster and stores more information hence can be used for big data, whether sciences etc.
- IOT and other related application for integration of computer in daily life
- Space technology and light portable computing.

China is ~~at~~ leading the Quantum Computing.

Q4.

Ans:

Bioremediation is use of Biotechnology and Bio-organisms to clean up environment, waste management, curtail pollution etc. For example.

- Clearing Oil Spills using ~~oil~~ oil consuming Bacteria.
- Faster degradation of Waste material using degrading agents.
- Carbon sequester sequestration using Algae. etc.

Marks = 06

Marks Obtained

Marks = 03

Marks Obtained

Write the answers of any 10 of the following questions in maximum 80 words. Each question carries 6 (six) marks.

10 x 6 = 60

Q 5.

Ans:

Marks = 06

Marks Obtained

(F) Q 6.

Ans:

Marks = 06

Marks Obtained

Internet is a network of various systems (computers, phones) around the world. Applications -

- Service delivery through electronic media of Jan Dhan Portal, Village Resource Centre etc.
  - E-governance - reduce corruption increase accountability.
  - E-Education decrease inter-regional and disparity provides for affordable education to all.
  - Leads to a more interconnected world.
  - Educates on social and political rights
- Though many advantages cyber bullying, trolling & frauds are some menace associated.



Write the answers of any 10 of the following questions in maximum 80 words. Each question carries 6 (six) marks. 10 x 6 = 60

(G) Q7. Net Metering -

Ans:

Marks = 06

Marks Obtained

(H) Q8 C-DAC - Centre for Development of Advanced Computing is top most Research and Development organisation on Computing in India.

Marks = 06

Marks Obtained

- It has developed the first Super Computer Param 800 of India
- Mihis which is fastest super computer is developed by C-DAC.
- Researches on Easy, Cheap and accessible ICT technology for all.
- Has lead India in world's race of Advanced Computing.

Write the answers of any 10 of the following questions in maximum 80 words. Each question carries 6 (six) marks.

10 x 6 = 60

(5) Q9. RNA - Ribony Nuclear acid is  
Ans: Genetic storing material along  
with DNA.

Marks = 06

Marks Obtained

- It is made up of Proteins
- It carries Information in the form of genes
- It is present in Nucleus and Mitochondria.

(5) Q10. TRIPS - Trade Related Intellectual  
Ans: Properties.

Marks = 06

Marks Obtained

- The treaty comes under World Trade Organisation
- It aims at providing protection to creator of patent from misuse.

• But Balances it with overall public interest and development

- It has clauses like for manufacture of generic products (eg Medicine) for developing Nations (counteracting measures)

But some issues like evergreening still prevail

Write the answers of any 10 of the following questions in maximum 80 words. Each question carries 6 (six) marks.

10 x 6 = 60

(K)

Q 11.

Ans:

WIPO - World Intellectual Property Organisation. It is a specialised agency of United Nations. It caters to International Patent, Copyright, Trademark and other Intellectual Property issues. It issues Geographical Indicators tags internationally. It publishes Global Innovation Index and Report. It aims to develop IP environment in the world.

Q 12.

Ans:

DRS technology is dispute resolution system in case of ambiguity and imperceptible details.

For eg - If edge of Bat has touched the Ball or not.

- It uses Infrared and sound frequency system which shows area of impact.

Marks = 06

Marks Obtained

Marks = 06

Marks Obtained

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(A) Q 3.1

Ans:

Stem Cells are or Somatic Cells are initial or reproductive cells in human body that can take a particular shape in future.

They are present in umbilical Chord, Menstrual flow, Bone Marrow etc of a human being.

Its types are

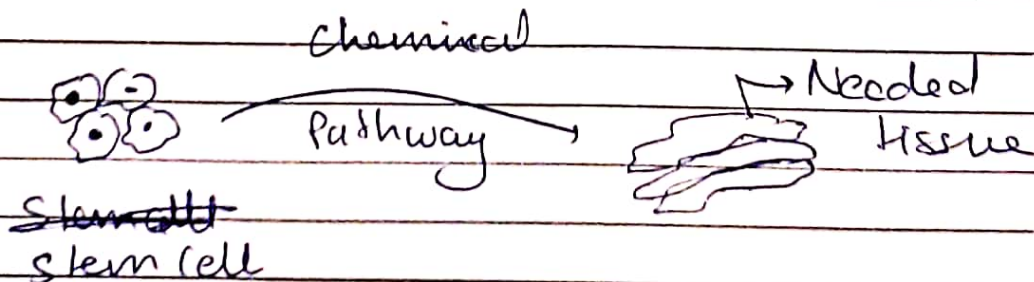
Pluripotent and Totipotent

• Can develop into some particular tissue of or organ

• Eg. Somatic cell in Bone Marrow

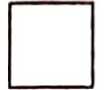
• Can develop into any particular tissue or Organ

• Eg. Somatic cell in Umbilical Chord.



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Marks = 15



Marks Obtained

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Q 3.1 Continued ..

### Application-

- They are used to develop clones
- Artificial tissue and organ culture
- Bone Marrow transplant in Cancer treatment.
- Increase immunity, disease treatment at later stage of life.
- Blood transplant etc.

Stem cell therapy is a blooming branch of Biotechnology, which ~~will~~ needs to be harnessed in ethical and effective manner.

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(B) Q 3.2.

Ans:

Bio-Energy is Energy derived from plants, animals and other and ~~retained~~ Bio Man.

Marks = 15

Marks Obtained

It is also known as Organically derived energy, different from fossil fuel.

It is Renewable Source of Energy

For Example -

- Energy from Bio Man - Anaerobic fermentation of Bio man produces Methane ( $CH_4$ ) used as cooking fuel. Gobar Gas Plant are one example.

- Fuel Wood and timber have been used over the years as Bio Energy.

But with change in technology Bio-Energy has taken a new leap in terms of Bio-fuels.

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Q 3.2 Continued ..

### Bio Fuels -

- 1<sup>st</sup> Generation Biofuel - Also extracted from fibrous plants eg Jatropha and Molasses.
- 2<sup>nd</sup> Generation Biofuel - Also generated from food crop waste material like Rice Husk, Hay, Cane Husk etc.
- 3<sup>rd</sup> Generation Biofuel - Not only fuel is extracted but Carbon is sequestered, hence they are Carbon negative in Nature. Eg - Algae Culture.

Bio fuels are efficient form of clean energy with very low carbon emission.

Govt has also mandated Bio-fuel Blending in petroleum to decrease import Bill and environmental impact.

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Q 3.3.

Ans: With several new nuclear energy projects coming up, India is aiming for near 2% of total energy to be made from Nuclear.

This dream was envisioned way before by Dr. Homi Jahangir Bhabha when he was designing India's three stage Nuclear Programme.

Stage 1 →

- Involves Uranium<sup>238</sup> as raw material when neutron is bombarded it breaks off into lighter material.
- Pressurised Heavy Water Reactor where  $U^{238} \rightarrow$  converted to  $U^{235}$  (fissile) material
- $D_2O$  Deuterium oxide used as Moderator
- Bi-product is Plutonium-239

Marks = 15



Marks Obtained



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Q 3.3 Continued ..

### Stage - II

- Plutonium-239 used as raw material
- Fast Breeder Reactors are used
- No coolant is required
- $U^{238}$  is used to breed more fuel
- $Pu^{239}$  - ~~is~~ undergoes fission reaction

Is under construction at Kalpakkam  
Madras.

### Stage III

- Raw material thorium and uranium
- thorium is bred into  $U-233$  which is fissile and undergoes reaction
- India's natural reserves of thorium being utilized

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Q 3.3 Continued ..

Most of India's Nuclear Reactors are in Stage - I, with Kalpakkam in Stage II.